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MONOCOTYLEDONAE

GRAMINEAE

ALKALOIDS OF THE FLOWERS OF *ARUNDO DONAX*

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Plant. Arundo donax L.

Occurrence. Lower Himalayas from Kashmir to Nepal, ascending to 3500 ft, from Punjab to Sylhet, Naga Hills, up to 5000–8000 ft, the Nilgiris.[1]

Uses. Decoction of rhizomes in the Indian system of medicine as emollient, diuretic, said to stimulate menstrual discharge and diminish secretion of milk.[1] Three major pharmacological actions, viz., antiacetylcholine effect, histamine release, and uterine stimulant, were observed with the total alkaloids from the rhizomes.[2,3]

Previous work. Occurrence of alkaloids in the leaves and rhizomes and triterpenes and sterols in the leaves were reported.[2–4] No phytochemical or pharmacological work on the flowers has been reported so far.

Flowers. Total alkaloid 0·2%. Defatted (petroleum 60–80°) plant material (2 week old, 2·5 kg) was hot extracted with EtOH, EtOH-extract concentrated under N_2 atmosphere, concentrate taken in AcOH (4%, 200 ml), clarified solution extracted with $CHCl_3$ at two pH levels (4 and 9), H_2O-soluble bases isolated through reineckates.[5]

Gramine (1·2 g, m.p., mixed m.p., co-TLC, UV, IR, *m/e* 174, 130, 102, 44). *N,N-Dimethyltryptamine.* (co-TLC, UV, m.p. and mixed m.p. of picrate, methiodide). *Bufotenine.* (m.p., mixed m.p., co-TLC, UV, m.p. and mixed m.p. of picrate). *5-Methoxy-N-methyltryptamine* (co-TLC, UV, m.p., and mixed m.p. of picrate).

New compound. Eleagnine (12 mg). $C_{12}H_{14}N_2$ (m.p., mixed m.p., co-TLC, UV, *m/e* 186 (M^+), significant peaks at *m/e* 157, 142, 102): from extractives at pH level 4, chromatographed on Brockmann neutral alumina, middle PhH-$CHCl_3$ fractions.

3,3′-Bisindolylmethyl dimethylammonium hydroxide (0·8 g). $C_{20}H_{23}N_3O$, λ_{max} 217, 270, 279, 287 nm, fragmented before giving any molecular-ion peak, significant peaks at *m/e* 174, 130, 102, 58, 44: from extractives at pH level 9, fractional crystallization from MeAc, sparingly soluble fraction, straw coloured needles, m.p. 179–180°, tan coloured iodide, m.p. 168–171°, mixed m.p. with a synthetic sample[6] remained undepressed.

Gramine methohydroxide (2·4 g). $C_{12}H_{18}N_2O$, amorphous solid, λ_{max} 218, 284, 290–292 (sh) nm, fragmented before giving any molecular-ion peak, significant peaks at *m/e* 174, 130, 116, 102, 44: from MeOH eluates from column chromatography of the extractives at pH level 9, brown coloured iodide, m.p. 168–169°, mixed m.p. with a synthetic sample, m.p. 169–171°, remained undepressed, trimethylamine on sublimation.

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N,N-Dimethyltryptamine methohydroxide (28 mg). (co-TLC, UV, m.p., mixed m.p. of the iodide): from H_2O-soluble fraction, regeneration of reineckates over De-Acidite FF.[5]

Uncharacterized quaternary indolic bases (84 mg): from H_2O-soluble fraction, two Dragendorff-, Ehrlich- (van Urk)-positive spots, R_f, 0·0–0·08, pK_a 10·8, UV characteristic of 3-alkylindoles.

Although indole-3-alkylamines are of common occurrence in plants belonging to the family Gramineae, this is for the first time that a tetrahydro-β-carboline alkaloid (eleagnine) has been isolated from a graminaceous plant. Another notable feature of the plant is the change in the content of gramine during its growth. Gramine content, in the flowers, remained constant up to first 2 weeks after their appearance, then it started declining and after about 1 month the tertiary base was almost entirely replaced by a mixture of the quaternary amine and the *bis*-compound. These observations indicate that a quaternary gramine compound, rather than a tert-amine oxide,[7] could be a plausible precursor of the metabolites of gramine in higher plants.

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