and linoleic acid These were characterized in the same manner as described above n-*Alkanes* GLC indicated the alkanes to be composed of almost equal amounts of n-$C_{16}H_{34}$ to n-$C_{31}H_{64}$ *Phytol* $C_{20}H_{40}O$, n_D^{25} 1 4637, $[\alpha]_D^{25}$ +0 98° (*c* 1 708, $CHCl_3$), *m/e* 296 (M^+), 71 (base), ν_{max}(liquid) 3300 (O–H), 1670 (C=C) 790 cm^{-1} (>C=CH–), δ_{ppm} 1 65 (s, 3H, >C=CC$\underline{H}_3$–), 4 12 (*d*, *J* 7Hz, 2H, =CH–C$\underline{H}_2$–O–), 5 38 (*t*, *J* 7Hz, 1H –C$\underline{H}$–CH_2–O–) direct comparison (co-TLC, IR, NMR and MS) with a known sample *Stigmasterol* $C_{29}H_{48}O$, mp 168 8 170°, $[\alpha]_D^{25}$ −52 9° (*c* 0 846, $CHCl_3$), *m/e* 412 (M^+), 55 (base), ν_{max} (KBr) 3350 (O–H), 1640 (C=C), 970 (trans –CH=CH–), 840 cm^{-1} (>C=C$\underline{H}$–), δ_{ppm} 5 09 (*t*, *J* 3Hz, 2H), 5 37 (broad s, 1H), direct comparison (m.m.p., co-TLC, IR, NMR and MS) *Fatty acids* The acidic fraction (0 28 g) was methylated with CH_2N_2 The methylated acids were then subjected to co-GLC with authentic samples The acidic fraction was thus found to be composed of palmitic acid (33 2%), stearic acid (18 6%), linoleic acid (15 6%), linolenic acid (20 4%) and other acids (14 2%)

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TWO PENTAMETHOXYLATED FLAVONOIDS FROM *GYMNOSPERMA GLUTINOSUM*

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Key Word Index—*Gymnosperma glutinosum*, Compositae, essential oil, phellandrene, camphene, α-pinene, 5,7-dihydroxy-6,8,3′,4′,5′-pentamethoxyflavone (luiselizondin), 5-hydroxy-3,6,7,8,3′-pentamethoxyflavone, emmaosunin

Plant Gymnosperma glutinosum (Spreng) (Syn. *Selloa glutinosum*, (Spreng)) Tatalencho, xonoquilitl (Voucher specimen No. 7268). Collected in San Luis Potosi in February 1972. Is a monotypic genus. *Uses* The flower heads as a cure of rheumatic illness.[1]

Previous work. None.

Steam distillation The semidried aerial part was steam distilled, a colorless, odiferous oil was obtained (yield 0 7%), sp. gr. 0 92, $\eta_D^{22°}$ 1 4725, $[\alpha]_D^{22°}$ +17°. IR and NMR did not show aromatic or carbonyl compounds. TLC and VPC showed phellandrene, camphene and α-pinene as main components.

Extraction. The pulverized dried aerial part was extracted with EtOH, the extract was evaporated and the residue was taken in $CHCl_3$. This solution was chromatographed on silica gel. On elution with $CHCl_3$–MeOH, two new flavonoids were successively percolated. *Luiselizondin*, as yellow crystals, m.p. 178–179°, $C_{20}H_{20}O_9$. Zeisel number gave $5CH_3O$. IR, 1650, 1620, 1585 and 1518 cm^{-1}. NMR: singlet at 7·4δ (2H), another at 6 2 (s, 1H), four singlets at 4 12 (3H), 4·08 (3H), 4 0 (6H) and 3·9 (3H), corresponding at five CH_3O groups, at down field 400 Hz there was a signal (1H). The UV in MeOH gave a spectrum typical of a flavone.[2] The addition of $AlCl_3$, $AlCl_3$–HCl and NaOAc·H_3BO_3 gave the expected displacements for a 5-hydroxyflavone. The MS gave a molecular ion at *m/e* 404 ($C_{20}H_{20}O_9$). The fragmentation pattern was as expected for a 5,7-dihydroxy-6,8,3′,4′,5′-pentamethoxyflavone,[3] a microfusion with KOH gave the expected 3,4,5-trimethoxyben-

[1] MARTÍNEZ, M. (1959) *Las Plantas Medicinales de Mexico* 4a. Ed. Botas, México, p. 299.

[2] MABRY, T. J., MARKHAM, K. R. and THOMAS, M. B. (1970) *The Systematic Identification of Flavonoids*, Springer, New York.

[3] ALDER, H. (1966) *Bull. Soc. Chim. Fr.* 2893.

zoic acid. The gossipetone test for *p*-dihydroxyflavonoid and the ammonium vanadate test[4] for an *o*-dihydroxyflavone were negative, confirming the assigned structure to luiselizondine *Emmaosunin*, as yellow crystals, m.p. 150–152°, $C_{20}H_{20}O_8$, Zeisel number gave 5 CH_3O. IR, 1650, 1610, 1570, 1500, 1040, 998 cm^{-1}. The NMR and UV spectra were typical of a 3-methoxy-5-hydroxyflavone.[3] And the addition of $AlCl_3$, $AlCl_3$–HCl or NaOAc–H_3BO_3 gave the expected shifts in the UV. The NMR exhibited a multiplet centered at 7·5δ (4H) for singlets at 4·10 (CH), 4·00 (3H), 3·95 (3H) and 3·90 (6H) at down field a multiplet was observed corresponding to the 5-OH proton. The MS gave a molecular ion at *m/e* 384 and the fragmentation pattern of a 3-methoxyflavone. Wilson and $FeCl_3$ tests were positive. On fusion of emmaosunine with KOH, 3-methoxy-benzoic acid was detected by TLC and PC comparison, confirming the structure as 5-hydroxy-3,6,7,8,3′-pentamethoxyflavone.

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[4] VENKATARAMAN, K (1962) In *The Chemistry of flavonoid Compounds* (GEISSMAN, T A, ed), p 75, Macmillan, New York

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IDENTIFICATION DU L-(+)-BORNESITOL DANS LE GENRE *GENTIANA**

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Key Word Index—*Gentiana* sp, Gentianaceae, cyclitols, L-(+)-bornésitol, chemotaxonomy

Dans une précédente communication,[1] nous avons décrit l'identification du L-(+)-bornésitol dans les feuilles de *Gentiana lutea* L. Dans le cadre de nos études phytochimiques du genre *Gentiana*, nous avons isolé ce cyclitol peu répandu dans la nature à partir des autres espèces de gentianes géantes, formant avec *G. lutea* L. la section Coelanthe.[2]

Plantes et provenance, *G. purpurea* L., Valais, Suisse; *G. punctata* L., Grisons, Suisse; *G. pannonica* Scop., Churfirsten, Suisse; *G. villarsii* Ronn., Dpt Hautes-Alpes, France; *G. burseri* Lapeyr., Dpt Pyrénées orientales, France. La poudre de feuilles séchées est extraite à chaud, successivement par la ligroïne, Et_2O, EtOAc et MéOH. L'extrait méthanolique est adsorbé sur une colonne de polyamide; l'élution est effectuée avec MeOH à 90% et les fractions analysées par CCM; les fractions de tête sont riches en L-(+)-bornésitol, les autres sont utilisées pour la recherche des glycosides flavoniques.[3] Après traitement par

* Partie IV de la série "Contribution à la phytochimie du genre *Gentiana*"

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[2] SCHARFETTER, R (1953) *Biographien von Pflanzensippen*, pp 315–331, Springer, Wien

[3] HOSTETTMANN, K et JACOT-GUILLARMOD, A (1974) *Phytochemistry*, en préparation