FLAVONOIDS FROM *Sophora griffithii* AND *Goebelia pachycarpa*

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Herein we communicate results from a study of flavonoids from *Sophora griffithii* Stocks and *Goebelia pachycarpa* Schrenk.

Leaves of *S. griffithii* act as an expectorant. The total flavonoids exhibit antibacterial activity. Apigenin, isoquercitrin, and quercetin glucoarabinoside have been isolated from the aerial part [1]. Flavonoids from the roots of this plant have not been previously studied.

Ground air-dried roots of *S. griffithii* were collected near Tashkumir (Republic of Kyrgyzstan) and extracted at room temperature five times with ethanol (85%). The condensed extracts were diluted with water and worked up successively with $CHCl_3$ and ethylacetate. The $CHCl_3$ fraction was evaporated and chromatographed over a column of silica gel with gradient elution by $CHCl_3$:hexane (95:5-50:50). Elution of the column with an 85:15 ratio of solvents gave **1**.

The isolated compounds were identified using UV, PMR, and mass spectra, chemical transformations, and direct comparison with authentic specimens.

Inermin (1), $C_{16}H_{12}O_5$, mp 180-181°C (benzene), $[\alpha]_D$ -211° (*c* 0.4, ethanol). UV spectrum (EtOH, λ_{max}, nm, log ε): 282 (3.53), 287 (3.59), 3.11 (3.78), characteristic of pterocarpanes [2].

The PMR spectrum (100 MHz, C_5D_5N, δ, ppm, J/Hz) exhibits signals at 3.42-3.92 (1H, m, H-6), 4.18 (1H, m, H-6a), 5.50 (1H, d, J = 6.0, H-11a), 5.85 (2H, d, J = 1.5, –OCH_2O–), 6.60 (1H, s, H-10), 6.80 (2H, br.s, H-4, H-7), 6.86 (1H, dd, J = 8.5, 2.0, H-2), 7.50 (1H, d, J = 8.5, H-1).

The mass spectrum of **1** exhibited a base peak for the molecular ion with *m*/*z* 284 and peaks for ions with *m*/*z* 147 and 175 due to ions *a* and *b*, respectively [2].

Thus, **1** is 6a(*R*),11a(*R*)-3-hydroxy-8,9-methylenedioxypterocarpane (inermin) [2, 3]. Inermin was isolated from *S. griffithii* for the first time.

The alkaloid pachycarpine was isolated from *Goebelia pachycarpa*. The aerial part of this plant is used in folk medicine for eczema, as an analgesic, and as a spasmolytic agent [4].

Quercetin, kaempferol, and genistein and its xyloglucoside have been isolated previously from the aerial part of this plant [1].

Chromatography over a silica-gel column using gradient elution by $CHCl_3$:CH_3OH isolated from the alcohol extract of roots of *Goebelia pachycarpa* flavonoid **2**.

Vexibinol (2), $C_{25}H_{28}O_6$, mp 170-172°C, $[\alpha]_D$ -36.5° (*c* 1.0, CH_3OH). UV spectrum (EtOH, λ_{max}, nm, log ε): 293 (4.23), 340 sh (3.69), characterisitc of flavanones [5]. The flavanone nature of **2** was confirmed by the PMR spectrum (100 MHz, DMSO-d_6, δ, ppm, J/Hz), which exhibited signals at 5.52 (1H, dd, J = 13.0, 3.0, H-2), 2.56 (1H, q, J = 17.4, 3.0, H-3_{ax}), and 3.12 (1H, q, J = 17.4, 13.0, H-3_{eq}). The spectrum also contained signals for protons of a lavandulyl group, aromatic protons of a 5,7,8,2′,4′-substituted flavanone, and a 5-OH chelate. The mass spectrum of **2** contained peaks for ions (*m*/*z*) 424 $[M]^+$, 406, 391, 301, 284, 283 (100%), 219, 165, 136, 124, etc.

Thus, spectral data identified **2** as 5,7,2′,4′-tetrahydroxy-8-lavandulylflavanone or sophoroflavanone G (vexibinol) [6, 7].

Vexibinol was isolated for the first time from *G. pachycarpa*.

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