Phytochemistry, Vol. 28, No. 12, pp. 3577–3578, 1989.
Printed in Great Britain.

0031 9422/89 \$3.00 + 0.00

APORPHINE ALKALOIDS FROM *OCOTEA CAESIA**

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(*Received in revised form* 26 *April* 1989)

Key Word Index—*Ocotea caesia*; Lauraceae; aporphine alkaloids.

Abstract—The trunk-wood of *Ocotea caesia* contains the aporphine alkaloids (−)-zenkerine, (+)-laurelliptine, (−)-pulchine and (+)-isoboldine and the novel alkaloid (*S*)-(+)-1-hydroxy-2,9-dimethoxynoraporphine.

INTRODUCTION

Brazilian species of the family Lauraceae have been extensively studied in previous papers of this series [1]. Aryl- and styrylpyrones, allyl- and propenylphenols, lignans and neolignans were found to be the main constituents of the slightly polar extracts. In the present paper, we report the isolation, from a polar extract of *Ocotea caesia*, of five aporphine alkaloids, including the novel (S)-1-hydroxy-2,9-dimethoxynoraporphine.

RESULTS AND DISCUSSION

The crude alkaloidal extract from wood of *O. caesia* proved to be relatively unstable and did not yield pure compounds by silica gel CC. However, by using techniques such as droplet countercurrent chromatography (DCCC), separation on Sephadex LH-20 and flash chromatography, we obtained for the first time from a member of the Lauraceae (−)-zenkerine (**1a**), previously isolated from *Isolona zenkeri* (Annonaceae) and found to be unstable [2], besides (−)-pulchine (**1b**) [3], (+)-laurelliptine (**2a**) [4], (+)-isoboldine (**2b**) [5] and the novel alkaloid **3a**.

A combination of NMR ^{1}H and ^{13}C counts with low-resolution mass spectrometry led to the molecular formula $C_{18}H_{19}O_3N$ for **3a**. UV data are compatible with a 1,2,9-trioxygenated aporphine alkaloid. This suggestion was confirmed by the ^{1}H NMR spectrum, where a doublet ($J = 7$ Hz) at δ8.05 indicates the existence of the typically deshielded *ortho*-coupled H-11 of an aporphine. H-3 is represented by a singlet at 6.65 ppm, whereas H-8 and H-10 give rise to a multiplet (δ6.8–7.1). In the absence of an *N*-methyl signal, the presence of two *O*-methyl signals (two singlets, δ3.75 and 3.85) and chemical shift values which are not compatible with the substitution of C-1 by a methoxyl, **3a** must be a 1-hydroxy-2,9-dimethoxynorarporphine. As was to be expected, acetylation resulted in an upfield shift of 0.5 ppm of the ^{1}H NMR doublet due to H-11 [6]. Alkali-induced UV shifts and ^{13}C NMR data corroborate the existence of a phenolic hydroxyl on ring A. A positive specific optical rotation ($[\alpha]_D + 61°$) revealed the L-*S* configuration at C-6a [7].

EXPERIMENTAL

Isolation of constituents. Powdered trunk wood (3 kg) from *Ocotea caesia* Mez (collected at Ilha do Cardoso, SP, Brazil, by Prof. M. Motidome, Universidade de São Paulo and identified by Prof. K. Kubitzki, Universität Hamburg) was extracted successively with hexane and EtOH. The EtOH extract was treated in the usual way to separate a crude alkaloid fr. This was submitted successively to DCCC (descending mode, $CHCl_3$–MeOH–H_2O, 5:5:3), flash chromatography [8] (silica gel, $CHCl_3$–MeOH–H_2O, 5:5:3, organic layer), CC (alumina, $CHCl_3$) and sepn on Sephadex LH-20 (MeOH), yielding **1a** (24 mg), **1b** (17 mg), **2a** (445 mg), **2b** (19 mg) and **3a** (12 mg).

R-(−)-*Zenkerine* (**1a**). Mp 73–76° (MeOH) $[\alpha]_D^{25} -103°$ (MeOH; *c* 0.17) (lit. −99° [2]), for spectral data see refs [2, 9].

R-(−)-*Pulchine* (**1b**). Mp 58–60° (MeOH), $[\alpha]_D^{25} -128°$ (MeOH; *c* 0.19) (lit. −130° [2]), for spectral data see refs [2, 9].

S-(+)-*Laurelliptine* (**2a**). Mp 189–191° (MeOH) (lit. 190–192° [4]), $[\alpha]_D^{25}$ +49 (*c* 0.12, MeOH) (lit. +47° [4]), ^{13}C NMR [75 MHz, $(CD_3)_2CO + CD_3OD$] δ:141.84 (C-1), 145.81 (C-2), 109.67 (C-3), 122.87 (C-3a), 27.28 (C-4), 42.64 (C-5), 53.90 (C-6a), 35.14 (C-7), 128.37 (C-7a), 114.75 (C-8), 146.09 (C-9), 147.48 (C-10), 113.45 (C-11), 124.30 and 125.12 (C-11a, C-11c), 119.74 (C-11b), 55.79 and 55.91 (MeO-2, MeO-10), for other spectral data see ref [4].

S-(+)-*Isoboldine* (**2b**). Mp. 120–122° (MeOH) (lit. 122–123° [6]), $[\alpha]_D^{25} + 51°$ (MeOH; *c* 0.13) (lit. +54° [6]), for spectral data see refs [10, 11].

S-(+)-1-*Hydroxy*-2,9-*dimethoxynoraporphine* (**3a**). Amorphous, $[\alpha]_D^{25}$ +61° (MeOH; *c* 0.11). IV ν_{max}^{KBr} cm^{-1}: 3500–3200, 1600, 1520, 1470. UV λ_{max}^{MeOH} (log ε): 236 (3.91), 279 (4.02), 315 (sh, 3.99). UV λ_{max}^{MeOH} nm (log ε): 245 (4.23), 289 (4.36), 326 (4.38). ^{13}C NMR [20 MHz, $(CD_3)_2CO$]. δ: 141.47 (C-1), 145.86 (C-2), 111.81 (C-3), 129.55 and 127.43 (C-3a, C-11c), 29.50 (C-4), 43.97

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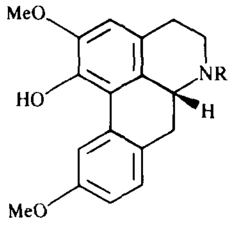
* Part 93 in the series 'The Chemistry of Brazilian Lauraceae'. For part 92 see ref. [1]. Based in part on the M.Sc. thesis presented by J. H. Y. V. to Universidade de São Paulo (1987).



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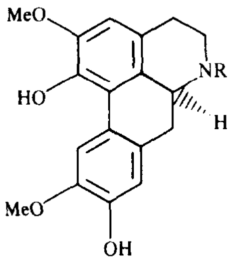

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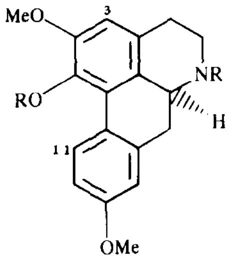

3a R = H
3b R = Ac

(C-5), 54.98 (C-6a), 37.07 (C-7), 137.12 (C-7a), 112.79 (C-8), 159.21 (C-9), 115.77 (C-10), 128.95 (C-11), 123.93 (C-11a), 116.01 (C-11b), 56.72 and 55.54 (MeO-2, MeO-9). ^{1}H NMR [60 MHz, $(CD_3)_2CO$] δ: 6.65 (*s*, H-3), 6.8–7.1 (*m*, H-8, H-10), 8.05 (*d*, *J* = 7 Hz, H-11), 3.75 and 3.85 (two *s*, MeO-2, MeO-9). MS *m/z* (rel. int.): 297 $[M]^+$ (97), 296 $[M-1]^+$ (100), 282 (43), 280 (59), 266 (37). N,O-*Diacetate* (**3b**), ^{1}H NMR (60 MHz, $CDCl_3$) δ6.65 (*s*, H-3), 6.8–7.2 (*m*, H-8, H-10), 7.55 (*d*, *J* = 7 Hz, H-11), 2.25 (*s*, OAc), 3.85 (*s*, MeO-2, MeO-9).

Acknowledgements—The authors are grateful to CNPq and FAPESP for financial support.

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