

CHEMICAL OBSERVATIONS OF SOME INDIAN PLANT DRUGS

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IN the course of a programme of work on the extraction and separation of components of Indian plant drugs for pharmacological and clinical experiments the following three plants have been examined by us.*

Mimusops elengi (N.O. Sapotaceae) is an evergreen tree growing wild and also cultivated in gardens in various parts of India. Its bark is the most important and is used as a febrifuge, tonic and astringent and its decoction is considered beneficial in diseases of the gums and teeth.

The stem-bark collected from the Delhi University Campus was extracted with petroleum ether (60–80°), ether and alcohol in succession. The petroleum ether extract on removal of the solvent gave an oily residue; T.L.C. (silicagel; chloroform: benzene 1:1) indicated the presence of two major components A and B. Their separation could be followed by fractional crystallisations and re-chromatography.

Compound A (80 mg per kg) separated as colourless plates from acetone, m.p. 164°. It answered Liebermann-Burchard and Salkowski's tests. The presence of unsaturation was indicated by the I.R. spectrum and tetranitromethane test. On treatment with acetic anhydride-pyridine (room temperature; 24 hr.) a monoacetate was obtained, m.p. 178°. The compound and its acetate gave green colouration with bromine in chloroform (Tortelli-Jaffe test). All these properties agree with those of α -spinasterol. The identity was established by direct comparison with an authentic sample.

Compound B (100 mg per kg) crystallised from acetone as colourless needles, m.p. 274–75°, and answered tests for triterpenoids. The I.R. spectrum indicated the presence of hydroxyl and unsaturation. Acetylation gave a monoacetate, m.p. 304° which on treatment with hydrochloric-acetic acid mixture isomerised to a product, which was identified as β amyrin acetate. A comparison of the properties of compound B with those of naturally occurring monohydroxy triterpenes indicated that it could

be taraxerol. A direct comparison, m.m.p., TLC of B and its acetate with taraxerol and its acetate confirmed the identity.

The ether extract of the bark left a dark sticky mass which when washed with a little ethanol turned into definite powder of less colour. It was chromatographed on alumina when some more of α -spinasterol and taraxerol were obtained.

The alcohol extract of the bark on concentration yielded a large amount of dark red semi-solid. It was largely extractable with water leaving behind a little amorphous impurity; the aqueous extract was extracted with *n*-butanol. The *n*-butanol concentrate was poured into ether when a brown amorphous solid (about 5% yield) was obtained. This gave tests for leucoanthocyanidin polymer and no definite compound could be isolated.

The occurrence of spinasterol and taraxerol has been recently reported also in brief by Misra and Mitra.¹

Wood.—The petroleum ether and ether extract of the heartwood contained the same components as the bark. The alcohol extract contained a colourless compound which was identified as meso-inositol (200 gm per kg). These extracts appear to be free from tannins.

Leaves.—Fresh leaves of *M. elengi* were extracted with alcohol and the alcohol extract fractionated into water-soluble and water-insoluble parts. The insoluble part which contained chlorophyll and waxes, on chromatography over alumina gave taraxerol (20 mg from 500 g). The aqueous solution contained a flavonoid glycoside not extracted by ether and on hydrolysis with aqueous sulphuric acid gave quercetin identified by colour reactions and chromatography.

Flowers.—The alcohol extract of the flowers was fractionated into ether-soluble and ether-insoluble part. The former gave positive test for triterpenoids; T.L.C. showed that it was a complex mixture. The ether-insoluble part on hydrolysis gave quercetin indicating that it contained a quercetin glycoside.

Ricinus communis (Erandi) root-bark has been used in Ayurvedic medicine in the treatment of nervous diseases, sciatica and rheumatism. The air-dried root-bark samples collected from one-year old plants after harvest of seeds from three

* An account was given at the special symposium during the Science Congress Session at Hyderabad, January 1967. See Abstracts D-29, Indian Science Congress, Hyderabad, 1967.

different localities, Delhi, Hardwar and Hyderabad were examined separately and gave the same results. The powdered bark was extracted with petroleum ether (60–80°), benzene, ether acetone and alcohol in succession. The petroleum ether extract on column chromatography over alumina gave a crystalline solid (120 mg per 360 g) m.p. 159°, $[\alpha]_D + 66$ (C 7.88 mg/ml in $CHCl_3$), which gave a positive Liebermann-Burchard test and a positive Salkowski's test; tetranitromethane test was also positive. With acetic anhydride and pyridine in the cold it gave an acetate, m.p. 136–38°, it also formed a benzoate, m.p. 147°; UV spectrum of the compound was similar in shape to that of authentic ergosterol (viz., 261, 272, 282, 294 m μ). However, absorption intensity of this compound was much lower than that of ergosterol. The acetate of the compound also showed a similar type of diene absorption (272, 283, 295 m μ). The Tortelli-Jaffe's test (Br_2 in chloroform) was negative. Due to paucity of the material and low yield of this compound detailed structural investigation could not be carried out.

The benzene and ether extracts of the root bark were very small in amounts and could not be studied. The acetone extract (10 g per 360 g) and alcohol extract (35 g per 360 g) were very similar in nature and were mixed, dried in the vacuum desiccator and extracted with absolute alcohol. The alcohol-insoluble part showed the presence of inorganic ions K^+ , Na^+ , Mg^{++} , Cl^- and NO_3^- . The alcohol-soluble portion gave a blue ferric reaction. Attempts to obtain a crystalline component by lead salt procedure followed by crystallisation and column chromatography were unsuccessful. Hydrolysis of alcoholic extract with 7% aqueous sulphuric acid yielded gallic acid and glucose

which were not present in the extract before hydrolysis. Gallotannins therefore constituted considerable portions of the above extracts besides mineral matter.

The aqueous extract of the root bark showed the presence of Fe^{+++} , Al^{+++} , Mn^{++} , Ca^{++} , Mg^{++} , K^+ , Na^+ , CO_3^{--} , NO_3^- , Cl^- , SO_4^{--} and PO_4^{--} ions. Ca^{++} and Mg^{++} were the major constituents.

Pluchea lanceolata (Rasna) is another plant with uses similar to those of *R. communis*. The air-dried leaves of the plant were used. The petroleum ether extract on chromatography over alumina gave a crystalline solid (1 g/kg), m.p. 237–40°, which gave a positive Liebermann-Burchard test. Spectral data of the compound indicated the presence of acetoxyl and unsaturation. It could be hydrolysed by 20% aqueous sodium hydroxide solution to the hydroxy compound, m.p. 218°. Subsequent alcoholic extract on concentration deposited inorganic matter which was separated. Purification of the extract by precipitation as lead salt gave a yellow solid which was found to be a mixture of two compounds by TLC. The two compounds were separated by column chromatography over silica gel and were identified as quercetin and isorhamnetin by colour reactions, UV, and visible spectra with the usual shifts with reagents and preparation of their acetates and methyl ethers. The identity was confirmed by direct comparison with authentic samples of quercetin and isorhamnetin. The flavonoids were present as aglycones in a yield of 700 mg/kg and no glycosides were detected.

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1. Misra, G. and Mitra, C. K., *Phytochemistry*, 1967 6, 1308.

ON THE SPIN OF THE 413 keV STATE IN Pm^{147}

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THE decay scheme of Nd^{147} to Pm^{147} is well studied.¹⁻⁵ The spins of the excited states are determined mainly from angular correlation studies. The characters of the ground and the 91 keV states are established to be $7/2^+$ and $5/2^+$ respectively. The spin assignment for the 413 keV state, however, is still uncertain, the values of $3/2$, $5/2$ or $7/2$ being favoured by different workers.⁴⁻⁸ A reinvestigation is therefore made employing a sum coincidence

method which has several advantages over the conventional angular correlation techniques so far used.

The main features of the decay scheme $Nd^{147} \rightarrow Pm^{147}$ are shown in Fig. 1. The experimental arrangement employed is a conventional fast-slow sum-coincidence system with a 100 channel analyser and is described elsewhere.⁹ The sum coincidence spectrum obtained with gate at 413 keV is shown in Fig. 2. It clearly