

We have studied the flavonoid compounds of *Crataegus pinnatifida* Bge. (Chinese hawthorn) and *Crataegus maximowiczii* Scheid (Maximowicz hawthorn) growing in the Far East. Five flavonoids have been isolated which have been identified from their hydrolysis products, physicochemical constants, and IR, UV, and NMR spectra [1] as 8-methoxykaempferol [2], quercetin, hyperoside, vitexin [3], and vitexin 4'-rhamnoside [4].

8-Methoxykaempferol,  $C_{16}H_{12}O_7$ , mp 269–271°C,  $\lambda_{\max}$  273, 327, 376 nm, mol. wt. 316 (mass spectrometrically). The NMR spectrum of the substance taken in deuteroacetone has a doublet at 8.12 ppm (2H),  $J = 9$  Hz, assigned to H-2',6', a doublet at 6.96 ppm (2H),  $J = 9$  Hz indicating H-3',5'; a singlet at 6.25 ppm (1H), due to H-6; and a singlet at 3.89 ppm (3H) due to the  $-OCH_3$  group in position 8. The substance was isolated from the flowers of *Cr. pinnatifida* and *Cr. maximowiczii*.

Quercetin,  $C_{15}H_{10}O_5$ , mp 310–312°C,  $\lambda_{\max}$  256, 375 nm, mp of the acetate 199–201°C. Isolated from the leaves of *Cr. pinnatifida*.

Hyperoside,  $C_{21}H_{20}O_{12}$ , mp 235–239°C,  $\lambda_{\max}$  257, 363 nm, giving on hydrolysis galactose and the aglycone, identified as quercetin. The substance was isolated from the flowers and leaves of *Cr. pinnatifida* and from the flowers of *Cr. maximowiczii*.

Vitexin,  $C_{21}H_{20}O_{10} \cdot 1/2 H_2O$ , mp 254–256°C,  $\lambda_{\max}$  270, 334 nm. The aglycone of the substance obtained by hydrolysis with Kiliani's mixture, was identified as apigenin. NMR spectrum (dimethyl sulfoxide), ppm: doublet at 7.98 (2H),  $J = 9$  Hz – H-2',6'; doublet at 6.84 (2H),  $J = 9$  Hz – H-3',5'; singlet at 6.74 (1H) – H-3; singlet at 6.24 (1H) – H-6; doublet at 4.64 ppm (1H),  $J = 10$  Hz, corresponding to the anomeric proton of  $\beta$ -glucose; and singlet at 13.11 ppm indicating the presence in the substance of a free OH group in position 5.

The NMR spectrum of the silylated glycoside contained the signals of six protons of the carbohydrate moiety. The substance was isolated from the flowers of *Cr. maximowiczii*.

Vitexin 4'-rhamnoside,  $C_{27}H_{30}O_{14} \cdot H_2O$ , mp 198–203°C,  $\lambda_{\max}$  271, 334 nm. The products of acid hydrolysis were rhamnose and vitexin. NMR spectrum of the silylated glycoside, ppm: doublet at 7.86 (2H),  $J = 9$  Hz, which is the signal of the H-2',6' protons; doublet at 6.84 ppm (2H),  $J = 9$  Hz – H-3',5'; singlet at 6.46 (1H) – H-3; singlet at 6.12 (1H) – H-6; doublet at 4.84 (1H),  $J = 2$  Hz, assigned to the signal of the proton of the anomeric center of  $\alpha$ -rhamnose; doublet at 4.66 (1H),  $J = 10$  Hz, assigned to the signal of the proton of the anomeric center of  $\beta$ -glucose; and signals in the 3.00–4.40 region (1OH) due to the protons of glucose and rhamnose. The substance was isolated from the flowers of *Cr. pinnatifida*.

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