FLAVONES OF *Mentha piperita* OF THE KRASNODARSKAYA 2 VARIETY

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We have continued a study of the flavonoid composition of varieties of peppermint regionalized in the North Caucasus. From the wastes of the variety Krasnodarskaya 2 obtained after the distillation of the essential oil, using column chromatography on silica gel L 100/160 μm of the chloroform fraction of an evaporated ethanolic extract we have isolated six flavones (I-VI), consisting of yellow crystalline substances insoluble in water and ether, sparingly soluble in ethanol, methanol, and chloroform, and soluble in formamide, pyridine, and DMSO:

Compound	mp., °C	M^+	$\lambda_{max}^{CH_3OH}$, nm
I. $C_{18}H_{16}O_7$	171—173	344	298, 334
II. $C_{19}H_{18}O_8$	200	374	291, 341
III. $C_{18}H_{16}O_8$	228—232	360	291, 345
IV. $C_{19}H_{16}O_7$	176—177	358	293, 330
V. $C_{18}H_{16}O_7$	190—193	344	273, 277, 340
VI. $C_{18}H_{16}O_6$	189—190	328	298, 332

On the basis of UV spectroscopy with ionizing and complex-forming reagents and PMR spectroscopy, substance (I) was identified as nevadensin [1], (II) as hymenoxin [1, 2], and (III) as methoxycubanone [1, 3], and these conclusions were confirmed by the absence of depressions of the melting points of mixtures of the compounds isolated with authentic samples and by the identity of their spectra.

The UV spectrum of (IV) with diagnostic and complex-forming reagents indicated the presence of a hydroxy group at C-5 and of an oxygen-containing function in position 6, and also the absence of a dihydroxy grouping and of a hydroxy group in the 4' position; PMR spectroscopy showed the presence of methoxy groups in positions 4', 6, 7, and 8. Compound (IV) had the structure of 5-hydroxy-4',6,7,8-tetramethoxyflavone.

UV spectroscopy with ionizing and complex-forming reagents showed the presence in (V) of hydroxy groups in the 3' and 5 positions, while UV and PMR spectroscopy showed the presence of methoxy groups in the 4', 6, and 7 positions. Compound (V) had the structure of 3',5-dihydroxy-4',6,7-trimethoxyflavone and was identical with eupatorin [4].

The UV spectroscopy of substance (VI) with ionizing and complex-forming additives showed the presence of a hydroxy group in position 5, and PMR and UV spectroscopy the presence of methoxy groups in positions 4', 6, and 7. The compound had the structure of 5-hydroxy-4',6,7-trimethoxyflavone and was identical with a compound isolated previously from plants of the *Citrus* genus [5].

This is the first time that 5-hydroxy-4',6,7,8-tetramethoxyflavone, eupatorin, and 5 hydroxy-4',6,7-trimethoxyflavone have been isolated from the *Mentha* genus.

We did not detect in mint of the Krasnodarskaya 2 variety the 5-hydroxy-3,4',6,7-tetramethoxyflavone and dimethylsudachitin that we have found previously in other mint varieties.

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CAROTENOIDS OF MULBERRY LEAVES AND OF SILKWORM EXCRETA

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At the present time, great attention is being devoted to the search for new cheap sources of carotene [1]. The raw material for this may be certain industrial wastes and, in particular, silkworm excreta (SWE) the complex study of the composition of which has already been carried on over a number of years [2].

In the present communication we present the result of a comparative study of the carotenoid complex of the SWE and of the product consumed by the silkworm — mulberry leaves.

Mulberry leaves and the excreta of silkworm caterpillars of the IVth and Vth instars collected in the Samarkand silkworm station (UzSSR) in 1985 were investigated.

The total carotenoids (Cs) were extracted with acetone—methanol (1:1) and were freed from chlorophylls and lipids by saponification. The preliminary separation of the Cs into carotenes and xanthophylls was carried out by chromatography on columns filled with sucrose [3]. Individual representatives were obtained by TLC on silica gel, using the heptane—methyl ethyl ketone (5:3) solvent system for the separation of the xanthophylls and hexane—acetone (96:4) for the carotenes. During the work, the pigments were protected from degradation by the addition of stabilizers [4] to the eluting solvent systems and by the performance of the operations in the absence of bright light.

The pigments were detected on the plates visually from their colorations, or, in the case of colorless and weakly colored Cs, staining with iodine vapor was used.

The compounds were identified on the basis of chromatography in the presence of markers, by staining with rhodanine, antimony trichloride, and strong acids [5], by spectrophotometry in the visible and ultraviolet regions [6], and by the use of the HCl epoxide test [7] for the presence of a hypsochromic shift in the spectra of the xanthophylls.

The amounts of the pigments were determined colorimetrically on the basis of molar extinction coefficients [6].

As a result of the investigations performed, the complete identity of the carotenoids of the leaves and of the wastes of the silkworm industry was established. It can be seen from the results presented below that the amount of carotenoids in the SWE was higher (~1.4 fold) than in the mulberry leaves. These results correlate with information [8] on the considerable accumulation of chlorophylls in SWE as compared with the leaves.

The relative amounts (% on the total weight) of carotenoids in mulberry leaves and SWE were as follows:

Carotenoids	Mulberry leaves	SWE
Phytoene	2,3	0,8
Phytofluene	1,8	0,5
β-Carotene	41,4	30,3
α-Carotene	3,5	1,2
Hydroxy-α-carotene	2,2	3,4
Lutein	22,4	29,2
Zeaxanthin	2,7	2,5
Violaxanthin	9,0	11,0
Luteoxanthin	3,4	5,6

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