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PRELEOSIBIRIN, A PREFURANIC LABDANE DITERPENE FROM *BALLOTA NIGRA* SUBSP. *FOETIDA*

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Key Word Index—*Ballota nigra* subsp. *foetida*; Labiatae; diterpenoid; prefuranic labdane derivative; preleosibirin; leosibirin.

Abstract—From the aerial parts of *Ballota nigra* subsp. *foetida* a new prefuranic labdane diterpene, preleosibirin, has been isolated. Its structure was established by spectroscopic means and by correlation with the previously known diterpenoid leosibirin.

INTRODUCTION

In our search for new natural diterpenoids in the family Labiatae [1–4], we have examined the aerial parts of *Ballota nigra* subsp. *foetida*. From this plant a new diterpenoid, preleosibirin (**1**), has been isolated and its structure established as the 13*R*-prefuranic derivative of leosibirin (**2**), a previously known furanic labdane diterpene found in *Leonorus sibiricus* [4].

RESULTS AND DISCUSSION

Preleosibirin (**1**) has a molecular formula $C_{24}H_{34}O_8$ and its IR spectrum showed hydroxyl (3460 cm^{-1}), acetate (1730 br, 1250 cm^{-1}), ketone (1715 cm^{-1}) and enol-ether (3100, 1615 cm^{-1}) absorptions [2]. The ^1H NMR spectrum of the new diterpenoid showed signals in complete agreement with structure **1**: δ6.43 (1H, *d*, $J_{15,14}$ = 2.6 Hz, H-15), 5.07 (1H, *d*, $J_{14,15}$ = 2.6 Hz, H-14), 4.79 and 4.68 (AB system, J_{AB} = 11.8 Hz, 2H-19), 4.52 (1H, *dd*, $J_{3\alpha,2\beta}$ = 9.1 Hz, $J_{3\alpha,2\alpha}$ = 6 Hz, H-3α), 4.40 and 4.03 (AB system, J_{AB} = 10.5 Hz, 2H-16), 4.30 (1H, *d*, $J_{6\alpha,5\alpha}$ = 2.7 Hz, H-6α), 3.51 (1H, *q*, $J_{8,17}$ = 6.7 Hz, H-8β), 2.12 (1H, *d*, $J_{5\alpha,6\alpha}$ = 2.7 Hz, H-5α), 2.07 and 2.06 (3H each, *s*, two OAc), 1.42 (3H, *s*, 3H-18), 1.05 (3H, *s*, 3H-20) and 1.01 (3H, *d*, $J_{17,8}$ = 6.7 Hz, 3H-17). The structure of preleosibirin (**1**) was confirmed by its ready conversion into leosibirin (**2**) [4] by mild acidic reagents, thus establishing the structure depicted in **1** for the new diterpenoid.

Finally, the 13*R*-configuration assigned to preleosibirin (**1**) was supported by NOE experiments [5, 6]. Irradiation of the C-17 methyl protons (δ1.01) produced a 4% NOE enhancement of the low-field doublet (δ4.40) of the AB system corresponding to the C-16 protons, whereas no NOE was observed on the C-14 proton signal (δ5.07). These results clearly established [2, 5, 6] a C-13(*R*) configuration for preleosibirin and also an α configuration for the C-17 methyl group in this new diterpenoid (**1**) and in leosibirin (**2**), the structure of which had previously been reported without this feature [4].

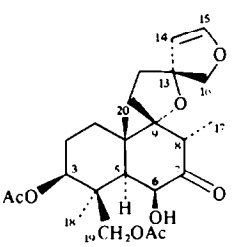
Preleosibirin is thus 3β,19-diacetoxy-9α,13*R*; 15,16-diepoxy-6β-hydroxy-7-keto-labd-14-ene (**1**).

EXPERIMENTAL

For general details on methods, see refs [1–4]. Plant materials were collected in June 1984, in the Botanic Garden of Palermo, Italy, and voucher specimens are deposited in the Herbarium of this Centre.

Extraction and isolation. Dried and finely powdered aerial parts of *B. nigra* L. subsp. *foetida* Hayek (300 g) were extracted with Me_2CO (2 l. × 3) at room temp. for 3 days. The extracts were evapd to dryness under red. pres. and low temp. (26°). The residue (15 g) was chromatographed on a silica gel (Merck, No. 7734, deactivated with 15% H_2O) column (400 g) and eluted with *n*-hexane and *n*-hexane–EtOAc mixtures. The *n*-hexane–EtOAc (2:1) fractions eluted preleosibirin (**1**, 820 mg) as an oil: $[\alpha]_D^{18}$ −60.3° ($CHCl_3$; *c* 0.187); IR ν_{max}^{NaCl} cm^{-1}: 3460, 3100, 2980, 2920, 2880, 1730 (br), 1715, 1615, 1465, 1380, 1250, 1145, 1070, 1030, 980, 940, 870; ^1H NMR (300 MHz, $CDCl_3$): see Results; EIMS (direct inlet) 75 eV, *m/z* (rel. int.): 450 $[M]^+$ (3), 432 (4), 391 (8), 390 (7), 333 (40), 267 (12), 181 (14), 121 (32), 95 (27), 87 (13), 82 (52), 81 (62), 69 (12), 55 (15), 43 (100). $C_{24}H_{34}O_8$ *M*, 450.

Leosibirin (**2**) *from preleosibirin* (**1**). A suspension of preleosibirin (**1**, 70 mg), CH_2Cl_2 (10 ml) and Amberlite IR-120 (H^+ form, 80 mg) was stirred at room temp. for 2 hr. The soln was filtered and solvent removed. After CC purification (silica gel, *n*-hexane–EtOAc, 2:1) it yielded an oily compound (62 mg), $[\alpha]_D^{18}$ −0.6°, $[\alpha]_{365}^{18}$ −23.2° ($CHCl_3$; *c* 0.823), which was identical with leosibirin (**2**) [lit. [4]: $[\alpha]_D$ −0.7°, $[\alpha]_{365}$ −24.7° ($CHCl_3$; *c* 0.30)]. This identity was also confirmed by TLC, IR, ^1H NMR and MS data.



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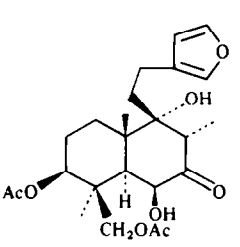

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REFERENCES

1. Savona, G., Bruno, M., Servettaz, O. and Rodríguez, B. (1984) *Phytochemistry* **23**, 2958.
2. Savona, G., Bruno, M. and Rodríguez, B. (1984) *Phytochemistry* **23**, 191.
3. Pérez-Sirvent, L., Rodríguez, B., Savona, G. and Servettaz, O. (1983) *Phytochemistry* **22**, 527.
4. Savona, G., Piozzi, F., Bruno, M. and Rodríguez, B. (1982) *Phytochemistry* **21**, 2699.
5. Laonigro, G., Lanzetta, R., Parrilli, M., Adinolfi, M. and Mangoni, L. (1979) *Gazz. Chim. Ital.* **109**, 145.
6. Rodríguez, B. and Savona, G. (1980) *Phytochemistry* **19**, 1805.

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TRITERPENES FROM *AMARACUS DICTAMNUS*

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Key Word Index—*Amaracus dictamnus*; Labiatae; triterpenes; oleanolic, ursolic and 21α-hydroxyoleanolic acids; uvaol.

Abstract—From the aerial parts of *Amaracus dictamnus* several triterpenes were isolated: oleanolic and ursolic acids, uvaol, the rare 21α-hydroxyoleanolic acid and a new 21α-hydroxyursolic acid.

INTRODUCTION

We reported recently [1, 2] on the investigation of *Amaracus akhdarensis* and *A. pampaninii* (family Labiatae), from which four isopimarane diterpenoids were isolated. The work was aimed at finding a possible chemotaxonomical differentiation of the genus *Origanum* and restoring the genus *Amaracus*.

In this paper we report our results on extracts of *A. dictamnus* Bentham (syn *Origanum dictamnus* L.), collected in the island of Crete (Greece). Stems and leaves, and flowers were examined separately.

RESULTS AND DISCUSSION

Usual work-up of the acetone extract of stems and leaves gave no diterpene derivatives. Oleanolic and ursolic acids were isolated as major components. After diazomethane methylation, methyl oleanolate and methyl ursolate were removed by chromatography and a small, more polar fraction was isolated. It contained two triterpene methyl esters.

The products proved to be isomers, both having the $C_{31}H_{50}O_4$ formula. Their mass spectra, very similar, showed peaks at *m/z* 486 $[M]^+$, 468, 278, 260, 219, 218 and 201. The peak at *m/z* 278 corresponded to the typical retro-Diels–Alder cleavage of an oleanene or ursene skeleton [3] with a carbomethoxy group on C-17 and a hydroxy group on ring D or E. This was confirmed by the peak at *m/z* 201, arising from the loss of 59 (COOMe) and 18 (H_2O) from the peak at *m/z* 278.

Careful examination of the ^{13}C NMR and ^1H NMR spectra of the first product (see Table 1 and Experimental) indicated a methyl oleanolate derivative [4–6] with a further hydroxy group, that was identified as 21α-hydroxy, as depicted in **1**.

Methyl 3β,21α-dihydroxy-olean-12-en-28-oate (**1**) has been previously prepared as a semisynthetic product [7]. Thereupon, **1** was isolated as a natural product only once [8], from the roots of *Olax dissitiflora* Oliv. (Olacaceae) where it occurs as a saponin of the free acid. Mass spectral data were reported only for **1** and ^1H NMR data only for its diacetyl derivative. This paper reports ^1H and complete ^{13}C NMR assignments for **1**. Physical data (mp and [α]) of our product are in agreement with previous data [7, 8].

The ^{13}C NMR and ^1H NMR spectra of the second product led to the identification of a methyl ursolate derivative [4–6] with a further hydroxy group. The