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ALKALOIDS OF THE CULTIVATED PLANT *Delphinium elatum*

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Delphinium elatum L. (bee larkspur) is a Eurasiatic species naturalized under the climatic conditions of the subarctic in the process of cultivation for several (10 and more) years. Being resistant to the unfavorable environmental factors of this region, it is capable of vegetative and seed regeneration.

We have studied the alkaloids of the epigeal part of bee larkspur gathered in the Polar-Alpine Botanical Garden in the period of mass flowering. From 1 kg of air-dry leaves, peduncles, and flowers we obtained 3 g of total alkaloids, amounting to 0.3% of the weight of the dry raw material. From this total we isolated 2.86 g of a crystalline perchlorate with mp 215-219°C (from methanol), identical with nudicauline perchlorate. The remaining solution of perchlorates was evaporated, diluted with water, made alkaline, and extracted with chloroform, the distillation of which yielded 0.31 g of a mixture of alkaloids. By chromatography, from this mixture we isolated nudicauline (170 mg) , 14-deacetylnudicauline (9 mg), base (**1**) (4 mg), and delectinine (21 mg).

Thus, nudicauline is the main alkaloid of the epigeal part of bee larkspur. In the period of mass flowering it makes up 89% of the total alkaloids.

Base (**1**) with the composition $C_{26}H_{41}NO_8$ had mp 98-102°C, Its mass spectrum showed the peaks of ions with *m/z* 495 (M^+, 0.5%), 480 ($M^+ - 15$, 50%), and 464 ($M^+ - 31$, 100%), which are typical for norditerpenoid alkaloids with the lycoctonine skeleton and methoxy groups at C-1 and C-6 [1].

The facts given above and also the PMR spectrum were close to the published characteristics of 14-acetyldelectinine [2]. A direct comparison (TLC, mass and PMR spectra) of the base isolated with 14-acetyldelectinine, obtained by the hydrolysis of nudicauline in methanolic solution in the presence of potassium carbonate, showed their identity.

On comparing the results obtained with those of our earlier investigations [3, 4], it is possible to draw the conclusion that the amount of alkaloids in the epigeal part of the plant increased, as it developed, from 0.24% at the beginning of the vegetation phase to 0.3% in the period of mass flowering. The alkaloids were localized mainly in the hypogeal parts (rhizomes with roots), where their content amounted to 2.24 and 2.50% in the periods of the beginning of vegetation and of the withering of the epigeal part, respectively [3]. In the hypogeal parts the total alkaloids consisted almost entirely of nudicauline, while the other alkaloids mentioned above were detected chromatographically in trace amounts.

It is interesting to note that the alkaloid compositions of the cultivated form of *D. elatum* and of that growing in nature are different. Thus, elatine and eldeline [5] and methyllycaconitine, delpheline, and delelatine [6], which are absent from the cultivated plant, have been isolated from the plant growing wild in various sites. Only in the seeds of the wild-growing plant have nudicauline and 14-deacetylnudicauline been detected among the alkaloids isolated [6]. We are the first to have isolated 14-acetyldelectinine from *D. elatum*.

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