Two new antineoplastic diterpenes from Taxus mairei

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Two new diterpenes, taxamairins A and B, were isolated from the bark of Taxus mairei. Their structures were determined by spectroscopic means, and finally confirmed by X-ray analysis.

KEYWORDS — Taxus mairei; Taxaceae; diterpene; taxamairin A; taxamairin B; antineoplastic activity

Taxus mairei (Lemée et Levl.) S. Y. Hu (Taxaceae) grows in Fujiang province, China. From the ethanol extract of the bark, two new diterpenes, named taxamairins A and B, possessing a tropone skeleton were isolated together with some taxane-type diterpenes. These new compounds displayed inhibitory activity (IC₅₀ 30.21 μg/ml (taxamairin A) and 26.78 μg/ml (taxamairin B)) against hepatoma cells in vitro. The structure of these compounds was determined by spectroscopy, and finally confirmed by X-ray analysis. To the best of our knowledge, this paper is the first report of diterpenes having a novel skeleton as natural products.

Taxamairin A (1) (0.02% for total extract) was obtained as white crystals from EtOH, mp 223–224°C, MW 338.1505 (Calcd. 338.1518), C₂₀H₂₄O₄, CD (MeOH) λ = 0, UV λmax nm (log ε): 211 (4.43), 255 (4.46), 385 (4.34), 1H-NMR (400 MHz, CDCl₃) δ: 1.33 (6H, d, J = 6.4 Hz, 19 and 20-CH₃), 1.46 (6H, s, 12 and 13-CH₃), 3.36 (1H, heptet, J = 6.46 Hz, 18-H), 3.99 (3H, s, 21-OCH₃), 6.11 (1H, d, J = 10.0 Hz, 7-H), 6.44 (1H, br s, 14-OH), 6.94 (1H, s, 11-H), 7.30 (1H, d, J = 10.0 Hz, 6-H), 7.77 (1H, s, 4-H), IR ν max cm⁻¹: 3410, 1676, 1622. The crystals of 1 used for X-ray analysis were recrystallized from MeOH. The crystals are a monoclinic system, space group C₂h-p21/C with four molecules...
in the unit cell. The cell dimensions are \(a = 10.0907 \text{ Å}, \ b = 8.2893 \text{ Å}, \ c = 96.744^\circ, \ v = 1810.48 \text{ Å}^3\), \(D_c = 1.23 \text{ g/cm}^{-1}\), \(F(000) = 704 \text{ e}\), \(\mu_{\text{MoK} \alpha} = 0.9 \text{ cm}^{-1}\), \(Z = 4\). The X-ray analysis showed that all molecules of 1 were on a plane, except C-9, 10 and 11 which appeared only a little twisted. It could be explained that the result of CD of 1 was zero.

Taxamairin B (2) (0.0025%) was obtained as white crystals, MW 352.1626 (Calcd. 352.1675), \(C_{22}H_{24}O_4\), CD (MeOH) \(\Delta \varepsilon = 0\), UV \(\lambda_{\text{EtOH}} \text{ max } \text{nm} (\log \varepsilon)\): 219 (4.10), 281 (4.12), 355 (3.94), \(^1\)H-NMR (400 MHz, CDCl\(_3\)) \(\delta:\) 1.29 (6H, d, \(J = 6.4 \text{ Hz}\), 19 and 20-CH\(_3\)), 1.44 (6H, s, 12 and 13-CH\(_3\)), 3.40 (1H, heptet, \(J = 6.4 \text{ Hz}\), 18-H), 3.95 (3H, s, 22-OCH\(_3\)), 3.98 (3H, s, 21-OCH\(_3\)), 6.11 (1H, d, \(J = 10.0 \text{ Hz}\), 7-H), 6.92 (1H, s, 11-H), 7.30 (1H, d, \(J = 10.0 \text{ Hz}\), 6-H), 7.85 (1H, s, 4-H), 7.92 (1H, s, 17-H), IR \(\nu_{\text{max}} \text{ cm}^{-1}\): 1675, 1640, 1610. Except for the number of methoxy groups, the \(^1\)H-NMR spectrum of 2 was very similar to that of 1. The spectral data for the compound (2'), methylated derivative of taxamairin A (dimethyl sulfate, K\(_2\)CO\(_3\) in acetone), were in good agreement with those for 2, and the melting point of 2' was not depressed in a mixture with 2.

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REFERENCES

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