Chemistry of Natural Compounds, Vol. 47, No. 5, November, 2011 [Russian original No. 5, September–October, 2011]

CHEMICAL CONSTITUENTS OF THE AERIAL PARTS OF *Aconitum kongboense*

Jian-Jun Fu,[1,2] Jiang-Jiang Qin,[1] Qi Zeng,[1] Hui-Zi Jin,[1*] and Wei-Dong Zhang[1,2,3*]

UDC 547.944/945

Aconitum L. (Ranunculalceae) is a large genus of about 300 species distributed in the temperate regions of the Northern Hemisphere [1]. The plant *Aconitum kongboense* Lauener is endemic to China, and its roots are used for the treatment of arthritic pain in folk medicine [2]. In previous reports [2–8], eighteen C_{19}-diterpenoid alkaloids were isolated from this plant. In this paper, we report the isolation and structure elucidation of fifteen compounds from the chloroform extract of *A. kongboense* Lauener, including six C_{20}-diterpenoid alkaloids (**1–6**), which were different from previously reported C_{19}-diterpenoid alkaloids. The compounds were characterized by the comparison of the physical and spectroscopic data with the reported data, including NMR and mass spectrometry. The fifteen compounds were identified as: songorine (**1**) [9], karakomine (**2**) [10], 12-*epi*-15-*O*-acetylnapelline (**3**) [11], songoramine (**4**) [12], 12-*epi*-19-dehydronapelline (**5**) [13], 12-*epi*-19-dehydrolucidusculine (**6**) [13], 8,9,10-trihydroxythymol (**7**) [14], 8,10-dihydroxy-9-isobutyryloxythymol (**8**) [15], (+)-medioresinol (**9**) [16], ethyl caffeate (**10**) [17], estragole-3-*O*-β-D-glucopyranoside (**11**) [18], *p*-methoxysalicylic acid (**12**) [19], 2,4-dimethoxybenzoic acid (**13**) [20], scopoletin (**14**) [21], and wedelolactone (**15**) [22]. All of them were isolated from this plant for the first time.

The aerial parts of *A .kongboense* were collected in Tibet, China, in August, 2008. The plant material was identified by Prof. Huang Baokang (Department of Pharmacognosy, Second Military Medical University). A voucher specimen (No. GBWT20080920) was deposited in the School of Pharmacy, Shanghai Jiao Tong University, Shanghai, P. R. China.

The air-dried powdered aerial parts of *A. kongboense* (4.0 kg) were extracted with 80% ethanol four times at room temperature. The extract was dissolved in water to form a suspension and acidified to pH 2 with 20% H_2SO_4 and filtered. The filtrate was basified to pH 11 with saturated NaOH aqueous solution and then extracted successively with $CHCl_3$. The $CHCl_3$ fraction (15 g) was chromatographed over a silica gel column with a gradient of CH_2Cl_2–MeOH (100:1→1:2) and Sephadex LH-20 ($CHCl_3$–CH_3OH 1:1), and further purified on preparative HPLC (MeOH–H_2O) to yield **1** (56.0 mg), **2** (13.7 mg), **3** (9.5 mg), **4** (14.2 mg), **5** (17.2 mg), **6** (6.1 mg), **7** (8.0 mg), **8** (9.2 mg), **9** (2.1 mg), **10** (14.0 mg), **11** (2.2 mg), **12** (2.0 mg), **13** (12.0 mg), **14** (7.6 mg), and **15** (4.0 mg).

ACKNOWLEDGMENT

The work was supported by NSFC (30725045), the Special Program for New Drug Innovation of the Ministry of Science and Technology, China (2009ZX09311-001, 2008ZX09308-005, 2008ZX09101-Z-029, 2009ZX09103-375, 2009ZX09301-007), Shanghai Leading Academic Discipline Project (B906), and in part by the Scientific Foundation of Shanghai Committee of Science and Technology (08DZ1971300, 09DZ1975700, 09DZ1971500, 09DZ1972200).

1) School of Pharmacy, Shanghai Jiao Tong University, Shanghai, 200240, P. R. China, fax: 86 021 34205989, e-mail: kimhz@sjtu.edu.cn; wdzhangy@hotmail.com; 2) School of Pharmacy, East China University of Science and Technology, Shanghai, 200237, P. R. China; 3) School of Pharmacy, Second Military Medical University, Shanghai, 200433, P. R. China.
Published in Khimiya Prirodnykh Soedinenii, No. 5, p. 746, September–October, 2011. Original article submitted May 18, 2010.

0009-3130/11/4705-0854

REFERENCES

1. P. G. Xiao, F. P. Wang, F. Gao, L. P. Yan, D. L. Chen, and Y. Liu, *Acta Phytotaxonomica Sinica*, **44**, 1 (2006).
2. P. A. D. L. Chen, Q. H. Chen, X. X. Jiang, and F. P. Wang, *Nat. Prod. Res. Dev*., **14**, 6 (2002).
3. F. P. Wang and Q. C. Fang, *Yaoxue Tongbao*, **17**, 395 (1982).
4. P. A. F. P. Wang, *Nat. Prod. Res. Dev.*, **14**, 37 (2002).
5. P. A, Q. H. Chen, D. L. Chen, X. X. Jiang, and F. P. Wang, *J. Asian Nat. Prod. Res.*, **6**, 151 (2004).
6. J. M. Yue, Y. Z. Chen, and Y. Z. Li, *Phytochemistry*, **29**, 2379 (1990).
7. M. Yue, J. Xu, and Y. Z. Li, *Phytochemistry*, **35**, 829 (1994).
8. Y. Chen, M. K. Wang, F. E. Wu, and L. S. Ding, *Zhiwu Xuebao*, **36**, 970 (1994).
9. F. Zhang, X. M. Wang, S. L. Peng, and S. L. Ding, *Chin. J. Chin. Mater. Med.*, **41**, 1851 (2006).
10. F. Zhang, S. L. Peng, X. Liao, K. B. Yu, and S. L. Ding, *Planta Med.*, **71**, 1073 (2005).
11. K. Wada, T. Mori, and N. Kawahara, *Chem. Pharm. Bull.*, **48**, 1065 (2000).
12. D. Csupor, P. Forgo, K. Csedo, and H. Judit, *Helv. Chim. Acta*, **89**, 2981 (2006).
13. H. Takayama, F. Wu, H. Eda, K. Oda, and S. Sakai, *Chem. Pharm. Bull.*, **39**, 1644 (1991).
14. D. M. Giuliano, D. M. Franco, J. Becerra, S. Mario, and M. Francesco, *Phytochemistry*, **23**, 1947 (1984).
15. A. G. Gonzilez, J. B. Bermejo, R. F. Estevez, H. Yanes, and N. P. Joseph, *Phytochemistry*, **22**, 2889 (1986).
16. A. Fumiko and Y. Tatsuo, *Phytochemistry*, **27**, 575 (1988).
17. J. Chen, Y. J. Bai, Y. Y. Zhao, B. Wang, and T. M. Cheng, *Chin. J. Chin. Mater. Med.*, **27**, 38 (2002).
18. E. Fujimatu, T. Ishikawa, and J. Kitajima, *Phytochemistry*, **63**, 609 (2003).
19. L. Wang, Z. Q. Yin, L. H. Zhang, W. C. Ye, X. Q. Zhang, W. B. Shen, and S. X. Zhao, *Chin. J. Chin. Mater. Med.*, **32**, 1300 (2007).
20. L. Shi and W. Y. Kang, *Chin. J. Chin. Mater. Med.*, **33**, 780 (2008).
21. B. S. Siddiqui, F. A. Sattar, F. Ahmad, and S. Begum, *Arch. Pharm. Res.*, **30**, 919 (2007).
22. C. C. Li, Z. X. Xie, Y. D. Zhang, J. H. Chen, and Z. Yang, *J. Org. Chem.*, **68**, 8500 (2003).