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NOTE

Chemical Investigation of *Uvaria narum* leaves

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Chemical investigation on the leaves of *Uvaria narum* has resulted in the isolation and identification of nonacosane, hentriacontane, tritriacontane, octacosanol, triacontanol, dotriacontanol, tetratriacontanol and β-sitosterol.

Uvaria narum is a shrub or sometimes a woody climber growing in the Western Ghats of India, as well as in the plains of Kerala. This plant is used in folk medicine for the treatment of rheumatic swellings, jaundice, biliousness, typhoid and eczema.[1,2] Hitherto phytochemical investigations on *Uvaria narum* have resulted in the isolation and identification of a number of compounds.[3–9]

In the present work finely powdered leaves (2 kg) of *U. narum* were extracted with petroleum ether (3 × 6 L, 60–80°C). The combined petroleum ether extract was concentrated under reduced pressure. The viscous residue thus obtained was chromatographed over silica gel. The column was eluted with petroleum ether, benzene and benzene-ethyl acetate mixture (4 : 1 and 3 : 1). Four components, U1, U2, U3 and U4, were isolated from petroleum ether, benzene and benzene-ethyl acetate extracts (4 : 1 and 3 : 1) respectively. The leaf powder left behind after petroleum ether extraction was extracted with ethanol (3 × 2 L). The combined extract was concentrated to 250 mL and 250 mL of water added to it and extracted with benzene (2 × 100 mL) followed by ethyl acetate (2 × 100 mL). Evaporation of the benzene extract afforded benzoic acid[9] and the ethyl acetate extract yielded U5.

The component U1 was a white crystalline solid (3.5 g) which, after crystallisation from ethyl acetate melted at 55°C. Its IR spectrum showed absorptions due to C—H stretching and bending (2957, 2917, 1474 and 1464 cm^{-1}), and absorptions characteristic of long chain alkane (729 and 720 cm^{-1}). The ^1H NMR spectrum showed absorptions in the region δ 0.85–1.32 and ^{13}C NMR had absorptions at δ 14.1, 22.7, 29.4, 29.7 and 31.9. All these data are characteristic of straight-chain alkanes. The mass spectrum showed highest m/z at 436 and base peak at m/z 57. The fragmentation pattern with a regular difference of 14 mass units showed U1 to be hentriacontane. However, the high resolution mass spectrum of U1 showed significant peaks at m/z 408.47, 436.5 and 464.53 corresponding to molecular formulae $C_{29}H_{60}$ (nonacosane), $C_{31}H_{64}$

(hentriacontane) and $C_{33}H_{68}$ (tritriacontane) respectively, confirming it to be a mixture of these three alkanes.

Compound U2 was obtained on evaporation of the benzene eluate (100 mg) which after crystallisation from acetone gave a powdery white substance melting at 70°C. Its IR, ^1H and ^{13}C NMR spectra were quite identical with that of U1. Its mass spectrum had M^+ at m/z 464 and base peak at m/z 57 with a fragmentation pattern of regular difference of 14 mass units. These data proved it to be tritriacontane. The m.p. of U2 also corresponded to that reported for tritriacontane (71.8°C).[6]

Evaporation of the benzene-ethyl acetate (4 : 1) eluate yielded U3 (400 mg) melting at 86°C. Apart from C—H stretching and bending absorptions its IR spectrum showed a broad peak with its maximum at 3451 cm^{-1} (O—H stretching), 1063 cm^{-1} (C—O stretching) and 732 and 719 cm^{-1} (long alkyl group). The presence of primary alcoholic group was evident from the ^1H NMR absorption of a triplet (2H) at δ 3.68 and the ^{13}C peak at δ 63.12. The high resolution mass spectrum of U3 had peaks at m/z 476.4, 448.3, 420.3 and 392.3. These correspond to $[M—H_2O]^+$ of $C_{34}H_{69}OH$ (tetratriacontanol), $C_{32}H_{65}OH$ (dotriacontanol), $C_{30}H_{61}OH$ (triacontanol) and $C_{28}H_{57}OH$ (octacosanol). Thus U3 was proved to be a mixture of four alcohols mentioned above.

Compound U4, obtained on evaporation of benzene-ethyl acetate (3 : 1) eluate melted at 137°C. It gave a play of colours with Lieberman-Burchard reagent, indicating it to be a sterol. Its mass spectrum had the highest m/z value at 414 (M^+) corresponding to β-sitosterol. The IR spectrum showed the presence of hydroxyl group (broad absorption with maximum at 3457 cm^{-1}) and absorptions due to *gem* dimethyl group (1386 and 1384 cm^{-1}). Mixed melting point of U4 with an authentic sample of β-sitosterol was undepressed proving its identity.

The structure of U5 obtained from the alcohol extract was tentatively assigned as dihydrokaempferol 4′-methyl ether by comparing its mass spectrum with that of literature.[11] Paucity of material prevented further analysis.

Parmar and coworkers[6] reported the isolation of tritriacontane alone from *U. narum* leaves. In contrast to their finding we confirmed the presence of nonacosane, hentriacontane and tritriacontane in them. They also reported the isolation of tetratriacontanol. But its melting point reported by them (86–87°C) is lower than the literature value (92°C).[11] From our work it is proved that U3 which melted at 86°C was a mixture of four alkanols including tetratriacontanol.

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