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# A New Dendrobine-Type Alkaloid from *Dendrobium nobile*

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**Abstract:** A new dendrobine-type alkaloid has been isolated from stems of *Dendrobium nobile* lindl.. Its structure has been identified on the basis of spectroscopic method.

**Keywords:** *Dendrobium nobile*, Orchidaceae, alkaloid, dendronobiline A.

Several species of *Dendrobium* plants (Orchidaceae) are used in traditional Chinese medicine as a Yin tonic to nourish stomach, promote production of body fluid, and reduce fever[1]. *D. nobile* lindl. (Chinese name "Jin-Chai-Shi-Hu") is an abundant medicinal *Dendrobium* species distributed in China. Several sesquiterpene alkaloids[2], phenanthrenoids[3], bibenzyls[4] coumarins[5] and sesquiterpenoids[6] have been reported from *D. nobile* lindl. up to now. As a result of our systematical investigation in chemical components of *Dendrobium* plants[6-8], we herein report the identification of a new dendrobine-type alkaloid **(1)** isolated from the stems of *D. nobile* .

Compound **1** was obtained as colorless crystals, mp 85-87°C, $[\alpha]_D^{20}$ -69.0 (*c* 0.1, $CH_3OH$). HREIMS of **1** exhibited molecular ion peak at *m/z* 319.2163 [$M^+$] (calculated for $C_{19}H_{29}NO_3$). In $^{13}C$ NMR spectrum of **1**, 19 carbon signals were observed as five methyls, three methylenes, eight methines and three quaternary carbons (**Table 1**). Among them, two signals at δ 178.9 and 208.0 ppm should belong to carbonyl carbons. $^1H$ NMR spectrum of **1** showed five methyls at δ 0.98 (d, 6H, 6.5), 1.39 (s, 3H), 2.15 (s, 3H) and 2.45 (s, 3H). In $^1H$-$^1H$ COSY spectrum of **1**, correlation signals were observed between $H_3$ and $H_2$, $H_4$; between $H_5$ and $H_4$, $H_6$; between $H_6$ and $H_{7\alpha}$, $H_{7\beta}$; between $H_{8\alpha}$ and $H_{7\alpha}$, $H_{7\beta}$, $H_9$; between $H_{11}$ and $H_9$, $H_{12a}$, $H_{12b}$; between $H_{12a}$ and $H_{12b}$; between $H_{15}$ and $H_{16}$, $H_{17}$. Further analysis of TOCSY and HMQC spectra of **1** led to deduction of fragments -$C_2$-$C_3$-$C_4$ [-$C_{15}$($-C_{16}$)-$C_{17}$]-$C_5$-$C_6$-$C_7$-$C_8$-$C_9$-$C_{11}$-$C_{12}$- in the structure. $^{13}C$-$^1H$ long-range correlation signals were observed at $H_{10}$ / $C_2$, $H_{19}$ / $C_2$, $H_2$ / $C_4$, $H_3$ / $C_{18}$, $H_4$ / $C_{18}$, $H_{16}$ / $C_4$, $H_{17}$ / $C_4$, $H_4$ / $C_6$, $H_{11}$ / $C_8$, $H_{10}$ / $C_9$, $H_{12}$ / $C_9$, $H_{14}$ / $C_{12}$ and $H_{19}$ / $C_{11}$, which enabled linkage of above fragments with other two methyls and three quaternary carbons. Relative configuration of **1** was established according to NOE correlations between $H_2$ and $H_3$, $H_{10}$, $H_{11}$, $H_{19}$; between $H_6$ and $H_5$, $H_{10}$; and between $H_{11}$ and $H_{8\alpha}$, $H_9$, $H_{12a}$. Compound **1** is a new compound named dendronobiline A.

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**Table 1** $^{1}H$ NMR (400 MHz) and $^{13}C$ NMR (100 MHz) data of **1** ($CDCl_3$)

| No. | $^{1}H$ | $^{13}C$ | No. | $^{1}H$ | $^{13}C$ |
|---|---|---|---|---|---|
| 1 | | 50.5, s | 10 | 1.36, m | 32.8, q |
| 2 | 2.86, m | 67.6, d | 11 | 3.19, m | 68.7, d |
| 3 | 4.89, dd, 2.6, 5.6 | 78.9, d | 12a | 2.82, m | 49.8, t |
| 4 | 2.12, m | 51.4, d | 12b | 2.31, dd, 8.5, 13.1 | |
| 5 | 2.43, dd, 4.5, 5.4 | 44.0, d | 13 | | 208.0, s |
| 6 | 1.98, m | 43.0, d | 14 | 2.15, s | 30.8, q |
| 7α | 2.04, m | 30.9, t | 15 | 1.75, m | 24.6, d |
| 7β | 2.04, m | | 16 | 0.98, d, 6.5 | 20.4, q |
| 8α | 1.60, m | 32.6, t | 17 | 0.98, d, 6.5 | 21.1, q |
| 8β | 1.82, m | | 18 | | 178.9, s |
| 9 | 2.01, m | 60.6, d | 19 | 2.47, s | 34.0, q |

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