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A NEW LIGNAN FROM THE ROOTS OF *Cinnamomum philippinense*

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*Cinnamophilin A (**1**), a new* Cinnamomum *lignan, has been isolated from* Cinnamomum philippinense *(Merr.) Chang (Lauraceae), and its structure was characterized and identified by physical and spectral evidence.*

Keywords: *Cinnamomum philippinense* (Merr.) Chang, Lauraceae, cinnamophilin A, lignan.

The *Cinnamomum* species (Lauraceae) have been used in folk medicine for their sweating, antipyretic, and analgesic effects [1]. There is only one paper describing the constituents of roots of *Cinnamomum philippinense* (Merr.) Chang [2]. In the course of screening for biologically and chemically novel agents from Formosan Lauraceous plants [3–7], *C. philippinense* was chosen for further phytochemical investigation. In this article, we report the isolation and structural elucidation of a new compound, cinnamophilin A (**1**).

Cinnamophilin A (**1**), was obtained as a gum. Its molecular formula was deduced as $C_{20}H_{20}O_4$ by HR-ESI-MS (*m/z* 324.1367 ($[M]^+$; calcd 324.1362). The UV spectrum had absorptions at 235 and 280 nm. The IR spectrum showed absorptions for the hydroxyl group (3400 cm^{-1}) and an aromatic moiety (1600 and 1520 cm^{-1}). Two singlet methyl groups at δ 2.11 (3H, s) and 2.43 (3H, s) in its ^1H NMR spectrum were observed. The ^1H NMR plot of cinnamophilin A showed six aromatic protons, including one set of the ABX spin system at δ 6.72 (1H, dd, J = 8.0, 1.6), 6.73 (1H, d, J = 1.6), and 7.02 (1H, d, J = 8.0), three singlets at δ 6.81, 7.05, and 7.49, two methoxyl group protons at δ 3.83 and 4.00, and two hydroxyl signals at δ 5.65 and 5.72, indicating that cinnamophilin A was probably a lignan-like dehydroguaiaretic acid [8]. The methoxyl position of **1** was determined through 2D NOESY analysis. The observation of the NOESY correlations from two methoxyl groups to H-8 and H-2′ suggested that the two methoxyl groups were in C-7 and C-3′ of this structure (Fig. 1). Therefore, the structure of **1** was determined as 1-(4′-hydroxy-3′-methoxyphenyl)-7-methoxy-2,3-dimethylnaphthalen-6-ol and assigned the trivial name cinnamophilin A. Thus, for providing a meaningful chemotaxonomic proof for the genus *Cinnamomum*, it is worth continuing the research on the components of the leaves and stems from *C. philippinense* in the future.

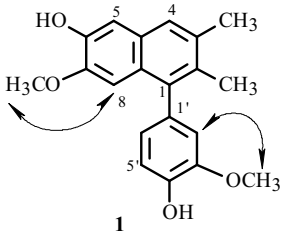

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Fig. 1. NOESY spectrum of cinnamophilin A (**1**).

EXPERIMENTAL

UV spectra were obtained in MeCN, and IR spectra were measured on a Hitachi 260–30 spectrophotometer. ^1H NMR (400 MHz) and NOESY spectra were obtained on a Varian (Unity Plus) NMR spectrometer. Low-resolution ESI-MS spectra were obtained on an API 3000 (Applied Biosystems), and high-resolution ESI-MS spectra on a Bruker Daltonics APEX II 30e

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spectrometer. Silica gel 60 (Merck, 70–230 mesh, 230–400 mesh) was used for column chromatography. Precoated Silica gel plates (Merck, Kieselgel 60 F-254), 0.20 mm and 0.50 mm, were used for analytical TLC and preparative TLC, respectively, visualized with 50% H_2SO_4.

Plant Material. Extraction and Isolation. The roots of *C. philippinense* were collected from Taiwan County in May 2008. Plant material was identified by Dr. Yen-Ray Hsui (Chungpu Research Center, Taiwan Forestry Research Institute). A voucher specimen (Cinnamo. 8) has been deposited at the Department of Medical Technology, School of Medical and Health Sciences, Fooyin University, Kaohsiung County, Taiwan. The roots (5.2 kg) of *C. philippinense* were extracted repeatedly with MeOH at room temperature for 24–48 h. The MeOH extract was dried and evaporated to leave a viscous residue (316.8 g). The residue was placed on a silica gel column and eluted with CH_2Cl_2 gradually enriched with MeOH to afford 10 fractions. Part of fraction 7 (23.6 g) was subjected to silica gel chromatography by eluting with CH_2Cl_2–MeOH (100:1), then enriched with MeOH to furnish seven fractions (7-1–7-7). Fraction 7-5 (5.2 g) was further purified on a silica gel column using $CHCl_3$–MeOH mixtures to obtain cinnamophilin A (4 mg).

Cinnamophilin A (1): colorless gum. UV (MeCN, λ_{max}, nm) (log ε): 235 (3.02), 280 (1.90). IR (neat, ν_{max}, cm^{-1}): 3400 (br, OH), 1600, 1520. ^1H NMR (500 MHz, $CDCl_3$, δ, ppm, J/Hz): 2.11 (3H, s, 2-CH_3), 2.43 (3H, s, 3-CH_3), 3.85 (3H, s, 3′-OCH_3), 4.00 (3H, s, 7-OCH_3), 5.65 (1H, br.s), 5.72 (1H, br.s), 6.72 (1H, dd, J = 8.0, 1.6, H-6′), 6.73 (1H, d, J = 1.6, H-2′), 6.81 (1H, s, H-8), 7.02 (1H, d, J = 8.0, H-5′), 7.05 (1H, s, H-5), 7.49 (1H, s, H-4). HR-ESI-MS *m/z* 324.1367 $[M]^+$ (calcd for $C_{20}H_{20}O_4$, 324.1362).

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REFERENCES

1. Y. H. Kuo and M. J. Shue, *J. Chin. Chem. Soc.*, **38**, 65 (1991).
2. T. S. Wu, Y. L. Leu, Y. Y. Chan, S. M. Yu, C. M. Teng, and J. D. Su, *Phytochemistry*, **36**, 785 (1994).
3. T. J. Hsieh, S. F. Hsieh, and C. Y. Chen, *Chem. Nat. Comp*., **46**, 99 (2010).
4. C. Y. Chen, H. M. Wang, S. H. Chung, W. L. Lo, W. L. Yang, and S. C. Yang, *Chem. Nat. Comp*., **46**, 474 (2010).
5. K. C. Cheng, M. C. Hsueh, H. C. Chang, A. Y. Lee, H. M. Wang, and C. Y. Chen, *Nat. Prod. Commun*., **5**, 911 (2010).
6. I. J. Lin, W. L. Lo, Y. C. Chia, L. Y. Huang, T. M. Cham, W. S. Tseng, Y. T. Yeh, H. C. Yeh, Y. D. Wang, and C. Y. Chen, *Nat. Prod. Res*., **24**, 775 (2010).
7. C. Y. Chen and Z. L. Hong, *Khim. Prir. Soedin*., 400 (2001).
8. M. M. P. Madalena, K. Anake, M. Ing-on, B. G. Alicia, and H. Werner, *Phytochemistry*, **29**, 1985 (1990).