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# A New Lignan from *Boschniakia himalaica*

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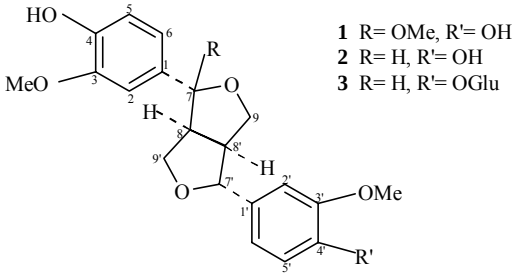
**Abstract:** From the ethanol extract of the whole plant of *Boschniakia himalaica Hook. f. et.* Thoms, a new and two known lignans have been isolated and identified as 7-methoxypinoresino **1**, pinoresinol **2**, and pinoresinol-O-β-D-glucopyranoside **3** respectively. Their structures have been established by spectroscopic methods.

**Keywords:** *Boschniakia himalaica*, 7-methoxypinoresinol, pinoresinol-O- β -D-glucopyranoside.

*Boschniakia himalaica Hook. f. et.* Thoms, a plant of genus *Boschniakia* (Orobanchacese), is mainly distributed in Yunnan, Tibet, Shanxi, Sichuan, Hubei provinces of China[1]. It is a folk Tibetan medicine. Chemical constituents of this species have not been reported previously. After a systematic chemical study, we isolated three lignans **1-3** from its *n*-BuOH extract. Their structures were determined as 7-methoxy-pinoresinol **1**, pinoresinol[2] **2** and pinoresinol-O-β-D-glucopyranoside[3] **3** by 1D and 2D NMR spectrums. In this article, we report the isolation and structural indentification of compound **1**.

**Figure 1** The structures of compounds **1–3**




Compound **1** was isolated as white powder, mp 174–175°C, $[\alpha]_D^{24}$ +153.85 (*c* 0.01, pyridine). According to its EIMS (*m/z* 388[$M^+$]), $^1$H NMR and $^{13}$C NMR spectral data, its molecular formula was deduced to be $C_{21}H_{24}O_7$ ($\Omega$ = 10) , which was further confirmed by its HREIMS (*m/z* found. 388.1523, calcd. 388.1522). Its $^1$H NMR (**Table 1**) showed six proton signals of benzene ring, four proton signals of two oxymethylenes ,

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three proton signals of methine , and three methoxyl signals. The $^{13}C$ NMR (**Table 2**) and DEPT spectra exhibited signals of twelve aromatic carbons (six methine and six quaternary carbons), double oxymethylenes, three methines (one is an oxymethine, δ 90.3), one quaternary carbon , and three methoxyls. All of the above spectral data showed that the compound was a lignan. In comparision with the NMR spectra of the known compound **2** (pinoresinol) which was isolated from the same plant, the signals of **1** were in agreement with those of **2** except for an extra signal of methoxyl group ($\delta_H$ 4.24, s; $\delta_C$ 50.5 q).

**Table 1** The assignment of $^1H$ NMR signals of compounds **1** and **2** (300MHz, pyridine-$d_5$, δ in ppm)

| No. | 1 | 2 | No. | 1 | 2 |
|---|---|---|---|---|---|
| 2 | 8.51 (s) | 6.82 (s) | 2′ | 8.33 (s) | 6.28 (s) |
| 5 | 8.38 (d, 8.07) | 6.80 (d, 8.08) | 5′ | 8.38 (d, 8.07) | 6.80 (d, 8.08) |
| 6 | 8.40 (dd, 1.52, 8.07) | 6.73(dd, 1.54,8.08) | 6′ | 8.22 (dd, 1.52, 8.07 ) | 6.73 (dd, 1.54, 8.08) |
| 7 | | 4.66 (d, 4.33) | 7′ | 5.86 (d, 6.55) | 4.66 (d, 4.33) |
| 8 | 4.71 (m) | 3.03 (m) | 8′ | 4.34 (m) | 3.03 (m) |
| 9 | 4.53 (t, 8.87) 5.19 (t, 8.94) | 3.79 (dd, 3.69, 9.21) 4.17 (dd, 6.88, 9.21) | 9′ | 5.32 (brs) | 3.79 (dd, 3.69, 9.21) 4.17 (dd, 6.88, 9.21) |
| 3-$OCH_3$ | 4.88 (s) | 3.81 (s) | 3′-$OCH_3$ | 4.90 (s) | 3.81 (s) |
| 7-$OCH_3$ | 4.24 (s) | | | | |

**Table 2** The assignment of $^{13}C$ NMR signals of compounds **1** and **2** (75MHz, pyridine-$d_5$, δ in ppm)

| No. | 1 | 2 | No. | 1 | 2 |
|---|---|---|---|---|---|
| C-1 | 131.4 s | 133.3 s | C-1′ | 135.1 s | 133.3 s |
| C-2 | 113.3 d | 109.0 d | C-2′ | 112.8 d | 109.0 d |
| C-3 | 150.5 s | 147.1 s | C-3′ | 150.8 s | 147.1 s |
| C-4 | 150.2 s | 145.6 s | C-4′ | 149.9 s | 145.6 s |
| C-5 | 118.3 d | 114.7 d | C-5′ | 118.4 d | 114.7 d |
| C-6 | 122.7 d | 119.4 d | C-6′ | 121.8 d | 119.4 d |
| C-7 | 113.0 s | 86.3 d | C-7′ | 90.3 d | 86.3 d |
| C-8 | 59.4 d | 54.5 d | C-8′ | 55.8 d | 54.5 d |
| C-9 | 72.8 t | 72.1 t | C-9′ | 71.8 t | 72.1 t |
| 3-$OCH_3$ | 57.9 q | 56.3 q | 3′-$OCH_3$ | 57.9 q | 56.3 q |
| 7-$OCH_3$ | 50.5 q | | | | |

In order to determine the position of the extra methoxyl group, its HMBC spectrum was studied. In the HMBC spectrum, the correlation of the methoxyl proton with C-7 (δ 113.0 ) indicated that the methoxyl group is linked at C-7. The full assignments of all the protons and carbons in compound **1** were made by means of $^1H$ NMR, $^{13}C$ NMR, HMQC, HMBC. Thus, the above evidence led to the establishment of the structure of

compound **1** as 7-methoxypinoresinol.

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