

N, 4.56%.) No m.p. depression was observed upon admixture with authentic candicine iodide.  $R_f$ s (System 2) and IR spectra (KBr discs) were identical, with strong absorption at 3300–3200 (phenolic O–H), 1220 (amine C–N), 1200 (C–OH), and 835  $\text{cm}^{-1}$  (1,4-disubstituted benzene ring).

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**Key Word Index**—*Trichocereus chilensis*; Cactaceae; alkaloids; candicine.

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## COMPOSITAE

### TERPENOIDS OF *CENTAUREA AMERICANA*\*

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**Plant.** *Centaurea americana*. **Uses.** In folk medicine. **Previous work.** On sister species.<sup>1–6</sup>

**Aerial parts.** From 700 g of the aerial part of *C. americana*: 21 g of resinous material were extracted with  $\text{CHCl}_3$ , this solution was chromatographed on an inverted column. The elution of each fraction was with successive portions of  $\text{CHCl}_3$ , acetone and ethanol. The NMR of the  $\text{CHCl}_3$  extract exhibited the typical signals of a germanicrol type of sesquiterpenelactone. The following compounds were obtained.

**$\beta$ -Sitosterol.** Identified by mixed m.p. IR, UV, NMR and co-TLC, of the sterol and its acetate. Acetate of a triterpene of the  $\beta$ -amyrin type;  $\text{C}_{32}\text{H}_{52}\text{O}_2$  ( $M^+$  468 by mass spectroscopy). Found, C, 80.18; H, 10.84; O, 8.18; Calcd. C, 81.99; H, 11.18, O, 6.83, m.p. 183°,  $[\alpha]_{589} + 84.5^\circ$ ;  $[\alpha]_{546} + 102.4^\circ$ ;  $[\alpha]_{436} + 176.4^\circ$ ; (Chl) L-B negative, TNM; positive, IR, 2940, 2880, 1740, 1630, 1460, 1440, 1375–1365,  $(\text{CH}_3)_2\text{C}$ , 1250, 1020,  $\text{cm}^{-1}$ . On saponification, alcohol, m.p. 138–140°.  $[\alpha]_{589} + 28.8^\circ$ ;  $[\alpha]_{578} + 34.8^\circ$ ,  $[\alpha]_{546} + 37.8^\circ$  (Chl) IR, 2920, 2840, 1630, 1450; 1380, 1360, 1040  $\text{cm}^{-1}$ . On oxidation of the alcohol, a ketone was obtained, m.p. 222–226°. IR. 2920, 2850. 1690 (C=O) 1460, 1385 and 1375  $\text{cm}^{-1}$ .

**New compound:**  $\text{C}_{28}\text{H}_{38}\text{O}_{10}$ . Found, C, 62.65; H, 6.65; O, 30.14; Calcd. C, 62.91; H, 7.17; O, 29.93. m.p. 355–360°, IR, 3450, 2930, 2850, 1755, 1720, 1640, 1450, 1430, 1390, 1260, 1145, 1050–1010, 950, 900, 800, 750  $\text{cm}^{-1}$ . NMR, 6.6 (m) S.

\* Part XVII in the series "Chemical Studies of Medicinal Plants".

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*Key Word Index*—*Centaurea americana*; Compositae; sterols;  $\beta$ -sitosterol.

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## FLAVONE-C-GLYCOSIDES IN A COASTAL RACE OF *GAILLARDIA PULCHELLA*

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*Plant. Gaillardia pulchella* Foug. (coastal race). *Source*. Collected by Dr. McDaniel in 1967; highway AIA, South of St. Augustine, Florida. *Previous work*. None on flavonoids, sesquiterpene lactones and sesquiterpene lactone alkaloids.<sup>1</sup>

*Compounds isolated*. Swertisin (7-O-methylsaponaretin), saponaretin, vitexin and orientin were isolated from the methanolic extracts of the plant by the methods described previously<sup>2</sup> and identified by direct comparison with authentic material by mixed m.p., co-chromatography (TLC, 3 solvents), UV and IR analysis.

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*Key Word Index*—*Gaillardia pulchella*; Compositae; flavone-C-glycosides; swertisin; isovitexin; vitexin; orientin.

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## EUPHORBIACEAE

### FRIEDELIN DERIVATIVES FROM *PHYLLANTHUS MUELLERIANUS*

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