

Alangiside: A Monoterpenoid Lactam

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Summary The structure and absolute configuration of *O*-methylalangiside have been established as (6) by chemical and spectroscopic studies and by correlation with ipecoside.

Alangium lamarckii Thw. is a rich source¹ of alkaloids structurally related to the Ipecac alkaloids, e.g. emetine (1). This Communication outlines the isolation and chemistry of alangiside (4) which is presumably derived from desacetylipecoside (2)² the established³ biological precursor of the Ipecac bases.

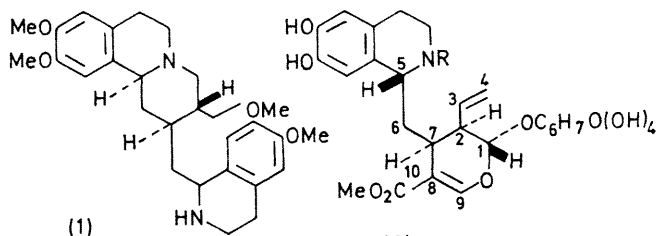
Alangiside, $[\alpha]_D -105^\circ$ (MeOH), was isolated from the roots, leaves, or fruit of *A. lamarckii* (best source unripe fruit) by a combination of countercurrent distribution and chromatography. Its molecular formula, $C_{25}H_{31}NO_{10}$, was confirmed by mass spectrometric study of the lactam itself and of four derivatives [(5)—(7) and (10)]; the fragmentation patterns were in agreement with the presence of residue (11) in these substances. The u.v. spectrum of alangiside (bathochromic shift in alkali) was similar to that of ipecoside (3)^{2,4} whereas the i.r. spectrum showed only one carbonyl absorption at 1650 cm^{-1} . Signals (τ values, CD_3SOCD_3) appeared in the n.m.r. spectrum of alangiside at 2.61 (1-H, C-9), 3.25 (2-H, Ar-H), 4.6 (3-H, C-3, and C-4) and 6.21 (3-H, OMe). β -Glucosidase cleaved alangiside to yield D-glucose and the aglucone, $C_{19}H_{21}NO_5$. Alangiside was converted into (a) a penta-*O*-acetate (5), (b) dihydroalangiside (9), which contained a C-ethyl group (n.m.r.), by catalytic hydrogenation and so into the penta-acetate (10), and (c) *O*-methylalangiside (6) by diazomethane and into the corresponding tetra-acetate (8).

The foregoing data, when taken with biogenetic considerations, lead to structure (4) for alangiside and a spectroscopic study of the foregoing derivatives supported this constitution.

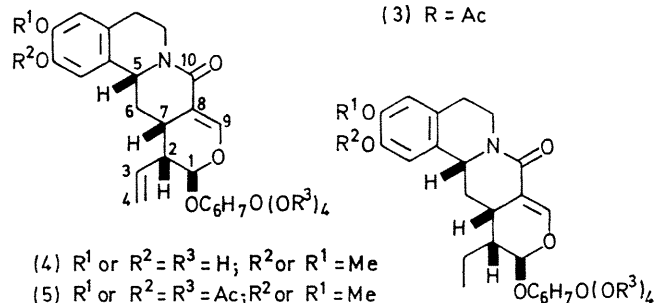
Correlation with desacetylipecoside (2) was therefore carried out

Treatment of the hydrochloride² of (2) with sodium carbonate or ammonia caused rapid lactamisation and the product (8) was methylated with diazomethane to give the

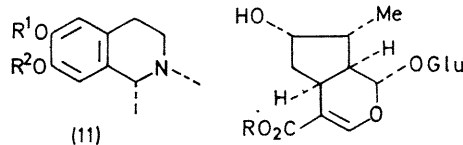
ether (6). This was identical (spectroscopy, chromatography) with *O*-methylalangiside. It follows that structure



(2) R = H
(3) R = Ac



(4) R^1 or $R^2 = R^3 = H$; R^2 or $R^1 = Me$
(5) R^1 or $R^2 = R^3 = Ac$; R^2 or $R^1 = Me$
(6) $R^1 = R^2 = Me$; $R^3 = H$
(7) $R^1 = R^2 = Me$; $R^3 = Ac$
(8) $R^1 = R^2 = R^3 = H$
(9) R^1 or $R^2 = R^3 = H$; R^2 or $R^1 = Me$
(10) R^1 or $R^2 = R^3 = Ac$; R^2 or $R^1 = Me$



(12) R = Me
(13) R = H

(6) is a complete representation for *O*-methylalangiside and two structures (4) are admissible at this stage for alangiside itself.

It is of interest, considering both the importance of loganin (**12**) for the biosynthesis of the Ipecac alkaloids⁵ and the structure of alangiside, that loganic acid (**13**)⁶ was also obtained during the above isolation from the unripe fruit of *A. lamarchii*.

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¹ *Inter alia* A. R. Battersby, R. S. Kapil, D. S. Bhakuni, S. P. Popli, J. R. Merchant, and S. S. Salgar, *Tetrahedron Letters*, 1966, 4965; S. C. Pakrashi and B. Achari, *Experientia*, 1970, **26**, 933 and refs. therein.

² A. R. Battersby, A. R. Burnett, and P. G. Parsons, *J. Chem. Soc. (C)*, 1969, 1187; O. Kennard, P. J. Roberts, N. W. Isaacs, F. H. A. Allen, W. D. S. Motherwell, K. H. Gibson, and A. R. Battersby, *Chem. Comm.*, 1971, 899.

³ A. R. Battersby and R. J. Parry, *Chem. Comm.*, 1971, 901.

⁴ A. R. Battersby, B. Gregory, H. Spencer, J. C. Turner, M.-M. Janot, P. Potier, P. Francois, and J. Levisalles, *Chem. Comm.*, 1967, 219.

⁵ A. R. Battersby and B. Gregory, *Chem. Comm.*, 1968, 134.

⁶ *Cf. e.g.* C. J. Coscia and R. Guarnaccia, *Chem. Comm.*, 1968, 138.