SHORT PAPER

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A new antitumour sesquiterpene from the *Euonymus nanoides*†

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A new (**1**) and a known (**2**) β-dihydroagarofuran sesquiterpene polyol ester were isolated from *Euonymus nanoides* and they showed antitumor activities in *vitro*.

Keywords: antitumour sesquiterpene, Euonymus nanoides

The family Celastraceae is a rich source of biologically active β-dihydroagarofuran sesquiterpene polyol esters.[1] In a previous study, we have described the isolation of several dihydro-β-agarofuran sesquiterpenes from this family.[2, 3] *Euonymus nanoides* Loes. is folk medicinal plant of Celastraceae which is widely distributed in China. Recently, we have isolated a new (**1**) and a known (**2**) β-dihydroagarofuran sesquiterpene polyol ester. Compound **2** was identified by comparison of this spectroscopic data (NMR and MS) with the data of published compounds.[4]

Compound **1**, yellow oil, analysed for $C_{33}H_{44}O_{11}$ by FABMS: *m*/*z* 617 $[M+1]^+$ and NMR spectra data (Table 1). The IR spectrum revealed a characteristic ester absorption band at 1739 cm^{-1}. The NMR spectra suggested the presence of three acetate esters [δ_H 2.09 s, 2.11 s, 2.20 s (2×3H); δ_C 20.7, 21.6, 21.2, 169.4, 170.4, 171.0 (3×Ac)], one benzoate ester [δ_H 7.45 t (2H), 7.55 t (1H), 8.04 d (*J*=8.0 Hz, 2H); δ_C 128.3 (2C), 129.4, 130.2 (2C), 133.3, 165.4] and one α-methyl-butanoate esters [δ_H 0.54 t (3H), 0.80 d (*J*=6.8 Hz, 3H), 0.88 m (1H), 1.18 m (1H), 2.01 m (1H); δ_C 11.9, 15.9, 25.4, 40.7, 173.8]. The NMR data for the parent ring system was very similar to those of **2**, suggesting that **1** contains pentasubstituted-β-dihydroagarofuran skeleton. The location of the protons have been confirmed by the ^1H–^1H COSY spectrum. The signals at δ 5.65 (d, *J*=4.0 Hz, H-1), 5.53 (m, H-2), 6.15 (s, H-6) and 5.34 (t, H-9) were assigned to four protons attached to carbon atoms bearing secondary ester groups, while signals at δ 4.80 (d, *J*=12.8Hz, H-13a) and δ 4.56 (d, *J*=12.8Hz, H-13b) were assigned to the two protons attached to carbon atoms bearing primary ester groups. The HMBC spectrum showed cross-peaks between H-9 and the carbonyl at δ 165.4 of the benzoate ester, H-1 and the carbonyl at δ 173.8 of the α-methyl-butanoate esters, H-13, H-2, H-6 and the carbonyl at δ 171.0, 170.4, 169.4 of three acetate esters, respectively. As is usually found in this class of skeleton, H-1 and H-6 have axial stereochemistry.[5, 6] From the NOESY of **1** (**Fig. 1**), the correlation between H-1/ H-9 and H-1/ H-2 indicated the presence of H-9ax and H-2eq. Thus, compound **1** was shown to be 1β-(α-methyl)-butanoyl-2β, 6α, 13-triacetoxy-9β-benzoyloxy-β- dihydroagarofuran.

Both compounds **1** and **2** were tested for *in vitro* antitumour against A_{549}, HL_{60}, BEL_{7402} and P_{388}.[7] The IC_{50} of **1** (A_{549}: 26.86 μg/ml; HL_{60}: 27.96 μg/ml; BEL_{7402}: 28.69 μg/ml; P_{388}: 34.96 μg/ml) show able to inhibit activity. However, compound **2** was inactive with all IC_{50} > 50 μg/ml.

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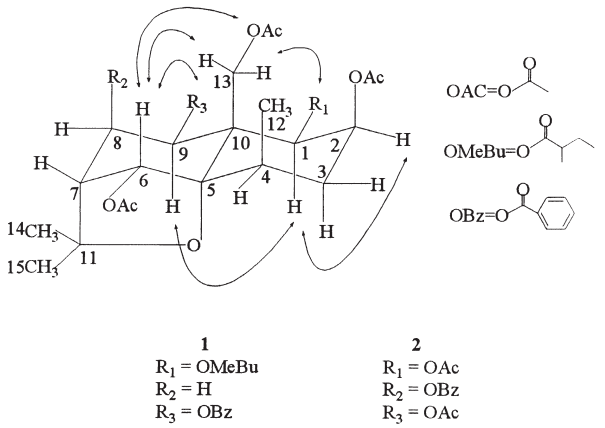
† This is a Short Paper, there is therefore no corresponding material in *J Chem. Research (M)*.

Table 1 The NMR data of **1** (400MHz, $CDCl_3$)

No.	δ_C (DEPT)	δ_H (J_{Hz})
1	70.0 (CH)	5.65 d (4.0)
2	68.3 (CH)	5.53 m
3	31.8 (CH_2)	2.66 m
4	32.1 (CH)	2.37 m
5	89.8 (C)	
6	70.0 (CH)	6.15 s
7	43.4 (CH)	2.33 m
8	33.4 (CH_2)	2.31 m
		2.10 m
9	68.5 (CH)	5.34 t
10	51.3 (C)	
11	83.8 (C)	
12	14.1 (CH_3)	1.28 d (7.7)
13	65.7 (CH_2)	4.80 d (12.8)
		4.56 d (12.8)
14	29.5 (CH_3)	1.42 s
15	24.8 (CH_3)	1.45 s



1
R_1 = OMeBu
R_2 = H
R_3 = OBz

2
R_1 = OAc
R_2 = OBz
R_3 = OAc

Fig. 1 Major NOESY correlations in **1**.

Experimental

IR: KBr. UV: Shimadzu UV-260 spectrometer. ^1H and ^{13}C NMR: 400MHz, $CDCl_3$ with TMS as internal standard. MS: EI. 70ev and HP-5988MS spectrometer. Optical rotation was measured with a Perkin Elmer Model 341.

The seeds of *Euonymus nanoides* Loes. were collected in Luqu country, Gansu province of China in October 1997, and identified by J. Z. Sun (Department of Biology, Lanzhou University).

Dried, powdered seed (1.2 kg) of *E. nanoides* were extracted with acetone by percolation at room temperature to give a residue (102.8 g) after evaporation. This residue was separated on CC with a gradient of petroleum ether (60–90 °C) –acetone as eluent. Compound **1** was isolated during elution with petroleum ether (60–90 °C)-acetone (8:1) and compound **2** during elution with petroleum ether (60–90 °C)-acetone (5:1). The TLC using solvent systems for **1** and **2** gave 7.5 mg and 1.4 mg, respectively.

Compound **1**, $C_{33}H_{44}O_{11}$, yellow oil, $[\alpha]_D^{20}$: +26.0° ($CHCl_3$, c 0.70); IR ν_{max}^{KBr} : 2929, 1739, 1606, 1237, 1050, 889, 757 cm^{-1}; UV λ_{max}^{MeOH} : 204, 231, 275 nm; EIMS: *m*/*z* (%) 616 $[M]^+$ (4.6), 436 $[M\text{-}AcO\text{-}BzO]^+$ (14.0), 336 $[436+H\text{-}MeBuO]^+$ (58.0), 212 $[M\text{-}3AcOH\text{-}BzOH\text{-}MeBuOH]^+$ (93.0), 50 (100); FABMS: *m*/*z* 617 $[M+H]^+$.

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