# CHEMICAL STUDIES ON MEXICAN PLANTS USED IN TRADITIONAL MEDICINE, II:[1] CUCURBITACINS FROM *HINTONIA LATIFLORA*

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In a continuation of our chemical studies of Mexican plants used in folk medicine (1), we have investigated *Hintonia latiflora* (Sessé et Mociño ex DC.) Bullock (Rubiaceae), syn. *Coutarea latiflora* Sessé et Mociño ex DC. The stem bark of this plant is extremely bitter, and it is used medicinally for a variety of indications (2-7). Previous phytochemical investigations resulted in the isolation of three neoflavonoids (8). We now report the isolation in high yield of two cucurbitacins: 23,24-dihydrocucurbitacin F-25-acetate, recently reported by Chinese workers (9), and 23-24-dihydrocucurbitacin F (10-12). These compounds must then be the bitter principles of the stem bark (13).

This is, to our knowledge, the first report of cucurbitacins in the Rubiaceae. This finding is interesting from the medicinal and chemotaxonomic points of view. The chemotaxonomic significance arises from the fact that there are many related species from the genera *Coutaportia, Portlandia, Exostema, Coutarea,* and *Hintonia*, currently under taxonomic revision (14)[2], some of which have bitter stem barks; as in the case of *H. latiflora*, those with bitter stem barks might contain cucurbitacins as common phytochemical components, and, therefore may be valuable for taxonomic purposes.

## EXPERIMENTAL

PLANT MATERIAL.—The stem bark of *H. latiflora* was obtained by two of the authors from the market in Cd. Chihuahua, Chihuahua, in October 1985 and orignated from the Barranca de Urique near Urique, State of Chihuahua, México. A voucher specimen was deposted at the Jardín Botánico Exterior, Instituto de Biología, Universidad Nacional Autónoma de México (Voucher: R. Bye and E. Linares No. 14, 153).

EXTRACTION AND ISOLATION.—The air-dried, powdered, stem bark (1.9 kg) was refluxed with hexane and then with $CHCl_3$. The combined $CHCl_3$ extracts were reduced to a syrupy residue (74 g) and chromatographed on a silica gel column (2.5 kg) using hexane, hexane with increasing amounts of EtOAc, and EtOAc as eluents. From fractions 297-301, eluted with EtOAc, 2.457 g (0.12% yield) of 23,24-dihydrocucurbitacin F-25-acetate, mp 231-232° (unreported in the literature) was obtained on recrystallization from $Et_2O$. Fractions 311-326, also eluted with EtOAc, afforded 3.320 g (0.17% yield) of 23,24-dihydrocucurbitacin F, mp 155°, lit. 155-156° (10,12).

IDENTIFICATION.—The $^{13}C$ nmr of both cucurbitacins, unreported in the literature, along with other standard spectroscopic procedures (ir, uv, ms, and $^1H$ nmr) were useful in identifying the isolated compounds (10,11,13,15). Acetylation of both compounds, carried out with pyridine and $Ac_2O$ under the usual conditions, afforded the corresponding acetyl derivatives which were more helpful for $^1H$-nmr analysis. The alkaline hydrolysis of 23,24-dihydrocucurbitacin F-25-acetate to 23,24-dihydrocucurbitacin F further confirmed the structures.

$^{13}C$-nmr data of 23,24-dihydrocucurbitacin-F: $^{13}C$ nmr ($CDCl_3$-MeOD) ppm: 215 (s, C-22), 212.80 (s, C-11), 140.74 (s, C-5), 118.00 (d, C-6), 80.32 (s, C-20), 79.05 (d, C-3), 70.02 (d, C-16), 69.28 (s, C-25), 57.33 (d, C-17), 50.19 (s, C-14), 49.29 (t, C-12), 48.29 (s, C-9), 47.65 (s, C-13), 44.96 (t, C-15), 42.48 (d, C-8), 41.54 (s, C-4), 36.51 (t, C-24), 33.53 (d, C-10), 32.76 (t, C-1), 30.96 (t, C-23),

[1]For Part I see R. Mata *et al.* (1).

[2]Dr. David Lorence, Instituto de Biología, Universidad Nacional Autónoma de México, Personal Communication.

28.30 (q, C-27), 28.05 (q, C-26), 23.95 (q, C-21), 23.19 (t, C-7), 20.90 (q, C-28), 19.38 (q, C-30), 19.02 (q, C-18), 18.43 (q, C-19).

Spectral data of 23,24-dihydrocucurbitacin-F-25-acetate: $[\alpha]^{20}D$, +47 (MeOH); uv λ max (MeOH) nm (log ε) 206 (3.769), 228 (2.684), 284 (2.431); ir γ max (KBr) $cm^{-1}$ 3562, 3451, 3409, 2983, 1708, 1694, 1452, 1372, 1280, 1022; $^1H$ nmr ($CDCl_3$-DMSO-$d_6$) ppm 0.85 (s, 3H, H-18), 0.90 (s, 3H, H-30), 1.01 (s, 3H, H-29), 1.12 (s, 3H, H-28), 1.24 (s, 3H, H-21), 1.34 (s, 3H, H-19), 1.40 (s, 6H, H-26, H-27), 1.90 (s, 3H, $CH_3$-C=O), 2.79 (d, $J$=7 Hz, H-17), 3.10 (d, $J$=15 Hz, H-12′), 3.50 (m, H-3), 3.75 (bs, OH), 4.12 (m, H-2), 4.22 (dd, $J$=7 Hz, H-16), 5.63 (bd, $J$=5.5 Hz, H-6); $^{13}C$ nmr ($CDCl_3$-MeOD) ppm 214.10 (s, C-22), 213.00 (s, C-11), 170.71 (s, $CH_3$-$C$=O), 140.80 (s, C-5), 118.70 (d, C-6), 81.60 (s, C-25), 80.43 (s, C-20), 79.06 (d, C-3), 70.33 (d, C-16), 70.12 (d, C-2), 57.60 (d, C-17), 50.36 (s, C-14), 48.45 (t, C-12), 48.29 (s, C-9), 47.87 (s, C-13), 45.15 (t, C-15), 42.58 (d, C-8), 41.69 (s, C-4), 34.55 (t, C-24), 33.65 (d, C-10), 32.86 (t, C-1), 30.74 (t, C-23), 25.57 (q, C-27), 25.36 (q, C-26), 24.19 (q, C-21), 23.40 (t, C-7), 21.71 (q, $CH_3$-C=O), 21.13 (q, C-28), 19.65 (q, C-30), 19.28 (q, C-18), 18.53 (q, C-19); eims *m/z* rel int 502 (2, M-60), 484 (6, M-60-18), 405 (32), 387 (40), 369 (28), 351 (10), 157 (20), 113 (65.6), 87 (100), 69 (68.4), 43 (78.8).

Full details of the isolation and identification data are available on request.

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