

of the sugars calculated with respect to silylated methyl  $\alpha$ -D-glucopyranoside are given in the table. In the separation of a mixture of sugars, the individual peaks overlap one another, but this does not interfere with qualitative analysis. The results that we have obtained in the gas-chromatographic analysis of the carbohydrate moiety of leontoside B [3] and gypsoside [4, 5] agree with literature data. To establish the molar ratios of the sugars, calibration factors must be determined previously on synthetic mixtures.

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#### COUMARINS OF THE ROOTS OF HERACLEUM ACONITIFOLIUM AND H. PONTICUM

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As already reported [1], we have begun the study of the coumarin composition of species of *Heracleum* endemic to the Caucasus. In the present paper we give the results of a study of the roots of *H. aconitifolium* G. Wor. and *H. ponticum* (Lipsky) I. Manden.

When ethanolic extracts were chromatographed on paper in the petroleum ether-formamide system [2], 9-10 compounds of a coumarin nature were found in the species mentioned.

From the roots of *H. aconitifolium* we isolated three substances in the crystalline state [3], these being identified as osthole  $C_{15}H_{16}O_3$ , mp 82-82.5° C; pimpinellin,  $C_{13}H_{10}O_5$ , mp 117° C; and sphondin,  $C_{12}H_8O_4$ , mp 192° C.

Osthole and pimpinellin were also obtained from the roots of *H. ponticum*. In addition, from the latter we isolated isobergaptin,  $C_{12}H_8O_4$ , mp 220° C; and imperatorin,  $C_{16}H_{14}O_4$ , mp 103° C.

This is the first time that imperatorin has been obtained from the genus *Heracleum*.

In the species studied, in addition to the coumarins isolated, we identified by paper chromatography isopimpinellin, psoralen, bergaptin, and others.

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