EXPERIMENTAL

Two dimensional chromatograms on Whatman 3MM paper were developed first in TBA (t-BuOH–HOAc–H_2O, 3 1 1), and then in 15% HOAc, NMR spectra of the trimethylsilyl ethers were recorded in CCl_4 and benzene-d_6 using TMS as an internal standard All UV spectra were obtained using standard procedures [1]

Air-dried ground leaf material of *Eschscholzia mexicana* (collected near Monterrey, Mexico*) was extracted with 85% MeOH A yellow amorphorous material (100 mg) precipitated from the extract, the precipitate was purified over polyamide [1] Color test purple (UV) to yellow (UV/NH_3), R_f's TBA 0 27, HOAc 0 71, UV, λ_{max} (nm) MeOH, 355, 270 sh, 257, NaOMe, 402, 270, 250 sh, $AlCl_3$, 400, 368, 300 sh, 270, $AlCl_3$–HCl, 400, 360 sh, 281, NaOAc, 417, 264, NaOAc-H_3BO_3, 360, 270 sh, 258

Mass spectral data for PDM-I *m/e* at 533, 516, 368, 367, 350 (base peak), 322, 321, 230 (PDM-glucose moiety), 196, 184, 183 (PDM-arabinose fragment), 149 and 107 PDM of isorhamnetin 3-*O*-glucoside 7-*O*-rhamnoside 547, 530, 368, 367, 350 (base peak), 321, 230 (PDM-glucose ion), 199, 198, 197 (PDM-rhamnose ion), 145, 127, 121 and 107

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* Voucher XAD-sn is deposited in the Instituto Technologico y de Estudios Superiores de Monterrey Herbarium

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COUMARINS AND ALKALOIDS OF *AEGLE MARMELOS**

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The ubiquitous usage[1 2] of *Aegle marmelos* Corr in the indigenous system of Indian medicine and the observed hypoglycaemic activity of the crude alcoholic extract of its root in rats prompted us to undertake the present investigation A number of alkaloids,[3–7] coumarins,[5,7–9] sterols[6,8,9] and essential oils[10] have previously been isolated from this plant

The EtOAc soluble fraction of the alcoholic extractive of the root on column chromatography over silica gel afforded the constituents outlined below

Psoralen, 37 mg ($C_{11}H_6O_3$), m p and m m p 169–170°, eluted with C_6H_6 UV λ_{max}^{EtOH} 240

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(4 4), 290 (4·0), 342 (3 9) nm IR (KBr) ν_{max} 1720 (C=O), 1640, 1575 (C=C), 880 cm^{-1} (furan), indicative of a furanocoumarin structure The linear fusion of the furan moiety followed the downfield shift of C_4, C_5, C_6 and C_7 protons at δ 7 78, 7 67, 6 82 and 7 68 respectively in its NMR spectrum (60 MHz, $CDCl_3$) Its MS (M^+ at *m/e* 186 as the base peak) also showed the linear fusion in contrast to the angular one where the M-28 is more intense than M^+

Xanthotoxin, 45 mg ($C_{12}H_8O_4$), m p and m m p 145–146°, M^+ 216 eluted with C_6H_6 UV λ_{max}^{EtOH} 219 (4 48), 245 sh (4 44), 249 (4 45), 262 sh (4 23), 301 (4 16) nm IR (KBr) ν_{max} 1705 (C=O), 1620, 1580 (C=C), 875 cm^{-1} (furan) It had a MeO group which was placed at C_9 due to upfield shift of the shielded C_5 proton (δ 7 33) in its NMR spectrum

6,7-Dimethoxycoumarin, 65 mg ($C_{11}H_{10}O_4$), m p 145°, M^+ 206 (base peak) eluted with 15% EtOAc in C_6H_6 Its IR and UV spectra were suggestive of a coumarin chromophore NMR ($CDCl_3$) δ 3 94, 3 98 (*s*, 3H each, two Ar CH_3O), 6 32, 7 68 (*d*, 1H, each, *J* 10 Hz, *AB* pattern), 6 90, 6 94 (*s*, 1H each) Methylation of scopoletin gave an identical compound

Scopoletin, 150 mg ($C_{10}H_8O_4$), m p and m m p 204°, eluted with 40% EtOAc in C_6H_6 Its IR and UV were suggestive of a phenolic coumarin NMR ($CDCl_3$) δ 6 23, 7 58 (*d*, 1H each, *J* 9 5 Hz), 6 83, 6 90 (*s*, 1H each), 3 93 (*s*, 3H, CH_3O), OH confirmed by D_2O shake MS An intense M-15 fragment indicative of scopoletin [11]

Tembamide,[12–15] 100 mg ($C_{16}H_{17}NO_3$), m p 156–157°, eluted with 40% EtOAc in C_6H_6, optically inactive UV λ_{max}^{EtOH} 230 (4 34), 275 (3 41), 282 (3 22) nm IR (KBr) ν_{max} 3495 (OH), 3390 (NH), 1625 cm^{-1} (CONH) NMR ($CDCl_3$–DMSO-d_6 50%) δ 7 80–8 00 (*m*, 5H, unsubstituted phenyl), 6 91, 7 73 (*d*, 2H each, *J* 9 Hz, *AB* pattern), 4 52 (*q*, 1H benzylic), 4 03 (*t*, 2H), 3 78 (*s*, 3H, CH_3O), 5 33, 2 92 (NH, OH respectively, eliminated by D_2O)

Contrary to an earlier observation,[13] a conspicuous M^+ signal (23%) was found at *m/e* 271 in the MS

The BuOH soluble fraction yielded a glycoside (Feigl Test), 263 mg, m p 208–209° UV λ_{max}^{EtOH} 217 (4 09), 325 (4 15) nm NMR (DMSO-d_6) δ 6 42, 8 08 (*d*, 1H each, *J* 9 Hz), 7·00–7 90 (*m*, 3H, Ar) MS M^+ at *m/e* 324, 162 (base peak, M-sugar residue), 134, 105, 78

On hydrolysis with 4% H_2SO_4 at 100°, it gave umbelliferone (IR, UV, NMR, MS, m p identical with an authentic sample) and D-glucose (PC, TLC) suggesting its structure as skimmin

Other constituents isolated and characterized were umbelliferone (265 mg), marmesin (150 mg), marmin (4 3 g) and skimmianine (250 mg)

EXPERIMENTAL

Extraction Milled roots (20 kg) was exhaustively percolated with EtOH, the concentrate diluted with 2% tartaric acid, and extracted with hexane followed by EtOAc On removal of the solvent, the EtOAc soluble residue (23 g) was chromatographed over silica gel (1 kg) and eluted with solvents mentioned in the text to yield the coumarins and alkaloids The aq phase was extracted with *n*-BuOH and the soluble residue (15 g) was chromatographed over silica gel (600 g) Elution was effected with 6% MeOH in EtOAc to furnish skimmin

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