

STUDIES ON THE INDIAN RUTACEAE. CHEMICAL INVESTIGATION OF
LIMONIA ALATA AND *EVODIA LUNU-ANKENDA*

P. S. MOHAN, M. RAMESH, and P. SHANMUGAM*

Department of Chemistry, Bharathiar University, Coimbatore - 641 046, India

As part of our systematic chemical investigation of some of the members of the Rutaceae which are used in folk medicine, we report the isolation of several natural compounds from *Limonia alata* W. & A. (1) and *Evodia lunu-ankenda* Merr. (1).

The petroleum ether extract of the bark of *L. alata* furnished the pyranocoumarins, xanthyletin (2) and xanthoxyletin (2), and the triterpene lupeol (3). From the fruits of the same species the pyranocoumarin, seselin (4), was isolated.

Examination of the basic fraction of the bark extract of *E. lunu-ankenda* afforded the furoquinoline alkaloids, dictamnine (5), evolitrine (5), kokusaginine (5), and a rare *N*-methyl-4-methoxy-2-quinolone (6), along with marmesin (7), a furocoumarin.

EXPERIMENTAL

PLANT MATERIAL.—Bark and fruits of *L. alata* were collected in the month of June 1982, from the Maruthamalai hills near Coimbatore (Tamil Nadu, India), and the bark of *E. lunu-ankenda* was collected from the Naduvattam and Kodanadu of Nilgris (Tamil Nadu). The herbarium specimens are maintained in the Department of Chemistry, Bharathiar University.

EXTRACTION AND SEPARATION.—Air-dried bark material of *L. alata* (250 g) was extracted with petroleum ether (60–80°) in a Soxhlet apparatus, and the extract was concentrated. Column chromatography of the residue over silica gel using petrol-C₆H₆ (1:1) as eluent yielded the triterpene, lupeol (150 mg), followed by xanthoxyletin (250 mg) and traces of xanthyletin. The air-dried fruits of *L. alata* (250 g) on similar workup gave seselin (500 mg).

The dried and powdered bark of *E. lunu-ankenda* (2.5 kg) was exhaustively extracted with CH₂Cl₂. The concentrated extract was acidified with 10% HCl and left for three days. The filtered solution was neutralized with NH₃ and extracted with CH₂Cl₂ (3 × 500 ml). The gummy residue obtained, after evaporation of the solvent, was placed over a column of basic alumina in petrol and eluted with petrol-C₆H₆ (1:1) when dictamnine (75 mg) and evolitrine (125 mg) were obtained. Further elution of the column with C₆H₆ afforded kokusaginine (45 mg), *N*-methyl-4-methoxy-2-quinolone (40 mg), and traces of marmesin (3 mg).

HPLC ASSAY.—The above constituents were neatly separated by hplc (Jobin-Yuon Prep-10 model): Lichroprep Si 60, 15 μg–25 μg column, Uv detector at 298 nm; using petroleum ether-CHCl₃ (Gradient elution), at flow rate of 18 ml/min.

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

ACKNOWLEDGMENTS

We thank the Department of Science and Technology, Government of India, for financial assistance. The authors thank Dr. S. Rajappa, Ciba-Geigy, Bombay, for the mass spectra and elemental analysis, Mr. M. Palaniswamy for ir and nmr spectra, and Mr. T.R. Sakkarai and Mr. T. Sekar for plant collection and for the technical assistance. PSM thanks the Department of Science and Technology for the award of a Junior Research Fellowship.

LITERATURE CITED

1. J.S. Gamble, "Flora of Presidency of Madras," Calcutta: Botanical Survey of India, Vol. 1, 2nd ed., 1967, pp. 105–112.
2. F.E. King, J.R. Housely, and S.J. King, *J. Chem. Soc.*, 1392 (1954).
3. T.G. Halsall, E.R.H. Jones, and R.R.H. Swayne, *J. Chem. Soc.*, 1905 (1954).
4. D.L. Dreyer, *Tetrahedron*, **23**, 4613 (1967).
5. R.G. Cooke and H.F. Haynes, *Aust. J. Chem.*, **7**, 273 (1954).
6. M.N.S. Nayer, C.V. Sutar, and N.V. Bvar, *Phytochemistry*, **10**, 2843 (1971).
7. F.K. Adesogan, *Phytochemistry*, **12**, 2310 (1973).

Received 8 October 1984