soaphylloylpiperidine (VII). The physicochemical constants of the compounds obtained are given in Table 1. The results of the pharmacological investigation will be published separately.

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ISOLATION OF THE ALKALOID LINDELOFINE FROM *Lindelofia anchusoides* BY AN ION-EXCHANGE METHOD

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UDC 577.17

The alkaloid lindelofine is widely distributed in plants of the family Boraginaceae and has been detected in various species – Rindera cyclodonta, Lindelofia anchusoides, L. stylosa, and others [1-4].

The existing method of obtaining lindelofine by extraction with chloroform is comparatively laborious and uses large amounts of expensive solvent.

We have studied the possibility of using ion-exchange resins for the isolation of the alkaloid lindelofine from aqueous extracts of the epigeal part of L. anchusoides and, in particular, the processes of the extraction, sorption, and desorption of the combined alkaloids. Experiments have shown the economic desirability of using water to extract the alkaloids, the sorption of the latter on KU-1 cation-exchange resin, and the desorption of the alkaloids from the resin by a 2% solution of ammonia in 80% ethanol.

The comminuted raw material (50 kg), collected on April 4, 1974 in Chimgan (Tashkent oblast) in the budding phase was charged into a battery of two extractors and was extracted continuously with water. The aqueous extract of the alkaloids was passed through a battery of adsorbers consisting of four columns filled with KU-1 cation-exchange resin in the H form (2.2-2.5 kg each). The rate of flow of the extract was 600-700 liters/h $\cdot$ m^2.

After the complete extraction of the alkaloids from the raw material, they were desorbed from the cation-exchange resin with a 2% solution of ammonia in 80% ethanol. The rate of flow of the eluent was 200 liters/h $\cdot$ m^2. The ethanolic solution was concentrated, the aqueous residue was made alkaline with 25% ammonia solution, and the alkaloids were exhaustively extracted with chloroform. The N-oxide forms of the alkaloids were reduced with zinc dust and extracted with chloroform. The chloroform extract was concentrated in vacuum to dryness. This gave 1511 g of combined alkaloids, or 302% of the weight of the raw material.

From the combined alkaloids by treatment with acetone we isolated 702 g of lindelofine with mp 105-106°C (1.4% of the weight of the raw material).

Thus, we have developed a simple and economically favorable method of obtaining lindelofine from the epigeal part of L. anchusoides and have established the epigeal part of this plant in the budding stage as a basic source for the production of lindelofine.

Institute of the Chemistry of Plant Substances, Academy of Sciences of the Uzbek SSR, Tashkent. Translated from Khimiya Prirodnykh Soedinenii, No. 1, p. 116, January-February, 1976. Original article submitted July 24, 1975.

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2,3,7-TRIMETHCXY-8,9-METHYLENEDIOXYPAVINAN – A NEW ALKALOID FROM Thalictrum strictum. II

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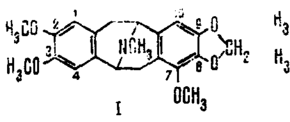
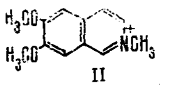
UDC 547.944/945

From the epigeal part of Th. strictum we have isolated a new unidentified base B (I). The alkaloid (I) is readily soluble in methanol, ethanol, and acetone and when the solvents are evaporated it separates out in the form of a faint yellowish oil. After chromatography twice on a column of alumina and concentration of the ethereal eluate, compound (I) crystallized in the form of transparent prisms with mp 144-145°C, $[\alpha]^{22}_{D}$ −174° (c 0.977; methanol).

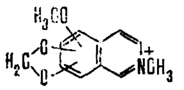
UV spectrum: $\lambda_{max}^{ethanol}$ 287 nm (log ε 3.84). The NMR spectrum ($CDCl_3$, δ values, ppm) showed signals at 2.46 (singlet, 3H, NCH_3), 3.80 (singlet, 6H, $2OCH_3$), and 3.72 (singlet, 3H, OCH_3), and two one-proton doublets at 5.75 and 5.80 ($J = 1.5$ Hz) due to the protons of a methylenedioxy group. In the region of aromatic protons there are three one-proton singlets at 6.23, 6.36, and 6.54 ppm. Furthermore, in the 4.05-2.40 ppm region are observed signals from methine and methylene protons (6H) with characteristic splitting analogous to the corresponding protons of argemonine. The most valuable information on the structure (I) is given by its mass spectrum in which, in addition to peaks with m/e 369 M^+, 368 $(M-1)^+$, and 354 $(M-15)^+$, there are strong peaks of ions with m/e 204 (100%, II) and 218 (70%, III). The combination of the results of UV, NMR, and mass spectroscopy shows that (I) is a pentasubstituted pavinan. Since the three aromatic protons appear in the form of singlets and in the mass spectrum the main peak is that of the ion (II), the two methoxy groups must be located as in argemonine [2]. According to the biogenetic hypothesis, from one and the same benzylisoquinoline with the appropriate intramolecular cyclization both pavine and aporphine bases can be formed [3]. From the epigeal part of Th. strictum, in addition to (I) we isolated the aporphine alkaloids thalicmine, northalicmine, and thalicminine [1]. This permits the assumption that all these compounds are based on the same precursor. From the facts given, we propose for (I) as the most probable structure 2,3,7-trimethoxy-8,9-methylenedioxy-N-methylpavinan (I):



I



II



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