FLAVONOIDS OF Equisetum arvense

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We have studied the phenolic compounds of Equisetum arvense L. (field horsetail) collected in the region of Irkut-sk at the end of June and beginning of July in 1972. The freshly collected epigeal part (moisture content 72-75%) was extracted with methanol. The aqueous alcoholic extract was evaporated to eliminate the methanol. Then it was extracted successively with petroleum ether, chloroform, diethyl ether, and ethyl acetate. The ethyl acetate fraction, enriched in phenolic substances, was chromatographed on polyamide sorbent. This yielded compound (I) with mp 343-344°C (methanol); λ_{max} (methanol) 268, 336 nm (log ε 4.34, 4.41); $\nu_{C=O}$ 1642 cm^{-1}. The NMR spectrum (dimethyl sulfoxide as solvent and internal standard, BS 487B radiospectrometer) showed two doublets at δ 6.98 and 7.94 ppm corresponding to the H-3' and H-5' and the H-2' and H-6' protons (J = 8.5 Hz, ortho position). The protons of ring A appeared in the form of doublets at δ 6.24 ppm (H-6) and 6.53 ppm (H-8); a singlet at δ 6.78 ppm confirmed the presence of a proton in position 3. The proton of the hydroxy group in position 5 was represented by a signal at δ 13.02 ppm.

The characteristics of the PMR and UV spectra (with the use of complex-forming and ionizing additives) showed that compound (I) was apigenin.

Compound (II), isolated from the aqueous residue, had mp 233-234°C (aqueous methanol); λ_{max} (methanol) 273, 335 nm (log ε 4.32, 4.34); $\nu_{C=O}$ 1640 cm^{-1}.

As the results of IR spectroscopy showed, this compound contained a carbohydrate substituent (1080, 1050, 1020, and 890 cm^{-1} – β-pyranose form) [1]. After acid hydrolysis by Kiliani's method, apigenin and D-glucose were obtained. The PMR spectrum of compound (II) was completely analogous to that of saponaretin, which one of us has isolated previously from Madotheca platyphylla [2]. Consequently, compound (II) may be identified as saponaretin.

The isolation from field horesetail of some flavonoids has been reported previously [3]. We are the first to have found apigenin and saponaretin in the family Equisetaceae.

LITERATURE CITED

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