

# THREE NEW HIGHLY CONDENSED RESVERATROL OLIGOMERS FROM INDONESIAN *VATICA PAUCIFLORA* BLUME (DIPTEROCARPACEAE)

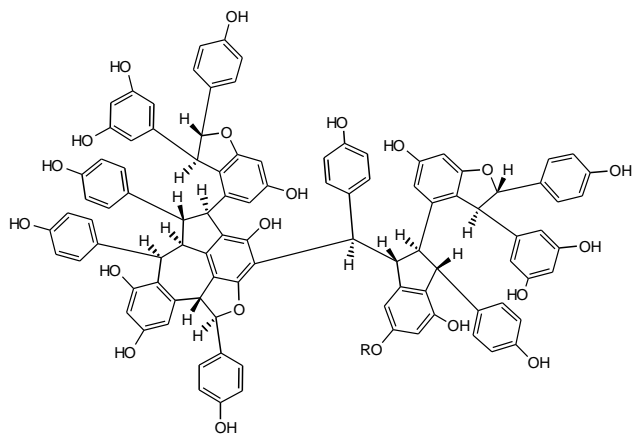
Sri Atun<sup>a</sup>, S. A. Achmad<sup>a</sup>, E. H. Hakim<sup>a</sup>, Y. M. Syah<sup>a</sup>,  
N. Aimi<sup>b</sup>, H. Takayama<sup>b</sup>, M. Kitajima<sup>b</sup>, K. Takeya<sup>c</sup>, L. D. Juliawaty<sup>a</sup>.

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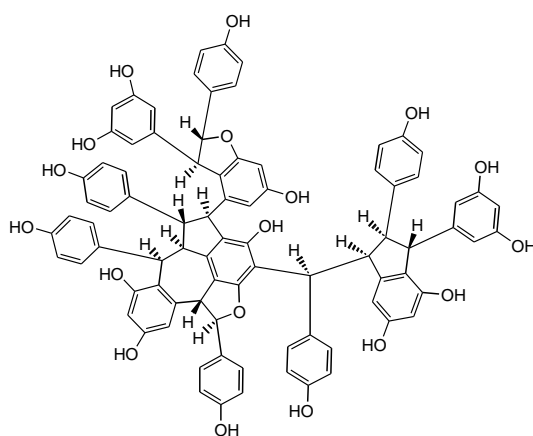
## Abstract

Three new resveratrol oligomers : Diptoindonesin C – E (1 – 3) were isolated from the ethyl acetate extract of the stem bark of *Vatica pauciflora* Blume (Dipterocarpaceae), together with five known resveratrol oligomers (4 - 8) and siringaresinol (9). The structures of isolates were established on the basis of detailed spectroscopic analysis.

Key words : Diptoindonesin C - E, *Vatica pauciflora* Blume, Resveratrol oligomers



1. R = H, Diptoindonesin C  
2. R = glu, Diptoindonesin D



3. Diptoindonesin E

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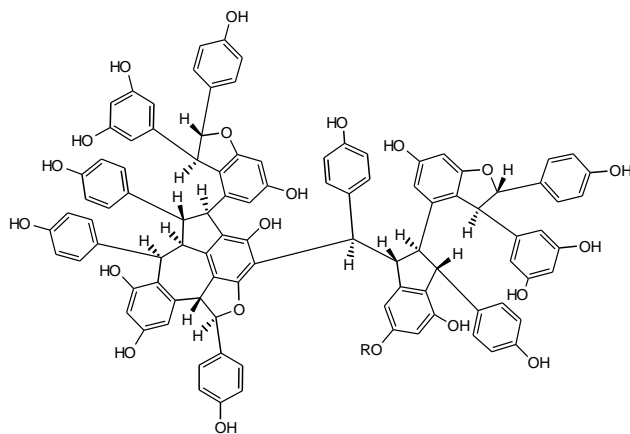
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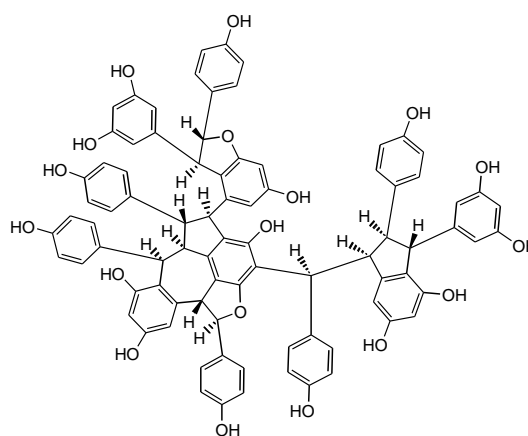
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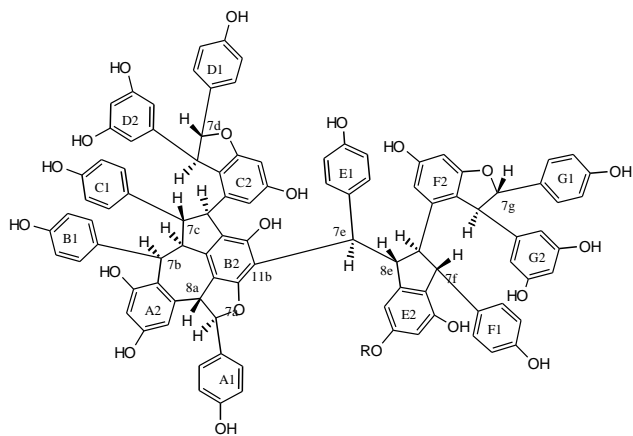
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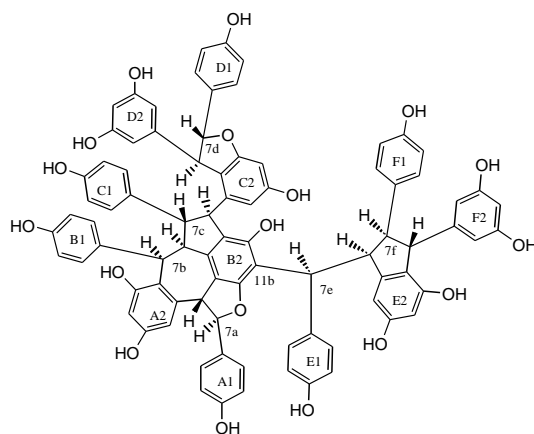
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## Introduction

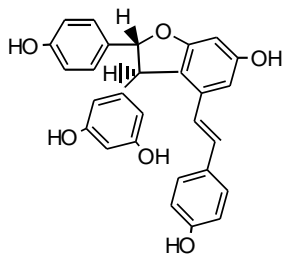
Dipterocarpaceae is one of the largest families found in the tropical forest Indonesia. The plants are distributed from the west of Indonesia until Papua (Irian Jaya) and the mostly in Kalimantan, there for the timber of these plants are usually called “ meranti” or “ Kayu Kalimantan”. Dipterocarpaceae consists of about 16 genus and 600 species<sup>1,2</sup> and until now only few species have been investigated. Some chemical constituents that can be found from this plants include arilpropanoid, benzofuran, flavanoid, polyphenol, resveratrol oligomers and terpenoid<sup>2,3</sup>. The resveratrol oligomer from Dipterocarpaceae plants have various structure from simple structure as like resveratrol monomer, resveratrol dimer, resveratrol trimer, until resveratrol hexamer<sup>4-10</sup>. These structure are very interesting and showed interesting biological activity, such as antibacterial<sup>3</sup>, anticancer<sup>4</sup>, antihepatotoxic<sup>5</sup>, and anti-HIV<sup>6</sup>. Thus Dipterocarpaceae plants are very potential for chemical research in natural product and pharmaceutical industry. This paper deals with the isolation and structure elucidation of new resveratrol oligomers [Diptoindonesin C-E (1-3)] along with five known resveratrol oligomers (4-8), and siringaresinol (9).



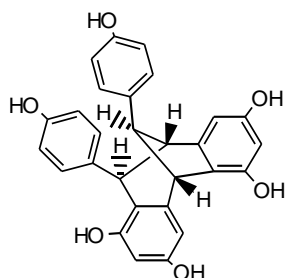
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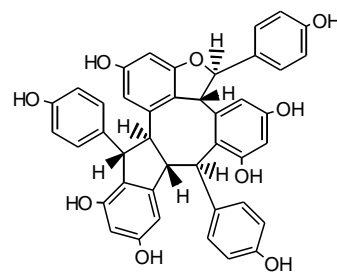
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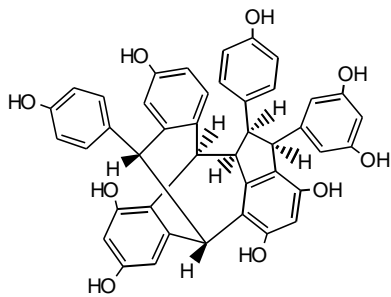
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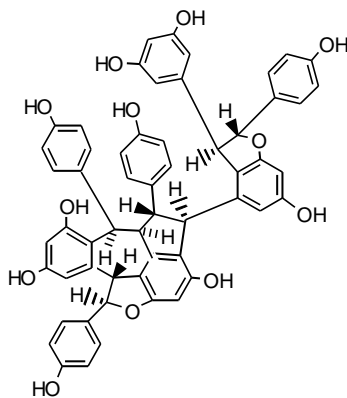
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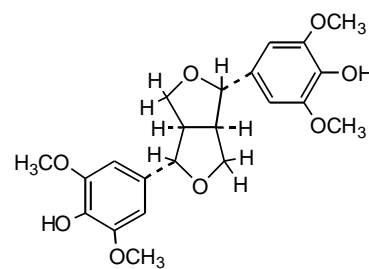
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8



9

## Results and Discussion

Diptoindonesin C (**1**),  $[\alpha]_D^{25} - 51^\circ$  (c : 0,1 MeOH) obtained as a pale yellow amorphous powder. An absorption band (283 nm) in the UV spectrum showed the presence of aromatic rings. The molecular formula was established to be  $C_{98}H_{74}O_{21}$  by means of the high resolution HRFABMS  $[M^+]$  ion at  $m/z$  1586,4816. Analysis of  $^1H$  and  $^{13}C$  NMR spectral data including  $^1H$ - $^1H$  COSY and HMQC of **1** (Table 1) showed the signals assignable to seven resveratrol units (aromatic ring A<sub>1</sub>-G<sub>1</sub>, A<sub>2</sub>-G<sub>2</sub> and aliphatic sequences of

## Experimental Section

### General Experimental Procedures

Melting points were determined on a micro melting point apparatus and are uncorrected. Optical rotation was measured in MeOH on a JASCO DIP-370 digital polarimeter. UV and IR spectra were obtained using Varian Cary 100 Conc and one Perkin Elmer Spectrophotometers.  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra were recorded with JNM A 6000 spectrometer operating at 500 MHz ( $^1\text{H}$ ) and 500 MHz ( $^{13}\text{C}$ ) using TMS as an internal standard. FAB-MS were obtained with Jeol JMS- AM 20 mass spectrometer using the EI mode. VLC was carried out using Merk Si-gel 60 GF<sub>254</sub>, flash chromatography with Merk Si-gel 60 (230 – 400 mesh), and TLC analysis on precoated Si-gel plates (Merk kieselgel 60 F<sub>254</sub> 0,25 mm).

### Plant Material

Sample of the steam bark of *V. pauciflora* were collected in September 2000 from the research garden Dramaga Bogor, Indonesia. The plant was identified by the staff at the Herbarium Bogorienses, Bogor, Indonesia.

### Bioactivity Test

The toxicity of the compound was evaluated by brine shrimp lethality test with *Artemia salina* Leach and antimitotic with cdk enzyme.

### Extraction and Isolation

The milled dried steam bark (5 Kg) was extracted exhaustively with MeOH (3 x 15 L) for 24 hours. The combined extracts were evaporated under reduced pressure to small volume. The extract was fractionated with hexane (3 x 500 ml), CH<sub>2</sub>Cl<sub>2</sub> (3 x 500 ml) and then with EtOAc. A part of the EtOAc fraction (35 gr) was preabsorbed on silica gel and chromatographed over a column of silica gel with amounts of hexane in EtOAc as eluent with increased gradient polarity. Fraction which gave the same R<sub>f</sub> on TLC were combined and rechromatographed in the same way to give five combined fraction (PV I – V). The less polar fraction (PV I) yielded material which was purified by repeated chromatography to give **4** (20 mg) and **5** (32 mg). The combined fraction PV II (10 g) was separated by VLC [CH<sub>2</sub>Cl<sub>2</sub> : n-hexane : Me<sub>2</sub>CO (3 : 1 : 1) and radial chromatography to give **6** (42 mg), **7** (95 mg), and **8** (102 mg). The third fraction (PV III) was purified by radial chromatography [EtOAc-CHCl<sub>3</sub>-MeOH-H<sub>2</sub>O (15:10:4:1)] to give **3** (47 mg) and **1** (57 mg). Further

purification of fr PV V by repeated radial chromatography [EtOAc-CHCl<sub>3</sub>- MeOH-H<sub>2</sub>O (15:10:4:1)] achieved the isolation of **2** (105 mg). Compounds **9** (12 mg) was obtained from CH<sub>2</sub>Cl<sub>2</sub> fraction after purification with repeated radial chromatographic method.

**Diptoindonesin C (1).** A pale yellow amorphous powder; m.p 245 °C (dec.);  $[\alpha]_D^{25} - 51^\circ$  (c : 0,1 MeOH). UV (MeOH)  $m_{ix}$  (log  $\epsilon$ ) : 208 (6,65), 232 (sh) (6,38), 283 (5,63) nm; IR (KBr)  $\nu_{max}$  : 3432, 1614, 1512, 1444, 1334, 1237, 1173, 1119, 1007, 833 cm<sup>-1</sup>; positif ion (HRFABMS)  $m/z$  1586,4816 [M<sup>+</sup>] (calcd 1586,4723 for C<sub>98</sub>H<sub>74</sub>O<sub>21</sub>,). The <sup>1</sup>H and <sup>13</sup>C NMR spectral data and HMBC correlation : see Table 1.

**Diptoindonesin D (2).** A pale yellow amorphous powder; m. p 225 °C (dec);  $[\alpha]_D^{25} - 25^\circ$  (c : 0,1 dalam MeOH). UV (MeOH)  $\lambda_{maks}$  (log  $\epsilon$ ) : 205 (6,51), 232 (sh) (6,26), 284 (5,54) nm IR (KBr)  $\nu_{max}$  : 3436, 1615, 1513, 1445, 1336, 1243, 1173, 1119, 1073, 1006, 834 cm<sup>-1</sup>; positif ion (HRFABMS)  $m/z$  1748, 5255 [M<sup>+</sup>] (calcd. 1748,5251 for C<sub>104</sub>H<sub>84</sub>O<sub>26</sub> ); The <sup>1</sup>H and <sup>13</sup>C NMR spectral data and HMBC correlation : see Table 1.

**Diptoindonesin E (3).** A pale amorphous powder; m.p.225 °C (dec),  $[\alpha]_D^{25} + 28^\circ$  (c : 0,1 MeOH). UV (MeOH)  $\lambda_{maks}$  (log  $\epsilon$ ) : 208 (6,55), 232 (sh) (6,39), 283 (5,63) nm; IR (KBr)  $\nu_{maks}$  : 3435, 1614, 1512, 1447, 1337, 1239, 1173, 1007, 834 cm<sup>-1</sup>; positif ion (HRFABMS)  $m/z$  1360,4089 [M<sup>+</sup>] (calcd. 1360,4093 for C<sub>84</sub>H<sub>64</sub>O<sub>18</sub> ). The <sup>1</sup>H and <sup>13</sup>C NMR spectral data and HMBC correlation : see Table 1.