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A PRELIMINARY INVESTIGATION OF THE ALKALOIDS OF *PHOEBE LANCEOLATA*

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ABSTRACT

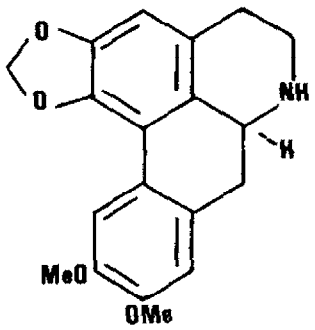
Nordicentrine (1) and dicentrinone (2) have been isolated from the leaves and terminal branchlets of *Phoebe lanceolata* (Wall.) Ness. (Lauraceae).

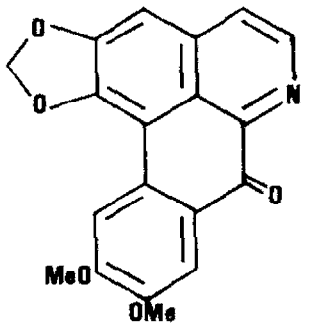
INTRODUCTION

The genus *Phoebe*, which belongs to the family Lauraceae, comprises 70 species which can be found in tropical regions of Asia and America[4]. *P. lanceolata* (Wall). Ness., occurs in the montane forests of West Sumatra where it is known locally as "madang sirai". This species yields a good timber and in West Sumatra some healers use the young leaves, mixed with other ingredients, for treatment of cuts and in the preparation of a tonic.

During a survey of West Sumatran plants for alkaloids[1] the leaves of *P. lanceolata* gave a strongly positive test for these substances. Extraction of the leaves and terminal branchlets then gave a crude alkaloid which was easily divided into phenolic and non-phenolic bases. Both of these fractions proved to be complex mixtures of what appeared to be closely related substances for treatment of the phenolic bases with diazomethane gave a mixture which had very similar behaviour to that of the crude non-phenolic bases on thin layer chromatography.

For this reason, attention was first focussed on the mixture of non-phenolic bases. Two alkaloids were isolated by chromatography and these have been identified as the aporphine nordicentrine (1) and the oxoaporphine dicentrinone (2).





EXPERIMENTAL

Melting points were determined on a Kofler hot stage. Infrared spectra were recorded with a Perkin Elmer 283 spectrophotometer and ultraviolet spectra were measured with a Hewlett Packard 8450A instrument. Low resolution mass spectra were determined with either a Hewlett Packard 5896 or a Varian MAT CH7 spectrometer. N.m.r. spectra were obtained with a Hitachi Perkin Elmer R-24B spectrometer operating at 60 MHz or with a Bruker WP80 instrument operating at 80 MHz. The adsorbent for analytical thin layer chromatography was Merck Kieselgel GF_{254}; Woelm neutral alumina and Merck silica gel 60 were used for column chromatography.

A voucher specimen of the plant material (DA 266) has been lodged in the *Herbarium Bogoriense,* Bogor, Indonesia.

Isolation of Nordicentrine (1) and Dicentrinone (2)

The air-dried leaves and terminal branchlets of *P. lanceolata,* which had been collected near Bukittinggi in West Sumatra during August 1983 were milled and the powdered material (2.2 kgs) was extracted thrice with methanol (7ℓ) for 2 days at room temperature. The combined extracts were concentrated to *ca.* 1.5ℓ under reduced

pressure then stirred with 5% aq. H_2SO_4 and left overnight. The acid extract was then decanted, basified with aq. NH_3 and re-extracted with chloroform; evaporation of the solvent then gave the crude base as a brown gum (8.7 g).

As the marc still gave a strong test for alkaloids, it was extracted twice with 0.05 N ammoniacal chloroform (7ℓ) for 2 days at room temperature. The chloroform extract was concentrated to **ca.** 1ℓ and shaken exhaustively with 5% aq. H_2SO_4, then the acid layer was basified with aq. NH_3 and re-extracted with chloroform. Evaporation of this extract gave a second crop of crude alkaloid as a brown gum (7.9 g). As both crude bases behaved similarly on t.l.c., they were combined redissolved in chloroform and shaken 5% aq. NaOH (4 × 100 ml). The remaining chloroform solution was washed with brine, dried and evaporated to yield the crude non-phenolic bases as a brown gum (4.9 g). When solid CO_2 was added to the alkaline solution a copious precipitate formed; this was extracted with chloroform. Evaporation of the solvent then gave the crude phenolic bases as a brown solid (8.4 g).

Chromatography of the crude non-phenolic alkaloids on neutral alumina gave two series of fractions which were eluted with increasing amounts of chloroform in benzene.

The faster-moving fractions were re-chromatographed on silica gel. Elution of the column with increasing amounts of chloroform in benzene gave one major fraction which on evaporation yielded nordicentrine (1) as a yellowish gum (350 mg). λ_{max} (EtOH) 220, 282, 306 nm (log ε 4.50, 4.16, 4.20, respectively). Mass spectrum m/z: 325 (M^+ 66%), 324(100), 323(11), 308(13), 294(10), 293(32), 266(12), 265(17), 165(13). ^{1}H nmr (80 MHz) δ ($CDCl_3$) : 2.5-3.5, m, 7H; 3.92, s, 6H, 2xOCH_3; 5.94 and 6.06, d(J 1.1 Hz) CH_2O_2; 6.52, s, H3; 6.75, s, H8; 7.69, s, H11.

Nordicentrine (1) (20 mg) was dissolved in methanol (1 ml) and 50% aq. HBr (0.1 ml) was added. The solution was then evaporated under reduced pressure and the residue was recrystallized from methanol; nordicentrine hydrobromide formed plates (10 mg) which decomposed without melting at **ca.** 250°. (Found: C, 55.8; H, 4.9; N, 3.2. Calcd. for $C_{19}H_{20}BrNO_4$: C, 56.2; H, 5.0; N, 3.4%.) The infrared spectrum of this salt agreed with the spectrum of nordicentrine hydrobromide provided by Professor M.P. Cava.

The slower-moving fractions from the alumina column which had the same behaviour on t.l.c. were combined and re-chromatographed on neutral alumina. Elution of the column with increasing amounts of chloroform in benzene gave one major fraction; evaporation and crystallization of the residue from chloroform/methanol (1:1) then gave dicentrinone (2) as yellow needles (250 mg) m.p. 295-297°[2] give m.p. 300° (dec); Rastogi and Borthakur[3] give m.p. 295-297° (dec) λ_{max} (EtOH) 249, 270, 310 (sh), 352, 388 nm (log ε 4.26, 4.18, 3.71, 3.76, 3.68, respectively). ν_{max} (KBr) 1650, 1605, 1590, 1525, 1290, 1065 cm^{-1}. Mass spectrum m/z: 335 (M^+ 100%), ^{1}H n.m.r. (60 MHz) (CF_3CO_2H) : 4.12, s, OCH_3; 4.18, s, OCH_3; 6.67, s, CH_2O_2; 7.53, s, H3; 7.97, s, H8;

8.25, s, Hll; 8.45 , d(J 6Hz) H4 ; 8.75, d(J 6Hz) H5. These data are very similar to those reported for dicentrinone (2)[2].

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1. Arbain, D. *A Study of the Alkaloids of Some West Sumatran Plants.* Ph.D. Thesis, 1986, University of Western Australia.
2. Cava, M.P. and Venkateswarlu, A. Dehydroocopodine, Dicentrinone and Other Alkaloids from *Ocotea macropoda and Hernandia jamaicensis. Tetrahedron,* 1971, **27**, 2639-2643.
3. Rastogi, R.C. and Borthakur, N. Alkaloids of *Litsaea laeta and L. salicifolia. Phytochemistry,* 1980, **19**, 998-999.
4. Willis, J.C. *A Dictionary of the Flowering Plants and Ferns.* 8th Ed., 1973, (revised by H.K. Airy Shaw). Cambridge University Press, Cambridge.