

## PHENOLIC ACIDS OF SOME PLANTS OF THE NORTHERN CAUCASUS

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Khimiya Prirodnykh Soedinenii, Vol. 6, No. 3, p. 388, 1970

UDC 615.32

We have obtained various phenolic acids from aqueous extracts of the epigeal parts of a number of plants of the northern Caucasus by column chromatography on various adsorbents with subsequent recrystallization of the substances isolated from the eluates.

**First phenolic acid.** Composition  $C_{13}H_{12}O_6$ ; mp 195–198° C;  $R_f$  0.82 [BAW (4 : 1 : 5)], 0.45 (15%  $CH_3COOH$ ), 0.64 [n-butyl acetate– $CH_3COOH-H_2O$  (4 : 1 : 2)]; UV spectrum:  $\lambda_{max}^{C_2H_5OH}$  325, 299, and 244;  $\lambda_{max}^{CH_3COONa}$  312 and 281,  $\lambda_{max}^{C_2H_5ONa}$  358 and 250,  $\lambda_{max}^{H_3BO_3 + CH_3COONa}$  322 and 297,  $\lambda_{max}^{AlCl_3}$  363, 315 and 240  $m\mu$ . The substance gave positive reactions with a number of reagents for phenolic acids [1–3]. On fusion with caustic potash, it formed protocatechuic acid.

Acetylation with acetic anhydride in pyridine led to the introduction of two acetyl groups. The melting point of the acetyl derivative was 197–198° C. The substance was identified as 3,4-dihydroxycinnamic (caffeic) acid.

**Second phenolic acid.** Composition  $C_{16}H_{18}O_9$ ; mp 204–205° C; UV spectrum:  $\lambda_{max}^{C_2H_5OH}$  325 and 240,  $\lambda_{max}^{CH_3COONa}$  328,  $\lambda_{max}^{C_2H_5ONa}$  377 and 261,  $\lambda_{max}^{H_3BO_3 + CH_3COONa}$  377 and 261,  $\lambda_{max}^{AlCl_3}$  363, 319, and 242  $m\mu$ .

This acid gave a pentaacetyl derivative with mp 184–186° C, it gave protocatechuic acid on fusion with alkali, and quinic and caffeic acids on acid hydrolysis (2% HCl, 30 min), while it did not form a lactone [4, 5], which shows that the caffeic acid is linked to the quinic acid in position 3. Therefore, this phenolic acid is chlorogenic acid.

The other phenolic acids were identified by paper chromatography.

In the epigeal part of representatives of the family Dipsacaceae, Scabiosa ochroleuca L., S. bipinnata C. Koch, S. caucasica Bieb., Knautia montana (Bieb) DC, and Cephalaria uralensis, we found caffeic and chlorogenic acids; in the family Compositae in Centaurea ciscaucasica Sosn. and C. jacea L., chlorogenic acid; in Cicerbita bourdaei Bass. Beauverd., caffeic, chlorogenic, isochlorogenic, and 1-caffeylquinic acids; in Lapsancommunis L., chlorogenic acid; in the family Scrophulariaceae in Veronica spicata L., V. multifida L., and Melampyrum arvense L., caffeic acid; and in Rinanthus minor L. and Veronica spicata L., chlorogenic acid.

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11 December 1969

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