

## POLYPHENOLS OF THE LEAVES OF *Hippophae rhamnoides*. II

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Continuing a study of the polyphenols of a methanolic extract of the leaves of *Hippophae rhamnoides* L. [1], in the aqueous residue (after the extraction of the aglycones and phenolic acids) we have found seven substances of flavonoid nature by paper chromatography. Column chromatography on silica gel, cellulose, and Sephadex LH-20 and preparative paper chromatography led to the isolation of three substances.

Substance (I), mp 234-236°C (methanol),  $[\alpha]_D^{20} -81^\circ$  (c 0.5; methanol) was identified as quercetin 3-0- $\beta$ -D-glucopyranoside (isoquercitrin) on the basis of UV and IR spectra, the products of acid and enzymatic hydrolysis, and comparison with an authentic sample.

Substances (II), mp 180-182°C (aqueous methanol),  $[\alpha]_D^{20} -73^\circ$  (c 0.2; methanol), and (III), mp 169-172°C (aqueous methanol), on acid hydrolysis (5% HCl, 2 h, 100°C) gave isorhamnetin, mp 303-305°C, and glucose in ratios of 1:2, and quercetin, mp 307-310°C, glucose and galactose in ratios of 1:1:1, respectively.

The ready hydrolyzability of substances (II) and (III) by 0.1% HCl in 50% CH<sub>3</sub>OH in the first 5 min is obviously due to the furanose form of the sugar residue attached to the aglycone.

The UV spectra with additives and peroxide oxidation showed that the biose is attached to the 3-OH group of the aglycone. Qualitative reactions and enzymatic hydrolysis with rhamnodiastase [2] showed a 1→6 arrangement of the bonds in the biose of substance (II). The results of a direct comparison of the substance with isorhamnetin 3-diglucoside isolated from camel's thorn [*Alhagi kirghisorum*] [3] confirmed their identity.

On the basis of the information obtained, substance (II) was characterized as isorhamnetin 3-0-[0- $\beta$ -D-glucopyranosyl-(1→6)- $\beta$ -D-glucofuranoside].

According to preliminary results, substance (III) is a quercetin 3-galactoglucoside.

### LITERATURE CITED

1. T. K. Chumbalov, M. M. Mukhamed'yarova, and V. V. Polyakov, *Khim. Prirodn. Soedin.*, 663 (1976).
2. M. P. Khare, O. Schindler, and T. Reichstein, *Helv. Chim. Acta*, 1544 (1966).
3. G. Sh. Burasheva, M. M. Mukhamed'yarova, and T. K. Chumbalov, *Khim. Prirodn. Soedin.*, 254 (1975).

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