PMR spectrum: 8.28 (1H, s, H-8), 7.62-6.80 (6H, arom.), 6.50 (1H, s, H-4), 3.88; 3.86; 3.58 (each 3H, ss, $3OCH_3$), 2.20 (6H, s, $N-CH_3$, $OCOCH_3$), 2.00 (3H, s, $OCOCH_3$), 3.12 (1H, m, H-7).

Hydrolysis of Speciosine (II) to Specioseine (I). A mixture of 3 g of speciosine and 20 ml of 3% hydrochloric acid was heated at 100°C for 2 h. The rsulting solution was made alkaline with ammonia and extracted wtih chloroform. A compound with mp 169-171°C (from acetone) was isolated and was identified from its R_f value and PMR spectrum as specioseine (I).

LITERATURE CITED

1. V. V. Kiselev, Khim.-Farm. Zh., No. 11, 43 (1968).
2. H. Potesilova, J. Bartosova, and F. Santavy, Ann. Pharm. Franc., 12, 616 (1954).
3. V. Mashinova and F. Santavy, Collect. Czech. Chem. Commun., 19, 1283 (1954).
4. H. Potesilova, C. Alcaraz, and F. Santavy, Collect. Czech. Chem. Commun., 34, 2128 (1969).
5. B. Chommadov, M. K. Yusupov, and Kh. A. Aslanov, Khim. Prir. Soedin., No. 3, 417 (1985).
6. W. S. Sangstrer and K. L. Stuart, Chem. Rev., 65, 69 (1965).
7. M. J. Fabian, V. Delaroff, P. Poirier, and M. Legrand, Bull. Soc. Chim. France, Nos. 11 and 12, 1455 (1955).
8. A. D. Cross, J. Hrbek, Jr., J. L. Kaul, and F. Santvay, Beitrage zur Biochemie und Physiologie von Naturstoffen, VEB Gustav Fischer Verlag, Jena, Vol. 8 (1965), p. 97.
9. F. Santavy, Alkaloids of Autumn Crocuses and Their Derivatives [in Cezch], Prague (1958), p. 100.
10. R. Ramage, Tetrahedron, 27, 1499 (1971).
11. V. Delaroff and P. Rathle, Bull. Soc. Chim. France, No. 6, 1621 (1965).
12. F. Santavy, Chem. Listy., 46, 280 (1952); F. Santavy and V. Macak, Chem. Listy., 47, 1214 (1953).
13. A. J. Freyer, M. H. Abu Zarga, S. Firdous, H. Guinaudeau, and M. Shamma, J. Nat. Prod., 50, 684 (1987).
14. B. Ch. Chommadov, M. K. Yusupov, V. D. Kalandadze, Ch. A. Chikhladze, and Kh. A. Aslanov, USSR Inventors' Certificate No. 4654372; Byull. Izobret. (1989).
15. V. P. Zakharov, N. I. Libizov, and Kh. A. Aslanov, Drugs from Plants and Methods for Their Manufacture [in Russian], FAN, Tashkent (1980), p. 96.

8-ACETYLEXCELSINE – A NEW ALKALOID FORM

Aconitum kirinense

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UDC 547.944.7

The alkaloid 8-acetylexcelsine has been isolated from the epigeal part of Aconitum kirinense Nakai. Its structure has been established with the aid of chemical transformations and spectral characteristics.

We have investigated the alkaloids of the epigeal part of the plant Aconitum kirinense gathered at the end of the vegetation period in the environs of the village of Chernyatino, Oktyabr'skii region, Maritime Territory. An alkaloid has been obtained from this plant previoiusly and an empirical formula has been derived for it [1]. After the extraction of the air-dry plant with aqueous ethanol, 1.9% of alkaloids was obtained. An amorphous base (I) with the composition $C_{24}H_{35}O_7$ (449.24094, HRMS) was isolated from the total alkaloids. The IR spectrum of (I) had absorption bands of hydroxy and ester groups while the PMR spectrum revealed the signals of N-ethyl, acetoxy, and two methoxy groups.

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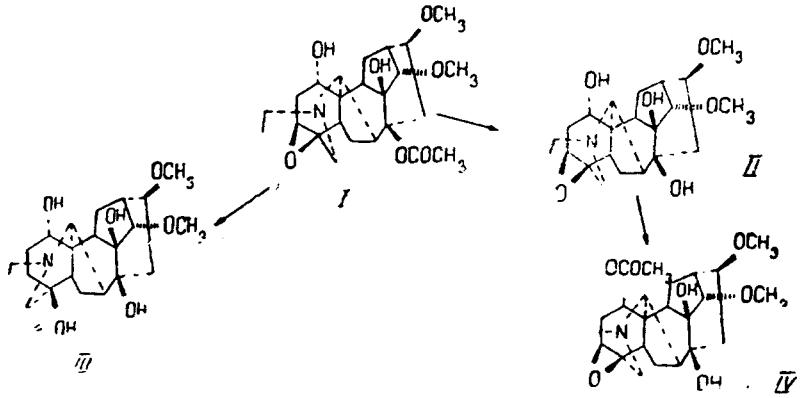
TABLE 1. Mass Spectra of Compounds (I) and (IV)

Compound	Intensity, %											
	M^+	M^+-15	M^+-17	M^+-31	M^+-43	M^+-44	M^+-59	M^+-60	M^+-75	M^+-77	$M^+-59-32$	$M^+-60-31$
8-Acetylexcelsince (I)	83	42	—	4,7	7	5,6	100	29	14	58	17	
1-Acetylexcelsince (IV)	16	10	0,7	9	2,6	—	100	2	1	2	2	

The alkaline hydrolysis of the base yielded an amino alcohol which was identified as excelsine (II) [2, 3]. The reduction of the base with Raney alloy in an aqueous alcoholic solution of alkali led to a product identical with lappaconidine (III). These facts showed that the alkaloid was a monoacetate of excelsine. To determine the position of the acetoxy group,1-acetylexcelsine (Iv) was obtained by the acetylation of (II) with acetic anhydride in the presence of pyridine.



Scheme 1

The PMR spectrum of 1-acetylexcelsine showed the signal of a proton geminal to C1 of an acetoxy group at 5.0 ppm in the form of a quadruplet (J_1 = 2 Hz, J_2 = 3.5 Hz). An analogous C-1 signal has been observed in the PMR spectrum of the monoacetate of monticoline [4]. The nonidentity of compounds (I) and (IV), and also the absence of the signal mentioned from the PMR spectrum of (I) showed that the hydroxy group at C-1 in (I) was not esterified.

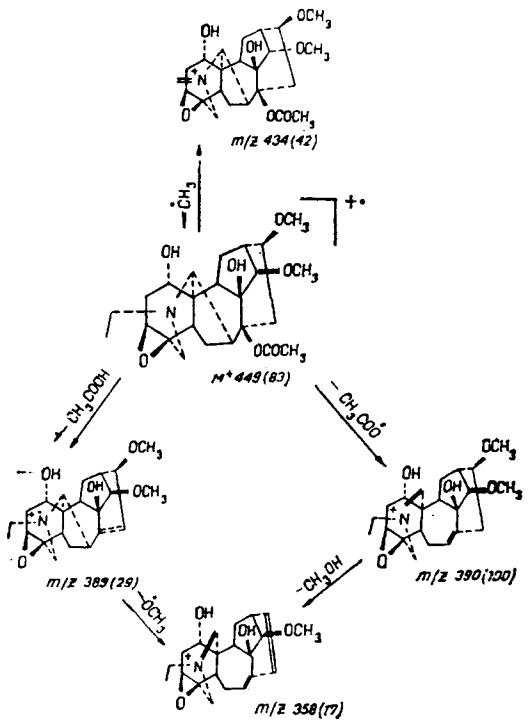
If the acetoxy group had been present at C-9, a downfield shift of the signal of the proton at C-14, which has been reported previously in the spectrum of excelsine triacetate [2], should have been observed.

The facts given above permitted the acetoxy group to be located at C-8. This was confirmed by the mass spectrum of (I). Table 1 gives details of the mass spectra of compounds (I) and (IV). The mass spectra of alkaloids of the type of excelsine with a C_3–C_4 epoxy function differ from the spectrum of the ordinary C_{19} dieterpene alkaloids [2]. However, in the mass spectrum of 1-acetylexcelsine (IV), as in other 1-acetoxy derivatives of C_{19} dieterpene alkaloids [5], the main direction of fragmentation is connected with the splitting out of the acetoxy radical from C-1.

In the spectrum of 8-acetylexcelsine (I), in addition to a considerable increase in the size of the peak of $M^+ - 15$ ion, a number of processes are observed which are connected with the elimination of an acetoxy radical and of an acetic acid molecule (scheme 2). Analogous fragmentation is observed in the spectra of other dieterpene alkaloids containing an acetoxy group at C-8 [6, 7]. It must be mentioned that the presence of the C_3–C_4 epoxy function in (I) intensifies the ejection of the acetoxy radical from C-8. (Scheme 2.)

EXPERIMENTAL

Mass spectra were taken on a MKh-1310 instrument with a system of direct introduction into the ion source, IR spectra on a UR-20 spectrometer (KBr), and PMR spectra on a Tesla BS-567A instrument. Type KSKG silica gel and deactivated alumina were used for chromatography.



Scheme 2

Isolation of the Total Alkaloids. The comminuted air-dry epigeal part of the plane (533 g) was covered with 80% ethanol (2 liters). After 24 h, the solvent was poured off and evaporated in vacuum. Six extractions were made, and the combined aqueous residue was acidified with 5% sulfuric acid and was washed with chloroform. It was then made alkaline with sodium carbonate and the alkaloids were extracted with hexane, ether, and chloroform. After the solvents had been distilled off, 1.19 g of hexane fraction, 7.36 g of ether fraction, and 1.72 g of chloroform fraction of the total alkaloids were obtained.

Separation fo the Hexane Fraction. The hexane fraction was chromatographed on a column of silica gel with elution by benzene to which ethyl acetate was gradually added. Benzene–ethyl acetate (5:1) gave a fraction enriched with 8-acetylexcelsine (0.5 g). It was rechromatographed on a column of silica gel with elution by benzene–methanol (125:1), and chromatographically pure amorphous 8-acetylexcelsine (I) (0.33 g) was obtained.

IR spectrum of (I), ν_{max}^{KBr}, cm^{-1}: 3500 and 3270 (OH): 1740 (C=O).

PMR spectrum of (I) (100 MHz, $CDCl_3$, ppm): 1.05 (3H, t, $N-C_2H_5$), 2.0 (3H, s, $OCOCH_3$), 3.25 and 3.32 (each 3H, s. OCH_3), 3.88 (1H, br.s.).

Alkaline Hydrolysis of 8-Acetylexcelsine. A solution of 0.8 g of the base in 7 ml of 5% methanolic OH solution was boiled for 90 min. The methanol was evaporated off, the residue was dissolvedin water, and the solution was extracted with ether. The extract was dried over sodium sulfate and evaporated. After treatment with ether, 0.05 g of a product with mp 82-83°C was obtained and was identified as excelsine (II) (IR, PMR, and mass spectra, TLC, mixed melting point).

Reduction of 8-Acetylexcelsine with Raney Alloy. A mixture of 0.2 g of 8-acetylexcelsine and 0.5 g of Raney alloy in 30 ml of a 10% aqueous alcoholic (1:1) solution of KOH was boiled under reflux for 8 h, after which the catalyst was separated off and the solvent was evaporated under reduced pressure. The residue was dissolved in water, and the reaction product was extracted with chloroform. The residue after the solvent had been driven off was chromatographed on a column of silica gel. Elution with chloroform–methanol (50:1) gave 0.08 of lappaconidine.

Acetylation of Excelsine. A solution of 0.04 g of the base in 2 ml of acetic anhydride and 0.1 ml of pyridine was left at room temperature for 19 h. The excess of acetic anhydride was evaporated off, the residue was dissolved in water, the solution was made alkaline with sodium carbonate, and the reaction product was extracted with ether. The extract was dried

over sodium sulfate and evaporated. On treatment with ether, 0.03 g of 1-acetylexcelsine (IV) with mp 108-110°C was isolated.

Mass spectrum of (IV): m/z (%): M^+ 449(15.6), 434(10), 432(0.7), 418(8), 406(2.6), 390 (100), 374(2), 372(2), 358(2).

PMR spectrum of (IV) (100 MHz, $CDCl_3$, ppm): 1.02 (3H, t, $N-C_2H_5$), 1.98 (3H, s, $OCOCH_3$), 3.03 and 2.12 (each 3H, s, OCH_3), 5.02 (1H, q), 3.55 (1H, br.s).

LITERATURE CITED

1. T. E. Monakhova, T. F. Platonova, A. D. Kuzovkov, and A. I. Shreter, Khm. Prir. Soedin., 113 (1965).
2. V. A. Tel'nov, M. S. Yunusov, and S. Yu. Yunusov, Khim. Prir. Soedin., 129 (1973).
3. S. M. Nasirov, V. G. Andrianov, Yu. T. Struchkov, V. A. Tel'nov, M. S. Yunusof, and S. Yu. Yunusov, Khim. Prir. Soedin., 812 (1974); 206 (1976).
4. É. F. Ametova, M. S. Yunusov, V. E. Bannikova, N. Dzh. Abdullaev, and V. A. Tel'nov, Khim. Prir. Soedin., 466 (1981).
5. M. S. Yunusov, Ya. V. Rashkes, and S. Yu. Yunusov, Khim. Prir. Soedin., 85 (1972).
6. M. S. Yunusov, Ya. V. Rashkes, and S. Yu. Yunusov, Khim. Prir. Soedin., 626 (1971).
7. M. N. Sultankhodzhaev, M. S. Yunusov, and S. Yu. Yunusov, 481 (1975).

SYNTHESIS OF THE RACEMIC ALKALOID DIPTOCARPILIDINE

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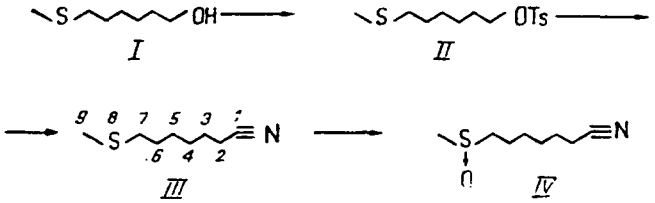
A convenient approach to the synthesis of the racemic alkaloid diptocarpilidine from the readily available 1-hydroxy-7-thiaoctane has been developed.

The isolation from the plant Dipthychocarpus strictus of the optically active alkaloid diptocarpilidine, which exhibits a high antihypoxic activity, has been reported previously [1].

We have developed a convenient approach to the synthesis of the racemic diptocarpilidine (IV) from 1-hydroxy-7-thiaoctane (I) [2]. The conversion of the ω-hydroxy sulfide (I) at the hydroxy group into the tosylate (II) and then into 8-thianonanonitrile (III) and the oxidation of the latter wtih hydrogen peroxide led to the desired alkaloid (IV) with an overall yield in the three stages of 63%. The transformation of the sulfide (III) into the sulfoxide (IV) was characterized by a considerable paramagnetic shift of the signals of the carbon atoms adjacent to the sulfur atom. While in the ^{13}C NMR spectrum of the sulfide (III) the signals of the C9 and C7 atoms were observed at 15.76 and 34.31 ppm, in the case of the sulfoxide (IV) these signals were shifted into the 38.58 and 54.29 ppm regions, respectively. The presence of a SO group in the molecule of the alkaloid synthesized was also confirmed by the appearance in the IR spectrum of an intense absorption band at 1032 cm^{-1}.



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