COUMARINS FROM THE ROOTS OF Platytaenia dasicarpa

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We have reported previously [1] that ethanolic extracts of the roots of Platytaenia dasicarpa (Regl. et Schmalh.) contain not less than eight coumarin derivatives. Some of the compounds isolated were identified as bergapten, zosimin, umbelliferone, and scopoletin. In the present paper we give the results of a study of a substance with the composition $C_{15}H_{16}O_3$, mp 85°C, R_f 0.68 in the cyclohexane–formamide system.

IR spectrum, cm^{-1}: 1720 ($C=O$ of a lactone), 1620, 1500, 1560 ($C=C$ of an aromatic ring), 1370 and 1355 (gem-dimethyl groups of a side chain). The NMR spectrum contained: a singlet with δ 3.89 ppm ($Ar-OCH_3$), signals at δ 1.70 and 1.76 ppm (gem-dimethyl group), a doublet at δ 3.30 ppm, $J = 7.5$ Hz (methylene group), a multiplet with δ 5.15 ppm (proton of a CH group), a doublet with δ 6.19 ppm, $J = 9$ Hz (H_3 proton), a doublet with δ 7.59 ppm, $J = 9$ Hz (H_4 proton), a singlet with δ 6.76 ppm (H_8 proton), and a singlet with δ 7.14 ppm (H_5 proton).

Analysis of the results obtained showed that the compound was suberosin (6-isopentenyl-7-methoxycoumarin), isolated previously from the bark of Xanthoxylum suberosum C. White [2], the wood of Ragera flava (Vahl.) Krug. et Urb. [3], and also from Peucedanum litorale Worosh et Gorovoi [4].

This is the first time that suberosin has been isolated from the roots of Platytaenia dasicarpa.

LITERATURE CITED

1. G. A. Zhukov, A. P. Prokopenko, and M. G. Pimenov, Khim. Prirodn. Soedin., 419 (1975).
2. G. K. Nikonov, M. A. Perel'son, and M. G. Pimenov, Khim. Prirodn. Soedin., 285 (1966).
3. J. Ewing, Gl K. Hughes, and E. Ritchie, Aust. J. Sci. Res., 3A, 432 (1950).
4. P. E. King, J. K. Housley, and T. J. King, J. Chem. Soc., 1392 (1954).

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COUMARINS FROM THE FRUIT OF Prangos bucharica

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The furocoumarins (+)-prangenin, imperatorin, isoimperatorin, oxypeucedanin, oxypeucedanin hydrate, and pranchimgin have been detected previously [1, 2] in the fruit and roots of Prangos bucharica B. Fedtsch. collected in the Tadzhik SSR on the southern slopes of the Hissar range in the gorge of the R. Kondary.

The present paper give the results of an investigation of the coumarin composition of the fruit of P. bucharica collected in the Uzbek SSR on the road to Baisun 10 km from the Tashkent–Termez highway.

An ethanolic extract of the fruit was chromatographed on a column of neutral alumina (Brockman activity grade III). Elution was carried out successively with petroleum ether–chloroform (1:1), chloroform, and ethanol. In this way we isolated and identified by melting points, mixed melting points with authentic samples, and IR spectra the coumarins scopoletin and osthole and the furocoumarin prangenin, pranchimgin, and (+)-oxypeucedanin, mp 105-106°C, $[\alpha]^{20}_{D} + 16.7°$ (c 1.2; ethanol).

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By the PC and GLC methods we found, in addition to the coumarin derivative mentioned, suberosin, imperatorin, isoimperatorin, marmezin, deltoin, prangenin hydrate and oxypeucedanin hydrate. For PC we used the following systems: 1) mobile phase petroleum ether; stationary phase ethylene glycol, and 2) mobile phase benzene, stationary phase formamide [3]. GLC was performed on a "Pye-Unicam 104" instrument using a column 1.5 m long containing as the stationary phase OV-17 (3%) on Chromosorb W (50-60 mesh). The temperature was programmed at 2 deg/min, 180-256°C. The rate of flow of the carrier gas, argon, was 30 ml/min [4, 5]. The high sensitivity of the GLC method enables microamounts (traces) of coumarin derivatives to be detected in extracts.

The use of the above-described GLC conditions with programming of the temperature makes it possible to separate substances similar in structure – in particular, deltoin and pranchimgin – through their relative retention times. These furocoumarins together or separately are frequently found in various parts of plants of the genus Prangos, but it is very difficult to identify them by the PC and GLC methods without isolation. The detection of scopoletin is interesting from the point of view of the biogenesis of the coumarins in plants of this genus.

LITERATURE CITED

1. L. M. Belenovskaya, A Study of the Coumarin Composition of some Central Asian Species of the Genus Prangos Lindl. [in Russian], Leningrad (1968).
2. G. A. Kuznetsova, L. M. Belenovskaya, and L. V. Kuz'mina, Zh. Prikl. Khim., 42, 723 (1969).
3. G. A. Kuznetsova, Natural Coumarins and Furocoumarins [in Russian], Leningrad (1967), p. 22.
4. T. Yu. Danchul, L. V. Kuz'mina, and G. A. Kuznetsova, Khim. Prirodn. Soedin., 250 (1975).
5. L. T. Shagova, M. G. Piminov, and G. A. Kuznetsova, Khim. Prirodn. Soedin., 386 (1976).

FLAVONOIDS OF Ajania Fruticulosa

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Ajania fruticulosa (Ledeb.) Poljak., family Asteraceae is found in the USSR in the regions of Central Asia, and Western and Eastern Siberia [1]. We have investigated the flavonoids of the epigeal part of this plant growing in the Mongolian People's Republic. The material was collected by the resources-prospecting division of the Combined Soviet-Mongolian Comprehensive Biological Expedition in 1972 and 1974 on the territory of the Kobdo and South Gobi aimaks in the vegetation period.

The dry ground epigeal mass of the plant was extracted with petroleum ether to eliminated lipophilic components, and then the flavonoids were extracted with 70% ethanol. The concentrated ethanolic extract was dissolved in water and the solution was treated successively with chloroform, ethyl acetate, and butanol. The ethyl acetate fraction was separated chromatographically on a Kapron column. Elution with chloroform–ethanol (9 : 1) yielded substances (I) and (II). The chloroform fraction of the extract was chromatographed on Woelm silica gel (activity grade 5) in the chloroform–benzene (1 : 1) system, giving substance (III). All three substances showed a positive cyanidin reaction and were flavonoid aglycones [2].

Substance (I), mp 236-238°C (chloroform), 360, $\nu_{\max}^{\mathrm{CH_3OH}}$: 266, 272 sh., 360 nm; melting point of the triacetate 157°C (chloroform). According to UV spectroscopy with ionizing and complex-forming additives and the PMR spectroscopy of (I) and its triacetate, the substance contained three free OH groups in positions 3', 4', and 5 and three OCH_3 groups in positions 3, 6, and 7, and it was identified as 3',4',5-trihydroxy-3,6,7-trimethoxyflavone [3, 4].

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