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CHEMICAL CONSTITUENTS FROM THE WOOD OF *Aquilaria sinensis*

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The genus *Aquilaria* (Thymelaeaceae) is widely distributed in Asia. *Aquilaria sinensis* (Lour.) Gilg is of particular interest economically because it is the principal source of agarwood, one of the most valuable forest products currently traded internationally [1]. *Aquilaria sinensis* is the only plant resource in China for agarwood, which is also called Chinese eaglewood, to distinguish it from agarwood of other species, such as *A. agallocha* or *A. malaccensis*. Previous phytochemical investigation on Chinese eaglewood revealed characteristic sesquiterpenes and chromone derivatives [2–9], but little is known about the chemical constituents of the healthy wood. Investigation of interrelated studies has shown that agarwood has significant anticancer [10], analgesic, anti-inflammatory [11], and anti-depression activities [12].

These observations provide useful information for potential chemopreventive drug design. The MeOH extract of its wood was subjected to solvent partitioning and chromatographic separation to afford twelve pure substances. The chemical constituents in the wood of *A. sinensis* were separated with column chromatography. Twelve compounds, including four flavonoids, 5-hydroxy-4′,7-dimethoxyflavone (**1**) [13], luteolin-7,3′,4′-trimethyl ether (**2**) [14], 5,3′-dihydroxy-7,4′-dimethoxyflavone (**3**) [15], and persicogenin (**4**) [16], three benzenoids, vanillic acid (**5**) [17], *p*-hydroxybenzoic acid (**6**) [18], and syringic acid (**7**) [19], one quinol, 4-acetyl-3,5-dimethoxy-*p*-quinol (**8**) [20], two amides, *N-trans*-feruloyltyramine (**9**) [21] and *N-cis*-feruloyltyramine (**10**) [21], one steroid, β-sitostenone (**11**) [22], and one lignan, (+)-syringaresinol (**12**) [17], were isolated from the wood of *A. sinensis*. All of these compounds (**1–12**) were obtained for the first time from this plant.

The specimen of *A. sinensis* was collected from Guansi Township, Hsinchu County, Taiwan in May, 2007. A voucher specimen was identified by Prof. Fu-Yuan Lu (Department of Forestry and Natural Resources College of Agriculture, National Chiayi University) and was deposited in the School of Medical and Health Sciences, Fooyin University, Kaohsiung, Taiwan. The wood (2.5 kg) of *A. sinensis* was chipped, air dried, and extracted repeatedly with MeOH (6 L × 8) at room temperature. The combined MeOH extracts (51.7 g) were then evaporated and further separated into four fractions by column chromatography on silica gel (5.8 kg, 70–230 mesh) with gradients of *n*-hexane–CH_2Cl_2–acetone–MeOH. Part of fraction 1 (15.4 g) was subjected to silica gel chromatography by eluting with *n*-hexane–acetone (60:1) and enriched with acetone to furnish two further fractions (1-1–1-2). Fraction 1-1 (4.6 g) was further purified on a silica gel column using *n*-hexane–acetone mixtures to obtain 5-hydroxy-4′,7-dimethoxyflavone (**1**) (12.7 mg). Part of fraction 1-2 (5.8 g) was subjected to silica gel chromatography by eluting with *n*-hexane–acetone (50:1) and enriched gradually with acetone to furnish two fractions (1-2-1–1-2-2). Fraction 1-2-1 (1.6 g) was further purified on a silica gel column using *n*-hexane–acetone mixtures to yield luteolin-7,3′,4′-trimethyl ether (**2**) (3.4 mg) and 5,3′-dihydroxy-7,4′-dimethoxyflavone (**3**) (3.2 mg). Fraction 1-2-2 (0.6 g) was further purified on a silica gel column using *n*-hexane–acetone mixtures to yield β-sitostenone (**11**) (21.7 mg). Part of fraction 2 (11.3 g) was subjected to silica gel chromatography by eluting with *n*-hexane–acetone (40:1) and enriched with acetone to furnish two further fractions (2-1–2-2). Fraction 2-1 (3.4 g) was further purified on a silica gel column using *n*-hexane–acetone mixtures to obtain persicogenin (**4**) (5.3 mg). Fraction 2-2 (4.9 g) was further purified on a silica gel column using *n*-hexane–acetone mixtures to obtain vanillic acid (**5**) (9.5 mg) and *p*-hydroxybenzoic acid (**6**) (4.2 mg). Part of fraction 3 (10.6 g) was subjected to silica gel chromatography by eluting with CH_2Cl_2–MeOH (100:1) and enriched with MeOH to furnish two fractions (3-1–3-2). Fraction 3-1 (3.5 g) was further purified on a silica gel column using CH_2Cl_2–MeOH mixtures to obtain

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(+)-syringaresinol (**12**) (14 mg). Fraction 3-2 (4.5 g) was further purified on a silica gel column using CH_2Cl_2–MeOH mixtures to obtain syringic acid (**7**) (7.2 mg). Fraction 4 (9.6 g) was subjected to silica gel chromatography, eluting with CH_2Cl_2–MeOH (80:1), and enriched gradually with MeOH to obtain two fractions (4-1–4-2). Fraction 4-1 (1.6 g) was further purified on a silica gel column using CH_2Cl_2–MeOH mixtures to obtain 4-acetyl-3,5-dimethoxy-*p*-quinol (**8**) (15.1 mg). Fraction 4-2 (5.4 g) was subjected to further silica gel column chromatography and purified by preparative TLC (thin layer chromatography) to yield *N*-*trans*-feruloyltyramine (**9**) (20.3 mg) and *N*-*cis*-feruloyltyramine (**10**) (3.2 mg).

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