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MANNITOL FROM FOMES FOMENTARIUS AND GANODERMA LUCIDUM

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Fomes fomentarius and *Ganoderma lucidum* are wood-rotting fungi of the sub-continent.

Arthur *et al.*[1] reported the isolation of ergosta-7,22-diene-3-one from the fruiting bodies of *Fomes fomentarius* collected from North Scotland. Singh and Rangaswami[2,3] investigated a sample of *F. fomentarius*, collected from western Himalayas (9000 ft) and reported the isolation of ergosterol, ergosta-7,22-diene-3-one, isoergosterone and fomentaric acid.[3] Variation in the constituents of *F. fomentarius* collected from different places prompted us to investigate the fungus of this region.

Fruiting bodies of *F. fomentarius* were collected around Peshawar (1100 ft) from the host tree, *Tamarix troupii* Hole, in August 1969. Hexane extract of the air-dried material yielded ergosterol and isoergosterone only. Alcoholic extract on treatment with ethyl acetate deposited a powdery material which on recrystallization from ethanol had a m.p. 166–167°; the acetate melted at 122–23°. NMR spectrum of the acetate showed the presence of six acetyl groups at 7.96, 7.92 and 7.90 τ (3 singlets, 18H), four proton multiplets centred around 5.7–6.0 τ (two methylene groups) and four proton multiplets centred around 4.55-4.9 τ (4 tertiary protons). Mixed melting point and comparison with the IR spectra of the authentic sample confirmed its identity as D-mannitol.

Lukacs and Zelbner[4] on the other hand reported the isolation of ergosterol from *Ganoderma lucidum*. Subramanian and Swamy[5] later collected this fungus around Pondicherry and also isolated ergosterol. They also reported that no crystalline substance could be isolated from the alcoholic extract.

However, while working up a sample of *Ganoderma lucidum* collected from Bahawalnagar in September 1969, from the host plant *Dalbergia sisso*, we isolated D-mannitol in addition to ergosterol. These were identified by their m.p., IR, and direct comparison with the authentic samples.

Experimental

Melting points are uncorrected. NMR spectrum was determined with Varian HA-100.

Fomes fomentarius.—Dried material (2.4 kg) was exhaustively extracted with hexane. Chromatographic separation of the hexane extract (17.9 g) on alumina yielded isoergosterone (m.p. 107–8°) and ergosterol (m.p. 165°[2]).

Extraction of the material with alcohol and removal of solvent gave a brownish semi-solid mass (67.4 g). This was further extracted with ethyl acetate when a powdery material (3.2 g) was left behind. The ethyl acetate extract was divided into acid and neutral fractions. The acid fraction did not yield any crystalline material, whereas the neutral fraction yielded a further crop of ergosterol.

The powdery material (3.2 g) on recrystallization from ethanol gave D-mannitol, m.p. 166–7°. (Found C, 39.77; H, 7.96. $C_6H_{14}O_6$ requires C, 39.57; H, 7.75%). ν_{max} (nujol) 3250, 1260, 1075, 1017 cm^{-1}. Acetylation of mannitol with acetic anhydride and pyridine gave hexaacetyl mannitol, m.p. 122–23° (Found C, 50.16; H, 5.86. $C_{18}H_{26}O_{12}$ requires; C, 49.77; H, 6.03%). ν_{max} (nujol) 1738, 1230 cm^{-1}.

Ganoderma lucidum.—Dried material (500 g) was extracted successively with hexane and ethanol. The hexane extract yielded ergosterol only. The alcoholic extract was worked up giving D-mannitol, m.p. and mixed m.p. 166°; hexaacetate, m.p. and mixed m.p. 122°. The IR spectras were identical.

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References

1. H.R. Arthur, T.G. Halsall and R.D. Smith, J. Chem. Soc., 2603 (1958).
2. Pratap Singh and S. Rangaswami, Ind. J. Chem., **3,** 575 (1965).
3. Pratap Singh and S. Rangaswami, Tetrahedron Letters, **2,** 149 (1967).
4. L. Lukacs and J. Zelbner, *Cited in Modern Methods of Plant Analysis* (Springer-Verlag, Berlin, 1955), Vol. 3, p. 144.
5. S. Sankara Subramanian and M. Marayan Swamy, J. Sci. Ind. Res. (India), **20B,** 39 (1961).