

SACCHARINIC ACID LACTONE⁽¹⁾ FROM ASTRAGALUS LUSITANICUS LAM.⁽²⁾

(-)-2-C-METHYL-D-ERYTHRONO-1,4-LACTONE

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Abstract: (-)-2-C-methyl-D-erythrono-1,4-lactone has been isolated from A. lusitanicus, its structure being established by spectroscopic methods and synthesis. This is the first report of a natural saccharinic acid lactone.

Iberian milk-vetch (Astragalus lusitanicus Lam. fam. Leguminosae) is a "loco-weed" that grows in Portugal and the West of Spain. It shows a high degree of toxicity for cattle and no report on its chemical composition appears to have been made.

The ethanolic extract from the aerial part of the plant gave negative response to the Gries-Ilosvay test for nitroderivatives. It was concentrated and dispersed into water, after which it was extracted with ether and *n*-BuOH and finally the water was removed from the aqueous solution at reduced pressure.

By chromatography of the brown syrup obtained on silica gel and elution with CHCl₃/EtOH (9:1), we have isolated a small amount of a new natural lactone whose MS (M⁺, m/e = 132) and elemental analysis correspond to the molecular formula C₉H₈O₄. Its IR spectrum (film) has absorption maxima at ν (cm⁻¹): 3500, 1770, 1200, 1100 and 1030 (γ -lactone and -OH groups). The ¹H NMR spectrum (C₅D₅N) shows signals at δ ppm: 1.39 (3H, s) of Me-C₁-OH and 4.1-4.6 (2H, complex multiplet).

Acetylation (Ac₂O/NaOAc reflux), gives a diacetate [m.p. 86-7°C, $[\alpha]_D^{25} = -9^\circ$ (c, 0.9 CHCl₃)], whose IR spectrum shows no bands for -OH groups and whose ¹H NMR spectrum has signals at δ ppm: 1.67 (3H, s; Me-C₁-OAc), 2.07 and 2.13 (two Me-COO- singlets), 4.5 (2H, octet, AB part of an ABX system) and 5.35 (1H, q; X part. J_{AB} = 10.5 Hz, J_{AX} = 6.2 Hz and J_{BX} = 4 Hz).

All preceding data, as well as the fragmentation pattern in the MS of both substances:
 γ -lactone, m/e (%): 132 (2.5), 117 (5), 104 (5), 85 (95), 83 (100), 74 (33), 70 (35) and 55 (22).
Diacetate: 216 (7), 172 (8.5), 149 (7.5), 146 (8), 130 (48), 129 (52), 112 (7.5), 103 (13.5), 74 (20), 70 (18), 55 (13) and 43 (100)]⁽³⁾ support structure I for the lactone.

