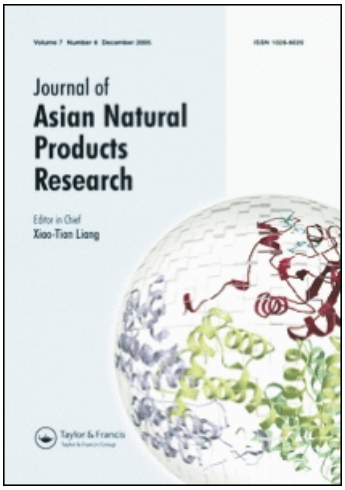

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ROTUNDIFOLINOL, A NEW 1,3-DIARYLPROPAN-2-OL FROM BARK OF *LITSEA ROTUNDIFOLIA* VAR. *OBLONGIFOLIA*

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A new 1,3-diarylpropan-2-ol, named rotundifolinol (**1**), has been isolated from the bark of *Litsea rotundifolia* var. *oblongifolia*. Its structure was elucidated on the basis of detailed spectroscopic analysis and comparison with related compounds.

Keywords: *Litsea rotundifolia* var. *oblongifolia*; Lauraceae; 1,3-Diarypropan-2-ol; Rotundifolinol

INTRODUCTION

Litsea is a genus in the family Lauraceae with about 72 species distributed in South and Southwest China [1]. Most *Litsea* plants contain alkaloids [2–4], flavonoids [5,6], terpenes [7,8], lactones [9], and volatile oil [10], which were reported to possess a variety of biological activities, ranging from antimicrobial and hypothermic to antitumor [2,11,12]. As part of our systematic studies on the chemical constituents of Chinese medicinal plants, we carried out a chemical study on *Litsea rotundifolia* var. *oblongifolia* since no phytochemical investigation has been done previously on the species. A new 1,3-diarylpropan-2-ol (**1**) and a known compound, (−)-epicatechin (**2**) [13] (Fig. 1), have been isolated from the title plant. This paper describes the isolation and structure elucidation of the new compound.

RESULTS AND DISCUSSION

The bark of *L. rotundifolia* var. *oblongifolia* was extracted exhaustively with MeOH, and the methanolic extract was partitioned between various organic solvents and water. The EtOAc soluble portion was subjected to a combination of Sephadex LH-20 and silica gel column chromatographies, eluting with various solvent systems. This procedure resulted in

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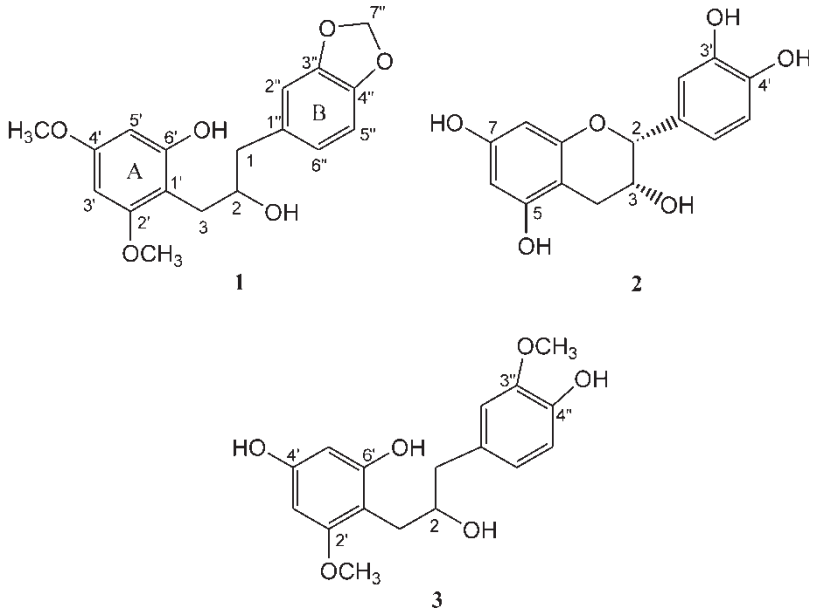

1 **2** **3**

FIGURE 1 Structures of compounds **1**–**3**.

the isolation of a new 1,3-diarylpropan-2-ol, named rotundifolinol (**1**), and (−)-epicatechin (**2**) [13].

Compound **1** was obtained as a colorless gum. The molecular formula, $C_{18}H_{20}O_6$, consistent with nine degrees of unsaturation, was determined by HR-EIMS, which gave a molecular ion peak at *m/z* 332.3196 $[M]^+$ (calculated, 332.3192). The ^1H and ^{13}C NMR spectra of **1** were closely related to those of co-occurring compound **2** and model compound **3**, previously isolated from the plant *Lindera umbellate* var. *membranacea* [13], showing the similar substitution pattern in rings A and B. In fact, two doublet signals (δ 6.08, H-3′, and 6.17, H-5′) and ABX-type signals [δ 6.63 (d, $J = 1.2$ Hz, H-2″), 6.70 (d, $J = 1.2$, 7.8 Hz, H-6″) and 6.73 (d, $J = 7.8$ *Hz*, H-5″)] were observed in the ^1H NMR spectrum of **1**, suggesting the presence of phloroglucinol-(ring A) and catechol-type (ring B) aromatic rings. Furthermore, the ^1H NMR spectrum of **1** revealed the presence of two benzylic methylenes (δ 2.54–3.00), a hydroxy-bearing methine (δ 4.04), two methoxyl groups (δ 3.75 and 3.76) and a methylenedioxy group (δ 5.91) (Table. I). These observations indicated that **1** possess a 1,3-diarylpropan-2-ol skeleton. The two methoxyl groups were concluded to be located at the C-2′ and C-4′ positions, since the ^{13}C NMR and ^1H NMR spectra exhibited an unsymmetrical signal pattern of the phloroglucinol-type ring [13] (Table. I). The methylenedioxy group was confirmed to be located at the C-3″ and C-4″ positions because the ^1H NMR spectrum exhibited ABX-type signals. From mass spectral analysis the above conclusions were further confirmed (Fig. 2).

On the basis of the above evidence, **1** was established as 1-(3″,4″-methylenedioxyphenyl)-3-(2′,4′-dimethoxy-6′-hydroxyphenyl)propan-2-ol. Compound **1**, like compound **3** [13], exists in a racemic form, as indicated by the specific optical rotation measurement.

Compound **1** could be biogenetically derived from the co-occurring compound **2** as depicted in Fig. 3. Firstly, methylation of **2** leads to **4**, which, after cleavage of the O-1–C-2 bond, gives **5**. Finally, losing CH_4 between 4″ and 5″-OCH_3 of **5**, and subsequent cyclization, should give compound **1**.

TABLE I Selected ^{1}H and ^{13}C NMR data[a] for **1** and ^{13}C NMR data[b] for **3**

	1		***3***
Position	δ *H* (*mult*, *J in Hz*)	δ ^{13}C (*mult.*)	δ ^{13}C (*mult.*)
1a	2.54 (dd, 9.7, 14.0)	42.5 (t)	40.2 (t)
1b	2.85 (dd, 3.3, 14.0)		
2	4.04(m)	74.9 (d)	74.8 (d)
3a	2.79 (dd, 7.1, 14.7)	29.5 (t)	30.9 (t)
3b	3.00 (dd, 2.3, 14.7)		
1′	–	106.0 (s)	106.1 (s)
2′	–	157.3 (s)	158.1 (s)
3′	6.17 (d, 2.3)	91.2 (d)	92.0 (d)
4′	–	147.9 (s)	158.4 (s)
5′	6.08 (d, 2.3)	94.5 (d)	97.5 (d)
6′	–	159.8 (s)	160.0 (s)
1″	–	131.7 (s)	131.5 (s)
2″	6.63 (d, 1.2)	108.4 (d)	113.8 (d)
3″	–	146.3 (s)	145.6 (s)
4″	–	147.9 (s)	148.0 (s)
5″	6.73 (d, 7.8)	109.6 (d)	115.5 (d)
6″	6.17 (dd, 1.2, 7.8)	122.2 (d)	122.6 (d)
7″	5.91 (s)	100.9	–
2′-OCH_3	3.76 (s)	55.5	–
4′-OCH_3	3.75 (s)	55.2	–

[a]Bruker AMX 500 MHz; Measured in $CDCl_3$. Chemical shifts (δ in ppm) are expressed relative to TMS. Assignments were deduced by analysis of 1D and 2D spectra. [b]Measured in acetone-d_6 [13].

This is the first report on the chemical constituents of the plant *L. rotundifolia* var. *oblongifolia.* Compound **1** has not been encountered before in nature nor has it previously been prepared synthetically. The immune activities of compounds **1** and **2** were tested, and both showed no significant bioactivity. Other bioassays of compounds **1** and **2**, as well as further chemical investigation of the minor secondary metabolites of the plant, are currently on-going.

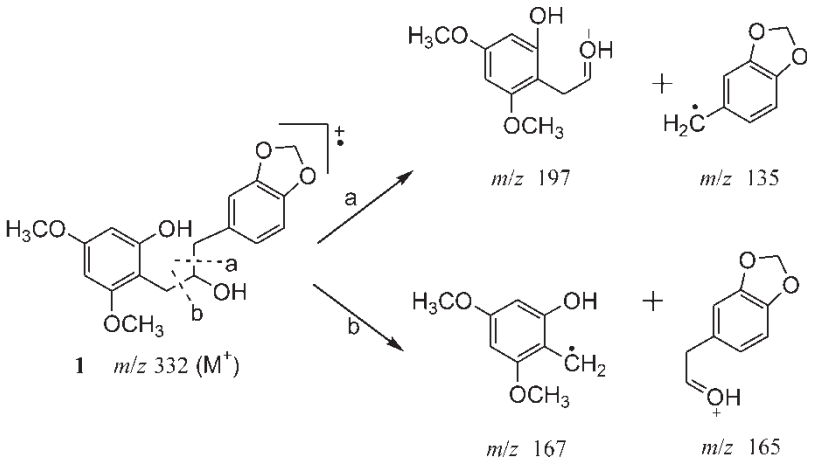

FIGURE 2 Significant mass fragmentations of **1**.

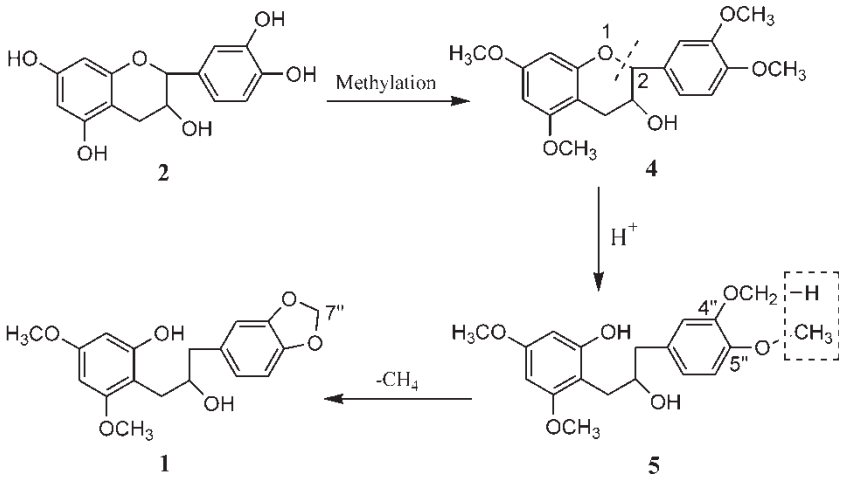

FIGURE 3 Possible biosynthetic pathway of **1**.

EXPERIMENTAL

General Experimental Procedures

UV spectra were recorded on a Varian Cary 300 Bio spectrophotometer; λ_{max} in nm. IR spectra were recorded on a Nicolet Magna FT-IR 750 spectrometer; ν_{max} in cm^{-1}. ^1H and ^{13}C NMR spectra were measured with a Bruker DRX-400 (400 MHz for ^1H and 100 MHz for ^{13}C) spectrometer. Chemical shifts (δ) are in ppm relative to TMS as internal standard, and coupling constants (J) are in Hz. The EIMS was obtained on a MAT-711 mass spectrometers. Optical rotation was measured on a Perkin-Elmer 241 MC Polarimeter. Commercial Si gel plates (Qing Dao Hai Yang Chemical Group Co.) were used for TLC. The chromatograms were sprayed with 0.1% $Ce(SO_4)_2$ in 2N H_2SO_4 and heated at 80°C for 5 min to detect the spots.

Plant Material

The examined sample was collected from Guangdong province of China in August 2001 and identified by Professor F.-W. Xin of the South China Institute of Botany, Chinese Academy of Sciences. A voucher specimen (no. PL02-5) is deposited in the Herbarium of the Institute of Materia Medica, SIBS-CAS.

Extraction and Isolation

The powdered bark of *L. rotundifolia* var. *oblongifolia* (1 kg) was repeatedly extracted with MeOH at room temperature. The extract was then concentrated under reduced pressure to give a brown syrup (132 g), which was partitioned with solvents into EtOAc-soluble (65 g) and *n*-BuOH-soluble (20 g) fractions. The EtOAc-soluble portion was subjected to Sephadex LH-20 column chromatography washing with $CHCl_3$–MeOH (1:1), by which five fractions (I–V) were obtained. Fraction II (12 g) was resubmitted to silica gel column chromatography (light petroleum–EtOAc in order of increasing polarity) to yield compounds **1** (23.4 mg), and **2** (30.2 mg), respectively.

Rotundifolinol (1)

A colorless gum, $[\alpha]_D^{20}$ 0 (*c* 1.55, $CHCl_3$); UV ($CHCl_3$) λ_{max}: 287 nm (ϵ 3900); IR (KBr) ν_{max} (cm^{-1}): 3400, 2921, 1621, 1589, 1442, 1039, 927, 813; EIMS *m/z* (%):332 (M^+, 28), 314 (12), 197 (59), 167 (100), 136 (28), 109 (12), 77 (10); ^1H and ^{13}C NMR: see Table I.

Acknowledgements

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