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TRITERPENOIDS IN LEAVES OF URALS AND ALTAI BIRCHES AND QUESTIONS OF THEIR CHEMOTAXONOMY

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We have studied the triterpene fraction of the unsaponifiable part of ethereal extracts of the leaves of three species of birch growing in the Urals and in Zaural'e ["Trans-Uralia"], and three species of Altai birch. For analysis we took mixed samples from 5-10 and more (in the case of bushes) individual specimens. The treatment of the leaves and the isolation and identification of the triterpenoids contained in them were performed by methods described previously [1]. The following triterpenoids were identified: betulafolienetriol (I), betulafolienetriol oxide (II), 12β,20(S)-dihydroxydammar-24-en-3-one (III), betulafolienetetraol (IV), dammar-23-ene-3α,12β,20(S),25-tetraol (V), dammar-25-ene-3α,12β,20(S),24(R)-tetraol (VI), dammar-25-ene-3α,12β,20(S),24(S)-tetraol (VII), 12β,20(S),25-trihydroxydammar-23-en-3-one (VIII), 20(S),24(R)-epoxydammarane-3β,11α,25-triol (IX) and its 11-acetate (X), 20(S), 24(R)-epoxydammarane-3α,11α,25-triol (XI) and its 11-acetate (XII), epiocotillol (XIII), ocotillol (XIV), betulafolienetriol 3,12-diacetate and 12-acetate (XV) and (XVI), respectively, and 11α,25-dihydroxy-20(S),24(R)-epoxydammaran-3-one (XVII). All these compounds have been isolated from various birch species previously.

Information on the amounts of triterpenoids in the leaves is given in Table 1. In its qualitative and quantitative triterpenoid content Betula krylovii is practically identical with B. pendula [1], which confirms the evaluation of B. krylovii as a variety of B. pendula that was made on the basis of biosystematic studies [3].

The results of the comparative chemical analysis of the leaves of B. nana and B. rotundifolia show that these bushy birches are very close species. An individual group readily distinguished from the others in terms of its triterpene alcohols is formed by B. microphylla, B. kelleriana, and B. kirghisorum. From the point of view of systematics, the results obtained objectively show that these species belong to a single cycle of races of B. microphylla.

Among the birch species studied, particular interest is attached to B. kelleriana, in which the triterpene alcohols amount to 1.52% of the weight of the air-dry leaves – i.e., considerably more than in other species and almost twice as much as that generally found in birches hitherto [2]. Also characteristic is the fact that the overwhelming bulk of the total triterpenoids content in this species consists of a single compound, (IX), which shows that the leaves of B. kelleriana are a promising source of a triterpene alcohol of the dammarane series.

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TABLE 1

Birch species, site and time of collection	Unsaponifiable part of the ethereal extract	Compound	Total amount of triterpenoids
	% on the weight of the air-dry leaves		
Betula krylovii K r y l., collection of the botanical garden of the Ukrainian Division, USSR AS, July, 1985	1,83	I (0,18), II (0,002), III (0,01), IV (0,01), V (0,009), VI (0,02), VII (0,08), VIII (0,01)	0,32
B. kirghisorum S a v.-R v c z., collection of the botanical garden of the Ukrainian Division, USSR AS, July, 1984	1,50	IX (0,08), X (0,1), XI (0,08), XII (0,1)	0,36
B. nana L., Sverdlovsk province, July, 1984	4,9	II (0,02), XIII (0,38), XIV (0,02), XV (0,03)	0,45
B. microphylla B u n g e*., collection of the botanical garden of the Ukrainian Division, USSR AS, July, 1985	1,04	IX (0,28), X (0,06), XI (0,04), XII (0,03), XIII (0,01), XIV (0,02), XVII (0,02)	0,46
B. kelleriana S u k.*, collection of the botanical garden of the Ukrainian Division, USSR AS, July, 1985	1,96	IX (1,38), X (0,05), XIV (0,04), XVII (0,05)	1,52
B. rotundifolia S p a c h., Gorno Altai AO, July, 1986	1,91	II (0,25), XIII (0,04), XVI (0,13)	0,42

*Population cultures, Gorno-Altai AO [Autonomous Province].

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STRUCTURE OF THE PRODUCT OF THE REACTION OF 6-DEHYDROELDELIDINE WITH SODIUM IN LIQUID AMMONIA

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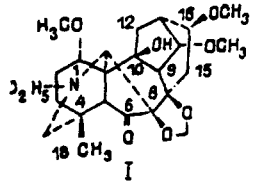
In a study of the reaction of dehydroeldelidine (I) with sodium in liquid ammonia a product was obtained with the composition $C_{24}H_{37}NO_6$, mp 163-166°C (ether) for which structure (II) was suggested on the basis of spectral characteristics [1].



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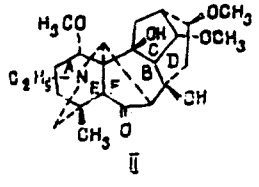

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