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SESQUITERPENE LACTONES OF *NEOHINTONIA MONANTHA*

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Key Word Index—*Neohintonia monantha*; Compositae; sesquiterpene lactones; germacranolides.

Abstract—The aerial parts of *Neohintonia monantha* afforded a new liacylindrolide derivative, in addition to liacylindrolide itself which was previously isolated from *Liatris cylindracea*. The structures were elucidated by spectroscopic methods.

INTRODUCTION

As part of our continuing biochemical systematic investigation of sesquiterpene lactones of the Compositae [1], we investigated *Neohintonia monantha* (Sch-Bip) King and H. Robins., a monotypic genus in the subtribe Critoniinae of the tribe Eupatorieae. The results are discussed in this paper.

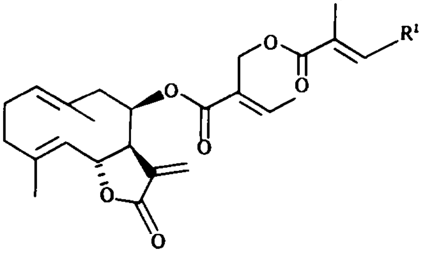
RESULTS AND DISCUSSION

The aerial parts of *N. monantha* afforded two sesquiterpene lactones with C_{10} diester side chains. The major sesquiterpene lactone was liacylindrolide (**1**), which was previously reported [2] from *Liatris cylindracea*, another member of the Eupatorieae. The ^{13}C NMR data of **1**, which had not been reported previously, is listed in Table 2.

The second lactone (**2**) was a new germacranolide (**2**), the structure of which differed only slightly from that of **1**. Like liacylindrolide (**1**), the spectral data established the presence of an α-methylene-γ-lactone moiety [IR: 1750, 1645 cm^{-1}; ^{13}C NMR: δ121.5 (C-13) and 170.4 (C-12); ^{1}H NMR: δ6.27 (1H, *d*, $J = 3.2$ Hz, H-13a) and 5.61 (1H, *d*, $J = 3.2$ Hz, H-13b)]. The CI-MS of **2** exhibited a strong $[M+1]^+$ ion at *m/z* 445 (26%) suggesting that **2** was an isomer of **1**, which has a $[M]^+$ of 444 and a $C_{25}H_{32}O_7$ formula. A prominent peak in the CI-MS of **2** appeared at *m/z* 231 (230 + 1) (40%) as expected for the fragment $C_{15}H_{18}O_2$ formed by loss of the side chain $C_{10}H_{14}O_5$. Moreover, the side chain fragment at *m/z* 99 ($C_5H_7O_2$) appeared as a base peak in the CI-MS suggesting that the terminal chain has a $C_5H_7O_2$ formula. These data of **2** indicated that a hydroxy-angelate or hydroxy-tiglate group was esterified with a hydroxy-angelate or hydroxy-tiglate group in the side chain. Inspection of the ^{1}H NMR spectrum (Table 1) together with decoupling experiments clearly showed that the 5-hydroxy-tiglate moiety was esterified at C-5 with another hydroxy-angelate or hydroxy-tiglate [1, 2, 3]. The ^{1}H NMR spectrum of **2** (Table 1) was essentially identical to that of **1** except that the one-proton H-3″ quartet at δ6.88 (*q*) was replaced by the one-proton (H-3″) broad doublet-triplet, and a two-proton (H-5″) singlet at δ4.33 was replaced by two-proton multiplet (H-4″) at δ4.30, a difference which indicated that the terminal hydroxy-tiglate was 4″-hydroxy-tiglate. The stereochemistry of the terminal ester was supported by ^{13}C NMR correlation with the side chain signals for chromolaenide [4]. Thus, the new compound is 8β-5′-[4″-hydroxytigloyloxy]-tigloyloxy-costunolide.

EXPERIMENTAL

Neohintonia monantha (504 g) was collected at two sites in Mexico (roadside along Mex. 80, 1.8 mi. S of La Huerta, Jalisco, voucher No. T. J. Ayers 96 and shaded north-facing slope, between km markers 41 and 42, W of Tecuitata on road to Miramar, Nayarit, Voucher No. T. J. Ayers 105). Leaf washes of small samples were identical by TLC and therefore the two bulk collections were combined. The combined plant material was washed with CH_2Cl_2 and the extract worked up in the usual manner [5]. The crude syrup obtained (11 g) was chromatographed on a Sephadex LH-20 (Pharmacia) column. The column was eluted with hexane–CH_2Cl_2–MeOH (7:4:1) and 26 fractions were collected. All fractions were checked on silica gel plates



	R	R¹
1	CH_2OH	CH_3
2	CH_3	CH_2OH

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Table 1. ^{1}H NMR data for compound **2** (360 MHz, $CDCl_3$, TMS as int. standard)

H	2
1	4.90 *m*
2a 2b 3a	2.38 *m* 2.25 *m*
3b	2.10 *m*
5	4.78 *br d* ($J = 10$)*
6	5.07 *dd* ($J = 10, 9$)
7	2.94 *m*
8	5.86 *m*
9a	2.84 *m*
9b	2.34 *m*
13a	6.27 ($J = 3.2$)
13b	5.61 ($J = 3.2$)
14	1.47 *br s*
15	1.80 *br s*
3'	7.26 *q* ($J = 7$)
4'	1.98 *d* ($J = 7$)
5'a	5.01 *d* ($J = 13$)
5'b	4.78 *d* ($J = 13$)
3"	6.68 *br td* ($J = 6, 1.8$)
4"a 4"b	4.30 *m*
5"	1.80 *s*

*Assignments made using model compound **1** [2]. Coupling constants in Hz.

Table 2. ^{13}C NMR data for compounds **1** and **2*** (90.8 MHz, $CDCl_3$, TMS as int. standard)

C	1	2
1	127.6 *d*	127.2
2	26.4 *t*	26.3
3	39.8 *t*	39.5
4	142.3 *s*	142.9
5	131.0 *d*	130.8
6	75.8 *d*	76.2
7	52.9 *d*	52.8
8	72.4 *d*	71.9
9	44.2 *t*	44.0
10	134.4 *s*	134.2
11	137.1 *s*	136.7
12	169.6 *s*	170.4
13	120.8 *t*	121.5
14	19.1 *q*	19.0
15	17.6 *q*	17.4
1'	165.4 *s*	165.3
2'	127.8 *s*	127.4
3'	146.0 *d*	146.2
4'	14.8 *q*	14.7
5'	56.8 *t*	57.5
1"	167.1 *s*	167.4
2"	132.0 *s*	127.3
3"	141.7 *d*	142.1
4"	14.4 *q*	59.6
5"	57.9 *t*	12.4

Assignments made using off-resonance decoupling experiments and model compounds [6].

using hexane–EtOAc (1:1 or 7:2). Fractions 16–26 were separated by prep. TLC (silica gel, hexane–EtOAc, 7:5) to give **1** (85 mg) and **2** (270 mg).

Liacylindrolide (**1**). This compound was previously isolated from *Liatris cylindracea* [2]. All the spectral data (IR and ^{1}H NMR) were consistent with the former report.

8β-5'-[4"-Hydroxytigloyloxy]-tigloyloxy costunolide (**2**). CI-MS (methane CI, 0.5 torr.): 445 $[M+1]^+$ (26%), 231 $[M - C_{16}H_{14}O_5 + 1]^+$ (40%), 99 $[C_5H_7O_2]$ (100%). IR ν_{max} cm^{-1}: 3460 (OH), 1750 (γ-lactone), 1700 (C=CCO$_2$R).

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