PHENOLIC CONSTITUENTS OF *Canarium album*

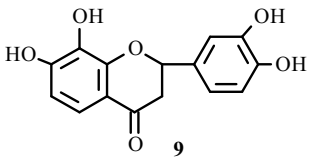
Zhao-bao Xiang,[1,3*] Hai-sheng Chen,[2] Yong-sheng Jin,[2] Guang-li Wang,[1] Liu-xin Xiang,[1] and Wei Chen[1]

UDC 547.972

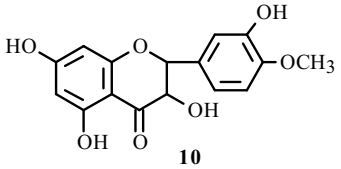
Canarium album (Lour.) Raeusch (Burseraceae) is widely distributed in southern China. Its fruits have been used as food in China. Also, the dried fruits of *Canarium album* (Lour.) Raeusch have been used in Chinese folk medicine for the treatment of angina, dysentery, snake bites, cough-hematemesis, falling sickness, enteritis, diarrhea, toxicosis from swellfish, and alcoholism [1]. Recently, phytochemical investigations found that this drug contained a number of phenolic compounds, such as gallic acid, brevifolin, scoparone, and hyperoside [2–4].

In the course of further studies, three monocyclic phenolic compounds: 3,4-dihydroxybenzoic acid ethyl ether (**1**) [5], 2-hydroxybenzoic acid (**2**) [5], ethyl gallate (**3**) [6]; two flavones: luteolin (**4**) [5], luteolin-7-*O*-β-D-glucoside (**5**) [7]; three flavonols: quercetin (**6**) [8], quercetin-3-*O*-β-D-glucoside (**7**) [9], kaempferol (**8**) [5], one flavanone: 7,8,3′,4′-tetrahydroxyflavanone (**9**) [10], and one flavanonol: 3,5,7,3′-tetrahydroxy-4′-methoxyflavanonol (**10**) [11] have been isolated from the fruits. All the above compounds have not been reported before from this plant source.

The EtOH extract was separated by repeated column chromatography using silica gel. The dried fruits (6 kg) were chopped and extracted with 80% EtOH three times under reflux and concentrated under vacuum to yield an EtOH extract (300 g). The concentrated solution was diluted with H_2O and extracted successively with petroleum ether, EtOAc, and *n*-butanol. The EtOAc extract was separated by repeated column chromatography using silica gel and Sephadex LH-20 to afford compounds **1–10**. All the phenolic compounds were identified by comparison of their ^1H and ^{13}C, DEPT NMR data. The ^{13}C NMR data of the isolated phenolic compounds are shown in Tables 1 and 2.



9



10

TABLE 1. ^{13}C NMR Data for Compounds **1–3** (600 MHz, δ, ppm)

C atom	**1** (DMSO-d_6)	**2** (CD_3OD)	**3** (CD_3OD)
1	122.9	113.8	122.4
2	115.8	163.1	110.3
3	146.2	118.1	147.1
4	151.6	136.5	140.3
5	117.4	120.0	147.1
6	123.6	131.5	110.3
O=C-O	168.4	173.5	169.0
O-CH_2-	61.7		62.2
-CH_3	14.6		14.9

1) College of Bio-Information, Chongqing University of Posts and Telecommunications, Chongqing, 400065, P. R. China, e-mail: xiangzb@126.com; 2) School of Pharmacy, Second Military Medical University, Shanghai 200433, P. R. China; 3) School of Pharmacy, Third Military Medical University, Chongqing, 400038, P. R. China. Published in Khimiya Prirodnykh Soedinenii, No. 1, pp. 101–102, January–February, 2010. Original article submitted September 2, 2008.

0009-3130/10/4601-0119

TABLE 2. ^{13}C NMR Data for Compounds **4–10** (600 MHz, DMSO-d_6, δ, ppm)

C atom	**4**	**5**	**6**	**7**	**8**	**9**	**10**
2	163.9	164.5	145.0	156.2	146.8	79.1	82.5
3	102.9	103.2	135.7	133.4	135.6	43.4	71.4
4	181.6	181.9	175.8	177.5	175.8	190.6	197.6
5	157.3	157.0	156.1	161.3	156.1	117.9	167.2
6	98.9	99.5	98.2	98.8	98.2	117.3	95.0
7	164.3	163.0	163.9	164.4	163.9	151.3	163.2
8	93.9	94.7	93.3	93.6	93.4	132.9	96.0
9	161.5	161.1	160.7	156.4	160.6	152.3	163.9
10	103.7	105.3	103.0	104.0	103.0	109.7	101.0
1′	121.5	121.4	121.9	121.2	121.6	130.1	120.4
2′	113.4	113.6	115.6	115.3	129.4	114.7	119.3
3′	145.8	145.8	146.8	144.9	115.4	145.1	147.0
4′	149.7	149.9	147.7	148.5	159.1	145.5	148.6
5′	116.0	116.0	115.1	116.2	115.4	114.4	111.6
6′	118.9	119.2	120.0	121.7	129.4	115.3	115.5
1″		99.9		101.0			
2″		73.1		74.2			
3″		76.4		76.6			
4″		69.5		70.0			
5″		77.2		77.6			
6″		60.6		61.0			
O-CH_3							55.6

ACKNOWLEDGMENT

This work was supported by the Natural Science Foundation of Chongqing University of Posts and Telecommunications (A2008-70).

REFERENCES

1. Editorial Board of "*Dictionary of Chinese Crude Drugs,*" Shanghai Scientific Technologic Publisher, Shanghai, 1999, p. 3842.
2. H. Wei, W. Peng, Y. M. Mao, B. M. Liu, and S. L. Li, *China J. Chin. Mater. Med.*, **24**, 421 (1999).
3. M. Ito, H. Shimura, N. Watanabe, M. Tamai, K. Hanada, A. Takahashi, Y. Takana, K. Arai, L.P. Zhang, C. Rao, and M. W. Chen, *Chem. Pharm. Bull.*, **38**, 2201 (1990).
4. M. Tamai, N. Watanabe, M. Someya, H. Kondoh, S. Omura, L. P. Zhang, C. Rao, and M. W. Chen, *Planta Med*., **55**, 44 (1989).
5. D. Q. Yu and J. S. Yang, *Analytical Chemistry Handbook (7th Fascicule)*, Chemical Industry Press, Beijing, 1999, p. 597, 599, 801, 838.
6. Z. Dai, G. L. Wang, Y. Liu, J. Zhang, and R. C. Lin, *China J. Chin. Mater. Med.,* **30**, 1131 (2005).
7. Z. J. Jia, H. M. Fei, Y. Li, and Z. Q. Zhu, *Chem. J. Chin. Univ*., **6**, 789 (1986).
8. F. Z. Chen and M. K. Wang, *Acta Pharm. Sin.*, **34**, 454 (1999).
9. Y. P. Tang, Y. Wang, F. C. Lou, Y. F. Li, and J. H. Wang, *Acta Pharm. Sin*., **35**, 363 (2000).
10. S. Z. Dziedzic, B. J. F. Hudson, and G. Barnes, *J. Agri. Food Chem*., **33**, 244 (1985).
11. J. H. Zhao, H. Kang, G. H. Yao, and W. Z. Zeng, *Chin. Tradit. Herb. Drugs*, **38**, 350 (2007).