

# THE ALKALOIDS OF *NEOLITSEA PUBESCENS* (LAURACEAE)

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The bark of *Neolitsea pubescens* (Teschn.) Merr. (family Lauraceae) affords a high yield of alkaloids (1.2%) and the major constituents have been identified as the known aporphine alkaloids roemerine, *N*-methyllaurotetanine, boldine, and lauro-litsine. Similar alkaloids have been isolated from various parts of the Japanese species *Neolitsea sericea*, the bark of which contains boldine<sup>1</sup> and the leaves boldine, lauro-litsine, roemerine, and litsericine.<sup>2</sup> Another species, *Neolitsea pulchella*, contains the aporphine alkaloid neolitsine.<sup>3</sup>

Bark of *Neolitsea pubescens* was collected from a tree (20 ft high, 4 in. diameter) growing in mountain forest at an elevation of 8600 ft at Marafunga in the Eastern Highlands District of the Territory of New Guinea (Voucher specimen TGH 13,225).

## Experimental

Milled, dried bark of *N. pubescens* (750 g) on extraction by the method used previously<sup>4</sup> afforded 9.0 g of crude alkaloids. The alkaloids were separated by chromatography on a column of alumina that had been made neutral by treatment with ethyl acetate. Quantitative yields for the individual alkaloids cannot be given, but roemerine, boldine, and *N*-methyllaurotetanine and lauro-litsine are all major constituents, with lauro-litsine predominant.

(i) *Roemerine*.—A series of fractions eluted from the column by benzene gave a colourless gum on evaporation. Thin-layer chromatography showed the presence of mainly one component, which formed a sparingly soluble hydrochloride on addition of aqueous hydrochloric acid. Recrystallization from water gave roemerine hydrochloride as colourless needles, m.p. 245–248°,  $[\alpha]_D -47^\circ$  (c, 0.11 in ethanol). The n.m.r. and i.r. spectra of the free base regenerated from the hydrochloride were identical with those of roemerine isolated from *Xylopiya papuana*,<sup>5</sup> and the identification was confirmed by direct comparison with authentic roemerine.

(ii) *N-Methyllaurotetanine*.—Continued elution with benzene gave a second constituent, further amounts of which were eluted by benzene containing 1–5% chloroform. This material would not crystallize but it was obtained as a colourless powder,  $[\alpha]_D +78^\circ$  (c, 0.80 in  $\text{CHCl}_3$ ), and was shown to be identical with authentic *N*-methyllaurotetanine by comparative thin-layer chromatography and by the identity of the n.m.r. and i.r. spectra of the two samples.

(iii) *Boldine*.—Fractions eluted by benzene containing a greater proportion of added chloroform contained another component that crystallized from chloroform in colourless needles, m.p. 162–163°,  $[\alpha]_D +110^\circ$  (c, 0.13 in ethanol). The physical constants determined for this alkaloid are in agreement with those of the known alkaloid boldine,<sup>6</sup> and its identity with boldine was confirmed by its spectroscopic properties. The mass spectrum showed a molecular ion peak at *m/e* 327 and the 100-Mc/s n.m.r. spectrum was typical of a 1,2,9,10-tetrasubstituted aporphine. The signals were assigned as follows: three-proton singlet at  $\delta$  2.49 (*N*-methyl), three-proton

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<sup>1</sup> Nakasato, T., and Nomura, S., *Yakugaku Zasshi*, 1957, **77**, 816.

<sup>2</sup> Nakasato, T., and Nomura, S., *Yakugaku Zasshi*, 1959, **79**, 1267.

<sup>3</sup> Hui, W. H., Loo, S. N., and Arthur, H. R., *J. chem. Soc.*, 1965, 2285.

<sup>4</sup> Johns, S. R., Lamberton, J. A., and Sioumis, A. A., *Aust. J. Chem.*, 1966, **19**, 2331.

<sup>5</sup> Johns, S. R., Lamberton, J. A., and Sioumis, A. A., *Aust. J. Chem.*, 1968, **21**, 1383.

<sup>6</sup> Shamma, M., and Slusarchyk, W. A., *Chem. Rev.*, 1964, **64**, 59.

singlet at  $\delta$  3.55 (C1-methoxyl), three-proton singlet at  $\delta$  3.80 (C10-methoxyl), and three one-proton singlets at  $\delta$  6.53,  $\delta$  6.73, and  $\delta$  7.88 (C3, C8, and C11 aromatic protons respectively).

(iv) *Laurokitsine*.—The material from the fractions eluted by chloroform-methanol was obtained as a colourless gum that could not be crystallized. Comparative thin-layer chromatography and the n.m.r. spectrum of the crude material indicated that it was largely composed of laurokitsine, and acetylation with acetic anhydride-pyridine at room temperature, followed by mild treatment with dilute sodium hydroxide solution in order to hydrolyse *O*-acetyl groups, gave *N*-acetyl-laurokitsine, which crystallized from chloroform in colourless needles, m.p. 255–260°,  $[\alpha]_D^{25} +374^\circ$  (c, 0.12 in  $\text{CHCl}_3$ ). The identification of *N*-acetyl-laurokitsine was confirmed by comparison with authentic *N*-acetyl-laurokitsine<sup>5</sup> (i.r. spectrum, mixed m.p.).

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