

Polyprenol from the Whole Plants of *Leucaena leucocephala*

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ABSTRACT

*Ficaprenol-11 (polyprenol) (1), squalene (2), lupeol (3), β -sitostenone (4), trans-coumaric acid (5), cis-coumaric acid (6) pheophytin-a (7), pheophorbide a methyl ester (8), methyl-13²-hydroxy-(13²-S)- pheophorbide-b (9) and aristophyll-C (10) were isolated from the whole plants of *Leucaena leucocephala* (Leguminosae). Among them, 1 and 2 was found for the first time from this species. The structure of these compounds were characterized and identified by spectra analyses.*

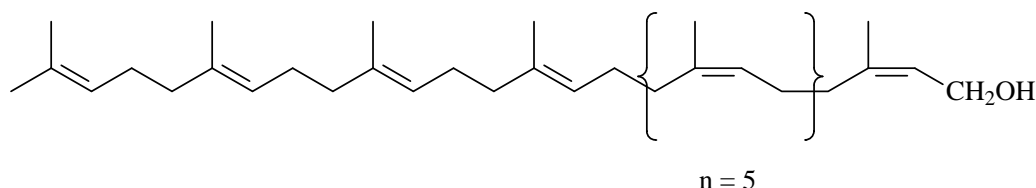
Keywords: Polyprenol, *Leucaena leucocephala*, Leguminosae

Leucaena leucocephala (Leguminosae) is a small, leguminous and native to tropical America, now widely distributed in southern Asia and neighboring islands [1]. This plant's reproductive capacity is extremely strong. If can henceforth the plant separate the effective component, applies, will be able to reduce it to the environment threat. Previous studies have show that the extract of *L. leucocephala* was found to exhibit various pharmacological effects [2–8], *L. leucocephala* was chosen for further phytochemical investigation. The MeOH extract of its plants were subjected to solvent partitioning and chromatographic separation to afford 10 pure substances. The chemical constituents in the plants of *L. leucocephala* were separated with column chromatography.

Investigation on the MeOH extract of the plants has led to the isolation of 10 compounds, one polyprenol: ficaprenol-11 (**1**) (**Figure 1**) [9]; two terpenoids: squalene (**2**) (**Figure 2**) [10] and lupeol (**3**) [11]; one steroid: β -sitostenone (**4**) [12]; two benzenoids: *trans*-coumaric acid (**5**) and *cis*-coumaric acid (**6**) [13]; and four chlorophylls: pheophytin-a (**7**) [14], pheophorbide a methyl ester (**8**) [15], methyl-13²-hydroxy-(13²-S)-pheophorbide-b (**9**) [16] and aristophyll-C (**10**) [17]. These compounds were obtained and characterized by the comparison of their physical and spectral data (UV, IR, NMR and MS) with values obtained in the literature. Among them, **1** (**Figure 1**) and **2** (**Figure 2**) was found for the first time from this species.

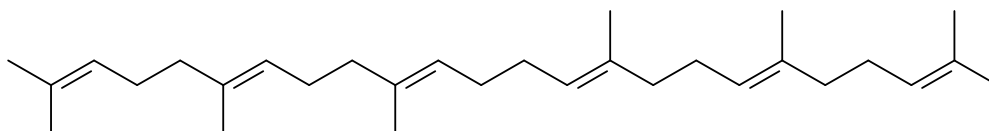
The specimen of *L. leucocephala* was collected from Kenting National Park, Pingtung County, Taiwan in May, 2009. A voucher specimen was characterized by Dr. Jin-Cheng Huang of Department of Forest Products Science and Furniture Engineering, National Chiayi Univer-

sity, Chiayi, Taiwan and deposited in the School of Medical and Health Sciences, Fooyin University, Kaohsiung County, Taiwan. The air-dried green beans of *L. leucocephala* (5.0 kg) were extracted with MeOH (80 L x 6) at room temperature and the MeOH extract (132.5 g) was obtained upon concentration under reduced pressure. The MeOH extract was chromatographed over silica gel using *n*-hexane/acetone as eluent to produce 10 fractions. Part of fraction 1 (8.24 g) was subjected to Si gel chromatography by eluting with *n*-hexane/acetone (50:1), then enriched with acetone to furnish 7 fractions (1-1~1-7). Fraction 1-4 (2.17 g) was re-subjected to Si gel chromatography, eluting with *n*-hexane/Acetone (40:1) to obtain -sitostenone (**4**) (9 mg, 0.0068%). Part of fraction 2 (2.67 g) was subjected to Si gel chromatography by eluting with *n*-hexane/acetone (50:1) to obtain ficaprenol-11 (**1**) (**Figure 1**) (21 mg, 0.0158%). Part of fraction 3 (6.77 g) was subjected to Si gel chromatography by eluting with *n*-hexane/acetone (8:1), then enriched with acetone to furnish 5 fractions (3-1~3-5). Fraction 3-3 (1.33 g) was further purified by another silica gel column using *n*-hexane/acetone to obtain squalene (**2**) (**Figure 2**) (5 mg, 0.0038%) and lupeol (**3**) (24 mg, 0.0181%). Part of fraction 5 (7.42 g) was subjected to Si gel chromatography by eluting with *n*-hexane/acetone (8:1) to obtain pheophorbide a methyl ester (**8**) (12 mg, 0.0091%). Part of fraction 6 (5.31 g) was subjected to Si gel chromatography by eluting with *n*-hexane/acetone (8:1) to obtain methyl-13²-hydroxy-(13²-S)-pheophorbide-b (**9**) (6 mg, 0.0045%). Part of fraction 8 (4.91 g) was subjected to Si gel chromatography by eluting with *n*-hexane/acetone (5:1) to obtain pheophytin-a (**7**) (8 mg, 0.0060%).



1

Figure 1. Chemical structure of Ficaprenol-11 (1)



2

Figure 2. Chemical structure of Squalene (2)

The air-dried leaves of *L. leucocephala* (5.8 kg) were extracted with MeOH (80 L \times 6) at room temperature and the MeOH extract (143.5 g) was obtained upon concentration under reduced pressure. The MeOH extract was chromatographed over silica gel using *n*-hexane/acetone as eluent to produce 8 fractions. Part of fraction 5 (9.22 g) was subjected to Si gel chromatography by eluting with *n*-hexane/acetone (8:1) to obtain aristophyll-C (**10**) (13 mg, 0.0091%). Part of fraction 8 (7.16 g) was subjected to Si gel chromatography by eluting with *n*-hexane/acetone (5:1) to obtain *trans*-coumaric acid (**5**) and *cis*-coumaric acid (**6**) mixture (5 mg, 0.0035%).

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