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ALKALOIDS FROM THE AERIAL PART AND ROOTS OF *Convolvulus pseudocanthabrica* INDIGENOUS TO UZBEKISTAN

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Convolvulus pseudocanthabrica Schrenk. is a perennial herbaceous plant of the Convolvulaceae (morning glory) family [1]. It is distributed over Central Asia (Tian-Shan, Pamiro-Alai) and Xin-jiang. It flowers in May-June and bears fruit in June-July.

Alkaloids from *C. pseudocanthabrica* were previously partially studied by Orekhov and Konovalova [2]. They determined that the total bases from plants collected in Tian-Shan contained 0.4% alkaloids in the aerial part; 0.52%, in seeds [3].

We continued investigation of alkaloids from plants collected at three sites in Uzbekistan during flowering and in Tadzhikistan. Table 1 presents the results.

Plants indigenous to Surkhandarya Oblast were studied in more detail. A quantitative determination established the content of total bases in the aerial part and roots (Table 1). Total alkaloids obtained by extraction of the aerial part and roots were worked up with hydrocarbons, from which condensation produced a crystalline mixture of the two alkaloids convolvine and convolamine, making up ~40% of the total alkaloids. A base with mp 189–190°C was isolated from the mother liquor of convolvine and convolamine. It was identified as the alkaloid convolvidine, which was previously isolated from *C. subhirsutus* [4]. The fraction that was insoluble in hydrocarbons was divided into phenolic and non-phenolic parts. The non-phenolic part afforded an additional amount of convolvine; the phenolic, phyllalbine with mp 209–210°C [5] and convolidine with mp 214–215°C [6], which were previously isolated from *C. subhirsutus*. The mother liquors of the non-phenolic part were combined and chromatographed over a column of Al_2O_3 with elution by hydrocarbons, a hydrocarbons:$CHCl_3$ mixture, $CHCl_3$, and a $CHCl_3$:MeOH mixture. The first hydrocarbons:$CHCl_3$ fractions yielded a crystalline base with mp 184–185°C, which was identified by its R_f value and mixed melting-point sample as the known alkaloid convoline [7]. Subsequent hydrocarbons:$CHCl_3$ fractions produced crystals with mp 144–145°C that were identified as convolicine [8].

We also studied alkaloids from *C. pseudocanthabrica* growing in Namangan Oblast and Tadzhikistan during flowering and determined that the aerial parts contained 0.75 and 0.12%, respectively, total alkaloids (Table 1). Two alkaloids were isolated from the obtained total bases. These were convolvine and convolamine (plants from Namangan Oblast). Plants from Tadzhikistan produced an alkaloid hydrochloride with mp 237°C that turned out to be convolvine hydrochloride.

Thus, seven alkaloids were isolated from *C. pseudocanthabrica* indigenous to Uzbekistan. Of these, convolvine and convolamine were reported earlier. Five bases, convolvidine, convoline, convolicine, phyllalbine, and convolidine were isolated for the first time from this *Convolvulus* species.

Isolation of Total Alkaloids. Air-dried roots of *C. pseudocanthabrica* (5 kg) collected in Surkhandarya were extracted as usual with $CHCl_3$ with preliminary wetting of the raw material with ammonia solution (10%) to afford total bases (30.0 g). The aerial part of the plant (480 g) produced by an analogous procedure total alkaloids (3.4 g).

Separation of Total Alkaloids. Total bases from roots (15.0 g) were dissolved in $CHCl_3$ (1 L) and worked up with KOH solution (4%, 4 × 100 mL). The alkaline extracts were made acidic with H_2SO_4 solution (20%), cooled, and made basic with ammonia solution (25%). Alkaloids were extracted exhaustively with $CHCl_3$. The $CHCl_3$ solution was dried over anhydrous Na_2SO_4. The solvent was distilled off to afford phenolic total alkaloids (3.5 g). The $CHCl_3$ solution after work up with base as washed with distilled H_2O and worked up successively with citrate-phosphate buffers at pH 6.8 and 5.6 until the alkaloids were completely extracted. The buffer extracts were cooled and made basic with conc. NH_4OH. Alkaloids were extracted by $CHCl_3$ to afford bases of the fraction with pH 6.8 (7.5 g, convolvine) and with pH 5.6 (1.9 g, convolamine with an impurity of convolvine).

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TABLE 1. Alkaloids from *Convolvulus pseudocanthabrica*

Plant organ	Total alkaloids, %	Isolated alkaloids
		Boisun, Surkhandarya, Uzbekistan
Aerial part	0.7	Convolvine, convolamine, convolvidine, convolicine, phyllalbine, convolidine, convoline
Roots	0.6	Convolvine, convolamine, convolvidine, convolicine, phyllalbine, convolidine, convoline
		Namangan Oblast
Aerial part	0.75	Convolvine, convolamine
		Khanaka, Hisor Ridge, Tadzhikistan
Aerial part	0.12	Convolvine

Isolation of Phyllalbine, Convolidine, and Convolicine. The phenolic part of the total alkaloids (3.5 g) was heated in acetone on a water bath (3 × 50 mL). Crude phyllalbine (0.7 g) was isolated from the combined and condensed acetone solution. A crystalline mixture that was insoluble in acetone was worked up with MeOH to afford convolidine (0.3 g).

The non-phenolic total alkaloids (2.0 g) were chromatographed over a column of Al_2O_3 with elution by hydrocarbons, a hydrocarbons:$CHCl_3$ mixture, and $CHCl_3$ with MeOH in various ratios. The first hydrocarbons:$CHCl_3$ effluents isolated a base (10 mg) with mp 178–179°C; subsequent ones, an alkaloid (15 mg) with mp 144–145°C that were identified by mixed melting-point samples with authentic alkaloid samples as convoline and convolicine, respectively.

Total alkaloids from the aerial part were separated analogously and afforded the same seven known bases as from the roots (Table 1).

REFERENCES

1. *Flora of Uzbekistan, Genus Convolvulus pseudocanthabrica Schrenk*, Vol. 5, Tashkent, 1961, p. 131.
2. A. P. Orekhov and R. A. Konovalova, *Zh. Obshch. Khim.*, No. 7, 646 (1937).
3. A. P. Orekhov and R. A. Konovalova, *Khim.-farm. Prom-st.*, No. 1, 52 (1933).
4. S. F. Aripova and S. Yu. Yunusov, *Khim. Prir. Soedin.*, 657 (1986).
5. J. Parello, P. Longeviale, W. Vetter, and J. A. McGlasky, *Bull. Chim. Fr.*, **12**, 2787 (1963).
6. S. F. Aripova, V. M. Malikov, and S. Yu. Yunusov, *Khim. Prir. Soedin.*, 290 (1977).
7. S. F. Aripova, E. G. Sharova, U. A. Abdullaev, and S. Yu. Yunusov, *Khim. Prir. Soedin.*, 749 (1983).
8. S. F. Aripova and S. Yu. Yunusov, *Khim. Prir. Soedin.,* 527 (1979).