

ADULTERATION OF CASCARA SAGRADA.

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The quality of commercial cascara bark has been so uniformly high for the past few years that little has been said concerning adulterations and inferior grades. Destructive methods of collection have continued, however, and the centers of supply have shifted rapidly to new districts, facts which augment the possibilities of new adulterations and admixtures. Such possibilities exist in the case of most vegetable drugs and an uninterrupted period of uniformity and high quality should not result in a lack of vigilance on the part of crude drug inspectors. That a close inspection of all commercial packages is essential to successful manufacturing operations is evident when the conditions controlling the collection of these products are carefully considered. This is especially true in this country where a considerable portion of the crude drugs is gathered and prepared for the market by ignorant collectors. They are responsible not only for many adulterations but also for a great many of the variations which regularly appear, the effects of which are always evident in the finished product. Many variations in these products could be and in numerous cases have been traced to certain abnormalities in the crude materials.

Such conditions as these have existed in the case of cascara sagrada and the available information indicates that the markets have not always supplied a uniform drug of definite origin. A warning has recently become current that much of the commercial bark is now composed of *Rhamnus californica* Esch. This has led to an examination of samples purchased from various sources as well as a closer inspection of all shipments of the drug recently received. The method of inspection used in this instance must of necessity be one which will eliminate the adulterant with a minimum amount of time and labor. A review of the work that has been done on the identification of the bark of different species of cascara, reveals a difference of opinion on certain important characters. This difference is most evident in the statements referring to the relative width of the medullary rays in *Rhamnus purshiana* D. C., and *Rhamnus californica* Esch. Rusby¹ states that they commonly consist of two rows of cells in *purshiana* and three or more in *californica*. He accompanies this statement with drawings by Kraemer which show the rays from one to three cells wide in *purshiana* and from three to five in *californica*. Sayre² makes no statement as to the width of the rays but includes drawings of both species. These drawings indicate that the rays in *purshiana* are all two cells wide and in *californica* from two to four. Kraemer³ gives the width as being from one to two cells in *purshiana* and from three to five in *californica*. It is to be noted that Kraemer furnished the drawings for Rusby¹ in which the width is shown to be from one to three cells in *purshiana*. Dohme and Engelhardt⁴ classify the rays in *purshiana* as usually bicellular. Moeller¹² says they are composed of two or three rows of cells. In the examination of the commercial samples above mentioned (five from New York and three from San Francisco) as well as in numerous shipments of the drug, eighty-five per cent. of the microscopic inspections have shown the medullary rays to be from one to three cells wide. Rays from one to two and from one

to four cells wide have been noted in only nine per cent. of the examinations, while those from one to five and from one to six have not exceeded one per cent. It may be stated from this, that if the inspection of cascara bark for the isolation of *Rhamnus californica* Esch., can be based upon the relative width of the medullary rays, as stated by two authorities, the commercial conditions at present are not alarming.

The most recent report of adulterated cascara bark comes from abroad, in which Perrot⁵ says that powdered cascara sagrada is sometimes adulterated on

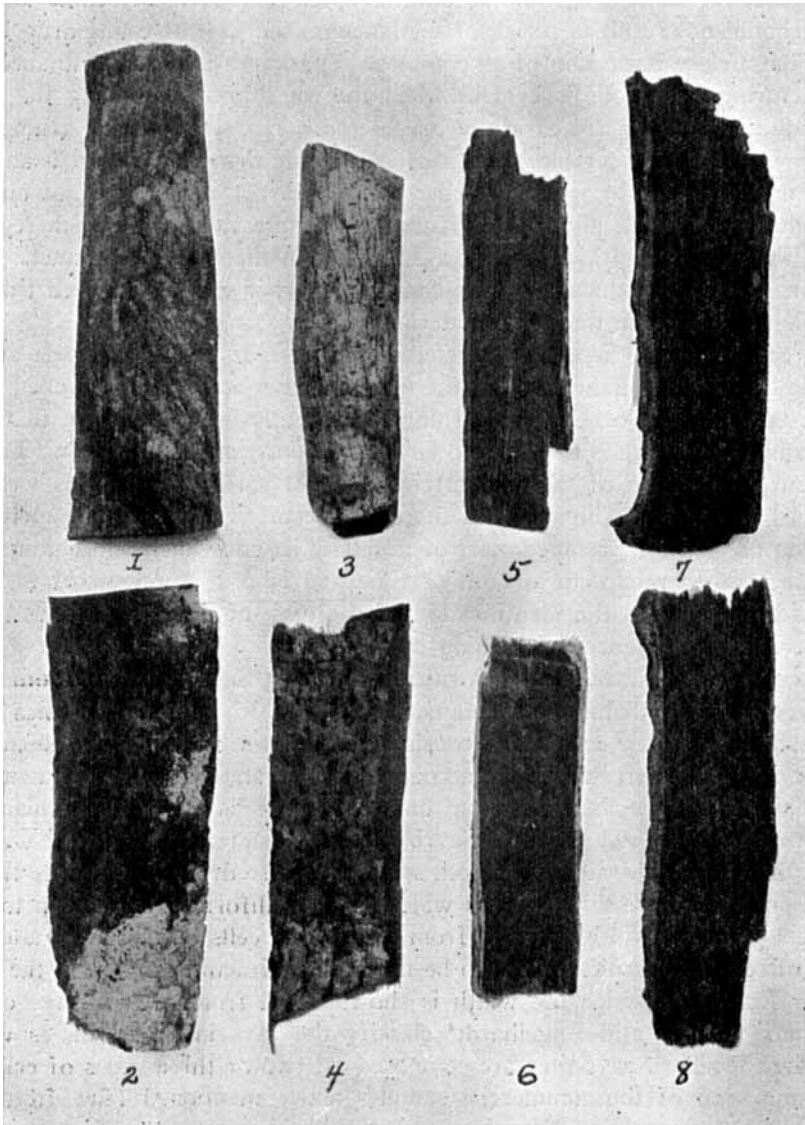


PLATE I.

Fig. 1, 3, 5, and 7, Cascara Sagrada. Fig. 2, 4, 6, and 8, Cascara Substitute.

the continent of Europe with powdered frangula. The small amount of the drug handled in this form in America, however, eliminates the possibilities of a similar occurrence. Also its suggestion as an adulterant in the crude form by Beckett⁶ does not seem well founded when the very distinct nature of the two barks is carefully considered. Its presence in cascara could readily be detected upon a basis of microscopic characters alone. Not so, however, with certain other forms that have appeared. Earlier reports indicate that the bark has varied considerably.

In 1888 Moss⁷ called attention to a spurious cascara which though he was unable to identify he felt sure was *Rhamnus purshiana* D. C. collected out of season. The following year Squibb⁸ discussed the general unsatisfactory condition of commercial cascara as it occurred during the summer of 1889. He accounts for this condition as being due to different methods of collecting and curing. Further complaint is not made until 1905 when Zeig⁹ in a discussion of Cascara Bark—its habitat, collection, supply, etc., ascribed the difference in the appearance of the crude article to climatic influences and manner of drying. Other evidence is at hand which points to actual substitution and adulteration. Rusby,¹⁰ 1890, claimed to have found this to be the case to the extent of car load lots. He attributes the cause to *Rhamnus californica* Esch. This hardly seems consistent with a statement made the previous year¹¹ which appeared as a criticism of the article by Moss. Referring to the inferior condition of cascara, he says that it is not so much a question of kind, inasmuch as Oregon and California barks are practically the same species and variety. He also states that he had been able to identify the bark *Cornus nuttallii* Audub, as a cascara substitute. Beckett⁶ characterized the market conditions for a few years prior to 1889 and believed that three species were collected and marketed indiscriminately, i. e. *Rhamnus californica* Esch., *Rhamnus purshiana* D. C. and *Rhamnus croceus* Nutt. Concerning their comparative appearance he says they are almost identical. Another substitute is mentioned by this author which he classified as some species of alder and which resembled true cascara in appearance and taste.

From the foregoing it is evident that inferior cascara *sagrada* has frequently found its way to the open market. It is to be noted, however, that this inferior condition has been largely due to natural causes and has consisted more of variations in the genuine bark rather than in its adulteration by other forms. The influences which brought about these variations do not seem to have been active during the past few years or if so, their effects have not been mentioned. Critical examinations of numerous commercial shipments of the drug have served to confirm the former supposition. The entire contents of each bag of drug composing these shipments was inspected and found to reveal no greater variation than those which naturally occur in all drugs of vegetable origin. It has been learned that in the inspection of all such materials certain limits, to all natural variations, must be fixed in order to accommodate the constant and unavoidable fluctuations. During the past few years the maintenance of a standard with rather strict limits has been found possible, in the case of cascara bark, owing to the fact that the drug has been of such uniform character. Nevertheless, such a condition of uniformity never continues indefinitely. Interruptions and indeed actual reversals in the market situations may occur at the least expected moment.

An occurrence of this nature or any interruption of a commercial aspect, relative to the cascara supply would seem of sufficient importance to justify its announcement. It is, therefore, with this view in mind that the present discussion has been suggested.

The appearance of a new form of inferior bark has been detected during a routine inspection of a considerable lot of cascara sagrada. Though not having been extremely troublesome it presents possibilities which if taken advantage of by the collectors would make it a difficult form to control. The bark in ques-

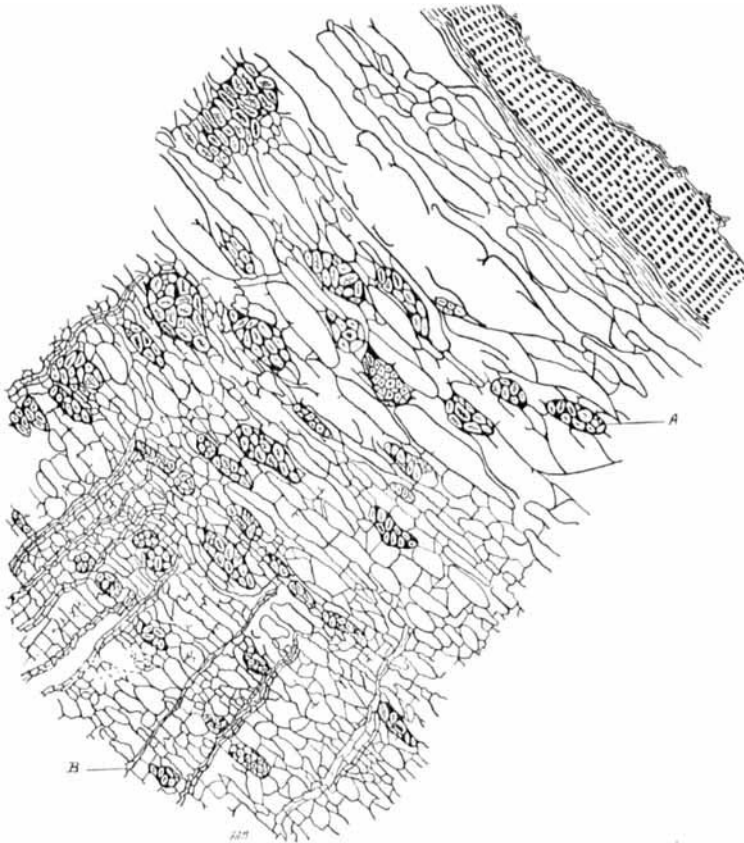


PLATE II.

Transverse section, *Cascara sagrada* bark. A—Sclerotic cells. B—Medullary ray.

tion resembles genuine cascara quite closely and especially is this true of the periderm. See fig. 1, 2, 3, & 4, plate I. Figures 1 and 2 are almost indistinguishable while in 3 and 4 is brought out the principle exterior difference viz., the more prominent longitudinally elongated lenticles of the substitute (fig. 4) and the small inconspicuous transversely elongated ones of the cascara (fig. 3). The inner surface, however, and especially of the large pieces is the key to the ready detection of the adulterant. This difference being largely one of color is not indicated to advantage in the photograph. This color in the false bark is a light brown with frequent darker blotches. None of the yellow or lustrous brown of

the true bark is evident. The inner surface and fracture are also diagnostic, being in the spurious article, respectively striate and fibrous, while in the cascara they are smooth and short. The bark is practically odorless and the taste is only that of astringency with slight bitterness. The size and form of the adulterant cannot be regarded as important characters since they both exhibit about the same range of variations as the genuine bark. The adulterant is somewhat flatter, showing no tendency to form quills, and is slightly thicker.

Turning to the microscopic structure, this is found to disclose an even greater



PLATE III.

Transverse section of bark, *Cascara substitute*. C—Bast fibers. D—Medullary ray.

difference than the external features. (See plates II and III). These plates were outlined with a camera lucida attachment under a magnification of 87 diameters and the detail filled in under a magnification of 385 diam. It will be noted from these plates that the extreme width and conspicuous nature of the medullary rays, the difference in the bast fibers and the absence of sclerotic cells are the principle features by which the adulterant may be distinguished from the true bark. A consideration of all histological elements is unnecessary and of no practical value in this particular case. The cortical portions of the bark have not been included in Plate III on account of the absence of any important structures.

The outer and inner layers of this area are to all practical purposes the same in both cases and could be disregarded in routine inspections.

Although the form herein described has not been identified it is seen to possess none of the taxonomic characters of the genus *Rhamnus* and so can be eliminated from this group of plants. Of greater importance, however, than its identity is its isolation from the true bark. To accomplish this, all commercial packages of the crude drug should receive a careful botanical inspection. This inspection should not only cover all commercial packages but also every portion of these packages. This is best carried out during the process of manufacture when all packages must of necessity be broken and the drug handled in the loose form.

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ERGOT AND ITS ACTIVE PRINCIPLES.

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Although ergot has long been established as one of the most valuable drugs at the disposal of the physician, its pharmacology remained, until the last few years, in a state of uncertainty and confusion.

Several causes contributed to this unsatisfactory result. In the first place the systematic position of ergot, as a fungus, rendered the chemical isolation of its active constituents a matter of peculiar difficulty. The search was further complicated by the fact that the most diverse opinions prevailed as to the type of physiological action which should be regarded as characteristic of a principle to which the therapeutic effect of ergot could be attributed. To some extent this difficulty still prevails. Not a little of the confusion, again, was due to the almost reckless manner in which successive observers bestowed names suggestive of chemical individuals on the crudest of extracts, or renamed substances isolated by their predecessors, through failure to compare their own results with those