

ROSMARINIC ACID IN REPRESENTATIVES
OF THE GENUS *Thymus*

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UDC 547.587

Rosmarinic acid was first isolated from the leaves of rosemary and described by Scarpati and Oriente [1, 2]. On analyzing the distribution of caffeic acid derivatives in plants of the family Labiatae, Herrmann showed that rosmarinic acid is the most common derivative for this family and proposed to call it "labiatic" acid [3, 4]. However, this statement does not correspond to the facts, since a considerable number of genera are known in which chlorogenic acid is found instead of rosmarinic acid [5, 6].

We have performed a comparative chromatographic analysis of 21 species of the genus *Thymus* for their rosmarinic acid content. From aqueous extracts of *Thymus kotschyanus* Boiss. et Hohen., *Th. transcasicus* Romn., and *Th. dimorphus* Klok. et Shost. by chromatography on polyamide sorbent we have isolated compound (I) with the composition $C_{18}H_{16}O_8$, forming light yellow needles with mp 203–204°C (water), $[\alpha]_D^{20} + 140^\circ$ (c 1.35; ethanol). R_f in 0.1 N HCl and 0.39 in 2% CH_3COOH .

Alkaline hydrolysis of the substance with 1 N NaOH in an atmosphere of hydrogen formed a substance with the composition $C_9H_8O_4$, mp 195–196°C. A mixture with an authentic sample of caffeic acid gave no depression of the melting point.

The saponification of compound (I) with a saturated solution of $Ba(OH)_2$ gave α -hydroxycaffeic acid with $[\alpha]_D^{20} + 23^\circ$ (c 0.62; water).

The IR spectrum of the substance showed absorption bands at (cm^{-1}) 3375–3300 (–OH), 2950–2850 (aliphatic C–H), 1742 (carboxy carbonyl), 1719 (carbonyl group), 1625, 1600, and 1520 (aromatic C–H), and 810 (1,2,4-substitution in a benzene ring).

On the basis of the facts given above, substance (I) that we isolated has been characterized as an ester of caffeic and α -hydroxyhydrocaffeic acid, i.e., rosmarinic acid.

By means of chromatographic analysis using qualitative reactions and UV spectroscopy, rosmarinic acid has also been detected in the following species: *Th. nummularius* Bieb., *Th. pseudonumularius* Klok. et Shost., *Th. caucasicus* Willd., *Th. tiflisiensis* Klok. et Shost., *Th. elisabethae* Klok. et Shost., *Th. kazamarjanicus* Klok. et Shost., *Th. pastoralis* Hjin., *Th. marschallianus* Willd., *Th. migricus* Klok. et Shost., *Th. collinus* Bieb., *Th. rariflorus* C. Koch., *Th. ziaratinus* Klok. et Shost., *Th. ararati-minoris* Klok. et Shost., *Th. fominii* Klok. et Shost., *Th. trautvetteri* Klok. et Shost., *Th. desjatoviae* Roon., *Th. dagestanicus* Klok. et Shost., *Th. sosnowskyj* Eyrossh.

The amounts of rosmarinic acid in the species of thyme studied were between 1.0 and 1.5%.

LITERATURE CITED

1. M. L. Scarpati and G. Oriente, *Ricerca Sci.*, **28**, 2329 (1958).
2. M. L. Scarpati and G. Oriente, *Ricerca Sci.*, **30**, 225 (1960).
3. K. Herrmann, *Arch. Pharm.*, **292**, 325 (1959).
4. K. Herrmann, *Arch. Pharm.*, **293**, 1043 (1960).
5. J. B. Harborne, *Z. Naturforsch.*, **21**, 604 (1966).
6. L. Hörhammer, H. Wagner, and H. Schilcher, *Arzneimittel-Forsch. (Drug res.)*, **12**, 1 (1962).

Pyatigorsk Pharmaceutical Institute. Translated from *Khimiya Prirodnikh Soedinenii*, No. 6, p. 797, November–December, 1972. Original article submitted January 21, 1972.

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