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FLAVONOIDS FROM *Millettia cubitti*

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The genus *Millettia* (Leguminosae) is comprised of more than 200 species of climbers and trees distributed in tropical Africa, Asia, and Australia [1]. *Millettia* plants have been known to be a rich source of flavonoids [2–5]. *Millettia cubitti* Dunn is a tree distributed in the south of Yunnan Province, China [6]. There have been no reports on the chemical composition of this plant so far. As part of our continuing studies on bioactive compounds from *Millettia* plants, we have first carried out an investigation of the chemical constituents of the title plant.

The twigs of *Millettia cubitti* were collected from Xishuangbanna, Yunnan Province, P. R. China in April 2013. It was dried (7.5 kg), ground, and macerated with 95% EtOH. The ethanol extract was then successively extracted with chloroform ($CHCl_3$) and ethyl acetate (EtOAc) to give a $CHCl_3$ extract (128 g) and an EtOAc extract (29 g), respectively. The $CHCl_3$ extract was subjected to silica gel column chromatography (CC) with petroleum ether (PE)–EtOAc step-gradient elution (9:1→4:6) to yield compounds **2** (25 mg), **4** (28 mg), and 7 fractions (A–G). Fraction C (2.2 g) was separated by reversed-phase C_{18} (RP-18) CC eluted with MeOH–H_2O (80→90%) to give compound **1** (15 mg). Fraction D (5.0 g) was chromatographed over silica gel CC eluted with PE–EtOAc (4:1, 3:1, 2:1, 6:4) to afford compound **6** (20 mg) and fractions D1–D6. Fraction D4 was subjected to RP-18 CC eluted with MeOH–H_2O (70→90%) to obtain compounds **7** (18 mg) and **9** (16 mg). Fraction E (5.6 g) was subjected to silica gel CC eluted with $CHCl_3$–MeOH (40: 1, 20:1, 10:1) to give compound **8** (17 mg) and fractions E1–E5. Fraction E2 was further purified by CC on Sephadex LH-20 eluted with MeOH to afford compound **5** (16 mg). Fraction E3 was further separated by RP-18 CC eluted with MeOH–H_2O (60→90%) to give compounds **3** (14 mg) and **10** (19 mg).

The isolated compounds were identified as 5-hydroxy-6″,6″-dimethylchromene-[2″,3″:7,8] flavone (**1**) [7], maximaisoflavone B (**2**) [8], cuneatin methyl ether (**3**) [9], isoerythrinin A 4′-(3-methylbut-2-enyl) ether (**4**) [10], 6-methoxy-7-hydroxy-3′,4′-methylenedioxyisoflavone (**5**) [11], isopongaflavone (**6**) [12], formononetin (**7**) [13], fujikinetin methyl ether (**8**) [9], durmillone (**9**) [10], and 3′,4′-methylenedioxy-[2″,3″:7,8]furanoisoflavone (**10**) [14] by spectral analysis using NMR spectrometers, including 2D NMR, and comparison with values reported in the literature. All compounds were isolated from *Millettia cubitti* for the first time. As far as we know, prior to this study, ^{13}C NMR data of compounds **1** and **2** and PMR and ^{13}C NMR data of **10** have not been reported. This is the first time that the data mentioned have been confirmed.

5-Hydroxy-6″,6″-dimethylchromene-[2″,3″:7,8]flavone (1). ^{13}C NMR (100 MHz, $CDCl_3$, δ, ppm): 182.5 (C-4), 163.5 (C-2), 161.7 (C-7), 159.6 (C-5), 151.9 (C-8a), 131.8 (C-4′), 131.4 (C-1′), 129.1 (C-3′, 5′), 127.6 (C-5″), 126.2 (C-2′, 6′), 114.8 (C-4″), 105.8 (C-3), 105.5 (C-8), 101.4 (C-4a), 100.4 (C-6), 78.1 (C-6″), 28.2 (C-7″, 8″).

Maximaisoflavone B (2). ^{13}C NMR (100 MHz, $CDCl_3$, δ, ppm): 175.7 (C-4), 163.2 (C-7), 157.8 (C-8a), 152.2 (C-2), 147.6 (C-3′, 4′), 139.4 (C-3″), 127.5 (C-5), 125.7 (C-1′), 124.9 (C-3), 122.3 (C-6′), 118.5 (C-2″), 118.1 (C-4a), 115.0 (C-6), 109.7 (C-2′), 108.3 (C-5′), 101.1 (OCH_2O), 100.8 (C-8), 65.4 (C-1″), 25.8 (C-4″), 18.3 (C-5″).

3′,4′-Methylenedioxy-[2″,3″:7,8]furanoisoflavone (10). ^{1}H NMR (400 MHz, $CDCl_3$, δ, ppm, J/Hz): 8.24 (1H, d, J = 8.8, H-5), 8.06 (1H, s, H-2), 7.76 (1H, d, J = 2.0, H-5″), 7.58 (1H, d, J = 8.8, H-6), 7.14 (1H, d, J = 1.7, H-2′), 7.14 (1H, d, J = 2.0, H-4″), 7.02 (1H, dd, J = 8.0, 1.7, H-6′), 6.90 (1H, d, J = 8.0, H-5′), 6.01 (2H, s, OCH_2O). ^{13}C NMR (100 MHz, $CDCl_3$, δ, ppm): 176.1 (C-4), 158.1 (C-7), 151.7 (C-2), 150.8 (C-8a), 147.7 (C-3′, 4′), 145.7 (C-5″), 125.6 (C-3), 125.5 (C-1′), 122.5 (C-6′), 122.4 (C-5), 119.9 (C-4a), 116.9 (C-8), 110.3 (C-6), 108.4 (C-5′), 104.2 (C-4″), 101.1 (OCH_2O).

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