# CHEMICAL STUDY OF Anthyllis macrocephala

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Plants of the genus Anthyllis L. have been studied comparatively little in the chemical aspect. The aglycone composition of A. vulneraria has been investigated; it contains isorhamnetin, quercetin, and kaempferol [1], and also their deoxy and methoxy derivatives [2].

We have studied A. macrocephala Wend. (synonym A. polyphylla Kit) [3, 4]. The epigeal part of the plant was collected in the flowering–fruit-bearing period on the terraces of the River Amanaus (Teberda State Reserve) and in the flowering period in June, 1973, on the southern slope of Mount Beshtau (Pyatigorsk). The dry inflorescences (0.5 kg) were extracted with 70% ethanol. The combined flavonoids were extracted with ethyl acetate and the extract was evaporated under vacuum. The dry residue was dissolved in actone. In the cold, the solution deposited a precipitate of substance A. From the mother liquor (by subsequent fractional crystallization we isolated substance B.

Substance A, mp 235-237°C, $[\alpha]_D^{20}$ −59° (0.05; ethanol); acetate with mp 108-110°C; coincided in the products of acid and enzymatic hydrolysis, its UV and IR spectra, and also by a mixed melting point with hyperoside (quercetin 3-O-β-D-galactopyranoside) [5].

Substance B, $C_{15}H_{10}O_7$, mp 308-312°C, acetate with mp 192-194°C (ethanol). The alkaline degradation of the substance formed phloroglucinol and protocatechuic acid. Its UV and IR spectra were identical with those of 3,3',4',5,7-pentahydroxyflavone – quercetin.

The dry leaves (0.6 kg) were extracted with 96% ethanol and then exhaustively with water. Quercetin, hyperoside, and trifolin were found chromatographically in the ethanolic extracts of both the leaves and of the flowers. The aqueous extract was evaporated under vacuum to small volume, and when an equal volume of ethanol was added to this a precipitate of substance C was formed (yield 6.7%).

Substance C, after reprecipitation from $C_2H_5OH-H_2O$ (1 : 1), formed a white crystalline powder with decomp. 276°C insoluble in ether and chloroform and sparingly soluble in water. Substance C does not undergo acetylation. On combustion, it formed 30% of an incombustible inorganic residue, analysis of which showed the presence of $Ca^{2+}$, $Mg^{2+}$, and $PO_4^{3-}$ ions. On hydrolysis with 10% $H_2SO_4$ solution, the substance dissolved in 4 h; after cooling, a crystalline precipitate of $CaSO_4$ deposited. In the filtrate, after neutralization with $BaCO_3$ from the hydrolysis products colorless crystals with mp 225-226°C were obtained. They gave a positive Scherer test for inositol [6]. The $R_f$ values when paper chromatograms were treated with the Tollens reagent coincided with those for mesoinositol [7]. On the basis of the facts presented and also IR spectroscopy, substance C is identical with mesoinositol hexaphosphate in the form of a mixture of the Ca and Mg salts – phytin [8].

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