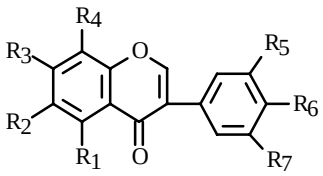
PHENOLIC CONSTITUENTS OF *Belamcanda chinensis*

L. Jin,[1] Y. S. Jin,[1] H. S. Chen,[1] Y. Shen,[1] S. Liang,[1] and Z. B. Xiang[1,2]

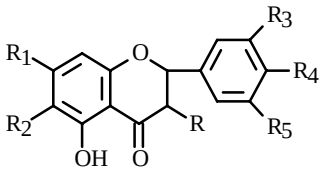
UDC 547.972

The dried rhizomes of *Belamcanda chinensis* (L.) DC. (Iridaceae) have been used as a Chinese drug to treat throat ailments such as tonsillitis [1]. Recently, intensive phytochemical investigations found that this drug contained a number of isoflavonoids [2–4].

In the course of further studies, five isoflavones: 5,7,4′-trihydroxy-6,3′,5′-trimethoxyisoflavone (**1**) [5], isoirigenin (**2**) [6], psi-tectorgenin (**3**) [7], irisolone (**4**) [8, 9], 5,7-dihydroxy-6,3′,4′,5′-tetramethoxyisoflavone (**5**) [10], two isoflavone glycosides: 3′-hydroxytectoridin (**6**) [11], tectorigenin-4′-*O*-*β*-glucoside (**7**) [12], one flavone: kanzakiflavone-2 (**8**) [13, 14], and one flavonol: 3,5,3′-trihydroxy-7,4′,5′-trimethoxyflavone (**9**) [15] have been isolated from the rhizomes. Among them, compound **1** is a new natural product. All the compounds have not been reported before from this plant source.



1 - 7



8, 9

1: $R_1 = R_3 = R_6 = OH$, $R_2 = R_5 = R_7 = OCH_3$, $R_4 = H$; **2:** $R_1 = R_3 = R_5 = OH$, $R_2 = H$, $R_4 = R_6 = R_7 = OCH_3$
3: $R_1 = R_3 = R_6 = OH$, $R_2 = R_5 = R_7 = H$, $R_4 = OCH_3$; **4:** $R_1 = OCH_3$, $R_2 = O\text{-}CH_2\text{-}O$, $R_4 = R_5 = R_7 = H$, $R_6 = OH$
5: $R_1 = R_3 = OH$, $R_2 = R_5 = R_6 = R_7 = OCH_3$, $R_4 = H$; **6:** $R_1 = R_5 = R_6 = OH$, $R_2 = OCH_3$, $R_3 = OGlc$, $R_4 = R_7 = H$
7: $R_1 = R_3 = OH$, $R_2 = OCH_3$, $R_4 = R_5 = R_7 = H$, $R_6 = OGlc$; **8:** $R = H$, $R_1R_2 = OCH_2O$, $R_3 = R_5 = H$, $R_4 = OH$
9: $R = R_3 = OH$, $R_1 = OCH_3$, $R_2 = H$, $R_4 = R_5 = OCH_3$

The EtOH extract was separated by repeated column chromatography using silica gel. The dired rhizomes (4 kg) were chopped and extracted with 80% EtOH three times under reflux and concentrated under vacuum to yield an EtOH extract (200 g). The concentrated solution was diluted with H_2O and extracted successively with petroleum ether, $CHCl_3$, and EtOAc. The $CHCl_3$ and EtOAc extract was separated by repeated column chromatography using silica gel and Sephadex LH-20 to afford compounds **1**–**9**. All the flavonoids were identified by comparison of their ^1H and ^{13}C, DEPT NMR data. The ^{13}C NMR data of the isolated flavonoids are shown in Table 1.

1) College of Pharmacy, Second Military Medical University, Shanghai, 200433, China, fax (8621) 25074439, e-mail: haishengc@hotmail.com; 2) College of Bio-information, Chongqing University of Posts and Telecommunications, Chongqing, 400065, China. Published in Khimiya Prirodnykh Soedinenii, No. 6, pp. 580-581, November-December, 2007. Original article submitted September 25, 2006.

 0009-3130/07/4306-0700

TABLE 1. ^{13}C NMR Data for Compounds **1-9** (500 MHz, DMSO-d_6, δ, ppm)

Atom	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
2	154.41	154.55	153.81	150.93	154.81	154.50	154.34	164.10	146.19
3	121.85	122.05	122.09	122.33	121.48	122.16	121.35	106.64	136.97
4	180.40	180.02	180.29	173.97	180.01	180.73	180.26	182.44	176.19
5	153.21	152.78	156.94	153.88	152.42	152.86	153.17	153.69	160.34
6	131.39	99.11	99.01	135.87	131.31	132.47	131.69	129.46	97.52
7	157.39	157.05	156.60	140.40	153.06	156.52	158.45	141.15	165.08
8	93.76	127.38	127.34	93.51	93.73	93.98	94.08	89.68	92.01
9	152.56	156.62	149.79	152.46	157.34	152.33	152.86	152.54	156.14
10	104.79	104.17	104.20	113.19	104.60	106.45	104.50	106.64	104.05
1′	120.62	125.88	121.06	124.16	126.06	121.43	124.32	121.00	125.89
2′	106.85	149.69	130.06	130.13	106.50	116.50	130.07	115.95	109.67
3′	147.70	136.42	114.98	114.76	152.42	144.86	116.07	128.44	146.19
4′	135.88	152.78	157.33	157.03	137.37	145.53	157.25	161.28	152.92
5′	147.70	104.57	114.98	130.13	152.42	115.35	116.07	115.95	150.39
6′	106.85		130.06	114.76	106.50	119.94	130.07	128.44	103.35
1″						100.20	100.36		
2″						77.24	77.06		
3″						73.11	73.25		
4″						69.65	69.74		
5″						76.66	76.64		
6″						60.65	60.71		
6,7-(OCH_2O)				102.51				102.70	
5-OCH_3				60.71					
6-OCH_3	59.85				59.82	60.21	59.87		
7-OCH_3									56.02
8-OCH_3		59.82	60.78						
3′-OCH_3	56.10								
4′-OCH_3		60.80							60.02
5′-OCH_3	56.10	55.75							55.95

REFERENCES

1. L. M. Perry, *Medicinal Plants of East and Southeast Asia*, MIT, Cambridge (1980), p. 181.
2. S. O. Lee, W. S. Woo, E. H. Woo, and K. S.Kim, *Korean. J. Pharmacogn.*, **20**, 219 (1989).
3. M. Yamaki, T. Kato, M. Kashihara, and S. Takagi, *Planta Med*., **56**, 335 (1990).
4. G. H. Eu, W. S. Woo, H. S. Chung, and E. H. Woo, *Korean. J. Pharmacogn.*, **22**, 13 (1991).
5. M. L. Sethi, S. C. Taneja, K. L. Dhar, and C. K. Atal, *Phytochemistry*, **22**, 289 (1983).
6. Atta-ur-Rahman, S. Nasim, I. Baig, S. Jalil, I. Orhan, B. Sener, and M. Choudhary, *J. Ethnopharmacol.*, **86**, 177 (2003).
7. K. V. Subba Raju and G. Srimanarayana, *Phytochemistry*, **17**, 1065 (1978).
8. N. Morita, M. Arisawa, Y. Kondo, and T. Takenoto, *Chem. Pharm. Bull.*, **21**, 600 (1973).
9. K. Tsukida, K. Saiki, and M. Ito, *Phytochemistry*, **12**, 2318 (1973).
10. M. L. Sethi, S. C. Taneja, K. L. Dhar, and C. K. Atal, *Phytochemistry*, **20**, 341 (1981).
11. K. R. Bidasee, A. Maxwell, W. F. Reynolds, V. Patel, and JR. H. R. Besch, *J. Pharmacol. Exp. Ther.*, **293**, 1074 (2000).
12. A. S. Shawl and T. Kumar, *Phytochemistry*, **31**, 1399 (1992).
13. I. Munekazu, T. Toshiyuki, and M. Shin, *Chem. Pharm. Bull.*, **32**, 1006 (1984).
14. A. Munehisa, K. Haruhisa, and M. Naokata, *Chem. Pharm. Bull.*, **24**, 1609 (1976).
15. E. Wollenweber and K. Egger, *Tetrahedron Lett.*, **19**, 1601 (1970).