A NEW DITERPENE ALKALOID FROM Aconitum nasutum

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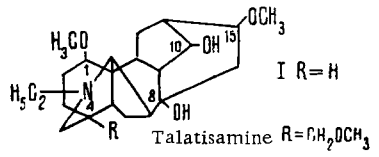
In a study of the alkaloids of Aconitum nasutum Fisch et Rchb. we found the presence in all parts of the plant of a new alkaloid which we have called aconosine (I). The base was isolated from the combined alkaloids by a scheme which we have developed [1]. It has mp 148°C (from hexane with drying at 108°C/350 mm for 3 h), $[\alpha]_D^{20}$ −21° (c 1; methanol), and it is readily soluble in methanol and chloroform, less readily in benzene, acetic anhydride, and acetone, and sparingly in ether and hexane. The empirical formula of the base is $C_{22}H_{35}NO_4$, mol. wt. 377 (mass spectrometrically). The IR spectrum shows the presence of hydroxy groups (3460 and 3630 cm^{-1}) and the absence of carbonyl groups. Aconosine contains two methoxy groups, as is confirmed by the presence in its NMR spectrum of two three-proton singlets at 3.20 and 3.28 ppm, and two hydroxy groups and an aminoethyl group. Consequently, the developed formula of compound (I) can be written in the following way: $C_{18}H_{22}(OH)_2(OCH_3)_2$ (> C_2H_5).

The mass spectrum of (I) is characteristic for the lycoctonine alkaloids and the maximum peak is that of the M−31 ion [2]. Low-intensity peaks corresponding to the ejection from the molecular ion of methyl and hydroxy groups are also recorded. The oxidation of (I) with chromium trioxide in acetone gave dehydroaconosine, $C_{22}H_{33}NO_4$, containing a carbonyl group in a five-membered ring, mp 136-142°C (cyclohexane−ethyl acetate).

The facts presented permit the assumption that aconosine belongs to the lycoctonine group of diterpene alkaloids. However, the presence in its basic skeleton of only 18 carbon atoms shows that it lacks an alkyl substituent at C-4 [3, 4].

One of the methoxy groups of the substance is at C-1, according to the mass spectrum [2]. The formation of dehydroaconosine shows that one of the hydroxy groups is secondary and is located in the five-membered ring. The second hydroxy group is apparently tertiary. This is also shown by an analysis of the mass spectra of acetyldehydroaconosine and of diacetylaconosine. In the spectrum of the latter the maximum peak is that of the M−31 ion. The peaks of the following ions also have a considerable intensity: M−CH_3COO (30%), M−CH_3COOH (45%) and M−CH_3COO−CH_3OH (M−CH_3COOH−CH_3O), i.e., M−91 (60%). In the spectrum of acetyldehydroaconosine, where the maximum peak is again that of the M−31 ion, the peak of the M−CH_3COO ion is 37% of the maximum and the peak of the M−CH_3COOH ion has an intensity of only 10%. The intensity of the M−91 peak is 25%. We have observed a similar situation previously in the spectra of diacetyltalatisamine and of dehydroacetyltalatisamine [5]. The spectra of the corresponding derivatives of talatisamine and aconosine are very similar, which enables the hydroxy groups in aconosine to be placed at C-8 and C-10, and the second methoxy group at C-15. The presence of a hydroxy group at C-10 is also confirmed by a one-proton signal in the NMR spectrum of the base at 4.09 ppm [6]. On the basis of the facts presented, structure (I) may be put forward for aconosine:



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LITERATURE CITED

1. D. A. Murav'eva and T. I. Plekhanova, Proceedings of a Scientific and Practical Conference on the Problem of the Principles of the Development of Pharmacy and the Search for New Methods of Preparing Drugs and Methods for their Investigation [in Russian], Tyumen' (1970), p. 110.
2. M. S. Yunusov, Ya. V. Rashkes, V. A. Tel'nov, and S. Yu. Yunusov, Khim. Prirodn. Soedin., 5, 515 (1969).
3. V. A. Tel'nov, M. S. Yunusov, and S. Yu. Yunusov, Khim. Prirodn. Soedin., 6, 583 (1970).
4. V. A. Tel'nov, M. S. Yunusov, Ya. V. Rashkes, and S. Yu. Yunusov, Khim. Prirodn. Soedin., 7, 622 (1971).
5. M. S. Yunusov, Ya. V. Rashkes, and S. Yu. Yunusov, Khim. Prirodn. Soedin., 7, 626 (1971).
6. M. S. Yunusov and S. Yu. Yunusov, Khim. Prirodn. Soedin., 6, 90 (1970).