A New Tetrahydrofuran of Cinnamomum Burmannii

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ABSTRACT

A new tetrahydrofuran, burmafuranic acid (I) was isolated from the mushroom supreme by Cinnamomum burmannii (Nees & T. Nees) Blume (Lauraceae). The structure of the new tetrahydrofuran was elucidated by chemical and physical evidence.

Keywords
Cinnamomum burmannii, Lauraceae, Tetrahydrofuran.

Introduction
Cinnamomum burmannii (Nees & T. Nees) Blume (Lauraceae) is a source of Indonesia cinnamon, and is widely used as a spice in Indonesia [1]. The chemical constituents of the roots of this plant have not yet been reported. Recently, we reported a new amide, a novel homosesquiterpenoid, along with five known amides from the stems of \textit{C. burmannii} [2,3]. Previously, we isolated 20 compounds, including one apocarotenoid, one triterpenoid, one coumarin, two steroids, and four benzoids from the leaves of this plant [4,5].

In the course of screening for biologically and chemically novel agents from Formosan plants in the family Lauraceae [6-83], \textit{C. burmannii} was chosen for further phytochemical investigation. In this paper, we report the isolation and structural elucidation of this new tetrahydrofuran.

Burmafuranic acid (I), obtained as a white powder, established by the molecular formula C_{14}H_{18}O_{7} by HR-EIMS at m/z [M + Na]\textsuperscript{+} 321.0947 (calcd for C_{14}H_{18}O_{7}Na, 321.0950). Two IR bands at \nu_{\text{max}} 3400 and 1650 cm\textsuperscript{-1} one signal appearing at \delta 178.0 in the \textsuperscript{13}C NMR spectrum suggested that hydroxyl groups and a carbonyl group might be present. The \textsuperscript{1}H NMR spectrum revealed an AX pattern at \delta 6.54 (1H, d, J = 1.8) and 6.49 (1H, d, J = 1.8) for H-2’ and H-6’, three methine protons at \delta 3.12 (1H, m), 3.42 (1H, td, J = 9.6, 4.2) and 4.61 (1H, d, J = 6.6) for H-4, H-3 and H-5, two methylene protons at \delta 4.21 (1H, dd, J = 9.6, 4.2)/4.34 (1H, m) and 3.65 (1H, m)/4.51 (1H, dd, J = 9.6, 6.6) for H-2 and H-6 and two methyl protons at \delta 3.87 (3H, s, OCH\textsubscript{3}) and 3.89 (3H, s, OCH\textsubscript{3}). \textsuperscript{13}C NMR and DEPT experiments on I showed 14 resonance lines consisting of two methyls, two methylenes, five methines and five quaternary carbons (including one carbonyl signal at \delta 178.0).

The mass, UV, IR and \textsuperscript{1}H NMR data suggested that I is a type of phenolic tetrahydrofuran lignan and that the position of methoxyl and hydroxyl groups should be located on the skeleton. The sequential correlations of the NOESY spectrum were successfully established as shown in Figure 1. Thus, the structure of this compound was named to be burmafuranic acid (I), which was further confirmed by HMBC experiments (Table 1).

Table 1: NMR data of I in CDCl\textsubscript{3} (\delta in ppm, J in Hz, 600 MHz for \textsuperscript{1}H NMR, and 150 MHz for \textsuperscript{13}C NMR).

<table>
<thead>
<tr>
<th>Position</th>
<th>\textsuperscript{13}C (\delta)</th>
<th>\textsuperscript{1}H (\delta)</th>
<th>mult., J (Hz)</th>
<th>HMBC (\textsuperscript{1}H \rightarrow \textsuperscript{13}C)</th>
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<tr>
<td>2</td>
<td>70.2</td>
<td>4.21</td>
<td>dd, 9.6, 4.2</td>
<td>C-3</td>
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<tr>
<td>3</td>
<td>46.0</td>
<td>3.42</td>
<td>td, 9.6, 4.2</td>
<td>C-3, C-4, C-7</td>
</tr>
<tr>
<td>4</td>
<td>48.2</td>
<td>3.12</td>
<td>m</td>
<td>C-3, C-5, C-6</td>
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<tr>
<td>5</td>
<td>86.0</td>
<td>4.61</td>
<td>d, 6.6</td>
<td>C-4, C-1\textsuperscript{1}</td>
</tr>
<tr>
<td>6</td>
<td>70.1</td>
<td>3.65</td>
<td>m</td>
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<tr>
<td></td>
<td></td>
<td>4.51</td>
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</tbody>
</table>

The stems (2.12 kg) of Cinnamomum burmannii (Nees & T. Nees) Blume were collected from Nantou County, Taiwan, in June 2020. Plant material was identified by Dr. Su-Ling Liu (Experimental Forest College of Bioresources and Agriculture of the National Taiwan University). A voucher specimen was deposited at the Department of Medical Biology, National Taiwan University. This research is sponsored by the project (110A01) from Experimental Forest College of Bioresources and Agriculture of the National Taiwan University.

**Extraction and Isolation**

The stems (2.12 kg) of C. burmannii were extracted repeatedly with MeOH (3 L x 3) at room temperature for 24-48 hrs. The MeOH extract was dried and evaporated to leave a viscous residue (37.6 g). The residue was placed on a silica gel column (1.5 kg, 70−230 mesh) and eluted with CHCl₃ gradually enriched with MeOH to afford 10 fractions. Part of fraction 2 (11.6 g) was subjected to silica gel chromatography (343 g, 70−230 mesh), by eluting with n-hexane-acetone (100:1), enriched gradually with acetone, to furnish four fractions (2-1−2-4). Fraction 2-2 (4.5 g) was further purified on a silica gel column using n-hexane/acetone mixtures to obtain burmafuranic acid (1) (4 mg).

**Burmafuranic acid (1)**

White powder. [α]D₂⁰ +35.4 (c 0.45, CHCl₃). UV λmax (MeCN, log ε): 210 (4.11), 235 (4.16), 274 (4.04) nm. IR (νmax cm⁻¹): 3400 (OH), 1650 (C=O), 1500. ESI-MS m/z 321 [M+Na]⁺; HR-ESI-MS m/z 321.0947 [M+Na]⁺ (calcd for C₁₂H₁₈O₅Na, 321.0950). ¹H and ¹³C NMR data, see Table 1.

**Acknowledgment**

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**References**


