Chemistry of Natural Compounds, Vol. 37, No. 4, 2001

B R I E F C O M M U N I C A T I O N S

ALKALOIDS OF THE AERIAL PART OF *Veratrum lobelianum* GROWING IN GEORGIA

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UDC 547.944/945

We previously reported results from an investigation of alkaloids of the subterranean part of *Veratrum lobelianum* Bernh. [1]. In the present communication we present results from a study of the alkaloids from the aerial part of the plant and the alkaloid accumulation dynamics of *V. lobelianum* collected in Georgia in various habitats. The plant was collected at the start of growth (May-June) and during natural die off of the aerial part (end of August-September) in 1992-1994. It was dried in the shade in air. The material was processed as it was received.

The alkaloid content was determined by gravimetry using $CHCl_3$ extraction with basicification of the material by ammonia in a Soxhlet extractor. The pulp after extraction was dried and extracted again with ethanol.

Table 1 shows that the rhizomes have the greatest accumulation of alkaloids whereas the aerial parts have the highest content at the start of growth. The height of the plants has a definite effect on alkaloid accumulation. Alkaloids were isolated by wetting the aerial part (5 kg, 5-25 cm) with ammonia (10%) and exhaustively extracting with $CHCl_3$. Alkaloids were transferred to H_2SO_4 solution and extracted by ethylether and $CHCl_3$ after basicification. Evaporation of the ether extract produced precipitate A (7.13 g), which was separated on a silica-gel column. The eluates afforded ($CHCl_3$—CH_3OH, 5:3) a base with mp 212-215°C [CH_3OH—$(CH_3)_2CO$ 1:3], $[\alpha]_D^{20}$ -147.5° (*c* 0.42, CH_3OH), λ_{max} (C_2H_5OH) = 245 nm, R_f = 0.30 (TLC, benzene—ethanol 9:2.5, silica gel LS 5/40 μ). The isolated compound is identical to the alkaloid veralosine [2, 3].

TABLE 1. Alkaloid Content of *Veratrum lobelianum*

Collection region and elevation above sea level, sm	Plant height, sm	Alkaloid content, % of air-dried mass			Collection region and elevation above sea level, sm	Plant height, sm	Alkaloid content, % of air-dried mass		
		Aerial part	Rhizome	Root			Aerial part	Rhizome	Root
Gori-1333	3-5	1.34	1.60	0.90	Dzhvari-2379	3-5	3.90	3.00	0.96
	20-25	0.72	1.66	0.96		20-25	1.60	3.45	1.00
	100 and >	Tr.	1.80	1.20		100 and >	Tr.	3.86	1.60
Bakuriani-1500	3-5	3.00	2.65	0.80	Gergeti Khevi-2500	3-5	3.77	3.20	0.95
	20-25	1.50	2.80	0.98		20-25	1.50	3.67	1.15
	100 and >	Tr.	3.50	1.40		100 and >	Tr.	4.00	1.62
Kazbegi-2200-2300	3-5	5.00	3.00	0.98	Datvisdzhvari-2676	3-5	4.84	3.60	1.00
	20-25	1.90	3.20	1.00		20-25	1.96	3.80	1.20
	100 and >	Tr.	3.95	1.65		100 and >	Tr.	4.65	1.73
Tskhratskaro-2354	3-5	4.20	2.96	1.00					
	20-25	1.65	3.15	1.10					
	100 and >	Tr.	3.97	1.43					

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Translated from Khimiya Prirodnykh Soedinenii, No. 4, pp. 335-336, July-August, 2001. Original article submitted June 26, 2001.

0009-3130/01/3704-0394$25.00

The ether extract was evaporated to dryness after removal of the veralosine fraction. The solid was dissolved in benzene. The soluble fraction was separated by distribution between benzene and citrate—phosphate buffer in 0.2 pH unit differences. The fraction with pH 5.0 was separated on a silica-gel column. Elution by benzene—methanol (20:1) afforded a base with mp 154-155°C [CH_3OH—$(CH_3)_2CO$], $[\alpha]_D^{20}$ -92.5° (*c* 0.45 ethanol), R_f = 0.27 ($CHCl_3$—C_2H_5OH 9:1), λ_{max} (C_2H_5OH) = 242 nm. The analytical results for the substance agree with the literature data for veralosidine [3, 4]. The fraction with pH 4.0 was chromatographed on a silica-gel column with elution by benzene to give a base with mp 160-163°C (acetone), $[\alpha]_D^{20}$ -185.7° (*c* 0.89, $CHCl_3$), λ_{max} (C_2H_5OH) = 242 nm. IR spectrum (KBr, ν, cm^{-1}): 3460 (OH), 1645 (C=C), 1730, 1250 (–$COOCH_3$), R_f = 0.60 (benzene—methanol 9:1.5). The analytical results agree with the literature data for veralosinine [2-4].

Standards were authentic samples of veralosine and veralosidine that were graciously supplied by D. M. Tsakadze (I. Dzhavakhishvili Tbilisi State University, Department of Organic Chemistry and Natural Compounds).

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