FLAVONOIDS OF THE FLOWERS OF *Sonchus oleraceus*

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Continuing a study of the flavonoid composition of plants of the genus *Sonchus* [1-4], we have isolated five flavonoids from the flowers of *Sonchus oleraceus* L. (common sow thistle).

To isolate the flavonoids, 1 kg of sow thistle flowers collected in the flowering period in the environs of Vitebsk was extracted with ethanol on the boiling water bath three times. The extracts were combined and evaporated in vacuum. The extracted material obtained was treated with hot water, and the mixture was filtered and treated repeatedly with dichloroethane. The combined flavonoids were subjected to chromatography on a polyamide sorbent. Mixtures of ethanol, and water and of ethanol and chloroform in various proportions were used as eluents. This gave substances (I)-(V).

Substance (I) had the composition $C_{15}H_{10}O_6$, mp 328-320°C (melting point of the acetate 224-226°C), λ_{max} 225, 268, 350 nm.

Substance (II) had the composition $C_{15}H_{10}O_7$, mp 310-312°C (melting point of the acetate 199-201°C), λ_{max} 256, 263, 264 nm.

On the basis of their chromatographic mobilities and Bryant's cyanidin test [5] substances (I) and (II) were assigned to the flavonoids of aglycone nature. The properties and spectral characteristics of these substances were identical with those of luteolin [1] and quercetin [3], respectively.

Substance (III) had the composition $C_{21}H_{20}O_{12}$, mp 245-247°C, $[\alpha]_D^{20}$ − 59.0° (c 0.21; methanol—pyridine, 5:1). The products of acid hydrolysis were quercetin and glucose. Glucose was present in position 7 of the quercetin and had the β-configuration of the glycosidic center. On the basis of UV, IR, and PMR spectra and a comparison with an authentic sample, substance (III) was identified as quercimeritrin — quercetin 7-β-D-glucopyranoside [3].

Substance (IV) had the composition $C_{21}H_{20}O_{11}$, mp 266-268°C, λ_{max} 255, 268, 350 nm. On acid hydrolysis it was split into luteolin and D-glucose. The UV, IR, and PMR spectra of substance (IV) corresponded to those of luteolin 7-β-D-glucoside (cynaroside) [1].

Substance (V) had the composition $C_{21}H_{20}O_{11}$, mp 180-182°C, $[\alpha]_D^{20}$ − 148.6° (c 0.5; formamide). On enzymatic (pektovamorin) and acid hydrolysis, glucose (TLC and PC) and luteolin were obtained. On the basis of its chromatographic mobility, a calculation of molecular rotation [7], UV, IR, and PMR spectroscopy, and a comparison with an authentic sample, the compound isolated was identified as luteolin 7-β-D-glucopyranoside (isocynaroside) [2].

Simultaneously with this, from an ethanolic extract of the flowers of *Sonchus arvensis* L. (field sow thistle), by column chromatography on a polyamide sorbent we isolated a substance of flavonoid nature with the composition $C_{21}H_{18}O_{12}$, mp 190-192°C, λ_{max} 255, 267, 350 nm. On hydrolysis it split into luteolin and glucuronic acid. On the basis of its UV, IR, and NMR spectra, the compound isolated had the structure of luteolin 7-β-D-glucosiduronic acid [6].

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COUMARINS AND FLAVONOIDS OF *Coronilla varia*

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Axseed (crown vetch) is known as a cardenolide-containing plant. The cardiac glycoside hyrcanoside [1] is isolated from its seeds, the flavonoid compounds kaemferol, astragalin, and trifolin from its inflorescences, and homoorientin from its herbage [2, 3]. We have studied the herbage of *C. varia* L. collected in the environs of Khar'kov in the flowering phase. To isolate the coumarins and flavonoids, the comminuted herbage was treated with a tenfold amount of 80% ethanol. The extract was evaporated until the solvent had been eliminated, the residue was mixed with distilled water, and the precipitate of chlorophyll and lipophilic substances that deposited was filtered off. The washed precipitate was discarded and the filtrate was treated successively with petroleum ether, chloroform, and ethyl acetate.

From the chloroform extract, by partition chromatography on silica gel using a mixture of benzene and chloroform as eluent we isolated hydroxycoumarins: umbelliferone ($C_9H_6O_3$, mp 231-233°C), scopoletin $C_{10}H_8O_4$, mp 200-202°C), and daphnoretin ($C_{19}H_{12}O_7$, mp 254-256°C), which have been obtained from the seeds of this species [1].

From the ethyl acetate extract with the aid of column chromatography on a polyamide sorbent we isolated flavonoids: saponaretin, $C_{21}H_{10}O_{10}$, mp 195-198°C, $[\alpha]_D^{20}$ + 48° (methanol); homoorientin, $C_{21}H_{20}O_{11}$, mp 220-223°C, $[\alpha]_D^{20}$ + 21° (methanol); and kaempferol $C_{15}H_{10}O_6$, mp 275-278°C.

The structures of the compounds isolated were confirmed by the results of elementary analysis, UV and IR spectroscopy, and a study of the products of acid and enzymatic hydrolysis, and also by comparison with authentic specimens.

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