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A METHYLATED FLAVONE FROM *ARTEMISIA MESATLANTICA*

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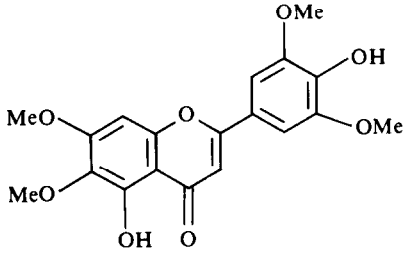
Key Word Index—*Artemisia mesatlantica*; Compositae; Anthemideae; new flavone; 5,4'-dihydroxy-6,7,3',5'-tetramethoxyflavone.

Abstract—From the aerial parts of *Artemisia mesatlantica*, a new highly methoxylated flavone was isolated. Its structure was determined by spectroscopic methods as 5,4'-dihydroxy-6,7,3',5'-tetramethoxyflavone.

INTRODUCTION

As part of our investigations on *Artemisia mesatlantica* Maire (N. Bouzid, C. Moulis and I. Fouraste, unpublished results), we report here the isolation of seven flavonoids. One of these, 5,4'-dihydroxy-6,7,3',5'-tetramethoxyflavone or 7-methyl-6-methoxytricin is a new natural compound.



1

RESULTS AND DISCUSSION

The Et_2O extract of air-dried aerial parts afforded the new compound **1** after chromatographic separations. Its molecular formula, $C_{19}H_{18}O_8$ (MS 374,100) was in accord with a flavone containing two hydroxyl and four methoxyl groups, The ^1H NMR spectrum displayed three singlets at δ3.76 (3H), δ3.92 (6H) and δ3.98(3H) indicating the four methoxyl groups. Substitution at C-7 was demonstrated by the failure of Band II to show a bathochromic shift in NaOAc relative to MeOH alone [1]. The $AlCl_3$ shift in Band I of 24 nm indicated the presence of a free 5-hydroxyl function, and implied a 5-OH,6-OR grouping [2]; as the λ_{max} of Band I was lower than 280 nm in MeOH and appeared as a single peak with $AlCl_3$, the compound was substituted at C_6 by a methoxyl group and at C-3 by a proton (B. Voirin, unpublished results).

The A-ring structure was compatible with ^1H NMR which exhibited two singlets respectively at δ7.04 and 7.10 for H_3 and H_8 and with MS, ion fragment at *m/z* 181 ($C_9H_9O_4$) according to Audier [3]. The location of the B-ring hydroxyl and two methoxyl groups was established by UV data (the NaOMe reagent

produced a large bathochromic shift (+80 nm) of Band I, which revealed that the hydroxyl group was located at C-4′ and by NMR data (a two-proton singlet appeared at 7.20 ppm for H-2′ and H-6′).

The spectral data established **1** to be 5,4′-dihydroxy-6,7,3′,5′-tetramethoxyflavone or 7-methyl-6-methoxytricin. Besides this methylated flavone, we have identified, in *Artemisia mesatlantica*, four common flavonoids: apigenin, chrysoeriol, cirsimaritin (6-methoxy-7-methylapigenin), tricin, and two flavonoids rarely found: 5-hydroxy-6,7,3′,4′-tetramethoxyflavone [4, 5] and 6-methoxytricin [6, 7]. From a chemosystematic point of view, it is interesting to note that 6-methoxyflavonoids with a trisubstituted B-ring have so far only been found in the Compositae–Anthemideae, namely in *Conoclinium coelestinum* [6], *Artemisia frigida* [7] and *Artemisia mesatlantica*.

EXPERIMENTAL

Plant materials were collected in Morocco, Boulmane Road (June 1979). Voucher specimen (no. 196) was deposited in the Herbarium of the Faculty of Pharmacy (Laboratoire de Matière Médicale, Montpellier I).

Extraction and isolation of the flavonoids. Air dried and finely powdered *Artemisia mesatlantica* plants (1 kg) were defatted with petrol (bp 40–60°) (3 × 2.5 l) and then extracted with Et_2O (4 × 3.5 l). The Et_2O extract was concentrated under vacuum to leave a residue (42 g) which was chromatographed in a Si gel column (Merck 7731) by use of $CHCl_3$–EtOAc (3 : 1) as the eluent and 7 fractions collected. Fraction 3 was concentrated under vacuum. The residue was dissolved in 50 ml $CHCl_3$–EtOAc (3 : 1) at 50°, and the solution left at 3° overnight. The precipitate formed was removed by filtration and then chromatographed on a Polyamide column (MN SC_6) using $CHCl_3$ as the eluent. The first two compounds eluted were separated by prep. TLC (Polyamide MND_6). **1** was purified over Sephadex LH-20 using MeOH for elution and recrystallized from MeOH to give yellow crystals. The six known flavonoids (see text) isolated were identified by standard procedures [1].

5,4′-Dihydroxy-6,7,3′,5′-tetramethoxyflavone (**1**). Yellow plates, mp 240–242°; UV (λ_{max}, nm) (MeOH) 242 (sh), 276, 350; (MeOH–NaOMe) 240 (sh), 262, 304 (sh), 430; (MeOH–$AlCl_3$) 258 (sh), 283, 310 (sh), 386; (MeOH–$AlCl_3$–HCl) 258 (sh), 286, 308 (sh), 374; (MeOH–NaOAc) 268, 352, 428; (MeOH–NaOAc–H_3BO_3) 274, 350. ^{1}H NMR signals (250 MHz, DMSO-d_6) at 7.20 (2H, H-2′ and H-6′) 7.10 and 7.04 (H-3 and H-8), 3.98 (3H, OMe) 3.92 (6H, 2OMe) and 3.76 (6H, 2OMe) ppm MS: 374 [M^+; 100%; 374, 100; calculated for $C_{19}H_{18}O_8$: 374, 1002; 373 (M-1; 25%); 359 (M-15; 77%); 345 (M-29; 13%); 331 (M-43; 8%); 181 (14%; 181, 0501; calculated for $C_9H_9O_4$: 181, 0501); 153 (18%; 153, 0186; calculated for $C_7H_5O_4$: 153, 0188).

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