FAVELOXIDE, A NEW ISOPRENOID DERIVATIVE FROM THE BRAZILIAN PLANT, *CNIDOSCOLUS PHYLLACANTHUS*

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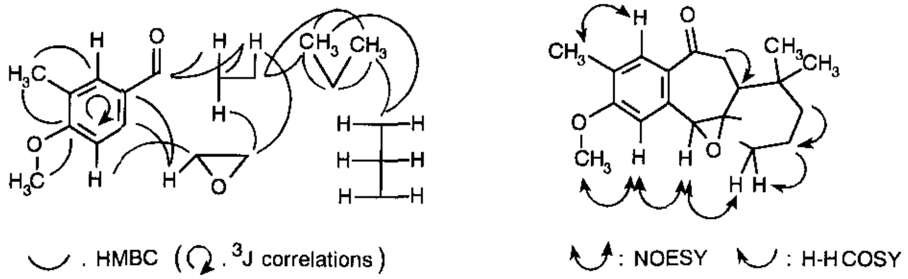
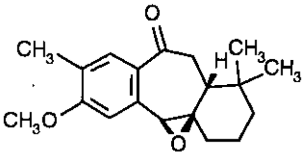
Abstract --- A new isoprenoid derivative, faveloxide, was isolated from the bark of *Cnidoscolus phyllacanthus*. The relative stereostructure (**1**) was determined on the basis of a spectroscopic analysis and a chemical transformation.

In the course of our investigation on antitumor constituents from natural sources, we have isolated five components having new types of skeleton from the Brazilian plant, *Cnidoscolus phyllacanthus* (MART.) PAX et K. HOFFM.[1-3] Further survey of this plant belonging to Euphorbiaceae, resulted in the isolation of a new compound, faveloxide.

Faveloxide (**1**, 5.5 mg, $2.75 \times 10^{-3}\%$), mp 165-169 °C, $[\alpha]_D^{26}$ -117.3° (c 0.486, $CHCl_3$), $C_{19}H_{24}O_3$ determined by HREI-ms (*m/z* 300.1707, Δ -1.8 mmu), was isolated from the MeOH extract of the dried bark of *C. phyllacanthus*, after repeated chromatography on silica gel (elution with hexane and EtOAc mixture) or reversed phase silica gel (ODS, elution with 80-90% MeOH). Faveloxide (**1**) showed characteristic ir absorptions at 1735, 1650, 1600 and 1500 cm^{-1}, and uv maxima (ε) at 269.6 (4200), 232.1 (sh, 5800), 226.8 (8000) and 221.5 (7900) nm due to a conjugated carbonyl and a benzene ring. ^1H, ^{13}C nmr and HMQC spectra showed the signals for three tertiary methyls (δ_H/δ_C: 0.81/28.13; 1.12/26.68; 2.22/15.88), a methoxyl (δ_H/δ_C: 3.91/55.56), four methylenes (δ_H/δ_C: 2.82-2.84/41.13; 1.53,2.02/31.60; 1.66,1.82/19.76; 1.34-1.44/36.92), two methines (δ_H/δ_C: 1.75/45.97; 3.65/60.95), and two quaternary carbons (δ_C 33.99; 64.53). Signals due to a conjugated system consist of seven sp^2 carbons (δ_H/δ_C: 6.96/112.15; 7.52/131.65, δ_C: 127.71; 129.12; 134.18; 160.96; 203.11). A large CH-coupling constant, 176 Hz, between an oxygenated methine hydrogen and a carbon signals (δ_H/δ_C: 3.65/60.95) implied an epoxide ring in the structure of faveloxide (**1**). 2D Nmr analysis with





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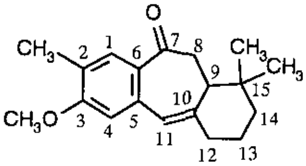

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Figure 1

H-H COSY, NOESY and HMBC spectra indicated the connectivities as illustrated in Figure 1. Judging from the above data including NOE data as shown in Figure 1 and seven degrees of unsaturation derived from the molecular formula, faveloxide was suggested to have the structure (**1**) or its antipode. Since the structure (**1**) implied that faveloxide was an oxidative metabolite of faveline methyl ether (**2**),[1] we treated **2** with an excess of *meta*-chloroperbenzoic acid in CH_2Cl_2 at room temperature. The epoxidized product, $[\alpha]_D^{23}$ -97.1° (c 0.239, $CHCl_3$), was identical to **1** in all respect. The fact that the sole stereoisomer (**1**) was obtained indicated the above epoxidation took place at the C-11 *si*-face that is stereochemically vacant. Consequently the relative stereostructure (**1**) was established for faveloxide.

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REFERENCES

1. Y. Endo, T. Ohta, and S. Nozoe, *Tetrahedron Lett.*, 1991, **32**, 3083.
2. Y. Endo, T. Ohta, and S. Nozoe, *Tetrahedron Lett.*, 1991, **32**, 3555.
3. Y. Endo, T. Ohta, and S. Nozoe, *Tetrahedron Lett.*, 1992, **33**, 353.

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