and S. Kokkini of the Department of Botany, University of Thessaloniki. The aerial parts of the plant, at the flowering state, were air-dried, then 200 g of plant material was subjected to steam distillation in an all-glass assembly for 2 hr yielding 3.2% of essential oil.

GC/MS analysis. Analysis and identifications were carried out using a computerized GC/MS. Gas chromatographic separations were performed on a W WCOT SP-2100 column, 30 m, with about 95000 theoretical plates. He flowed at 1.8 ml/min, temp. 70–270° at 6°/min. The detectors FID and TCD were operated simultaneously after 1:100 split ratio. Mass spectra were taken every 0.6 sec over the range m/z 34–420, utilizing an ionizing voltage of 70 eV.

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THREE EUDESMANOLIDES FROM *PLUCHEA ROSEA**

XORGE A. DOMINGUEZ, RAUL FRANCO, GERONIMO CANO, ROMELIA VILLARREAL, MARINGANTI BAPUJI† and FERDINAND BOHLMANN†

Instituto Technilogica y de Estudios Superiores de Monterrey, Mexico; † Institute for Organic Chemistry, Technical University of Berlin, D-1000 Berlin 12, West Germany

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Key Word Index—*Pluchea rosea*; Compositae; sesquiterpene lactones; eudesmanolides.

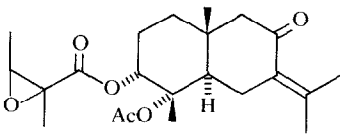
Abstract—Three eudesmanolides of *Pluchea rosea* were found to be structurally related to the eudesmane, cuauthemone, earlier reported from plants of the same genus.

So far, the investigations of *Pluchea* species (Compositae, tribe Inuleae) have shown that eudesmane derivatives like cuauthemone (**1**) are characteristic [1–5]. The aerial parts of *Pluchea rosea* Godfrey also afforded **1**. Furthermore, lactones were present in small amounts, the eudesmanolides **2**–**4**. The structures followed from the ^{1}H NMR data (Table 1). From the spectra of **2** and **3** the presence of an axially orientated ester group at C-3 could be deduced; its nature also followed from the typical ^{1}H NMR signals. The difference in the chemical shift of H-3 in the spectra of **2** and **3** is characteristic [2, 4] and is obviously due to the deshielding effect of the 4α-acetoxy group. As the signals of H-5 and H-6 could also be assigned unambiguously, the presence of an 8,12-lactone was obvious too. The chemical shift of H-9 and of H-13 further supported the proposed structures. The spectrum of **4** (Table 1) was very similar to that of **3**. However, the olefinic singlet at 5.49 ppm was missing. As already clear from the molecular formula, an additional hydroxy group was present, which only could be placed at C-8, most probably β-orientated, as the chemical shift of H-14 obviously was influenced by a deshielding effect of the hydroxyl. Again, the 3α-orientated ester group clearly followed from the couplings observed. The 8,9-dihydro compound of **2** we have named ixtlixochilin.

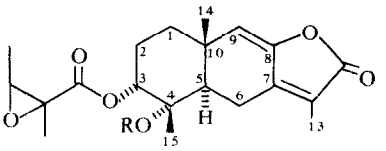
EXPERIMENTAL

The Soxhlet extract (petrol) of the air-dried aerial parts (2 kg) (Voucher 7733) afforded after column chromatography (Si gel) and TLC (Si gel) 5 mg **1**, 3 mg **2**, 10 mg **3** and 3 mg **4** (separated

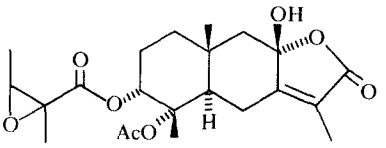
*Part 364 in the series 'Naturally Occurring Terpene Derivatives'. For Part 363 see Bohlmann, F., Singh, P., Borhtakur, N. and Jakupovic, J. (1981) *Phytochemistry* **20**, (in press).



1



2 R = H 3 R = Ac



4

with Et_2O–petrol, 3:1 and HPLC (reversed phase, MeOH–H_2O, 7:3).

8,9-*Dehydroixtlixochilin* (**2**). Colourless gum, IR $\nu_{max}^{CCl_4}$ cm^{-1}: 3500 (OH), 1770, 1665 (γ-lactone), 1740 (CO_2R); MS *m/z* (rel. int.): 362.173 (M^+, 4) ($C_{20}H_{26}O_6$), 344 (M – H_2O, 1), 333 (M – CHO, 20), 228 (344 – RCO_2H, 25), 213 (228 – Me, 10), 99 (RCO^+, 10), 71 (99 – CO, 67), 55 ($C_4H_7^+$, 100).

8,9-*Dehydroixtlixochilin*-4-O-*acetate* (**3**). Colourless gum, IR $\nu_{max}^{CCl_4}$ cm^{-1}: 1780 (γ-lactone), 1745 (OAc, CO_2R); MS *m/z* (rel. int.): 404.183 (M^+, 0.5) ($C_{22}H_{28}O_7$), 344 (M – HOAc, 8), 228 (344 – RCO_2H, 100), 213 (228 – Me, 56), 99 (RCO^+, 28), 71 (99 – CO, 81).

Table 1. ^1H NMR spectral data of compounds **2**–**4** (400 MHz, $CDCl_3$, TMS as internal standard)

	2	3	4
H-3β	4.89 *br dd*	5.88 *dd*	5.85 *dd*
H-5α	2.12 *dd*	2.36 *dd*	2.02 *ad*
H-6α	3.04 *dd*	2.93 *dd*	2.89 *dd*
H-6β	2.40 *br dd*	2.45 *br dd*	2.35 *br dd*
H-9	5.52 *s*	5.49 *s*	1.57 *m*
H-13	1.92 *d*	1.95 *d*	1.89 *d*
H-14	1.10 *s*	1.11 *s*	1.25 *s*
H-15	1.56 *s*	1.52 *s*	1.52 *s*
OCOR	3.05 *q*	3.02 *q*	3.05 *q*
	1.32 *d*	1.29 *d*	1.29 *d*
	1.58 *s*	1.62 *s*	1.61 *s*
OAc	—	2.00 *s*	2.00 *s*

J(Hz): Compounds **2** and **3**: 2α,3β = 2β,3β = 2.5; 5α,6α = 2.5; 5α,6β = 13.5; 6α,6β = 16; 6β,13 = 1.5; 3′,4′ = 5; compound **4**: 2α,3β = 2β,3β = 5α,6α = 2.5; 5α,6β = 13.5; 6α,6β = 16; 6β,13 = 1.5; 3′,4′ = 5.

$$[\alpha]_{24^\circ}^{\lambda} = \frac{\begin{matrix}589 & 578 & 546 & 436\,nm\\ +109 & +115 & +132 & +234\end{matrix}}{}\ (c = 0.7,\ CHCl_3).$$

8β-*Hydroxyixtlixochilin*-4-O-*acetate* (**4**). Colourless gum, IR $\nu_{max}^{CCl_4}$ cm^{-1}: 1780 (lactone), 1740 (OAc, CO_2R); MS *m/z* (rel. int.): 422.194 (M^+, 3) ($C_{22}H_{30}O_8$), 362 (M – HOAc, 10), 344 (362 – H_2O, 2), 228 (344 – RCO_2H, 23), 99 (RCO^+, 12), 71 (99 – CO, 100).

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