

HEDERAGENIN, URSOLIC ACID, AND PINATOL FROM *FAGONIA INDICA*

ATTA-UR-RAHMAN,* AKBAR ALI ANSARI,

H.E.J. Research Institute of Chemistry, University of Karachi, Karachi-32, Pakistan

and LENNART KENNE

Department of Organic Chemistry, Arrberius Laboratory,
Stockholm University 106 91, Stockholm, Sweden

Fagonia indica L. (1) (Zygophyllaceae) is a small spiny shrub widely distributed throughout Pakistan. The plant is claimed to be a remedy for tumors in their early stages. A number of compounds have been reported previously from this plant (2-13). In this communication, we describe the isolation and identification of two saponin, hederagenin and ursolic acid, along with pinatol, which have not been reported before. The substances were identified on the basis of their spectroscopic data and by comparison with authentic samples of the materials. The identities of hederagenin and ursolic acid were further confirmed by their conversion to the corresponding esters and acetates and by comparison of the spectral data of these derivatives with those reported in the literature (14-17).

EXPERIMENTAL¹

ISOLATION OF HEDERAGENIN.—The aerial parts of the fresh plants (8 kg) were collected in Karachi and extracted with EtOH. A dark green, semisolid residue was obtained, which was dissolved in MeOH. Addition of Me₂CO resulted in precipitation. The precipitate (18 g) was found to contain six saponins. The crude saponins were hydrolyzed with 20% ethanolic HCl for 5 h on a boiling water bath to obtain the crude saponin (8 g). These were chromatographed on a silica gel column to obtain hederagenin (60 mg), which was identical by comparison (ir, ms, ¹H-nmr, tlc) with an authentic sample.

ISOLATION OF URSOLIC ACID.—The aerial parts of the fresh plants (1 kg) were extracted with distilled H₂O. The aqueous solution was strongly acidified by adding concentrated HCl, and the mixture was boiled for 4 h. A crude mixture of saponin (5 g) was thus obtained. Ursolic acid was separated by column chromatography on silica gel and finally purified by crystallization from MeOH. On the basis of comparison (ir, ms, ¹H-nmr, tlc) with an authentic sample, the saponin was identified as ursolic acid.

ISOLATION OF PINATOL.—The saponin fraction obtained from the ethanolic extract of *F. indica* was subjected to flash column chromatography on silica gel using first CHCl₃-MeOH-EtOAc (4:5:7) and later CHCl₃-MeOH-EtOAc-H₂O (4:6:7:1). The last eluates contained pinatol, which was further purified by preparative tlc on silica gel plates (G 60) in CHCl₃-MeOH-EtOAc-H₂O (4:6:7:1). The compound was identified from its spectra and the identification confirmed by comparing its ¹³C-nmr data with those reported in the literature (18).

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¹Full details of the isolation and identification of the compounds are available on request to the senior author.

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ALKALOIDS FROM *FUMARIA MACROCARPA*

A. LOUKIS and S. PHILIANOS

Laboratory of Pharmacognosy, University of Athens, Hippocratous 20, GR-106 80 Athens, Greece

As part of an investigation of the Greek species of the genus *Fumaria*, the isolation and identification of three alkaloids from *Fumaria macrocarpa* is reported here.

EXPERIMENTAL

PLANT MATERIAL.—Aerial parts of *Fumaria macrocarpa* Parl. (Papaveraceae) (1) were collected in Attica, Greece. The plant was authenticated by the Botanical Museum of the University of Athens, where a voucher specimen of the plant has been deposited.

EXTRACTION OF ALKALOIDS (2).—Dried, aerial parts of the plant were worked up by standard procedures (acid-base extraction) and fractionated in an aluminium oxide column (neutral 70-230 mesh). The alkaloids obtained were two spirobenzylisoquinolines (fumariline, parfumine) and a phthalideisoquinoline (bicuculline). All alkaloids were identified by chromatographic and uv spectral data (3) and compared with authentic samples.

Full details on isolation and identification are available on request.

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