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Chemical Investigation of *Acrostichum aureum* Linn.

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ACROSTICHUM aureum (Adiantaceae), a tall, handsome, very tough fern native of North Nigeria, is also found in mangroves and marshy places in India[1]. The plant is widely used as an indigenous drug in various ailment in Nigeria. The rhizome is pounded and grated and is applied as a paste to wounds and boils in Borneo and Malaya[1]. Since no work seems to have been done on this medicinally important plant, it was subjected to extensive chemical investigation. The plant was procured from North Nigeria.

Experimental

The powdered plant material was exhaustively extracted with boiling ethanol (95%) and the solvent was removed under reduced pressure. The concentrated extract was fractionated into (i) light petrol (b.p. 60–80°) and (ii) ethyl acetate fractions. The petrol fraction was chromatographed over Brockmann alumina. Elution of the column with different solvents and their mixtures yielded five fractions marked A, B, C, D and E. The ethyl acetate soluble fraction on usual chromatographic resolution over silica gel furnished the products D, F, G and H.

Compound-A : It had m.p. 62–67°; glc analysis showed it to be a mixture of n-alkanes containing hentriacontane (36.3%), tritriacontane (28.9%), nonacosane (21.2%), triacantane (2.9%), heptacosane (2.0%), hexatriacontane (2.0%), octacosane (2.0%) accompanied by hexacosane, pentacosane and pentatriacontane as minor constituents.

Compound-B : On crystallisation (MeOH—$CHCl_3$) it furnished silky needles, m.p. 214–15°; identified as lupeol by m.m.p., co-tlc and co-ir with an authentic sample[2].

Compound-C : It was identified as Friedelin[3], m.p. 259–60°; the oxime, colourless plates, m.p. 292–94°.

Compound-D : On crystallisation ($CHCl_3$—MeOH) it gave needles, m.p. 136–37°; the acetate, m.p. 125–26°; the benzoate, m.p. 142–43°; identification of the compound as β-sitosterol made through m.p., m.m.p., co-tlc, and preparation of derivatives.

Compound-E : It had m.p. 140–42°; gave positive Libermann—Burchard and tetranitromethane test; ν_{max} 3 450 and 1 055 (OH), 1 640 (C=C), 1 460 and 1 381 cm^{-1} (C—CH_3); the acetate, m.p. 127–30°; the benzoate, m.p. 145–48°. The gc-ms analysis of the product (TMS derivatives) showed it to be a mixture of campesterol (3%) (M^+ 473), stigmasterol (4%) (M^+ 484) and β-sitosterol (70.3%) (M^+ 486) in major amounts along with a few minor sterol isomers. It had a significant molecular ion peak M^+ 458 (may be cholesterol; 0.2%).

Fraction-F : It had m.p. 87° (Me_2CO) $C_{24}H_{48}O_2$ (M^+ 368); the methyl ester, m.p. 58–59°, identified as tetracosanoic acid[5].

Compound G : It crystallised as shining needles, m.p. 284–86°; the acetate (CH_3COCH_3), colourless needles, m.p. 290–91°; the methyl ester (diazomethane) and methyl ester acetate, m.p. 172–73° and 243–45°, respectively. It was identified as ursolic acid[6] by m.p., m.m.p., co-tlc, ir and preparation of derivatives.

Compound-H : It had m.p. 253°d, identified as gallic acid[7] through m.p., m.m.p. and co-tlc with an authentic sample.

The defatted product was treated successively with water and aqueous NaOH (0.2%). After usual workup the residue was dissolved in absolute ethanol and applied on Whatman filter paper (no. 1)[8,9], developed with n-butanol—acetic acid—water (4 : 1 : 1, v/v). The chromatogram was sprayed with ninhydrin in acetone (0.1%), and finally dried in an electric oven at 55°. Amino acids were located as coloured spots. The observed R_f values of the various protein amino acids and those of authentic specimens agree fairly well with one another: R_f (×100) for methionine, 40.1, violet;

alanin, 24.2, violet ; glutanic acid, 16.2, blue-violet ; aspartic acid, 8.9, blue-violet ; lysine, 7.3, violet.

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