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FLAVONOIDS OF *Halocnemum strobilaceum*

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We have investigated the flavonoid composition of the epigeal part of *Halocnemum strobilaceum*, fam. Chenopodiaceae, gathered in the dried up bed of the Aral Sea in the flowering phase.

It was found that this plant contained 31.0% of extractive substances. A quantitative determination of the total flavonoids was made by the photoelectrocolorimetric method. According to a calibration graph it amounted to 1.2%, calculated as rutin [1]. To obtain the total flavonoids, the air-dry raw material (500.0 g) was extracted first with benzene to eliminate lipophilic substances, and then with aqueous ethanol. The aqueous alcoholic extract, concentrated to an aqueous residue, was treated with ethyl acetate. The ethyl acetate extract, concentrated to minimal volume, was deposited on a column of polyamide sorbent and was eluted with water and alcohol at various concentrations.

The following flavonoids and flavonoid glycosides were isolated:

Substance (1) — $C_{21}H_{20}O_{12}$, mp 237—240°C (from MeOH), $[\alpha]_D^{20}$ -62.2° (*c* 0.1; ethanol); $\lambda_{max}(C_2H_5OH)$ 362, 255 nm — quercetin 3-O-β-*D*-glucopyranoside, or isoquercitrin [2].

Substance (2) — $C_{22}H_{22}O_{12}$, mp 220—222°C (from MeOH), $[\alpha]_D^{22}$ -54° (*c* 0.335, ethanol); $\lambda_{max}(C_2H_5OH)$ 256, 275 (sh), 367 nm — isorhamnetin 3-O-β-*D*-glucopyranoside.

Substance (3) — $C_{16}H_{12}O_7$ mp 305°C (from MeOH), $\lambda_{max}(C_2H_5OH)$ 254, 278 (sh), 370 nm — isorhamnetin [3].

Substance (4) — $C_{17}H_{14}O_7$, mp 214—216°C (from (MeOH), $\lambda_{max}(C_2H_5OH)$ 254, 374 nm — rhamnazin.

Substance (5) — $C_{22}H_{23}O_{12}N$, mp 241—243°C (from MeOH), $[\alpha]_D^{22}$ +89° (*c* 0.4; ethanol); $[M]_D \cdot K_\varphi$+219. $\lambda_{max}(C_2H_5OH$, nm) 360, 256 (sh), 265; + CH_3COONa: 362, 255 (sh), 266; + H_3BO_3 + CH_3COONa: 360, 254 (sh), 264; + C_2H_5ONa: 392, 254 (sh), 270; + $AlCl_3$: 405, 257 (sh), 270; + $AlCl_3$ + HCl: 380, 256 (sh), 268. ν_{max} (KBr, cm^{-1}: 3600—3400 (OH); 2940 (OCH_3), deformation vibrations: 1610 (N—H), 1100—1000 (three peaks), 840 (α-configuration of a glycosidic bond).

Acid hydrolysis (2% HCl, 2 h) formed isorhamnetin with mp 350°C.

To determine the sugar fragment, the aqueous residue obtained after acid hydrolysis was concentrated and purified chromatographically. With the *o*-toluidine reagent the sugar gave a blue-green coloration, and with ninhydrin a violet-red coloration.

The sugar formed white crystals with mp 82—84°C. PMR spectrum (D_2O + DSS), ppm: 4.15 (d, H-1′, J = 2 Hz); 4.02 (d, H-2′); 3.85—3.81 (m, H-3′); 3.64 (m, H-4′); 3.42 (2H-5′). In the ^{14}N spectrum of the sugar a signal of amine nitrogen was observed in the 329.302 ppm region Consequently this sugar residue was that of an amino sugar — namely, glucosamine [4].

UV and IR spectroscopies showed that the aminosugar was attached in the C-7 position and had the pyranose form and the α-configuration of the glycosidic bond in the molecule of the monoglycoside.

Thus, on the basis of chemical and spectral analyses, for substance (5) we propose the structure of 3,4′,5-trihydroxy-3′-methoxyflavone 7-O-α-*D*-glucosaminopyranoside.

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