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ALKALOIDS AND TERPENOIDS OF *MICHELIA* SPECIES

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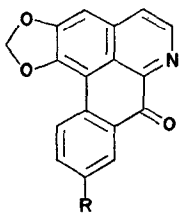
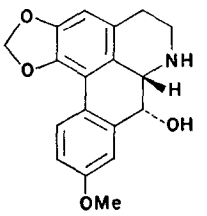
Key Word Index—*Michelia lanuginosa*; *M. cathcartii*; *M. excelsa*; Magnoliaceae; liriodenine; lanuginosine; parthenolide; sitosterol; fatty alcohol.

Recent investigations[1–4] on the trunk bark of *Michelia lanuginosa* Wall have resulted in the isolation of four sesquiterpene lactones, (dihydroparthenolide[1], lanuginolide[1], 11,13-dehydrolanuginolide[2] and parthenolide[5]) and two new aporphine alkaloids, viz. lanuginosine[3] (I) and michelanugine[4] (II) along with a known aporphine alkaloid liriodenine[4,6] (III). These results induced us to undertake thorough chemical investigation on the leaves and roots of *M. lanuginosa* as well as two other so far uninvestigated *Michelia* species, viz. *M. cathcartii* HK. f. & T and *M. excelsa* Blume (Magnoliaceae, tribe Magnolieae). These three Indian *Michelia* species are lofty trees growing in the temperate Himalayas at an altitude of 1500–2500 m, from Nepal to Bhotan and in the Khasia hills.[7]



(I) R = OMe
(III) R = H



(II)

In general, the dried plant material was extracted successively with $CHCl_3$ and EtOH at room temperature. The respective extracts were concentrated under reduced pressure. The residue from each extract was separated into basic and non-basic constituents in the usual way. The non-basic fraction of the alcoholic extract did not afford any characterizable material. The neutral fractions of the $CHCl_3$ extracts were chromatographed over silica gel and the basic fractions of the $CHCl_3$ as well as EtOH extracts were chromatographed over Brockmann alumina. In each case the chromatogram was eluted successively with solvents and solvent mixtures of increasing polarity. The yields of alkaloids and sitosterol isolated in our laboratory from the available parts of the aforesaid *Michelia* species are

[1] TALAPATRA, S. K., PATRA, A. and TALAPATRA, B. (1970) *Chem. Commun.* 1534.
[2] TALAPATRA, S. K., PATRA, A. and TALAPATRA, B. (1973) *Phytochemistry* **12**, 2312.
[3] TALAPATRA, S. K., PATRA, A. and TALAPATRA, B. (1969) *Chem. Ind. (London)* 1056.
[4] TALAPATRA, S. K., PATRA, A. and TALPATRA, B. (1970) Unpublished work; presented in the Convention of Chemists, Madras, *Abstracts* p. 24.
[5] GOVINDACHARI, T. R., JOSHI, B. S. and KAMAT, V. N. (1965) *Tetrahedron* **21**, 1509.
[6] BUCHANAN, M. A. and DICKEY, F. E. (1960) *J. Org. Chem.* **25**, 1389; TAYLOR, W. I. (1961) *Tetrahedron* **14**, 42.
[7] HOOKER, J. D. (1875) *Flora of British India*, Vol. I, pp. 42–43, Reeve, London.

recorded in Table 1. C_6H_6 and C_6H_6–$CHCl_3$ (1:1) eluted sitosterol, m.p. 137–138° (acetate, m.p. 133–134°; benzoate, m.p. 143–144°) and C_6H_6—$CHCl_3$ (1:3) eluted parthenolide, m.p. 115–116° from the chromatograms of the neutral fractions. These two compounds were not found to occur in the same part of any plant. The neutral fractions of the leaves of *M. lanuginosa* and the root bark of *M. excelsa* afforded in addition to sitosterol only one other neutral constituent, an uncharacterized fatty alcohol, m.p. 85°, ν_{max}(KBr) 3450 cm^{-1} (OH), being eluted out of the column in the earlier C_6H_6 fractions. The basic fractions afforded either liriodinine (III, m.p. 280–282° *d*) or a mixture of liriodenine and lanuginosine (I, m.p. 317–320° d) from the yellow $CHCl_3$ eluates (exhibiting green fluorescence) of the alumina chromatograms. The difficulty separable mixture of I and III exhibiting a single iodine staining spot in TLC but showing two distinct fluorescent zones (III, yellow; I, orange–yellow) under UV light were separated by repeated fractional crystallizations from $CHCl_3$ and subsequent purification by repeated chromatography over alumina. It is noteworthy that so far, to our surprise, *M. cathcartii* and *M. excelsa* do not appear to produce any of the germacranolides or the 7-hydroxy noraporphine II—the constituents of *M. lanuginosa*.

TABLE 1. YIELDS OF THE COMPOUNDS ISOLATED FROM SOME *Michelia* SPECIES (mg/100 g)

Plant part	Lanuginosine (I)	Liriodenine (III)	Michelanugine (II)	Sitosterol
M. lanuginosa				
Leaves	0·3	1·5	—	10
Trunk-bark*	9	5	6	—
Root-bark†	13	4	—	—
M. cathcartii				
Trunk-bark	2·5	9	—	22
M. excelsa				
Trunk-bark	—	11	—	25
Root-bark	—	5	—	40

* Contained all four germacranolides.
† Contained only parthenolide.

All the isolated compounds were identified by direct comparison (m.m.p., IR, co-TLC) with the respective authentic samples isolated earlier in our laboratory. Voucher specimen Nos. T/M.l/3/71, T/M.c/4/71 and T/M.e/5/71 have been preserved in this laboratory.

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