HELIANGOLIDES FROM *STEVIA ORIGANOIDES*[1]

J.S. CALDERÓN, L. QUIJANO, F. GÓMEZ, and T. RÍOS

Instituto de Química, Universidad Nacional Autónoma de México, Circuito Exterior, Ciudad Universitaria, Coyoacán 04510, México, D.F.

In continuation of our chemical investigations of Mexican *Stevia* species (1-3), we report the isolation and identification of three sesquiterpene lactones of the heliangolide type from the aerial parts of *Stevia origanoides* H.B.K. (Compositae, tribe Eupatorieae). They have been identified as eucannabinolide, hiyodorilactone F, and eucannabinolide-19-*O*-acetate. The structures and stereochemistry were determined by comparison of spectroscopic data with literature values (4-7) and partial hydrolysis of eucannabinolide. To our knowledge, from 29 *Stevia* species studied chemically, heliangolides have been isolated only from *Stevia monardaefolia* (2).

Hiyodorilactone F has previously been isolated from *Eupatorium sachalinense* (5), but the ^{1}H-nmr data were incompletely published; later the isolation of eucannabinolide-20-*O*-acetate from *Disynaphia multicrenulata* (6) was reported. An examination of the ^{1}H-nmr data reported in Bohlmann *et al.* (6) with those of our hiyodorilactone F clearly showed their identity, but the assignments for H-3α and H-6 were interchanged. Therefore, there is no doubt in our minds that hiyodorilactone F and eucannabinolide-20-*O*-acetate are identical.

Recently these three heliangolides were also isolated from *Isocarpha oppositifolia* var. *achyrantes* (7). This finding may be of chemotaxonomic value, since *Isocarpha* has been placed both in the Eupatorieae (8) and the Heliantheae tribes (9).

EXPERIMENTAL

PLANT MATERIAL.—*S. origanoides* was collected in México City at Ciudad Universitaria on November 1979. A voucher specimen Calderón-30 is deposited in the Herbarium of the Instituto de Biología, UNAM, México.

EXTRACTION AND ISOLATION.—The air-dried leaves and flowers (1.41 kg) were extracted with petroleum-ether and $CHCl_3$. The $CHCl_3$ extract (60 g) was column chromatographed on Si gel (400 g) using $CHCl_3$ and $CHCl_3$/Me_2CO as eluents. Fractions eluted with $CHCl_3$-Me_2CO (9:1) were combined (5.56 g) and rechromatographed on Si gel and further purified by tlc to give hiyodorilactone F, colorless oil: $[\alpha]^{25}D = -111.3$ (*c* 2.5, $CHCl_3$) [lit. (5) $[\alpha]^{25}D = -141$ (*c* 0.21, EtOH)], ir, and ^{1}H-nmr data identical to those previously published (5,6) and eucannabinolide-19-*O*-acetate: ir, eims, and ^{1}H-nmr data identical with literature values (7,10). Fractions eluted with $CHCl_3$-Me_2CO (3:2) were rechromatographed on Si gel. Further purification of the fractions from the above column by tlc afforded eucannabinolide whose ir, eims, ^{1}H-nmr, and optical rotation data were identical with those published in the literature (4,10).

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

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