

ALKALOIDS OF *FUMARIA DENSIFLORA*

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As part of a research program dealing with the study of the chemical constituents of Jordanian flora, *Fumaria densiflora* DC. (Syn: *F. micrantha* Lag) was investigated for its alkaloidal content. The plant is an annual herb which is widespread in Jordan, especially in the Jordan Valley and the hilly areas parallel to that valley. Previously, eight alkaloids were isolated from *F. densiflora*. These were fumaramine, protopine, cryptopine, coptisine, palmatine, adlumidicine, sinactine, and densiflorine (1-3). In the present work, fourteen known alkaloids have been isolated and identified in the plant. (+)- α -Hydrastine, fumaridine, parfumine, parfumidine, fumaritine, cheilanthifoline, (\pm)-scoularine, isosalutaridine, (\pm)-aldumidine, *N*-methylhydrasteine, fumariline, and (\pm)-bicuculline are reported for the first time from this source. The previously reported protopine and cryptopine have also been isolated from the plant. Another unidentified alkaloid has been obtained, and its structure is still under investigation.

EXPERIMENTAL

GENERAL EXPERIMENTAL PROCEDURES.—Spectra were recorded using the following instruments: uv, Pye Unicam SP-8-500; ir, Perkin-Elmer 577; ^1H nmr, Varian 60 MHz; ms; Varian-Mat 112. Specific rotations were obtained using a Perkin-Elmer 141 polarimeter.

PLANT MATERIAL.—*F. densiflora* was collected in the Jordan Valley near the village Al-Ram in April 1982. A voucher specimen was deposited at the Herbarium of the Biological Sciences Department, University of Jordan, Amman, Jordan.

EXTRACTION AND ISOLATION.—The dried and ground whole plant material (12 kg) was extracted exhaustively with EtOH. The ethanolic extract was concentrated in vacuo, dissolved in 5% HCl and filtered. The aqueous acidic solution was extracted with CHCl_3 . The dried (K_2CO_3) extract was evaporated to give fraction A (30 g). The acidic solution was basified with NH_3 and extracted with CHCl_3 . The CHCl_3 extract was dried (K_2CO_3) and evaporated to give fraction B (31 g). Chromatography of fraction A over silica gel afforded (+)- α -hydrastine (260 mg), protopine (120 mg), parfumine (210 mg), (\pm)-scoularine (70 mg), fumariline (120 mg), parfumidine (100 mg), and (\pm)-bicuculline (130 mg). Fraction B was chromatographed over neutral alumina to give (+)- α -hydrastine (980 mg), fumaridine (1630 mg), protopine (1750 mg), cryptopine (60 mg), parfumine (130 mg), fumaritine (400 mg), cheilanthifoline (220 mg), (\pm)-scoularine (1210 mg), isosalutaridine (50 mg), (\pm)-aldumidine (40 mg), *N*-methylhydrasteine (1750 mg), and an unidentified alkaloid (120 mg). The compounds were identified by their spectral (uv, ir, ^1H nmr, and ms) and physical (mp and $[\alpha]_D$) data, as well as by chemical transformations. Full details of the isolation and identification of the compounds are available on request to the authors.

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