

## FLAVONOIDS OF RUBIA TINCTORUM

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In all parts of Rubia tinctorum L. (madder), family Rubiaceae, by qualitative reactions and paper chromatography [ethyl acetate-formic acid-water (10 : 2 : 3 by volume)] we have detected flavonoids (chlorogenic acid and the iridoid glycoside asperuloside. In the leaves and stems of the plant we have found four flavonoids with  $R_f$  0.47, 0.55, 0.61, and 0.75 (in traces), and in the buds and flowers the substances mentioned and also one with  $R_f$  0.82. These pigments were not detected in the seeds. The samples for analysis were taken every ten days, beginning with the appearance of the first whorl of leaves.

By using adsorption chromatography on columns of Kapron, from the leaves and stems we isolated, respectively, 0.94 and 0.23% of a flavonol glycoside  $C_{27}H_{30}O_{16}$  with mp 185–186° C (water)  $[\alpha]_D^{19} -33^\circ$  (dimethylformamide),  $R_f$  0.75. Acid hydrolysis (3%  $H_2SO_4$ , 100° C, 40 min) gave D-glucose and L-rhamnose, which were identified by paper chromatography, and quercetin with mp 306–308° C, pentacetate with mp 193–195° C.

The constants mentioned and a direct comparison of the glycosides studied with a reference sample show that it was rutin.

From the flowers, besides rutin, we isolated 0.08% of a glycoside with mp 231–233° C,  $R_f$  0.82, which was shown by the products of acid hydrolysis and UV and IR spectra to be identical with hyperoside.

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