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ANALYSIS OF THE RHIZOME AND ROOTLETS OF PLANTAGO MAJOR, LINNÉ

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Philadelphia College of Pharmacy, No. 175.

The proximate analysis of the rhizome and rootlets described herein was undertaken with the view of adding to the results of the foregoing work, and of contributing to the knowledge of the constituents of this well-known plant.

The rhizome and rootlets used in the work were collected from wild-growing plants by the writer. The two parts were carefully separated, cleaned and dried. The relative proportions of the two parts as they occur in nature are 30.5 of rhizome and 19.5 of rootlets.

It was assumed that the two parts lost the same amount of water upon drying, and they were subsequently mixed in the given proportions for the analysis. This was conducted according to Dragendorff's method.

Petroleum ether dissolved .57 per cent. of the material. The extract was of waxy consistence and had a greenish yellow color. It was solid at ordinary temperatures, but melted on the boiling water-bath. The extract consisted of caoutchouc, wax and fatty matter. The extract was treated with hot alcohol, the clean solution filtered off and allowed to evaporate. In about a week's time, when the alcohol had evaporated, stellate groups of crystals were noticed in the semi-solid residue of fatty matter. The writer hopes to be able to further investigate these crystals in the future.

Ether extracted .41 per cent. of the rhizome and rootlets. The extract was of a dark amber color, and it only partly melted when placed on the water-bath. Warm water applied to the extract was found to have acquired a faint acid reaction. The water solution contained small quantities of glucose and a substance behaving like protocatechuic acid. Negative results were obtained for alkaloids and glucosides. That part of the extract insoluble in water was chiefly wax. This wax was insoluble in aqueous potassium hydrate solution, but soluble in alcoholic potassium hydrate solution.

Absolute alcohol was the next solvent applied. It removed 8.60 per cent. of red-brown extract. As the alcohol was being recovered from the extract a precipitate formed. This would not re-dissolve in the supernatant liquid or in absolute alcohol. But water completely dissolved the precipitate with the production of a "purple of Cassius" color. Hydrochloric acid produced no precipitate in this solution, but it caused the color to become paler. Ferric chloride imparted an olive-green color to the solution, but gave

no precipitate. Sodium carbonate added to the last test produced a red color. These reactions probably indicate a phlobaphene or traces of protocatechuic acid. A fresh portion of the solution gave a yellowish precipitate with lead acetate. Glucose was found to the extent of 1.61 per cent., and, after boiling the solution with sulphuric acid, .87 per cent. of saccharose was found.

Water was put upon the residue from the treatment with absolute alcohol, but unfortunately the material underwent fermentation. For this reason the remainder of the analysis cannot be looked upon as representative of the original material; still, mention will be made of the proximate principles found. The water solution contained mucilaginous, but not albuminous matter precipitable by alcohol. Alkaline water also extracted mucilaginous matter.

Acidulated water dissolved pararabin substances and phosphates.

A special examination for tannin was made of some of the mixture of rhizome and rootlets by treating a portion with water, but the reactions were not sufficiently characteristic to indicate more than very slight traces of tannin, phlobaphene or allied substances.

Starch was shown to be present by both chemical and microchemical examinations.

The drug was found to contain 6.92 per cent. of moisture.

The ash amounted to 24.70 per cent. It was of a reddish-brown color, but a small quantity of it was soluble in water. A qualitative analysis of the ash revealed the presence of aluminum, iron, magnesium, manganese and potassium as chlorides, phosphates and sulphates.

RECENT LITERATURE RELATING TO PHARMACY.

THE VOLATILE CONSTITUENTS OF THE WOOD OF GOUPIA TOMENTOSA.

W. R. Dunstan and T. A. Henry (*Proceedings of the Chemical Society*, London, March, 1898), state that *Goupia tomentosa* is a large tree growing in British Guiana, where it is known as "kabucalli." The wood is hard, and is used in the colony for boatbuilding. When freshly cut it emits a smell resembling that of valerian. By distilling the wood with water, a mixture of acids of the acetic series was obtained, from which the authors have isolated and identified formic acid, isovaleric acid, normal capric acid and lauric acid. A small quantity of succinic acid was also obtained.

PERU BALSAM.

K. Dietrich has obtained authentic samples of Peru balsam from Honduras, which represent the pure natural product of the trees. The author distinguishes three qualities of the product representing the first, second and third flow respectively, mixed with a few traces of bark. The three varieties differ from the commercial products by being much thicker, also much clearer and of darker color, and having a more intense balsamic odor. The author contradicts the usual supposition that the

same tree furnishes balsam of the same quality, since the three samples examined showed different ester numbers. The balsams examined furnished 77 per cent. of aromatic bodies (cinnamein, etc.) and only 13 per cent. of resin ester, while the commercial products never have more than 65 to 75 per cent. aromatic substances. The proportion of cinnamein differs to the same extent, and the residue insoluble in ether was found to be 41.38 per cent., or 1.5 to 3 per cent. more than those of the commercial products. On this basis a balsam having less than 65 per cent. of aromatic substances and more than 28 per cent. of resinous matter should be considered as doubtful quality.—*Berickle d. Pharm. Ges.*, 1897, 437, through *Pharmaceutical Journal*, February 26, 1898.

DAVIESIA LATIFOLIA.

In a communication to the *Pharmaceutical Journal* in its issue of February 26th, Mr. J. Bosisto directs attention to this plant as one worthy of investigation, and mentions that, in the districts where it abounds, its infusion has proved useful in the treatment of hydatids, low fevers, etc.

The plant is indigenous to Victoria, Australia, and belongs to the natural order Leguminosae, suborder Papilionaceae. It is a lowgrowing shrub, and is also known as the "Native Hop Bush," probably on account of its bitter taste.

The author states that a crystalline principle may be obtained by making an infusion of the leaves (and flowers when in season), concentrating to about one-half, and setting aside for crystallization to take place. After separation of the crystals, of which a further crop may be obtained by slight evaporation of the liquid, an oleoresin having a bitter taste remains.

A small amount of the crystalline principle was examined by Messrs. Paul and Cownley, who report on it as follows:

"It was a bitter, neutral substance, readily soluble in hot water, crystallizing out on cooling in the form of fine white needles.. which were rendered anhydrous at 100-120° C. It was insoluble in ether, soluble in boiling chloroform and readily dissolved by weak alcohol, from which it was left as an amorphous residue on evaporation, but soon crystallized on the addition of a little water. It was soluble in caustic soda, and reprecipitated apparently unchanged by acids. On purification of the original crystals by recrystallization from water, the substance still retained its bitter taste and had a constant melting-point after having been dried at 120°. Fusion with sodium gave no indication of nitrogen. It did not reduce Fehling's solution until after hydrolysis by boiling with acid Its aqueous solution was precipitated by ammoniacal lead acetate, but not by neutral lead acetate."

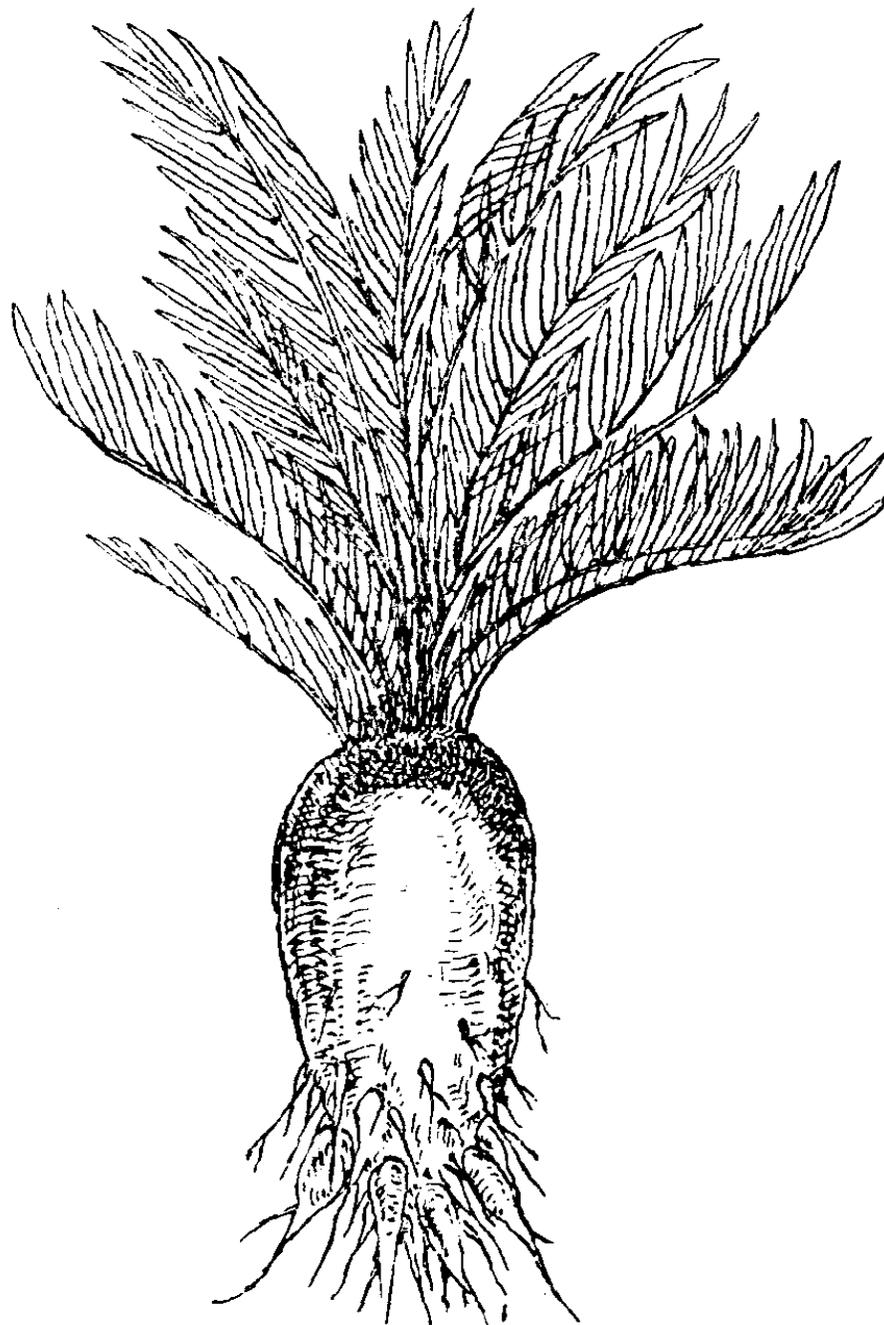
As stated by Messrs. Paul and Cownley, these results point to this substance as being either a glucoside or sugar, but unless the persistent bitter taste could be eliminated by further purification, they are in favor of the former view.

These investigators hope to continue their study of the constituents of *Daviesia latifolia* when they obtain the leaves in sufficient quantity for the satisfactory

extraction of them.

ARROW-ROOT, CASSAVA AND KOONTI.

In the issue of the *Journal of the American Medical Association* for February 12th, appears a paper having the above title, by A. T. Cuzner, M.D.



Koonti.

The author, after considering the respective merits of arrow-root and cassava as sources of food, then gives an account of the third member of the group.

This plant (*Zamia integrifolia*¹) is a native of South Florida, and is called "Indian Bread Root." In its foliage it bears a resemblance to the palm and tree fern. In affinity it is nearer the latter than the former. The accompanying figure represents the plant. Its root is the edible portion.

When the poor whites on the east coast are greatly in need of money they go to the woods and dig koonti, finding a ready market for the roots. Indeed, it is the sole occupation of many people. The roots are not cultivated, as they grow wild in abundance. A very fine quality of starch and tapioca is manufactured from them, which may be found at all times in the Key West market.

The starch cells of koonti are muller-shaped, like those of cassava, but smaller. The starch is said to be equal to the best Bermuda arrow-root, and lately its worth as an article of commerce has been fully recognized in Florida. There are a number of factories for its preparation in Southern Florida. A correspondent of the United States Agricultural Department writes: "I ate of a koonti pudding at Miami, and can say that, as it was prepared and served with milk and guava jelly, it was delicious."

The unique industry (in the more limited sense of the word) of the Seminole is the making of the koonti flour. The Indian process is this: The roots are gathered, the earth is washed from them, and they are laid in heaps near the "koonti log." The koonti log, so-called, is the trunk of a large pine tree, in which a number of holes, about 9 inches square at the top, their sides sloping downward to a point, have been cut side by side. Each of these holes is the property of some one of the squaws or children of the camp. For each of the holes, which serve as mortars, a pestle made of some hard wood is furnished.

The first step in the process is to reduce the washed koonti to a kind of pulp by chopping it into small pieces and filling with it one of the mortars and pounding it with a pestle. The contents of the mortar are then laid upon a small platform; each worker has one. When a sufficient quantity of the root has been pounded, the whole mass is thoroughly saturated with water in a vessel made of bark. The pulp is then mashed in a straining cloth, the starch of the koonti draining into a deer hide suspended below. When the starch has been thoroughly washed from the mass the latter is thrown away, and the starchy sediment in the water left to macerate. After some days the sediment is taken from the water and spread upon palmetto leaves to dry. When dried, it is a yellowish white flour, ready for use.

In the factories this process is substantially followed, but with improved appliances, the chief variation being that the koonti starch undergoes several successive macerations, thereby making it purer and whiter than the Indian product.

The koonti bread made by the Indians is of a bright orange color. It is rather insipid, though not unpleasant to the taste. It is made without salt. Its yellow color is due to the fact that the flour has had but one maceration.

¹ now called *Zamia pumila*