These indictions agree evidently with those ascribed by Strother to the Mexican drug; although the Dispensatory describes chiefly the East Indian drug.

Wm. Cullen, 1799, enumerates Dragon's Blood (variety not stated) among the astringents; but in view of its insolubility in watery fluids, he considers that it must be inert. He concludes "We are therefore, upon the whole, clear that it should be expunged from our materia medica list."

Coxe in his American Dispensatory (1818) quotes Duncan that neither the Calamus nor the Pterocarpus drugs precipitate gelatin, nor do they color with iron, and for these reasons cannot be astringent. He mentions Proust as the principal advocate of its astringent action; but points out that Proust's drug was water-soluble, and therefore not Dragon's blood at all. It may possibly have been a variety of Kino, which was first brought to the attention of Fothergill as "the finest variety of Dragon's Blood."

Murray, 1821, describes the West Indian (Pterocarpus) drug as entirely discredited.

"Though it has been considered an astringent, it has no such power, nor is it now applied to any medical use."

The drug does not seem to have attained any reputation among the Eclectics; for King and Newton in their Dispensatory of 1852 state of Calamus Draco: "Formerly considered an astringent and used in doses from 10 to 30 grains in passive hemorrhage, diarrhea, etc."

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THE MICROSCOPICAL IDENTIFICATION OF MOWRAH MEAL (BASSIA) IN INSECTICIDES.*

BY GEO. L. KEENAN.

I. INTRODUCTION.

In the course of the microscopical examination of various insecticides for the Insecticide and Fungicide Board it was observed that Mowrah Meal was being employed in products designated as ant and worm eradicators. As this is the first time that this material has been detected in insecticides or substances repre-

* Contribution from Insecticide and Fungicide Board and Bureau of Chemistry, Department of Agriculture, Washington, D. C.

sented to be used as such, it is deemed advisable to describe the histological features of this material as they appear in powdered form.

II. The Uses of Mowrah Meal.

The use of Bassia seeds for the large amount of oil which they contain has been known for some time. The seeds of the various species of Bassia trees, said to be widely distributed[1] in the Northern Provinces of India and especially in Bengal, are all known to be quite rich in oil which is expressed for technical purposes. The kernels of *Bassia latifolia*, for instance, are reported[5] to contain as much as 45.7 percent of oil. Lewkowitsch[5] states that Mowrah Seed oil is obtained from the seeds of *Bassia latifolia* and is an important article of commerce. It has been used in a number of ways, as an illuminating oil, in soap and candle making, as an ointment for the skin and also as an adulterant of ghi. This paper, however, is not so much concerned with the oil obtained from the seeds as with the residue remaining after the expression of the oil. This seed residue is known by various names, among them being Mowrah, Mahwa, Madhuca and Mahua Meal. Kesava-Menon[3] states that the oil cake is used to poison fish and the smoke from burning it is said to kill insects and rats. According to Lewkowitsch[5] Mowrah seed cakes are poisonous and can only be used as manure, although attempts have been made to render them edible.

III. Morphological Description of *Bassia latifolia* Rxb.

Honcamp and his associates[4] describe *Bassia latifolia* Rxb. quite in detail morphologically and the description to follow will consist partially of material drawn from that source. This tree is botanically a member of the Sapotaceae and is widely distributed in India, especially in Bengal, where it is associated with other species of Bassia. The tree possesses leathery leaves and the branches are crowded with flowers. The flowers[2] are said to taste like raisins and are either eaten raw by the natives or cooked with rice. They are also employed in making an intoxicating liquor, the residual liquid from which acts as an emetic. According to Roxburgh,[1] the tree is of average size, the leaves being deciduous during the cold season, and appearing again with the flowers in March and April. The seed ripens in July and August. The trunk is straight but short and covered with smooth, ash-colored bark. The leaves are alternate, petioled, crowded about the extremities of the branches, oblong, rigid, smooth above, somewhat whitish below; they are from four to eight inches long, and from two to four broad. The fruit consists of a berry about the size of a small apple and contains from one to four seeds, very rarely more.

IV. Microscopical Examination of Bassia-Seed Meal.

In the ant and worm eradicator powders in which Bassia-seed meal has been found it has existed in the form of a powder consisting of a mixture of fine as well as coarse material from the cotyledons and also fragments of the yellowish husk from the seed. In other respects, the material microscopically very much resembles cocoa powder, although not so uniformly pulverized. Honcamp[4] has so thoroughly described the histology of the seed of *Bassia latifolia* Rxb. that it hardly seems necessary to repeat in detail this part of the work. However, for a proper interpretation of the elements found in the seed powder, it will be necessary to give at least a brief description of the histology of the seed. For a more detailed

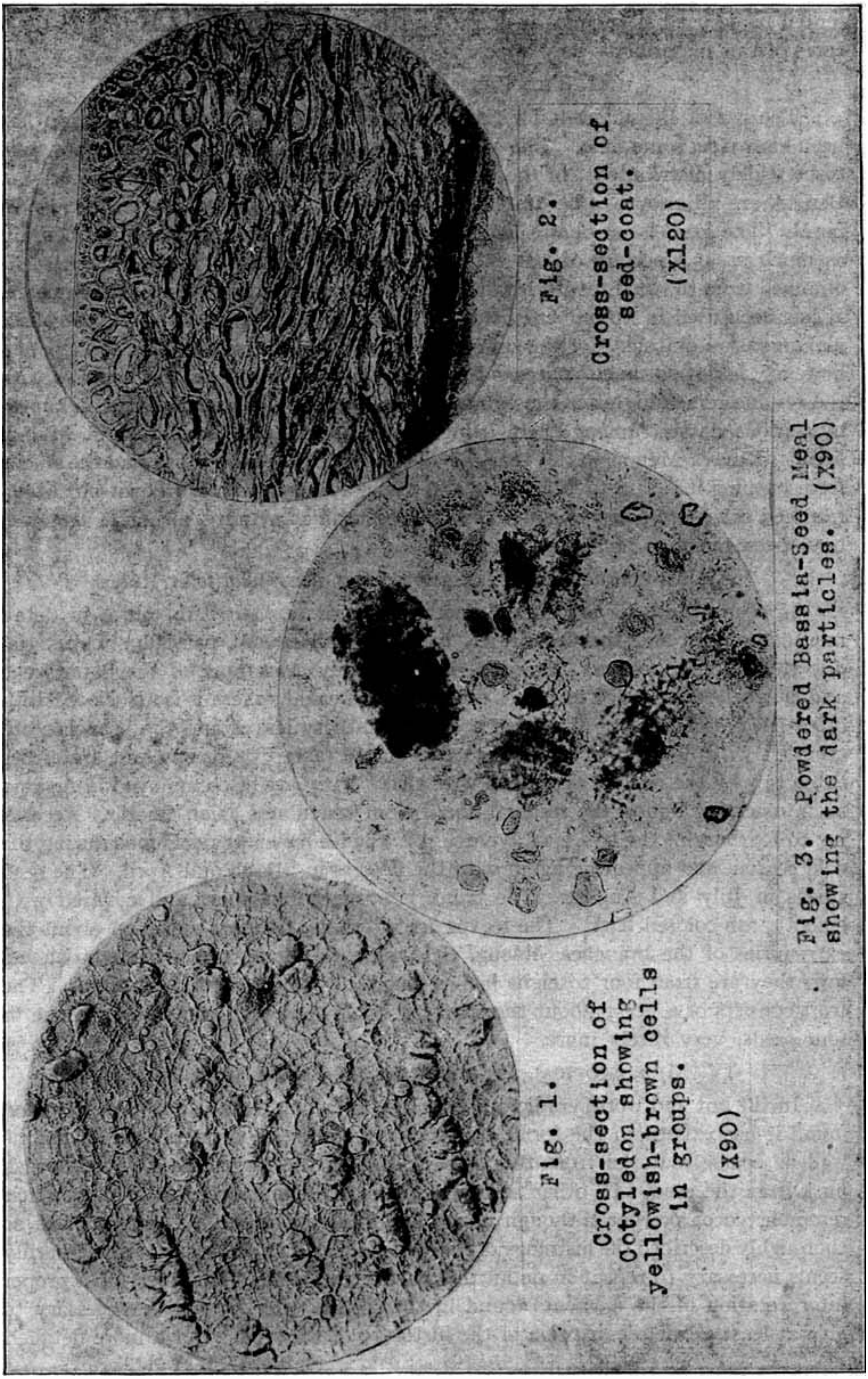

Fig. 1. Cross-section of Cotyledon showing yellowish-brown cells in groups. (X90)

Fig. 2. Cross-section of seed-coat. (X120)

Fig. 3. Powdered Bassia-Seed Meal showing the dark particles. (X90)

Microscopical Identification of Mowrah Meal

description the reader is referred to Honcamp's paper.[4] The seeds are somewhat almond-shaped and measure from 2 to 3 cm in length, being light brown in color. There are two cotyledons, these being reddish brown and of an oily consistency. The cotyledons which compose the bulk of the powdered seed-cake, consist of polyhedral cells, many of which contain yellowish brown material. These colored masses are arranged in quite characteristic groups throughout the lighter colored tissue of the cotyledon. Near the exterior of the cotyledon these cells appear to occur in larger aggregates. In order to satisfactorily examine the powder microscopically it is well to mount the material in chloral hydrate solution (1 : 1) on a microscopic slide and gently warm the preparation for the purpose of clearing the tissues. The most characteristic elements which immediately attract the eye are the yellowish brown colored cells from the cotyledons. These cells stand out distinctly in the surrounding tissue. They also occur separately as isolated fragments or in groups (Fig. 1.) Aside from these colored cells, the other tissues of the cotyledon do not appear to be sufficiently distinctive for diagnostic purposes as far as the powdered seed is concerned. These colored cells appear to be rich in tannin, a fact which can be readily demonstrated by the use of iron sulphate solution. This reagent turns them black. Fragments of the seed-coat can be readily picked out of the seed powder and cross-sections of them made (Fig. 2). This cross-section does not reveal tissue elements especially diagnostic and the seed-coat is very seldom found pulverized in the powdered material from the cotyledons. The epidermal cells from the seed coat have thick walls and the cells are quite compactly arranged. The bulk of the tissue consists of cells which are somewhat collapsed and contain a reddish brown material. The other edge of the section shows the remains of the spiral vessels which seem to form a network over the cotyledons. The yellowish brown cells of the cotyledon, isolated and in characteristic groups, are quite the most diagnostic elements whereby the analyst may identify the powdered material with certainty under the microscope.

SUMMARY.

This investigation calls attention to the use of Bassia-seed meal in so-called ant and worm eradicators and the diagnostic tissues relied upon for its microscopical identification when in powdered form. The ground meal very much resembles cocoa powder in general appearance, consisting largely of the powdered cotyledons and occasional fragments of the seed-coat. A microscopical examination of the powder in chloral hydrate solution reveals the presence of yellowish brown masses occurring separately as isolated fragments and also in a characteristic group arrangement. These tissues are quite diagnostic enough for the positive identification of the powdered material microscopically.

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