Flavonoids from the Flowers of *Melastoma malabathricum*

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Abstract

Kaempferol 3-*O*-(2'',6''-di-*O*-*E*-*p*-coumaroyl)-β-D-galactopyranoside (**1**), kaempferol 3-*O*-β-D-galactopyranoside (**2**), kaempferol 3-*O*-α-L-rhamnopyranoside (**3**), kaempferol 3-*O*-β-D-glucopyranoside (**4**), kaempferol (**5**), and quercetin (**6**) were isolated along with ellagic acid (**7**) from the ethyl acetate soluble part of an aqueous methanolic (90%) extract of the flowers of *Melastoma malabathricum* L., and their identities established by spectroscopic methods. All these compounds except (**5**) are being isolated for the first time from the flowers of this plant, and the identification of (**1**) in a plant has only been reported once before.

Keywords: Melastoma malabathricum L.; Melastomataceae; kaempferol glycosides; acylated kaempferol glycosides; kaempferol 3-*O*-(2",6"-di-*O*-*E*-*p*-coumaroyl)-β-D-galactopyranoside

Plant. *Melastoma malabathricum* L. (Melastomataceae) flowers were collected from Penang Island, Malaysia, in January 2003, and identified by Dr L.K. Chan, School of Biological Sciences, Universiti Sains Malaysia, Penang, where a voucher specimen (No.10613) has been deposited.

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Uses in traditional medicine. Leaves and flowers are used as a crude drug for treatment of cholera, diarrhoea, prolonged fever, dysentery, leucorrhoea, wounds and skin diseases, and for the preparation of gargles [1,2].

Previously isolated constituents. Kaempferol [3,4], kaempferol 3-*O*-β-D-xyloside [3], quercetin 3-*O*-α-L-rhamnosyl-(1→2)-β-D-galactoside [5], anthocyanins [3,6], tannins [7,8], fatty acids and sterols [9] from the aerial parts.

New isolated constituents. From fresh flowers (250 g), kaempferol 3-*O*-(2'', 6''-di-*O*-*E*-*p*-coumaroyl)-β-D-galactopyranoside (**1**) (41 mg) [10], kaempferol 3-*O*-β-D-galactopyranoside (**2**) (8 mg), kaempferol 3-*O*-α-L-rhamnopyranoside (**3**) (37 mg), kaempferol 3-*O*-β-D-glucopyranoside (**4**) (52 mg), kaempferol (**5**) (21 mg), quercetin (**6**) (5 mg) were isolated along with ellagic acid (**7**) (14mg). NMR spectra were determined, in CD_3OD, using a Bruker Avance 400 spectrometer operated at 400 MHz for ^1H and at 100 MHz for ^{13}C. The spectra were measured relative to CD_3OD peaks, 3.30 ppm for ^1H and 49.0 ppm for ^{13}C. CD_3OD, as solvent, gave the most favourable signal dispersion of flavonoid glycosides in respect to DMSO-d_6 and resolved better signals of sugar protons, usually overlapped by water signal in DMSO-d_6 [11].

Kaempferol 3-O-(2'',6''-di-O-E-p-coumaroyl)-β-D-galactopyranoside (**1**). Pale yellow powder, mp 194 °C d; UV_{max}(MeOH): 268, 299sh, 313, 366sh nm; (MeOH + NaOMe): 274, 310sh, 366 nm; (MeOH + $AlCl_3$): 275sh, 315, 398 nm; (MeOH + $AlCl_3$ + HCl): 278sh, 317, 392 nm; (MeOH + NaOAc): 275, 299sh, 314, 370sh nm; (MeOH + NaOAc + H_3BO_3): 268, 301sh, 317 nm; IR bands (KBr): 3391, 3247, 1696, 1654, 1630, 1604, 1589,

1513, 1444, 1359, 1332, 1259, 1204, 1171, 1106, 1080, 1049, 982, and 830 cm^{-1}; ^{1}H-NMR (400MHz, CD_3OD): δ 6.05 (1H, *d*, J 1.9 Hz, H-6), 6.21 (1H, *d*, J 1.9 Hz, H-8), 6.86 (2H, *d*, J 8.8 Hz, H-3' and H-5'), 7.93 (2H, *d*, J 8.8 Hz, H-2' and H-6'), 5.5 (1H, *d*, J 8.0 Hz, H-1''), 5.37 (1H, *dd*, J 1.6, 8.0 Hz, H-2''), 3.78-3.84 (2H, *m*, H-3'' and H-5''), 3.88 (1H, *d*, J 2.9 Hz, H-4''), 4.19 (1H, *dd*, J 4.0, 11.5 Hz, H-6''), 4.37 (1H, *dd*, J 3.2, 11.5 Hz, H-6''), 6.38, 6.05 (2H, *d*, J 15.9 Hz, H-2''' and H-2''''), 7.69, 7.39 (2H, *d*, J 15.9 Hz, H-3''' and H-3''''), 6.81, 6.78 (4H, *d*, J 8.6 Hz, H-6''' and H-8''', H-6'''' and H-8''''), 7.46, 7.26 (4H, *d*, J 8.6 Hz, H-5''' and H-9''', H-5'''' and H-9''''); ^{13}C-NMR (100 MHz, CD_3OD): 158.4 (C-2), 134.7 (C-3), 179.2 (C-4), 162.9 (C-5), 100.4 (C-6), 167.0 (C-7), 95.0 (C-8), 158.3 (C-9), 105.3 (C-10), 122.7 (C-1'), 132.1 (C-2' and C-6'), 116.3 (C-3' and C-5'), 161.5 (C-4'), 101.1 (C-1''), 74.0 (C-2''), 73.2 (C-3''), 70.6 (C-4''), 75.0 (C-5''), 64.2 (C-6''), 168.8 (C-1''' and C-1''''), 115.2, 114.5 (C-2''' and C-2''''), 147.0, 146.7 (C-3''' and C-3''''), 127.2, 127.0 (C-4''' and C-4''''), 131.2 (C-5''', C-9''', C-5'''' and C-9''''), 116.9, 116.8 (C-6''' and C-8''', C-6'''' and C-8''''), 161.3 (C-7''' and C-7''''); EI-MS *m/z* (rel. int.): 432 (0.2), 311 (2.3), 286 (40.5), 164 (34.5), 147 (40.1), 120 (27.6), 91 (18.8), 65 (12.5), 44 (100).

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