# ISOLATION OF MATRINE FROM THE SEEDS OF *SOPHORA JAUBERTII*

GÜLSEL KAVALALI[1]

*Faculty of Pharmacy, Istanbul University, Istanbul, Turkey*

*Sophora jaubertii* Spach. (Leguminosae) is an herb indigenous to the northern part of Turkey.

A survey of the literature (1, 2, 3 and 4) indicated it is distinguished from other *Sophora* species in that it possesses the following features: leaflets are hairy on the lower surfaces, the inflorescence has 8–30 flowers, and the standard is re-curved through 180°.

*Sophora* species are also distinguishable from one another by their leaf flavonoids and seed alkaloids (5, 6, 7). Alkaloid chemotaxonomic studies previously carried out on *Sophora* species have been based on the presence or absence of the alkaloid matrine (7). The group of species containing matrine exhibit pharmacological activity (8). Matrine is a quinolizidine alkaloid which has been isolated to date only from *Sophora* species. On this basis, the primary purpose of this investigation was to determine whether *Sophora jaubertii* contains matrine.

## EXPERIMENTAL

PLANT MATERIAL.—The plant material used in this investigation was collected in July in 1974 and 1975 on the road of Düzce-Akçakoca in Bolu. The voucher specimen was identified by the author and is deposited in the herbarium of Faculty of Pharmacy, Istanbul University (Voucher no. 20 569, 16 689).

EXTRACTION AND FRACTIONATION.—The air-dried seeds (3 kg) of *Sophora jaubertii* were ground and extracted successively with petroleum ether and methanol in a Soxhlet apparatus. The methanol extract was concentrated under reduced pressure. The residue was acidified with 10% hydrochloric acid solution and extracted with chloroform (5 x 250 ml). The chloroform extract was discarded. The aqueous acidic portion was made alkaline with 10% sodium hydroxide solution and extracted with chloroform (20 x 200 ml). The combined chloroform extracts were washed with water and dried with anhydrous $Na_2SO_4$, filtered and concentrated to dryness. A brownish residue (20 g) resulted.

ISOLATION OF MATRINE.—Two grams of residue were chromatographed over a 5 x 70 cm column of aluminum oxide (Merck, neutral, activity grade I, 200 g). Elution was started with benzene and continued through a series of solvents containing increasing amounts of ether in benzene (5%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, and 90% v/v). Ten fractions (25 ml each) were collected with each solvent. Each fraction was chromatographed on both silica gel G and aluminum oxide thin-layer plates.[2]

IDENTIFICATION OF MATRINE.—Fractions 21–50 were shown to contain a single compound, other fractions (51–70) were shown to contain the same compound in a mixture. Matrine was purified by preparative tlc on silica gel G plates developed in chloroform-methanol (4:1). A band having an Rf value identical to that of authentic matrine was eluted with acetone. The eluted fraction was subjected to tlc in four different solvent systems. Re-crystallization from petroleum ether gave matrine (100 mg), mp 74–75° (lit. (11) mp 75°); tlc: Rf, 0.80 with solvent system A, 0.88 with solvent system B, 0.56 with solvent system C, and 0.70 with solvent system D; uv, $\alpha$ max (MeOH) 216 nm exhibited lactam group (12); ir (KBr), $\nu$ 2865, 2800 and 2760 $cm^{-1}$ trans quinolizidine group and 1620 $cm^{-1}$ lactam carbonyl group (13, 14); nmr (DMSO-$d_6$) $\delta$, 1.1–2.5 (m, $-CH_2$ and $-CH$ group), 2.8–3.3 (dd, Hc geminal proton at $C_{17}$, $J$–12 Hz.), 3.4–4 (m, Hb proton at $C_{11}$ and water peak of di-methyl sulphoxide) and 4.2–4.4 (dd, Ha geminal proton at $C_{17}$, $J$–12 Hz.) (15); ms: $m/e$ 248 (100%)

[1]Permanent address: Department of Pharmacology, Cerrahpaşa Faculty of Medicine, Istanbul University, Istanbul, Turkey.

[2]Solvent systems used for silica gel tlc were: (A) Chloroform-ethanol (9:1); (B) chloroform-methanol (4:1); and (C) diethylamine-cyclohexane (3:7) (9). Tlc with aluminum oxide was accomplished with solvent system (D) 2% ethanol in chloroform-cyclohexane (1:1) (10). All chromatograms were visualized by spraying with Dragendorff's and potassium iodoplatinate reagents.

($C_{15}H_{24}N_2O$) 231 (7), 291 (20), 205 (62), 192 (25), 177 (36), 150 (80), 137 (30), 136 (39), 198 (29), 96 (60), and 84 (15) (16).

*Anal.* calcd for $C_{15}H_{24}N_2O$: C, 72.54; H, 9.74; N, 11.28. Found: C, 72.10; H, 9.70; N, 10.76.

Isolated matrine was found to be identical with reference matrine in its mp, tlc data and ir, ms, uv and nmr spectral properties.

## ACKNOWLEDGMENTS

The author wishes to thank Prof. Dr. L. H. Briggs (deceased), Auckland University College, Auckland, New Zealand, for an authentic sample of matrine and also Dr. G. Eckhardt, Organisch-Chemisches Institut der Universität Bonn, for his interest and help in the measurement of mass spectra.

*Received 22 April 1980*

## LITERATURE CITED

1. E. Boissier, "Flora orientalis," Genevae, vol. 2, 1872, p. 629.
2. F. Hayek, "Florae peninsulae Balcanicae," Dahlem-Berlin, vol. 1, 1927, p. 770.
3. T. G. Tutin, H. V. Heywood, N. A. Burges, H. D. Valentine, S. M. Walters and D. A. Webb, "Flora Europaea," University Press, Cambridge, vol. 1, 1968, p. 85.
4. D. F. Chamberlain, in "Flora of Turkey and the East Aegean Islands, P. H. Davis," ed., University Press, Edinburg, vol. 3, 1970, pp. 11–12.
5. K. R. Markham and E. J. Godley, *New Zealand Journal of Botany*, **10**, 627 (1972).
6. K. R. Markham, *Phytochemistry*, **12**, 1091 (1973).
7. M. Izaddoost, *Phytochemistry*, **14**, 203 (1975).
8. R. Kojima, S. Fukushima, A. Ueno and Y. Saiki, *Chem. Pharm. Bull.*, **18** (12) 2555 (1970).
9. St. Gill, E. Steinegger, *Pharm. Acta Helv.*, **39**, 508 (1964).
10. A. Urzua, B. K. Cassels, *Phytochemistry*, **9**, 2365 (1970).
11. G. Faugeras, R. R. Paris, M. N. Alexis and J. F. Dobremez, *Plantes Médicinales Phytothérapie*, **10**, 85 (1976).
12. M. F. Grundon, The Alkaloids, A Specialist periodical report, Chemical Society, Burlington House, London, **6**, 1976, pp. 90–94.
13. F. Bohlmann, W. Wiese, D. Rahtz and C. Arndt, *Chem. Ber.*, **91**, 2176 (1958).
14. A. Ueno, K. Morinaga, S. Fukushima, Y. Iitaka, Y. Koiso and S. Okuta, *Chem. Pharm. Bull.*, **23**, 2560 (1975).
15. F. Bohlmann and D. Schumann, *Tetrahedron Lett.*, No. 28, 2433 (1965).
16. G. Faugeras, R. Paris, and M. Peltier, *Annales Pharm. Franc.*, **31**, 561 (1973).