linkages in the molecule are trans and are made by bonds equatorial in relation to one another. The angles between the mean-square planes of rings A, B, and C differ little from zero. It is just with such a geometry of the molecule that the minimum interatomic nonbond interactions in the molecule are observed, while all the other possible linkages of four chair-shaped rings lead to more or less strained structures. The C(15)—O interatomic distance is 1.22(6) Å. The coordination of the N(1) nitrogen atom is pyramidal and that of the N(16) is plane-trigonal because of conjugation in the lactam fragment of the molecule.

The oxidation of allomatrine to its N-oxide does not lead to appreciable change in the conformation of the molecule. The chair conformation of the rings and the type of their linkages do not change. The coordination of the N(1) atom becomes tetrahedral. There are no special packing features in the crystal structure of allomatrine, and all the intermolecular contacts are normal from the point of view of intermolecular radii. In the crystal of the N-oxide, the molecules are joined into infinite layers connected with one another through molecules of water of crystallization by hydrogen bonds.

LITERATURE CITED

1. E. Ochiai, S. Okuda, and H. Minato, J. Pharm. Soc. Jpn., 72, 781 (1952).
2. A. Ueno, K. Morinaga, S. Fukushima, Y. Jitaka, Y. Koiso, and S. Okuda, Chem. Pharm. Bull., 23, 2634 (1975).
3. B. T. Ibragimov, S. A. Talipov, Yu. K. Kushmuradov, and T. F. Aripov, Khim. Prir. Soedin., 538 (1978).
4. V. I. Andrianov, Z. Sh. Safina, and B. L. Tarnopol"skii, Zh. Strukt. Khim., 15, 911 (1974).
5. L. A. Muradyan and V. I. Simonov, Kristallografiya, 18, 75 (1974).

TETRAHYDROPROTOBERBERINE ALKALOIDS OF *Corydalis ledebouriana*

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From the nonphenolic ether-soluble compounds of *C. ledebouriana* collected in the period of the end of flowering to the beginning of fruit-bearing at Baraldaisae we have isolated bases (I) and (II).

Base (I) has mp 139-140°C, $[\alpha]_D$ —105° (c 0.7; CH_3OH). UV spectrum. λ_{max}, nm: 288 (log ε 3.85). The IR spectrum shows absorption bands at (cm^{-1}) 935 and 1050 (CH_2O_2), 1515 and 1605 (aromatic ring), and 2760 (trans-quinolizidine). The mass spectrum contains the peaks of the molecular ion with m/e 353, and also those of ions with m/e 338, 192, 190, 162 (100%), and 176.5 (M^{2+}). The NMR spectrum of (I) taken in $CDCl_3$ shows signals from a $>CH-\underline{CH_3}$ group in the form of a doublet at 0.88 ppm (J = 7 Hz), a signal from two methoxy groups at 3.82 ppm, and one from a methylenedioxy group at 5.87 ppm (quadruplet). Aromatic protons give signals at 6.62 ppm (3 H) and 6.54 ppm (4 H). There are two one-proton doublets at 3.42 and 4.01 ppm (J = 15 Hz), and the signals of the remaining protons appear in the 2.5-3.5 ppm region.

The facts presented permit base (I) to be assigned to the tetrahydroprotoberberine alkaloids containing a methyl group at C_{13}. All the spectral characteristics of base (I) coincide completely with those of *dl*-cavidine, isolated from *C. thalictrifolia* [1, 2].

Thus, base (I) is *l*-cavidine, which has not previously been described in the literature.

Base (II), with mp 199-200°C (from methanol), $[\alpha]_D$ +300° (c 0.23; CH_3OH). The UV spectra of (II) and of *l*-cavidine are similar. The mass spectrum contains the peaks of ions with m/e 337 (M^+), 332, 176, 174, 162 (100%), and 168.5 (M^{++}). The NMR spectrum of (II) shows signals from two methylenedioxy groups at 5.86 ppm, while the remainder of the spectrum coin-

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cides with that of *l*-cavidine. The chemical properties, and also the spectral characteristics given, enable the base to be identified as d-tetrahydrocorysamine which has been isolated from *C. pallida* var. *tenuis* [3].

LITERATURE CITED

1. C. K. Yu, D. B. MacLean, R. G. A. Rodrigo, and R. H. F. Manske, Can. J. Chem., 48, 3673 (1970).
2. S. Naruto and H. Kaneko, Phytochemistry, 12, 3008 (1973).
3. H. Kaneko and S. Naruto, Yakugaki Zasshi, 91, 101 (1971); Chem. Abstr., 74, 142, 108t (1971).

ALKALOIDS OF *Ungernia vvedenskyi*

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We have investigated the alkaloids of *Ungernia vvedenskyi* S. Khamidh. [1] collected in the Chimkent oblast. This species has not previously been studied. The total area of the thickets amount to about 200 ha. We considered the amount and dynamics of the accumulation of the alkaloids during the vegetation periods:

Date of collection (1976)	Dimensions, cm	Leaves		Bulbs	
		total alkaloids, %	lycorine in dry plant, %	total alkaloids, %	lycorine in dry plant, %
March 25	4–6	0,24	0,12	0,35	0,21
April 5	17—22	0,18	0,065	0,58	0,28
April 18	23—25	0,12	0,05	0,83	0,32
April 29	30–40	0,09	0,01	0,08	0,37
May 28	33–42	0,02	—	1,17	0,45

The figures given confirm the laws of the dynamics of the accumulation of alkaloids in plants deduced previously [2, 3]. This species may serve as a new source of the production of lycorine.

We made a detailed study of the total bases of the epigeal part of the plant collected on May 25, from which we isolated lycorine, tazettine, ungminorine, ungminoridine, hippeastrine, galanthamine, narwedine, pancratine, and hordenine [4, 5], and a base with mp 210-212°C (I). The flowers with peduncles contained 0.36% of alkaloids, from which lycorine, tazettine, and a base with mp 148-150°C (II), having the composition $C_{19}H_{25}NO_5$, were isolated.

Base (I) has the composition $C_{17}H_{19}NO_5$, M^+ 317; R_f 0.25 (TLC on KSK silica gel in the benzene—methanol 4:1 system); optically inactive.

The UV spectrum of (I) showed a single maximum at λ_{max}^{EtOH} 290 nm (log ε 3.40), which is characteristic for alkaloids of the lycorine type [4].

The IR spectrum showed absorption bands at 3200-3400 cm^{-1} (—OH), 2840 and 1265 cm^{-1} (—OCH_3), and 1610 cm^{-1} (aromatic ring). The NMR spectrum (JNM-4-100/100 MHz in CCl_4, internal standard HMDS, δ scale) contained two one-proton singlets at 6.82 and 6.83 ppm corresponding to two aromatic protons, a two-proton singlet at 5.82 ppm assigned to the protons of a methylenedioxy group, a two-proton signal at 4.65 ppm assigned to geminal protons to hydroxy groups.

The spectral characteristics of (I) coincide with those of ungminorine, and a mixture with ungminorine gave no depression of the melting point. Since the base is optically inactive, it is the racemate of ungminorine.

LITERATURE CITED

1. C. Khamidkhodzhaev, Dokl. Akad. Nauk Uzb.SSR, No. 5 (1979).

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