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CHEMICAL EXAMINATION OF THE TUBEROUS ROOT OF IPOMŒA HORSFALLIÆ

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TUBEROUS ROOT OF *Ipomœa Horsfalliæ*, HOOKER

About one-half actual length

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CHEMICAL EXAMINATION OF THE TUBEROUS ROOT OF IPOMŒA HORSFALLIÆ, *HOOKER*.

By Frederick B. Power and Harold Rogerson.

A Contribution from the Wellcome Chemical Research Laboratories, London.

In the Spring of 1909 one of us was kindly presented by Mr. E. M. Holmes, F.L.S., Curator of the Museum of the Pharmaceutical Society of Great Britain, with a large tuberous root which had been received from the West Indies, and was evidently the product of a species of *Ipomœa*. It had been sent to Mr. Holmes by Messrs. Westmacott & Son, of Manchester, England, who had likewise favored him with the following information concerning it. "It grows wild, and is not cultivated for any purpose. This specimen was gathered in the woods of Maypen, Clarendon District, Jamaica, by our client, Col. Barlow, of Bury, who states that it is used for starch making, although it produces a yellow product, and that it is also used for food in some instances."

The root in question was a very large one, and, as it could not conveniently be preserved in its entire, fresh state, it was thought that it might be utilized for a chemical examination, so far at least as the amount of material would permit. Some additional interest was imparted to the subject by the fact that the present authors had recently made a complete chemical study of the stems of *Ipomœa purpurea*, Roth,[1] and also of the official jalap,[2] from *Ipomœa Purga*, Hayne (*Exogonium Purga*, Benth).

In order to ascertain the botanical source of the root referred

[1] This Journal, 1908, 80, pp. 251–286.

[2] *Journ. Amer. Chem. Soc.*, 1910, 32, pp. 80–113.

activity is considerably lower than that of either of the above-mentioned resins, and appears to approximate most nearly to that of the resin from *Ipomœa orizabensis,* Ledanois, which has been recorded by Guigues (*loc. cit.*) as varying from — 23.30′ to — 25°.

Extraction of the Resin with Various Solvents.

A small portion of the resin (1.0 gramme) was reserved for a physiological test, and the remainder (7.6 grammes) dissolved in alcohol, the solution being brought onto prepared sawdust, and the mixture thoroughly dried. It was then successively extracted with light petroleum, ether, and alcohol, when the following amounts of extract, dried at 100° C., were obtained:

Petroleum (b. p. 40–60° C.)	extracted 4.92 grammes,	or 64.7 per cent.
Ether	extracted 1.90 grammes,	or 25.0 per cent.
Alcohol	extracted 0.60 grammes,	or 8.0 per cent.
Total	7.42 grammes,	or 97.7 per cent.

Petroleum Extract.—This was a soft, brown resin. It was heated in a reflux apparatus with an alcoholic solution of potassium hydroxide for several hours, after which the alcohol was removed, water added, and the alkaline mixture extracted with ether. The ethereal liquid was dried, and the solvent evaporated, when a small quantity of solid material was obtained. This yielded a little of a crystalline substance, which melted at 132–133° C., and gave the color reactions of the phytosterols.

The alkaline liquid which had been extracted with ether was acidified, and again extracted with this solvent, the ethereal liquid being dried and evaporated. A small amount of acid was thus obtained, which was distilled under diminished pressure, when it partially solidified. The oily portion was unsaturated, since it absorbed bromine in chloroform solution. The solid portion was recrystallized from dilute acetic acid, when it melted at 56–58° C. It was thus evident that the original product consisted of a mixture of acids, but the amount was too small to permit of their further separation.

Ether Extract.—This extract, like the preceding one, was a soft, brown resin. On redissolving it in ether a very small amount of a sparingly soluble substance separated, which was collected. This was found to give a color reaction similar to that yielded by

the phytosterols, and it probably consisted of one of the dihydric alcohols, such as ipuranol and ipurganol, which have previously been isolated by us from convolvulaceous resins (*loc. cit.*) and other sources. The exceedingly small amount of this substance rendered it impossible to identify it.

The ethereal liquid was subsequently shaken successively with solutions of sodium carbonate and sodium hydroxide, but only resinous material was thus removed, and on finally evaporating the ether only a trace of yellow resin remained.

Alcohol Extract.—This extract, which was very small in amount, resembled the two preceding ones, and even after prolonged drying it could not be reduced to a powder. Its alcoholic solution was treated with baryta, and allowed to stand in a warm place for twelve hours, after which the alcohol was removed, water added, and the barium precipitated by means of sulphuric acid. The filtered aqueous liquid did not reduce Fehling's solution until after heating with a drop of concentrated sulphuric acid, thus indicating that at least a portion of the alcoholic extract of the resin was glucosidic.

Examination of the Aqueous Liquid.

The aqueous liquid, as above indicated, represented that portion of the alcoholic extract of the root which was soluble in water, and from which the small amount of resinous material had been removed. It was first shaken with ether, and on adding to the ethereal liquid a little aqueous alkali the latter solution showed a blue fluorescence. This was probably due to the presence of traces of β-methylæsculetin, $C_9H_5(CH_3)O_4$, a substance which we have previously shown (*loc. cit.*) to be a constituent of jalap resin.

After extracting the aqueous liquid with ether, it was treated with a solution of basic lead acetate, which produced a light brown precipitate. This was collected, washed with water, and then suspended in water and decomposed by hydrogen sulphide. On filtering the mixture a liquid was obtained which gave a slight brown coloration with ferric chloride, but it yielded nothing definite. The filtrate from the lead subacetate precipitate was treated with hydrogen sulphide for the removal of the excess of lead, and again filtered. On concentrating this liquid a dark colored syrup was obtained, which contained a quantity of sugar, since it readily yielded *d*-phenylglucosazone, melting at 213–214° C.

In order to ascertain whether the resin obtained from the root of *Ipomœa Horsfalliæ,* Hooker, possesses any physiological activity, a test was kindly conducted for us by Dr. H. H. Dale, Director of the Wellcome Physiological Research Laboratories. One gramme of the resin was administered to a small dog, but no purgation was produced, nor could any other effect be observed.

It is evident from the results of the preceding investigation that the root of *Ipomœa Horsfalliæ,* Hooker, does not possess any constituent which would render it of medicinal value, for even the very small proportion of resin which it contains appears to be devoid of any marked physiological action.

In conclusion we desire to express our thanks to Mr. E. M. Holmes, F.L.S., for the great pains he has taken to secure the botanical identification of the material supplied to us.