

## II. AN ALKALOID FROM ANONA SQUAMOSA LEAVES.

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The common custard-apple, *Anona squamosa* Linn., introduced from the West Indies, grows wild in many parts of India, particularly the south and west, and is also cultivated as far north as the Punjab. The leaves and crushed seeds are used medicinally and also as insecticides, and its roots form a drastic purgative. According to Callan and Tutin<sup>1</sup> the leaves of an allied species, *A. muricata* contain an un-crystallisable alkaloid, but the amount is too small for careful investigation.

The leaves and seeds of the custard-apple have been examined for alkaloids and it has been found possible to indicate the presence of alkaloids but not of glucosides.

The alkaloid from the leaves has been isolated as platinichloride and from this both the hydrochloride and free base were prepared, but in minute quantities only.

### EXPERIMENTAL.

The dried and powdered leaves, when extracted with 90 per cent. alcohol, give a product which shows all the characteristic reactions for alkaloids even after removal of tannins. Similar results are obtained by extraction with water or ethyl acetate.

The ethyl acetate extract after removal of the solvent is a black viscous mass, weighing about 10 per cent. of the dry leaves taken. The aqueous extract of this residue, when freed from tannins and then examined with the aid of Fehling's solution both before and after boiling with 2N sulphuric acid, is found to contain reducing sugars but no glucosidic constituents.

A series of experiments was made in order to ascertain the relative amounts of alkaloid extracted by alcohol and water. In each experiment 100 grams of dry powdered leaves were digested for 30 minutes on the water bath with the solvent and with constant stirring. The mass was filtered and the residue digested with more solvent for another period of 30 minutes. The temperature was maintained at 85° during the extraction and after the removal of tannins the alkaloid was isolated as the platinichloride. The results are given in Table I.

<sup>1</sup> *Pharm. J.*, 1911, iv, 33, 743.

TABLE I.

*Yields of alkaloid using water or alcohol.*

No. of Experiment	Solvent	Grams of platinichloride per 100 grams of dry leaves
1	Alcohol ... ..	0.17
2	Alcohol and lime (25 grams)	0.19
3	Water ... ..	0.17
4	Water and lime (25 grams) ...	0.31

As the time taken for the extraction appeared to affect the yield of platinichloride, several experiments were made with water at 90° to ascertain the time required to give the optimum yield. The results are given in Table II, and indicate that digestion for a period exceeding 25 minutes tends to diminish the yield.

TABLE II.

*Influence of time of extraction on yield.*

Time in minutes ... ..	15	25	45	90
Grams of Platinichloride ... ..	0.16	0.20	0.16	0.12

A final series of experiments was made to ascertain the effect of the temperature of extraction on the yield. The results are given in Table III, the conditions being similar to those for the experiments given in Table II and in each case the time of digestion was 25 minutes.

TABLE III.

*Effect of temperature on yield.*

Temperature in °C ... ..	65	80	90	100
Gram of platinichloride ... ..	{ (a) 0.12 (b) 0.11	0.37 0.40	0.20 0.24	0.034 0.040

It is clear from these experiments that a temperature of 80° gives the best yields, and that an increase to 90° or 100° brings about a decomposition of the alkaloid.

*Extraction of six kilograms of dry leaves.*—The leaves were powdered and extracted with water and lime (1.5 kilos) in a large

jacketed evaporating pan at 78–80° for 25 minutes and the extraction was repeated. The clear extract was freed from tannins by means of basic lead acetate, the precipitate well washed and the filtrate and washings freed from lead by means of hydrogen sulphide. When evaporated to small bulk a little solid was deposited; this was removed and the clear solution divided into two parts, to the one half hydrochloric acid and an excess of platinic chloride were added when 12 grams of crystallised platinichloride, corresponding with a 0.4 per cent. yield, were obtained. The other half was mixed with a warm aqueous solution of picric acid but no definite picrate could be isolated.

The *platinichloride* was purified by recrystallisation from hot water and obtained in the form of well developed, yellow rhombic crystals, which on decomposition gave an equivalent of 44, and this was only slightly altered on a second crystallisation.

The *hydrochloride* was prepared by removing the platinum by means of hydrogen sulphide and evaporating to dryness. About 2.0 grams were obtained from 6.7 of the platinichloride in the form of colourless needles readily soluble in water. A portion of the hydrochloride was converted into platinichloride, which closely resembled the original platinichloride in appearance but the equivalent found was 88. It is possible that two platinichlorides represented by formulae B,  $H_2PtCl_6$  and B<sub>2</sub>,  $H_2PtCl_6$  exist.

A portion of the hydrochloride was shaken repeatedly with water and silver oxide and a small amount of a *base* was obtained as a white powder readily soluble in alcohol.

The continuance of the work was rendered impossible by my accepting a post in the Indian Forest Service.

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