FLAVONOIDS AND TERPENOIDS FROM *SALVIA VERTICILLATA* AND *SALVIA PINNATA*

AYHAN ULUBELEN and GÜLAÇTI TOPÇU

Faculty of Pharmacy, University of Istanbul, Istanbul, Turkey

As a part of our investigation of the genus *Salvia* from Turkish flora, we examined *Salvia verticillata* L. subsp. *verticillata* and *Salvia pinnata* L. Because the triterpenoids of *S. pinnata* have already been studied (1), we report here the triterpenoids only for *S. verticillata*, and the flavonoids for both species. The known flavone luteolin 7-O-glucoside and the coumarin esculetin were isolated from both species. In addition, *S. verticillata* yielded a rare flavone glycoside, 6-hydroxyluteolin 5-O-glucoside, which was obtained from *Salvia tomentosa* for the first time (2), as well as the antibacterial flavone cirsimaritine (3). *S. pinnata* yielded apigenin, luteolin, 6-methoxyluteolin, apigenin 7-O-glucoside, and quercetin 3-O-glucoside.

Five known triterpenic acids (ursolic, oleanolic, crataegolic, vergatic, and betulinic) and two steroids (β-sitosterol and sitosteryl 3β-D-glucoside) were identified from the C_6H_6 extracts of *S. verticillata*. Ursolic and oleanolic acids are common in *Salvia*, while the other three acids are rather rare compounds; vergatic acid was first isolated from *Salvia virgata* (4) and later from *S. pinnata* (1), crataegolic acid was isolated from *S. tomentosa* and *Salvia officinalis* (5,6) and betulinic acid from *Salvia triloba* (7).

EXPERIMENTAL

GENERAL EXPERIMENTAL PROCEDURES.—Melting points were determined in a Reichert-microscope instrument and are uncorrected. Spectra were recorded with the following instruments: uv, Varian Techtron 625; ir, Perkin-Elmer model 577; nmr, FT-NT 200 MHz and ms, DuPont 21-490.

PLANT MATERIAL.—*S. verticillata* subsp. *verticillata* was collected from the European section of Turkey (Kırklareli) in June 1980, *S. pinnata* was collected from Istanbul in May 1980; they were identified by Dr. E. Tuzlacı (Istanbul), and voucher specimens were deposited in the Herbarium of the Faculty of Pharmacy, University of Istanbul, ISTE 44556 and ISTE 44246, respectively.

EXTRACTION AND ISOLATION.—The plant materials (500 g of each) were separately and successively extracted with C_6H_6, $CHCl_3$, and EtOH in a Soxhlet. Triterpenoids were obtained from combined C_6H_6 and $CHCl_3$ fractions by separation on silica gel columns. Flavonoids were isolated from the EtOH extract on a Polyclar column. Flavonoids were further separated and/or cleaned by Sephadex LH-20 columns. All identifications were done by using spectral methods, hydrolysis, acetylation, TMSi derivatization when necessary, as well as tlc comparison with authentic samples.

ACKNOWLEDGMENTS

The authors would like to thank Prof. Dr. T.J. Mabry (Austin, Texas) for nmr and ms spectra.

LITERATURE CITED

1. A. Ulubelen and G. Topçu, *Phytochemistry*, **23**, 133 (1984).
2. A. Ulubelen, M. Miski, and T.J. Mabry, *J. Nat. Prod.*, **44**, 586 (1981).
3. M. Miski, A. Ulubelen, C. Johansson, and T.J. Mabry, *J. Nat. Prod.*, **46**, 874 (1983).
4. A. Ulubelen and E. Ayanoğlu, *Phytochemistry*, **15**, 309 (1976).
5. A. Ulubelen, M. Miski, and T.J. Mabry, *J. Nat. Prod.*, **44**, 119 (1981).
6. C.H. Brieskorn and Z. Kapadia, *Planta Med.*, **38**, 86 (1980).
7. F.M. Abdel-Moneim, M.H.A. Elgamal, M.B.E. Fayez, and L.A.R. Salam, *Phytochemistry*, **6**, 1035 (1967).

Received 20 July 1984