COMPONENTS OF *Sophora alopecuroides* SEEDS

Guan Ye,[1] Chun-Hui Ma,[1] Xiang-Yuan Huang,[2] Zhi-Xiong Li,[1] and Cheng-Gang Huang[1*]

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The seed of *Sophora alopecuroides* (Fabaceae) is a traditional Chinese medicine called locally "kudouzi", which is used as an antibacterial and antiinflammatory agent and is widely distributed in northwest China. Previous phytochemical studies of *S. alopecuroides* led to the isolation alkaloids, flavonoids, steroids, and organic acids [1]. Herein we describe the isolation and structure determination of the isolated compounds.

Dried seeds of *S. alopecuroides* (5 kg) were powdered and refluxed with petroleum ether to degrease them (1h × 3). The undissolved powder was extracted with boiling 95% aqueous EtOH (1h × 3). The extract was evaporated under vacuum to give a residue (135 g). The extract was subjected to silica gel eluted with gradient MeOH:$CHCl_3$ (20:1–3:1) to afford fractions A–D. Fraction A (17.0 g) was further subjected to silica gel chromatography eluted with MeOH–$CHCl_3$ gradient (30:1–15:1) and Sephadex LH-20 eluted with MeOH, successively, to give ferulic acid (**1**) (80 mg) [2], butein (**2**) (100 mg) [3], sulfuretin (**3**) (18 mg) [3], 7-hydroxy-3′,4′-methylenedioxyisoflavone (**4**) (6 mg) [4], and sophocarpine (**5**) (24 mg) [5]. Fraction B (21.3 g) was purified by silica gel eluted with MeOH–$CHCl_3$ (20:1–8:1) and Sephadex LH-20 eluted with MeOH, successively, to give 7,3′,4′-trihydroxyflavone (**6**) (26 mg) [6], dihydrophaseic acid (**7**) (75 mg) [7], matrine (**8**) (17 mg) [5], and sophoridine (**9**) (21 mg) [5]. Fraction C (18.1 g) was subjected to silica gel eluted with MeOH–$CHCl_3$ (5:1) to afford piscidic acid (**10**) (491 mg) [8], sophoramine (**11**) (21 mg) [9], and cytisine (**12**) (36 mg) [10]. Fraction D (12.3 g) was subjected to Sephadex LH-20 eluted with MeOH to give butein-4-*O*-β-D-glucopyranoside (**13**) (195 mg) [3] and 7,3′,4′-trihydroxyflavanone-7-*O*-β-D-glucopyranoside (**14**) (16 mg) [11]. The structure of the compounds was deduced from spectroscopic experiments, and all the data were in good agreement with literature.

Sulfuretin (3), orange powder, ESI-MS (negative) *m/z*: 269 $[M–H]^-$. PMR spectrum (400 MHz, DMSO-d_6, δ, ppm, J/Hz): 6.62 (1H, s, H-10), 6.69 (1H, d, J = 8.4, H-6′), 6.83 (1H, d, J = 8.1, H-4), 6.74 (1H, br.s, H-7), 7.23 (1H, d, J = 8.1, H-5), 7.44 (1H, br. s, H-2′), 7.59 (1H, d, J = 8.4, H-5′); ^{13}C NMR spectrum (100 MHz, DMSO-d_6, δ, ppm): 145.7 (C-2), 181.3 (C-3), 125.8 (C-4), 116.0 (C-5), 167.5 (C-6), 98.4 (C-7), 166.1 (C-8), 113.3 (C-9), 112.9 (C-10), 123.5 (C-1′), 112.0 (C-2′), 145.4 (C-3′), 148.0 (C-4′), 117.9 (C-5′), 124.6 (C-6′). These data agreed with those published [3].

Dihydrophaseic acid (7), white powder, ESI-MS (negative) *m/z*: 281 $[M–H]^-$. PMR spectrum (400 MHz, DMSO-d_6, δ, ppm, J/Hz): 0.77 (3H, s, H-14), 0.97 (3H, s, H-15), 1.53 (1H, m, H-8α), 1.58 (1H, m, H-10α), 1.69 (1H, m, H-8β), 1.85 (1H, m, H-10β), 1.96 (3H, s, H-12), 3.53 (1H, d, J = 7.2, H-13α), 3.60 (1H, d, J = 7.2, H-13β), 3.87 (1H, m, H-9), 5.66 (1H, s, H-2), 6.42 (1H, d, J = 15.6, H-4), 7.84 (1H, d, J = 15.6, H-5); ^{13}C NMR spectrum (100 MHz, DMSO-d_6, δ, ppm): 166.9 (C-1), 118.0 (C-2), 149.5 (C-3), 129.5 (C-4), 135.1 (C-5), 81.5 (C-6), 48.1 (C-7), 43.8 (C-8), 63.8 (C-9), 45.4 (C-10), 85.8 (C-11), 20.9 (C-12), 75.4 (C-13), 16.2 (C-14) 19.6 (C-15). These data corresponded with those in the literature [7].

Thus, our systematic phytochemical study on *S. alopecuroides* led to the isolation of 14 compounds, in which 9 compounds (**1**–**4**, **6**, **7**, **10**, **13**, **14**) were isolated from the species for the first time. Among them, compounds sulfuretin (**3**) and dihydrophaseic acid (**7**) were the first to be isolated from the the genus *Sophora*. On the other hand, to the best of our knowledge, compounds **3** and **7** were also the first reports on the occurrence of the aurone and sesquiterpene from this genus, respectively. These compounds add to the types of secondary metabolites of the genus *Sophora* and may contribute to the chemotaxonomic characteristics of this species.

1) Shanghai Institute of Materia Medica, Shanghai Institutes for Biological Sciences, Chinese Academy of Science, 555 Zuchongzhi Road, Zhangjiang Hi-tech Park, Shanghai, P. R. China, 201203, fax: 86 21 50806716, e-mail: yg4847@yahoo.com.cn; 2) Guangxi Baise Institute for Food and Drug Control, Guangxi 533000. Published in Khimiya Prirodnykh Soedinenii, No. 4, p. 462, July–August, 2009. Original article submitted December 10, 2007.

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