

ISTANBULIN C, A NOVEL SESQUITERPENE LACTONE FROM *SMYRNIUM CONNATUM*

AYHAN ULUBELEN*, NEZHUN ATEŞ* and TOSHIAKI NISHIDA†

*Faculty of Pharmacy, University of Istanbul, Turkey and †STC, PB 17007, S-14462, Stockholm, Sweden

(Received June 29, 1978)

Key Word Index—*Smyrniium connatum*; Umbelliferae; sesquiterpene lactone; eremophilanolide.

In a course of a chemical investigation of the genus *Smyrniium* (Umbelliferae), the chloroform extract of the whole plant of *S. connatum* from Isparta (south-western part of Turkey) yielded a group of steroidal compounds [1] and a new sesquiterpene lactone, istanbulin C.

The chloroform extract of the plant when chromatographed on a silica gel column yielded a solid from benzene-chloroform (1:4) eluates. Crystallization from ethanol yielded crystals. The compound, istanbulin C, was identified as 1-oxo-4-exocyclohexylmethylene-eremophilanolide (1), on the basis of UV, IR, NMR, MS and ¹³C NMR data.

The UV spectrum of istanbulin C in EtOH showed the lack of conjugation, λ_{max} 220 nm being characteristic for α,β-unsaturated γ-lactones [2]. The IR (in CHCl₃) supports the presence of the α,β-unsaturated γ-lactone (1750 cm⁻¹), a six-membered ring ketone (1710 cm⁻¹), unsaturation (1680 cm⁻¹), exocyclic methylene (1650, 880 cm⁻¹) and the lack of hydroxyl groups.

¹H NMR data established the presence of an exocyclic methylene group (two broad one proton singlets at 4.96 and 5.18 ppm), a lactonic proton (broad one proton multiplet at 4.8 ppm), the C₅ methyl (three hydrogen singlet at 1.15 ppm) and the C₁₁ vinylic methyl (three hydrogen doublet of 1.85, J = 1.5 Hz). The small J value is characteristic of a long range homoallylic coupling with an axial H on C₆. D₂O exchange did not alter the spectrum. In the MS, the strong molecular ion peak at m/e 246 confirms the molecular formula C₁₅H₁₈O₃. Other peaks are at m/e 245 (M - 1), 231 (M - CH₃), 203 (M - CH₃ - CO), 175 (M - CH₃ - COO), methyl tropylium m/e 105, tropylium m/e 91 and other peaks at m/e 79, 76, 65, 55.

These spectral data are in agreement with those of istanbulin A in many respects, except that in the IR and NMR of the new compound the hydroxyl group is lacking, in the NMR at 4.8 ppm the lactonic proton is seen in place of hydroxyl group and there is an exocyclic methylene instead of methyl group at C₄. Noise decoupled

and off-resonance ¹³C NMR spectra are in conformity with the proposed structure. The following signals were obtained, ketone 211.18 (s), lactone carbonyl 174.25 (s), C₇ 160.49 (s), C₄ 144.21 (s), C₁₁ 120.81 (s), C₁₄ 110.63 (t), C₅ 49.14 (s), C₈ 70.05 (d), C₁₀ 47.97 (d), C₂, C₃, C₆ and C₉ methylenes 39.45, 34.13, 24.75 and 37.12 (t), C₁₃ 16.79 (q), C₁₅ 8.28 (q).

A similar compound istanbulin A (2) has been isolated from *S. olusatrum* [2], the first such compound in the Umbelliferae. Bohlmann and Zdero, in a later study of *S. olusatrum* [3] found a new furoeremophilone (3) and suggested that istanbulin A was probably formed by the aerial oxidation of this ketone. The isolation of istanbulin C from *S. connatum* and the absence of eremophilone type compounds in both plants obtained from Turkey has a possible bearing on the biogenesis of eremophilanolides in *Smyrniium* species.

EXPERIMENTAL

Smyrniium connatum (Umbelliferae) was identified by Prof. Dr. A. Baytop (Istanbul). A voucher sample was deposited in the herbarium of the Faculty of Pharmacy (Istanbul) ISTE 26209. Si gel (Merck) column (4 × 55 cm) chromatographic separation yielded 1, mp 178–180°. TLC and GC showed a single compound. (Found: C, 72.89; H, 7.44. C₁₅H₁₈O₃ requires: C, 73.17; H, 7.31 %). UV λ_{max}^{EtOH} 220 nm log ε 4.15. IR (in CHCl₃) 2950, 2895, 1750, 1710, 1680, 880 cm⁻¹. NMR (60 MHz, CDCl₃, TMS) δ 1.15 (3H, s), 1.85 (3H, d, J = 1.5 Hz), 4.8 (1H, br m), 4.96 and 5.18 (1H, each, br s). MS, m/e 246, 245, 231, 203, 175, 105, 91, 79, 76, 65, 55. ¹³C NMR (CDCl₃, TMS) δ 211.18 (s), 174.25 (s), 160.49 (s), 144.21 (s), 120.81 (s), 110.63 (t), 70.05 (d), 49.14 (s), 47.97 (d), 39.45 (t), 37.12 (t), 24.75 (t), 16.29 (q), 8.28 (q).

REFERENCES

1. Ulubelen, A. and Ates, N. (1978) *Planta Med.* **34**, 215.
2. Uluben, A., Oksuz, S., Samek, S. and Holub, M. (1971) *Tetrahedron Letters* **46**, 4455.
3. Bohlmann, F. and Zdero, C. (1973) *Chem. Ber.* **106**, 3414.

