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FLAVONOIDS OF THE EPIGEAL PART OF *Onobrychis arenaria*

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Plants of the genus *Onobrychis* Mill. (fam. Fabaceae) are a rich source of flavonoids, and some of them are used in folk medicine for metrorrhagias and as potency-enhancing agents. Preparations of individual flavonoids and of the total mixture possess a hypolipidemic activity [1].

In the present communication we give the results of a study of the flavonoids of the epigeal part of Hungarian sainfoin *O. arenaria* (Kit.) DC, gathered in July, 1991 in the environs of Lake Issyk-Kul' [2]. An alcoholic extract of the ground air-dry raw material was concentrated in vacuum, diluted with water, and re-extracted successively with chloroform, ethyl acetate, and *n*-butanol. Chromatography of the ethyl acetate fraction on a column of silica gel in a gradient chloroform–methanol system led to the isolation of compounds (**1**)-(**3**).

For the identification of the substances isolated we used UV, PMR, and mass spectra and the results of chemical transformations.

Nicotiflorin (**1**), (kaempferol 3-O-rutinoside) — yellow crystals with the composition $C_{27}H_{30}O_{15}$, mp 215-217°C, λ_{max} 265, 352 nm. The acetylation of substance (**1**) with acetic anhydride in pyridine gave the nonaacetyl derivative with mp 142–144°C (M^+ 972).

The acid hydrolysis of flavonoid (**1**) formed kaempferol (3,4′,5,7-tetrahydroxyflavone), *D*-glucose, and *L*-rhamnose. The presence of terminal *L*-rhamnose in the (**1**) molecule was confirmed by the formation of kaempferol 3-O-β-*D*-glucoside (astragalin) with mp 178–179°C by the partial hydrolysis of glycoside (**1**).

Narcissin (**2**) (isorhamnetin 3-O-rutinoside) — yellow crystals with the composition $C_{28}H_{32}O_{16}$, mp 178-180°C, λ_{max} (ethanol) 254, 265, 356 nm. In the PMR spectrum of compound (**2**), in addition to the signals of the protons of the aglycon, signals appeared of the anomeric protons of *L*-rhamnose (5.19 ppm, br.s) and of *D*-glucose (5.45 ppm, d, 6.5 Hz), of the CH_3 group of rhamnose (1.45 ppm, br.s) and of other protons of the carbohydrate moiety in the 3.75-4.52 ppm interval. The acid hydrolysis of glycoside (**2**) gave isorhamnetin ($C_{16}H_{12}O_7$, mp 305-307°C, M^+ 316, λ_{max} 255, 266, 372 nm), *D*-glucose, and *L*-rhamnose.

The acetylation of glycoside (**2**) with acetic anhydride in pyridine gave the nonaacetyl derivative with the composition $C_{46}H_{50}O_{25}$, mp 117-119°C, the mass spectrum of which contained, in addition to the peak of the molecular ion with *m/z* 1002, intense peaks of fragmentary ions: of an acylated biose with *m/z* 561 and of terminal rhamnose with *m/z* 273, 213, and 153 [4].

The partial hydrolysis of glycoside (**2**) with 10% acetic acid led to isorhamnetin 3-O-β-*D*-glucopyranoside with the composition $C_{22}H_{22}O_{12}$, mp 163-165°C, λ_{max} 257, 267, 360 nm [5].

Arbutin (**3**) (hydroquinone O-β-D-glucoside) — $C_{12}H_{16}O_7$, mp 159-161°C, λ_{max} (ethanol) 285 nm. The acid hydrolysis of substance (**3**) gave hydroquinone and *D*-glucose [6].

This is the first time that compounds (**1**)-(**3**) have been isolated from *O. arenaria*.

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