

FLAVONOIDS FROM *Passiflora incarnata*

N. M. Gavasheli, I. I. Moniavo,
and L. I. Éristavi

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Continuing an investigation of *Passiflora incarnata* L., cultivated in Tbilisi, we have studied the substances of flavonoid nature of the leaves and flowers of this plant collected in August, 1971, in the flowering phenophase.

The fresh leaves (1 kg) were carefully comminuted and extracted four times with methanol (fivefold amount). The extracts were concentrated to one liter and were treated with a 2:1 mixture of petroleum ether and chloroform (5 × 1 liter) and then with ether. The ethereal layer obtained was concentrated to a dry residue and this was dissolved in 50 ml of methanol, mixed with 15 parts of polyamide, dried on the water bath, and transferred to a column of polyamide sorbent (d 35 mm, h 550 mm). Elution was performed with chloroform and with mixtures of chloroform and ethanol containing increasing concentrations of the latter. In various fractions of the eluates, four substances (A, B, C, and D) characterized by a positive Bryant cyanidin reaction [1] were obtained.

Substance A consisted of small light-yellow acicular crystals with mp 347-350°C. Color reactions and a bathochromic shift with complex-forming and ionizing reagents showed the presence in it of free hydroxy groups in positions 4', 5, and 7. The UV spectrum had two absorption maxima $\lambda_{\max}^{\text{C}_2\text{H}_5\text{OH}}$ 268, 336 nm characteristic of apigenin. The IR spectrum showed absorption bands at 3345 cm^{-1} (OH' group) and 1645 cm^{-1} (γ -pyrone). Consequently, substance A is apigenin [2].

Substance B formed small acicular crystals with mp 327-330°C; according to color reactions and a bathochromic shift with complex-forming and ionizing reagents it contained hydroxy groups in the 3', 4', 5, and 7 positions. UV spectrum: $\lambda_{\max}^{\text{C}_2\text{H}_5\text{OH}}$ 255, 350 nm. The IR spectrum showed absorption bands of a free OH group (3355 cm^{-1}) and of a γ -pyrone (1655 cm^{-1}). Substance B was identified as 3',4',5,7-tetrahydroxyflavone or luteolin [2].

Substance C formed yellow crystals with mp 307-309°C giving no depression of the melting point in admixture with an authentic sample of quercetin and appearing at the same level as quercetin on paper chromatography in various systems. Color reactions and bathochromic shift showed the presence of free OH' groups in the 3, 3',4',5,7 positions. UV spectrum: $\lambda_{\max}^{\text{C}_2\text{H}_5\text{OH}}$ 258, 372 nm. The IR spectrum showed an absorption maximum of the carbonyl group of a γ -pyrone (1655 cm^{-1}). According to the results obtained, substance A was identified as 3,3',4',5,7-pentahydroxyflavone, or quercetin [3].

Substance D formed yellow acicular crystals with mp 272-274°C and in admixture with authentic kaempferol it gave no depression of the melting point, UV spectrum: $\lambda_{\max}^{\text{C}_2\text{H}_5\text{OH}}$ 257, 367 nm. The IR spectrum showed absorption bands at 3350 cm^{-1} (OH) and 1650 cm^{-1} (γ -pyrone). Chromatographically, in various systems of solvents it appeared at the level of kaempferol. It was identified as 3,4',5,7-tetrahydroxyflavone or kaempferol [3].

This is the first time that free flavones have been isolated from *Passiflora incarnata* L.

LITERATURE CITED

1. B. T. Bryant, J. Am. Chem. Soc., **39**, 481 (1969).
2. A. V. Simonyan and V. I. Litvinenko, Rast. Res., **4**, 580 (1971).
3. L. A. Gumenyuk, P. A. Gnedkov, and V. S. Batyuk, Khim. Prirodn. Soedin., 630 (1970).

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