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# γ-LACTONES FROM *MEZILAURUS SYNANDRA**

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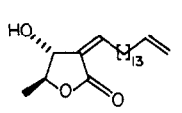
**Key Word Index**—*Mezilaurus synandra*; Lauraceae; benzylisoquinoline alkaloids; α-alkyl-β-hydroxy-γ-methyl-γ-lactone.

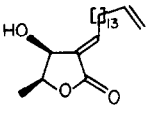
**Abstract**—The trunk wood of *Mezilaurus synandra* contains the known alkaloids coclaurine, corytuberine and norcinnamolaurine, besides the novel (2*R*,3*R*,4*S*)-2-dodec-ω-enyl-3-hydroxy-4-methylbutanolide.

The trunk wood of *Clinostemon mahuba* (A. Samp.) Kuhlm. et A. Samp. has been shown to contain 22 butanolides, e.g. **1** and **2** [2]. The genus *Clinostemon* belongs to the chemically little known [3] subtribe Beilschmiediineae [4]. An additional genus of this subtribe, *Mezilaurus*, is widespread in Amazonia. One of the species, *M. synandra* (Mez) Kosterm., occurs in the drier *terra firma* forests in the Manaus region [5]. As shown in the present work, its trunk wood contains a butanolide (**3a**). Compound **4** would be expected to be less polar than **3a**. Since **4** was eluted from a Si gel column in succession to **3a** it may well be an artificial dehydration product of this β-hydroxy-γ-lactone.

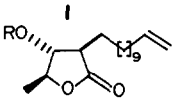
The mass spectrum of **3a** showed all the characteristic peaks previously assigned [2] to the lactone moieties of the hydrogenation products of **1** (**5a**) and **2** (**6a**) (Table 1). While the constitution of these moieties should thus be identical, the side chains not only differ by the number of methylenes ([M]$^+$ **3a** 282, **5a** and **6a** 340) but also by the presence of a terminal vinyl group (*ca* δ 5.6 and 4.95, respectively, one and two hydrogens) in **3a**. The comparison of $^1$H NMR data indicate **3a** to be analogous to **5a** and not to **6a** (Table 2) with respect to relative



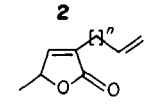
**1**



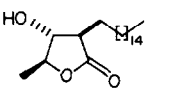
**2**



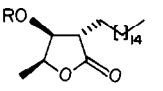
**3a** R = H
**3b** R = Ac



**4**



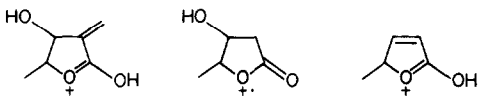
**5a** R = H
**5b** R = Ac



**6a** R = H
**6b** R = Ac

*Part 72 in the series "The Chemistry of Brazilian Lauraceae". For Part 71 see ref. [1]. Taken from part of the M.Sc. thesis submitted by R.S. to Universidade Federal de Minas Gerais.

Table 1. Structural assignment and relative intensities of all major mass spectral peaks of butanolides



| m/z | 129 | 116 | 99 |
|---|---|---|---|
| **3a** | 40 | 100 | 30 |
| **5a** [2] | 64 | 100 | 34 |
| **6a** [2] | 42 | 100 | 30 |

Table 2. $^1$H NMR chemical shifts ($CDCl_3$, $\delta$-values) and coupling constants (in parentheses, Hz) of the lactone ring protons of butanolides

| | H-2 | H-3 | H-4 |
|---|---|---|---|
| **3a** | 2.5 *m* | 3.72 *dd* (8, 7) | 4.20 *dq* (7, 6) |
| **5a** | 2.6 *m* | 3.83 *dd* (8, 7) | 4.23 *dq* (7, 6) |
| **6a** | 2.55 *m* | 4.2–4.7*m* | 4.2–4.7 *m* |
| **3b** | 2.5 *m* | 4.90 *dd* (6, 5) | 4.25 *dq* (5, 6) |
| **5b** | 2.65 *m* | 4.92 *dd* (6, 4.5) | 4.37 *dq* (4.5, 6.5) |
| **6b** | 2.7 *m* | 5.62 *dd* (5, 3.5) | 4.60 *dq* (3.5, 5) |

configuration. Finally, comparison of $[\alpha]_D$ values (in dioxane) show **3a** (−7.5°) to be also analogous to **5a** (−9.5° [2]) with respect to absolute configuration.

The two intense lactone mass spectral peaks at *m/z* 129 and 116 of **3a** (Table 1) are replaced by peaks at *m/z* 112 (25%), 111 (24) and 98 (95), respectively, in **4**. This, together with preliminary $^1$H NMR data, suggests the existence of the endocyclic $\alpha,\beta$-unsaturated $\gamma$-lactone system. The detailed analysis of **4**, however, must await the isolation of more material.

The identification of further constituents of the wood of *M. synandra*, sitosterol, coclaurine [6, 7] norcinnamolaurine [8] and corytuberine [9–12] relied on spectral comparisons with published data.

## EXPERIMENTAL

*Isolation of the constituents.* A sample of trunk wood of *Mezilaurus synandra* from the vicinity of Manaus was powdered (5 kg) and extracted with EtOH. The extract (100 g) was washed successively with petrol and $C_6H_6$. The former soln was evaporated and the residue (6 g) purified to give sitosterol (5 mg) by repeated CC (Si gel). The $C_6H_6$ soln was evaporated and the residue (85 g) washed successively with EtOAc and MeOH. The former soln was evaporated and the residue (5 g) submitted to pressure CC (polyamide); $C_6H_{14}$–EtOAc (9:1) and $C_6H_{14}$–EtOAc (8.5:1.5) eluting fractions which were purified by crystallization to give, respectively, **3a** (17 mg) and **4** (1 mg). The MeOH soln was evaporated and the residue (73 g) submitted to pressure CC (polyamide); elution with solvent mixtures ($C_6H_{14}$–EtOAc–MeOH) of gradually increasing polarity gave fractions which were crystallized to give coclaurine (15 mg), corytubine (8 mg) and norcinnamolaurine (9 mg).

(2R, 3R, 4S)-2-*Dodec-ω-enyl-3-hydroxy-4-methylbutanolide* (**3a**). Mp 72–76° ($M^+$ found: 282.2184; $C_{17}H_{30}O_3$ requires: 282.2195). IR $\nu_{max}^{KBr}$ cm$^{-1}$: 3440, 1735, 1640, 1470, 1225, 1200, 1190, 1060, 920, 865, 725, 705; $^1$H NMR (60 MHz, $CCl_4$): $\delta$ 1.25 [*s*, $(CH_2)_n$], 1.4 (*d*, *J* = 6 Hz, Me), 2.5 (*m*, H-2), 3.72 (*dd*, *J* = 8, 7 Hz, H-3), 4.20 (*dq*, *J* = 7, 6 Hz, H-4), 4.95 (*m*, $CH_2$=), 5.6 (*m*, CH=); MS *m/z* (rel. int.): 282 (5), 225 (4) 167 (3), 166 (7), 155 (6), 154 (3), 130 (3), 129 (67), 128 (4), 116 (100), 115 (8), 111 (21), 110 (4), 109 (5), 99 (37), 98 (6), 97 (7), 96 (4), 95 (5), 83 (9), 82 (5), 81 (9), 71 (7), 70 (5), 69 (11), 68 (5), 67 (10), 57 (29), 56 (5), 55 (24), 54 (5), 43 (6), 41 (8). *Acetate* (**3a**, $Ac_2O$, $C_5H_5N$, room temp.) (**3b**): oil. IR $\nu_{max}^{KBr}$ cm$^{-1}$: 1780–1735, 1640, 1480, 1380, 1340, 1250, 1200, 1060, 930, 820, 745, 725; $^1$H NMR (60 MHz, $CCl_4$): $\delta$ 1.3 [*s*, $(CH_2)_n$], 1.5 (*d*, *J* = 6 Hz, Me), 2.1 (*s*, OAc), 2.5 (*m*, H-2), 4.9 (*dq*, *J* = 6, 5 Hz, H-3), 4.25 (*dq*, *J* = 6, 5 Hz, H-4), 4.95 (*m*, $CH_2$=), 5.6 (*m*, CH=). *Dihydroacetate* (**3b**, $H_2$, Pd–C, $C_6H_6$): oil. IR $\nu_{max}^{KBr}$ cm$^{-1}$: 1775, 1735, 1530, 1450, 1360, 1255, 1230, 1170, 1100, 800, 720.

*Compound* **4**. Mp 82–86°. IR $\nu_{max}^{KBr}$ cm$^{-1}$: 1730, 1650, 1620, 1540, 1530, 1490, 1300, 1200, 760, 750; $^1$H NMR (60 MHz, $CCl_4$): $\delta$ 1.3 [*s*, $(CH_2)_n$], 1.45 (*d*, *J* = 6 Hz, Me), 2.0 (*m*, $2CH_2C$=), 4.4 (*m*, H-4), 4.8 (*m*, $CH_2$=), 5.5 (*m*, CH=) 5.65 (*br d*, H-3); MS *m/z* (rel. int.): 177 (8), 134 (6), 126 (6), 125 (10), 112 (25), 111 (24), 110 (7), 109 (8), 99 (9), 98 (95), 97 (44), 96 (18), 95 (16), 85 (17), 84 (45) 83 (56), 82 (23), 81 (19), 74 (10), 73 (29), 71 (33), 70 (20), 69 (75), 68 (19), 67 (19), 61 (6), 60 (25), 57 (68), 56 (28), 55 (100), 54 (12), 43 (55), 41 (30).

*Coclaurine.* Mp 215–218° (lit. [6] mp 217–218°).

*Norcinnamolaurine.* Mp 196–198° (lit. [8] mp 197–198°).

*Corytuberine.* Mp 230–233° (MeOH) (lit. [12] mp 240°).

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