CHEMICAL STUDY OF SOME PLANTS OF THE FAMILY ONAGRACEAE. AMINO ACID COMPOSITIONS OF Chamaenerion (RAFIN) SPECIES AND OF OENOTHERA MOLLISSIMA

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In the present communication we give the results of a study of the amino acid composition of the epigeal part of Chamaenerion angustifolium L. (fireweed, ivan-chai), Chamaenerion caucasicum Haussku (Caucasian willowweed), and Oenothera mollissima L., which have been investigated previously for flavonoids [1, 2].

The raw material, gathered in August, 1988, in the flowering period at the Reference Base of the V. L. Komarov Botanical Institute, was exhaustively extracted with chloroform. The chloroform was eliminated, and 50 mg of the dry raw material was extracted three times with 70% ethanol at 45°C. After centrifugation the free amino acids in the supernatant were determined, for which 15 ml of the liquid was evaporated in vacuum. The residue was dissolved in 2 ml of dosing buffer (pH 2.2), and the free amino acids were analyzed on an AAA-339 automatic analyzer (Mikrotechna, Czechoslovakia). The amount of sample injected was 0.1 ml, and the chart speed 0.025 mm/s.

The deposit formed on centrifugation was hydrolyzed with 6 N HCl at +105°C for 24 h; the reaction mixture was filtered, decolorized, and evaporated in vacuum, the residue was dissolved in 3 ml of dosing buffer (pH 2.2), and the bound amino acids were analyzed.

Table 1 gives the results of a determination of free and bound amino acids. The arithmetic means of three parallel determinations the discrepancies between which did not exceed 20% of the absolute value of the magnitude were taken as the final results.

In the course of the analysis, 16 amino acids, including 8 essential ones, were identified.

TABLE 1. Quantitative Composition of the Amino Acids in the Epigeal Parts of the Plants (% on the weight of the air-dry raw material)

Amino acid	Chamaenerion angustifolium		Chamaenerion caucasicum		Oenothera mollissima	
	free	bound	free	bound	free	bound
Aspartic acid	0,22	5 18	0,27	7,72	0,15	3,71
Threonine	1,50	3,19	1 52	4,34	0,76	2,01
Serine	0,01	3,55	0,01	5,26	0,03	2,68
Glutamic acid	0,11	4,64	0,11	9,15	0,09	3.91
Proline	2,94	5,61	0,31	7.34	0,02	4,34
Glycine	0,02	6,21	0,08	8.62	0,02	4,51
Alanine	0,30	5 20	0,45	6,91	0.14	3.45
1/2-Cystine	—	—	—	—	—	—
Valine	0 03	3,30	0.53	5,36	0.10	2,28
Methionine	0.03	0 03	0,02	0,02	0 02	0,01
Isoleucine	0.13	0 77	0,19	2,45	0.06	0,44
Leucine	0,04	2,18	0,10	4,94	0.07	1.23
Tyrosine	0,26	0,03	0,11	0,03	0,19	0,08
Phenylalanine	0,99	0,04	0,61	0,11	0,43	0.03
Histidine	0,05	1,21	0.04	0.09	0,04	1,20
Tryptophan	—		—	—	—	—
Lysine	0,03	2,84	0.03	3,92	0,03	2 07
Arginine	0.02	0,89	0,02	0,27	0,03	2.60
Sum of the essential amino acids	2,99	12,36	3,0	22,11	2,65	8,12
Sum of the nonessential amino acids	1,12	33,32	1,39	45.30	0,70	25,36

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Attention is attracted by the high content of free essential amino acids (3.00%) and of bound amino acids (21.11%) in Caucasian willowweed, which is used by the inhabitants of the Northern Caucasus as an additive to tea. There is a fairly high level of free essential amino acids (2.99%) and of bound nonessential amino acids (12.36%) in fireweed, which is also used in folk medicine [2]. The lowest level of essential amino acids (free – 2.65%; bound – 8.13%) is present in Oenothera mollissima, a decorative plant cultivated at the Reference Base of the V. L. Komarov Botanical Institute.

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NUCLEOSIDES FROM Theonella SPONGE

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Three nucleosides have been isolated, after column chromatography, from alcoholic chloroform extracts of a sponge Theonella sp. collected during a 1987 expedition on the Scientific Research Ship Akademik Oparin off the western coast of Australia from a depth of 80 m. The least polar of them (0.01% on the dry weight of the animals) was shown by a comparison of physical constants and mass, PMR and ^{13}C NMR spectra to be identical with an authentic sample of thymidine. The second compound obtained (0.01%) was identified as 2'-deoxyuridine by comparison with literature characteristics [1].

The third nucleoside (0.006%, mp 216-218°C (from ethanol–water), $[\alpha]_{578}^{20}$ –16° (c 0.15; pyridine)) had in its mass spectrum the peak of the molecular ion at m/z 252 and an intense signal at m/z 117, corresponding to the detachment of this fragment from the $M^+ + H$ ion. The diacetate of the nucleoside gave the following signals in the ^{13}C NMR spectrum (62.9 MHz, $CDCl_3$, δ, TMS, ppm): 20.7; 20.8; 169.9; 170.1 ($2CH_3COO$); 82.8 (C-1'); 38.0 (C-2'); 74.4 (C-3'); 84.8 (C-4'); 63.6 (C-5'). These facts permitted the assumption that the compound isolated was a 2'-deoxyribonucleoside. At the same time, the chemical shifts of the carbon atoms of the nitrogen base at 120.3 (C-5), 138.1 (C-8), 145.2 (C-2), 148.6 (C-4), 158.6 ppm (C-6) coincided with the corresponding signals of inosine. On this basis, taking into account the results of UV spectroscopy (λ_{max} = 249 nm, 12,200) and a comparison of the PMR spectra of the diacetate of the nucleoside obtained and of standard 2'-deoxyinosine diacetate, it was established that the compound isolated was 2'-deoxyinosine.

Thymidine and 2'-deoxyuridine have been detected previously in marine organisms – in particular, the starfish Acathaster Placi [1] and embryos of the sea hare Aplysi kurodai [2]. So far as we are aware, deoxyinosine has not been found previously in marine materials.

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