

ISOLATION OF PROTOPINE FROM *Fumaria vaillantii*  
BY THE ION-EXCHANGE METHOD

A. Z. Sadikov, B. Babaev,  
and T. T. Shakirov

UDC 547.944/945

*Fumaria vaillantii* Jaisl contains a considerable amount of alkaloids [1], among which the greatest interest is presented by protopine. It possesses a well-marked antiarrhythmic action [2, 3].

We have developed an ion-exchange method for obtaining protopine from this plant. The extraction of the alkaloids from the plant raw material was investigated with various organic solvents and with water and weak aqueous solutions of acids. Good results were given by extraction of the raw material with 0.5-1% solutions of sulfuric acid.

In a study of the dynamics of the exchange capacity of various cation-exchange resins for protopine from the extract (KU-1, KU-2, KB-4, etc.) it was found that KU-1 cation-exchange resin has the maximum capacity.

The plant, collected in May, 1972, in the Tashkent oblast, was placed in a battery of four 10-kg extractors. Extraction was performed by the continuous counterflow method with a 1% solution of sulfuric acid. The acid solution of the alkaloids was passed through a battery of adsorbers consisting of two columns ( $H/d=3$ ) each containing 4 kg of KU-1 ion-exchange resin in the H form. The rate of flow of the extractant was 500-600 liters/h·m<sup>2</sup>.

The desorbent consisted of ethanolic solutions of ammonia and mixtures of them with chloroform. The best desorbent proved to be 92% ethanol containing 1.5% of ammonia. Desorption was performed at the rate of 160-170 liters/h·m<sup>2</sup>.

The eluate obtained from the adsorbers was concentrated, and the aqueous residue was acidified with 10% sulfuric acid to pH 1-1.5 and was washed three times with chloroform. The washed acid solution was made alkaline with 25% ammonia to pH 9-10, and the alkaloids were extracted with chloroform. The chloroform extract was evaporated to dryness. The residue was recrystallized from a mixture of methanol and chloroform (5:1). This gave 52 g of crystals of protopine with mp 205-206°C, or 0.13% of the weight of the air-dry raw material.

LITERATURE CITED

1. I. A. Israilov, M. S. Yunusov, and S. Yu. Yunusov, *Khim. Prirodn. Soedin.*, 194 (1968).
2. L. N. Selivanova, *Pharmacological Investigation of the Alkaloids Allocryptopine, Protopine, and Berberine*, [in Russian], Author's Abstract of Candidate's Dissertation, Moscow (1954).
3. Kh. U. Aliev and U. B. Zakirov, *Dokl. Akad. Nauk UzSSR*, No. 7, 28 (1970).

---

Institute of the Chemistry of Plant Substances, Academy of Sciences of the Uzbek SSR. Translated from *Khimiya Prirodnikh Soedinenii*, No. 6, p. 816, November-December, 1974. Original article submitted June 28, 1974.

©1976 Plenum Publishing Corporation, 227 West 17th Street, New York, N.Y. 10011. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, microfilming, recording or otherwise, without written permission of the publisher. A copy of this article is available from the publisher for \$15.00.