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A New Furobenzopyranone from *Anaphalis lactea*

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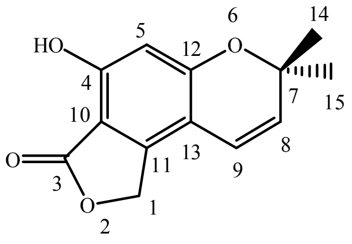
Abstract: A new furobenzopyranone, named anaphalisol, was isolated from the whole plant of *Anaphalis lactea*. Its structure was elucidated by spectroscopic methods including 2D NMR techniques.

Keywords: *Anaphalis lactea*, Compositae, furobenzopyranone, anaphalisol.

The whole plant of *Anaphalis lactea* Maxim. has long been used as a Tibetan medicine for invigorating the circulation of blood, relieving phlegm and hemostasia[1], however, its chemical constituents have not been previously investigated. In our research, a new furobenzopyranone was obtained from the whole plant of *A. lactea*. Here we report the structural elucidation of it.



1

Compound **1**, colorless gum, its FABMS gave quasi-molecular ion peaks at *m*/*z* 239.2 $[M+Li]^+$ and *m*/*z* 255.1 $[M+Na]^+$, combined with the peak of EIMS ($[M]^+$ at *m*/*z* 232), the molecular formula of **1** was deduced to be $C_{13}H_{12}O_4$, which was supported by ^{1}H NMR, ^{13}C NMR and DEPT data (**Table 1**). The IR spectrum (KBr) showed absorptions for hydroxyl (3528 cm^{-1}), α,β-unsaturated γ-lactone (1723 cm^{-1}), benzene ring (1635, 1600, 1464 cm^{-1}) and C-O-C bond (1335, 1152, 1046 cm^{-1}). Its ^{1}H NMR spectrum gave the typical signals of 2,2-dimethyl-chromene derivative at δ 6.15 (d, 1 H, 9.9 H_Z), 5.63 (d, 1 H, 9.9 H_Z), 1.46 (s, 6 H), two independent signals at δ 6.35 (s, 1 H),

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5.25 (s, 2 H) and a aromatic hydroxyl signal at δ 7.65 (brs, 1 H) which disappeared on addition of D_2O. ^{13}C NMR and DEPT spectra revealed 13 carbons (2×CH_3, 1×CH_2, 3×CH, 7×C) (**Table 1**). The signals δ_C 161.1, 157.6, 143.0, 108.6, 104.0, 103.9 (benzene ring) and δ_C 129.8 (CH=), 116.6 (CH=), 78.1 (C), 28.5 (2×CH_3), further confirmed the skeleton of 2,2-dimenthylchromene. Apart from the carbon signals corresponding to the above mentioned groups, the ^{13}C NMR and DEPT spectra also displayed a carbonyl carbon at δ_C 172.5 and a oxygen-bearing carbon menthyene at δ_C 69.4, which could be due to a γ-lactone moiety, as followed by the molecular formula, the IR and UV ($\lambda_{\max}^{CHCl_3}$: 245nm) spectra. In addition, its HMBC spectrum gave the long-range correlations between δ_H 6.35 (H-5) with δ_C 161.1 (C-12), 157.6 (C-4), 108.6 (C-13), 104.0 (C-10); δ_H 6.15 (H-9) with δ_C 161.1 (C-12), 143.0 (C-11), 108.6 (C-13); δ_H 5.25 (H-1) with δ_C 172.5 (C-3), 143.0 (C-11), 108.6 (C-13), 104.0 (C-10) (**Table 1**). Therefore, compound **1** was established and named anaphalisol. Moreover, compared the ^1H NMR spectrum of compound **1** with that of the known compound phthalidochromene[2], their structure's difference was the group at C-4, the phthalidochromene was OMe (δ 3.93), however, anaphalisol was OH (δ 7.65). As a result, the structure of anaphalisol was further elucidated.

Table 1 ^1H NMR, ^{13}C NMR, DEPT data and HMBC correlations of 1 (δ, ppm, TMS, $CDCl_3$)

No.	^1H NMR	^{13}CNMR (DEPT)	HMBC
1	5.25 (s)	69.4 t	C-3, 10, 11, 12, 13
3	-	172.5 s	-
4	-	157.6 s	-
5	6.35 (s)	103.9 d	C-4, 10, 12, 13
7	-	78.1 s	-
8	5.63 (d, J=9.9 Hz)	129.8 d	C-7, 9, 13, 14, 15
9	6.15 (d, J=9.9 Hz)	116.6 d	C-7, 8, 11, 12, 13
10	-	104.0 s	-
11	-	143.0 s	-
12	-	161.1 s	-
13	-	108.6 s	-
14	1.46 (s)	28.5 q	C-7, 8, 15
15	1.46 (s)	28.5 q	C-7, 8, 14
OH	7.65 (brs)	-	-

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