1.12 (6 H, s), 1.21 (3 H, s), the protons of tert-Me groups, 2.09 (3 H, s), 1.96 (3 H, s),
the protons of acetate Me groups, 3.72 (i H, triplet, C24-H), 4.59 (i H, triplet, J < 4 Hz,
C9-H), 5.16 (1 H, multiplet, J ~ 20 Hz, C11-H). Mass spectrum, m/e: 542 (M+--H2O), 545
(M+--CH3), 501 (M+--59), 500 (M+--AcOH), 143 (100%), 125, 59.

Saponification of the Diacetate (XI). A mixture of 150 mg of (XI) and 5 ml of 0.9 N
methanolic KOH was heated under reflux for 2 h. After the usual working up, the residue was
chromatographed on silica gel in the hexane-acetone (10:1) system. The reaction yielded 15
mg of a mixture of (II) and (III), and also 95 mg of the triterpene (V).

SUMMARY

1. From the unsaponifiable fraction of an ethereal extract of the leaves of Betula Lan-
ata, in addition to 3-epiocotillol (I) we have isolated a new triterpene of the dammarane
series 29(S),24(R)-epoxydammarane-3α,11α,25-triol (V), and also derivatives of it: 11α-aceto-
xy-20(S),24(R)-epoxydammarane-3α,25-diol (II), 2α-acetoxy-20(S),24(R)-epoxydammarane-11α,
25-diol (III), and 11α,25-dihydroxy-20(S),24(R)-epoxydammaran-3-one (IV).

2. It has been established that the triterpenoids are present in the leaves of B. lanata
in the form of acetates.

LITERATURE CITED

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CHARACTERISTICS OF THE MASS SPECTRA OF ECDYSTEROIDS WITH DIFFERENT
NUMBERS OF --OR GROUPS

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The mass spectra of 15 phytoecdysteroids and acetyl derivatives have been compared.
With a decrease in the number of --OR groups, the contribution of cleavages of the
bonds of the steroid skeleton increases. 20,22-Diols are characterized by the
greatest significance of fragmentation at the C-20--C-22 bond. In all the spectra,
clear indications of fragmentation of the side chain at the C-22--C-23, C-23--C-24,
and C-24--C-25 bonds are observed.

The detection in the plant Silene praemixta M. Pop. of several phytoecdysones belonging
to the subgroup of 2-deoxy-α-ecdysone [1, 2] has substantially supplemented the general pattern
of distribution of compounds of this type in the plants of Central Asia. To ecdysteroids
found previously the molecules of which contain seven or eight hydroxy groups (integristerones
A and B [3, 4]) compounds with three or four hydroxy functions have been added. The necessity
for an all-sided study of the ecdysteroids of the latter group follows, for example, from
the work E. Ohnishi et al. [5], who have shown that 2-deoxy-α-ecdysone is not only one of the
main metabolites of α-ecdysone but also plays an independent role in the metamorphosis of
insects.

The analysis of mass-spectrometric characteristics is important for establishing the
structures of the ecdysones [6]. The basic laws of fragmentation of these compounds have
been expounded previously [6-8]. At the same time, the existence of a set of ecdysteroids with different numbers of hydroxy functions will enable us to compare their spectra in order to evaluate the relative contribution of each of the main directions of the fragmentation. Furthermore, the use of high-resolution mass spectrometry is opening up a route for the discovery of previously unknown fragmentation reactions of the steroid nuclei and of the side chains of the ecdysteroids.

We have compared the spectra of 2-deoxy-α-ecdysone (I) and its 22-monooacetate (II) and 3,22-diacetate (III), silenosterone (IV) [1] and its 22-monooacetate (V), α-ecdysone (VI), 2-deoxycdysterone (VII) and its 3,22-diacetate (VIII), ecdysterone (IX) and its 2,3,22-triacetate (X), and premixisterone (XI) [2] and its 3,22-diacetate (XII).

Basic Processes in the Fragmentation of Compounds (I-XII). Table 1 gives information on the fragments by the successive splitting out from $M^+$ of the particles $R$-$OH$ and $CH_3$ (column 2), and also on the key ions of series $a$, $b$, and $c$ (columns 3, 5, and 7). The structures of the ions at the head of these series are given. The ions of series $a$ and $b$ are the well-known [6, 8] products of cleavage at the C-20-C-22 and C-17-C-20 bonds. The $c$ ions are the closest analogs of the main key fragments in the spectra of the cardenolides [9, 10]. Their formation has been observed previously for the acetates of ponasterone and ajugasterone [8]. The nature of the particles, the transfer of which to the charged (+) or uncharged (−) fragment accompanied the cleavage of a C-C bond, is shown in columns 4, 6, and 8. The origin of the ions denoted by asterisks has been confirmed by measurements of elementary compositions. In the present paper, as 100% we have taken the maximum peaks in the $M^+-m/e$ 200 interval.

The main property of the spectra of the 2- and 20-deoxycdysteroids is the presence of the peak of the molecular ion, which is absent in the case of the ecdysteroid (IX) and its acetate (X).

In order to follow the change in the contribution of the processes of the fragmentation of compounds (I-XII) with a change in the number and position of the OR groups, we have drawn up Table 2, including part of the material of Table 1, in generalized form. The numerical matter of Table 2 was obtained as the sum of the relative intensities of the peaks in columns 2, 3, 5, and 7 for each compound taken individually in percentages with respect to the sum of the heights of all the peaks shown in the table.

It can be seen from Table 2 that there is no regularity whatever in the change in the contribution of the ions ($M-nOR-CH_3$)$^+$, with the exception of a tendency to a decrease in