Biological significance. The presence of alkaloids in these spineless monstrose plants imparts a disagreeable bitter taste, as well as known pharmacotoxic effects [9], and quite likely has a protective value to the plants in repelling hungry rodents and other animals.

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IDENTIFICATION AND C-13 N.M.R. SPECTRUM OF STACHYDRINE FROM *CADABA FRUTICOSA*

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Key Word Index—*Cadaba fruticosa*; Capparidaceae: cadabine; stachydrine.

Abstract—Cadabine, a compound isolated from the leaves of *Cadaba fruticosa* has been identified as stachydrine and its C-13 NMR studied.

In 1971, Ahmad and Basha [1] isolated hygroscopic crystalline needles, m.p. 98–100 from the leaves of *Cadaba fruticosa*, a straggling shrub found around Karachi. The compound contained nitrogen and from its ionic properties was presumed to be a betaine. It did not show any absorptions in the UV region and did not respond to mass spectrometry because of its low volatility. The IR spectrum afforded peaks at 1625 cm^{-1} (COO^-) and 3450 cm^{-1} (–OH).

NMR spectroscopy of a solution of the picrate in CF_3 COOD afforded peaks at 4·56 δ (*m*, 1H), 3·78 δ (*m*, 2H), 3·37 δ (S, 3H), 3·54 δ (S, 3H) and broad multiplets in the region 2·3—3·08 (4H). The multiplet at 3·78 δ collapsed to a singlet on spin–spin decoupling when irradiated at 2·5 δ. The above signals were assigned to the C-2, C-5, N–CH_3, N–CH_3, and C-3 and C-4 protons respectively. This spectrum was similar to that reported [2] for stachydrine (**1**) in D_2O. Since no C-13 NMR spectra of any betaines have previously been reported, such a spectrum was recorded at 25·2 MHz in D_2O using dioxan as internal standard. The fully decoupled spectrum afforded six sharp singlets at 75·3, 68·2, 52·7, 46·8, 24·8 and 19·2 ppm relative to TMS, which were assigned to C-2, C-5,

$N–CH_3$, N–Me, C-3 and C-4 carbons respectively.

The structure (**1**) was confirmed by comparison with a synthetic specimen (m.p. NMR, IR).

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ISOLATION OF ERYTHRODIOL MONOPALMITATE FROM *TAGETES* cv. SEN. DIRKSEN

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Key Word Index—*Tagetes* cv. Sen. Dirksen; Compositae; erythrodiol monopalmitate; 3-β-palmitoxy-olea-12en-28-ol; palmitic acid; sterols.

Plant. Tagetes cv. Sen. Dirksen. *Source.* The plant material was collected in the United States by Dr. Robert E. Perdue, Jr. [1]. A voucher specimen, identified by Dr. Perdue, has been deposited at the Department of Pharmacognosy and Pharmacology, University of Illinois at the Medical Center (specimen CA-2033). *Uses.* None, but other species of this genus have shown nematocidal [2,3] and antitumor [4] activities.

Previous work. None on this species. From *T. minuta*: thiophenes [5], terpenes [6,7], flavonoids [4, 8–11], carotenoids [12–14]; *T. erecta*: carotenoids [13], sterols [17], thiopenes [18].

Plant part examined. Whole plant. *Isolation and Identification.* The powdered plant material (5 kg) was defatted with light petroleum, followed by extraction with MeOH and concentration *in vacuo* to yield 617 g of residue, which was partitioned between $CHCl_3$ and H_2O. The $CHCl_3$ solubles (66·18 g) were chromatographed over a 2 kg column of silica gel PF_{254} and eluted with $CHCl_3$–MeOH (9:1). Fractions 11–33 (50 ml each) were combined, taken to dryness (12·96 g), and rechromatographed over a second column of silica gel PF_{254} (600 g). This column was developed with benzene and work-up of fractions 76–102 (20 ml each) yielded 71·1 mg of a crystalline material from acetone. The compound was identified as erythrodiol monopalmitate by the following physical methods. It gave a positive Liebermann–Burchard test for triterpenes; m.p. 112–113°; $[\alpha]_D^{27\cdot5}$ +57·5° (conc 0·1 in $CHCl_3$). The compound gave the following R_f values on silica gel G TLC–$CHCl_3$ (0·37), $CHCl_3$–MeOH (9:1) (0·86). IR spectrum (KBr) at ν_{max}: 3475 (*s*) (OH), 2915 (*s*), 2840 (*s*), 1700 (*s*) (ester C=O), 1465 (*s*), 1380 (*m*), 1360 (*m*), 1260 (*m*), 1240 (*m*), 1140 (*w*), 1070 (*w*), 1045 (*w*), 1010 (*w*), 820 (*w*), 810 (*w*), 800 (*w*) (trisubstituted double bond) and 720 cm^{-1} [$-(CH_2)_n-$, $n > 4$]. A PMR spectrum in $CDCl_3$, (TMS), showed signals at 5·2 δ (1H, broad, C_{12}–H), 4·5 δ (1H, *m*, $C_{3\alpha}$–H), 3·4 δ (2H, *dd*, C_{28}–H_2). The MS showed a molecular ion at *m/e* 680 (1·7%), followed by ions at *m/e* 662 (3·5%), 425 (4·8%), 393 (5·2%), 256 (2·2%), 234 (39·1%), 203 (100%) and 189 (12·6%). All of these data were in agreement with those reported for erythrodiol monopalmitate isolated from *Madhuca butyracea* (Sapotaceae) [19]. *Saponification* with boiling 5% alcoholic KOH (3 ml) for 3 hr gave erythrodiol, m.p. 210–214°; $[\alpha]_D^{27\cdot5}$ +95° (conc 0·1 in $CHCl_3$) (MS and PMR spectra and MS of its acetate [20]) and palmitic acid (GLC of its methyl ester 5% OV-101 on Gas Chrom Q, 80–100 mesh at 260°). The isolation of this compound from *Tagetes* cv. Sen. Dirksen represents the first report of its occurrence in the Compositae.

The isolate from fractions 162–165 from the second column was shown by GLC (5% OV-101