CHEMICAL COMPOSITION OF Potentilla Fruticosa

I. FLAVONOIDS

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The plant Potentilla fruticosa [Pentaphylloides fruticosa (L.) O. Schwarz, Dasifora fruticosa (L.) Rudb.] (family Rosaceae) is frequently use in folk medicine. It has a wide area of distribution and is highly productive in terms of biomass [1, 2]. This species has been little studied in the chemical aspect: there are reports of the presence of ursolic acid [3], and two flavonoids — quercetin and quercitrin — have been isolated [4].

We have investigated the epigeal part of the plant (flowers and young shoots). By extraction with polar solvents and repeated chromatography we have isolated five individual compounds: two flavonol glycosides (I, II), two acylated flavonoid glycosides (III, IV), and flavan-3-ol (V).

Compounds (I) and (II) were identified on the basis of ^1H and ^{13}C NMR spectra [5].

Compound (I) — $C_{20}H_{18}O_{11}$, mp 249-252°C $[\alpha]^{20}_{546}$ −64.1° (c 1.34; methanol) [6]; FAB MS, m/z: 435 (MH^+); 303 (MH^+ — arabinose); identical with quercetin 3-O-α-L-arabinopyranoside [6].

Compound (II) — $C_{21}H_{20}O_{12}$, mp 231-234°C, $[\alpha]^{22}_{546}$ −81° (c 0.61; methanol) [6]; FAB MS, m/z; 465 (MH^+); 303 (MH^+ — galactose) [6]; identical with quercetin 3-O-β-D-galactopyranoside [6].

In the IR spectrum of each of compounds (III) and (IV), in addition to the absorption band of a γ-pyrone ring, there was carbonyl absorption, at 1690 and 1685 cm^{-1}, respectively. The alkaline hydrolysis of (III) led to apigenin 7-β-glucopyranoside (III') and that of (IV) to kaempferol 3-β-D-glucopyranosid (IV) (PMR, double resonance). A comparison of the chemical

TABLE 1. Chemical Shifts in the ^{13}C NMR Spectra of Compounds (III), (IV), (III'), and (IV') ($(CD_3)_2SO$; TMS — 0; 22.49 MHz)

C atom	III	III'	IV	IV'	C atom	III	III'	IV	IV'
	Aglycone					Glucone			
C-2	164,3	164.4	156,5	156,4	C-1	99,6	100,0[a]	101,1	100,1
C-3	103,2	103,3	133,2	133,3	C-2	74,0	73,2	74,3	74,3
C-4	182.0	182.1	177,5	177.5	C-3	76,3	76,5[b]	76,8[b]	77,5[a]
C-5	159.9	161,5	161,2	161,3	C-4	70,1	69,7	70,1	70,0
C-6	99,6	99,6[a]	99,8	98,7	C-5	76,3	77,3[b]	76,3[b]	76,5[a]
C-7	162.7	163,1	164.2	164,2	C-6	63,5	60,7	63,0	60,9
					Coumaroyl				
C-8	94,8	95,0	93,7	93,7	C-1	125,0	—	125.0	
C-9	157,0	157,1	156,5	156,4	C-2	130,2		130,2	
C-10	105,4	105,4	104,0	104,1	C-3	115,7		115.8	
C-1'	121.1	121.1	120,9	121,0	C-4	161,4[a]		159,8[a]	
C-2'	128.6	128,7	130,9	130,9	C-5	115,7		115,8	
C-3'	116,1	116,1	115.1	115,1	C-6	130,2		130,2	
C-4'	161,2[a]	161,2	160,0[a]	160,0	C-7	145.0		144,6	
C-5'	161.1	116,1	115.1	115,1	C-8	113 8		113.7	
C-6'	128,6	128,7	130,9	130,9	C-9	166.5		166.2	

a,bAlternative assignments for each compound.

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shifts of the carbon atoms of the products of alkaline hydrolysis (III') and (IV') and of the initial compounds (III) and (IV) unambiguously confirmed that in each compound the glucose residue was acylated at C-6 by p-coumaric acid (Table 1).

The FAB mass spectra of (III) and (IV) contained the peaks of the molecular ions and of their aglycons. For neither compound was the successive splitting out of p-coumaric acid and glucose from the molecular ion observed, but the acylglycosyl moiety was ejected as a whole.

Compound (III) — $C_{30}H_{26}O_{12}$, mp 267-269°C $[\alpha]_{546}^{20}-153°$ (c 0.68; pyridine); FAB MS, m/z: 579 (MH^+); 271 (MH^+ - coumaroylglucose); identical with terniflorin [7].

Compound (IV) — $C_{30}H_{26}O_{13}$ mp 249-251°C; $[\alpha]_{546}^{18}-70°$ (c 1.2; methanol); FAB MS, m/z: 597 (MH^+); 287 (MH^+ - coumaroylglucose); identical with tribuloside [8].

Compound (V) was identified on the basis of spectral characteristics and its angle of rotation as (—)-catechin, $C_{15}H_{14}O_6$, mp 184-186°C; $[\alpha]_{546}^{22}-10.0°$ (c 0.4; methanol).

The UV spectra of all the compounds corresponded to those given in the literature.

This is the first time that compounds (I-V) have been isolated fromP. fruticosa.

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