

N-methyl-3,4-dimethoxyphenethylamine [5,6], hordenine [5,7], *N,N*-dimethyl-4-hydroxy-3-methoxyphenethylamine [7], *N*-methyltyramine [8] and *N*-methyl-4-methoxyphenethylamine [9] in various species of this genus.

No previous alkaloid studies have been reported regarding *A. scapharostrus* Bodeker. This species is extremely rare and only known from one locality in the mountains of Nuevo León [1]. We now report the identification of four phenethylamines in this cactus.

Alkaloid extraction was followed by fractionation on an ion-exchange column into phenolic and non-phenolic alkaloids [4]. These fractions were studied by GC and GC-MS. Comparison with synthetic reference materials allowed us to identify hordenine and *N*-methyltyramine in the phenolic fraction, hordenine being the major compound. In the non-phenolic fraction *N,N*-dimethyl-3,4-dimethoxyphenethylamine and *N*-methyl-3,4-dimethoxyphenethylamine were identified.

Hordenine, *N*-methyltyramine and *N*-methyl-3,4-dimethoxyphenethylamine have been isolated from several genera of the Cactaceae [6,8,10], but *N,N*-dimethyl-3,4-dimethoxyphenethylamine has been more elusive. This compound was first described from nature as the main alkaloid of *Echinocereus merkeri* [10], and was recently identified by us in extracts of *Coryphantha greenwoodii* [11]. The present paper is the first recorded occurrence of *N,N*-dimethyl-3,4-dimethoxyphenethylamine in a species of *Ariocarpus*, although closely related alkaloids occur in the genus [7].

EXPERIMENTAL

Plant material. Living plants of *Ariocarpus scapharostrus* Bodeker were obtained from Abbey Garden, Reseda, California, and the identification was confirmed by Mr. Charles Glass*. A herbarium specimen has been placed in the Department of Pharmacognosy, Biomedicum, Uppsala.

Isolation of alkaloids. Ten plants (420 g) were homogenized in EtOH. Filtered extract was evaporated to dryness, dissolved in 3% HOAc and washed with CHCl₃. The aq phase was basified with NH₃ conc (pH 10) and the alkaloids were extracted with CHCl₃ and CHCl₃-EtOH (3:1). The crude alkaloids were purified on an acidic diatomaceous earth (Celite 545) column (yield 50 mg; 0.012%) and resolved into phenolic and non-phenolic fractions with an ion-exchange column (IRA-400) as described previously [4]. 80% (40 mg) of the alkaloids were recovered in the phenolic fraction.

Identification of alkaloids. The phenolic and non-phenolic fractions were chromatographed by GC on 2 columns (5% SE-30 and 5% XE-60 on Gas Chrom Q, 100-120 mesh, col. temp. 150°) for preliminary information [4]. MS were obtained using a combined GC-MS instrument (ion source 2.5 kV, electron energy 70 eV and ionization current 60 μA). Column: 3% XE-60 on Gas Chrom Q, 100-120 mesh, 150°.

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FLAVONOIDS FROM *COCHLOSPERMUM GILLIVRAEI*

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Key Word Index—*Cochlospermum gillivraei* Benth; Cochlospermaceae; apigenin; naringenin; (+)-afzelechin; naringenin 7-glucoside; apigenin 7-glucoside.

Plant. The bark of *Cochlospermum gillivraei*, collected in Stuart, Queensland, Australia, Sep-

tember, 1962 and 1965.

Previous work. None. The flavonoids myricetin,

quercetin, kampferol and cyanidin (from leucocyanidin) have been found in the hydrolysed leaf extract of *C. religiosum* [1].

Present work. Extraction and identification of the flavonoids from the bark. The crude flavonoids were obtained by extraction of the milled bark with ethanol in the usual manner [2] and purified by means of column chromatography and preparative TLC. Apigenin (5,7,4'-trihydroxyflavone), naringenin (5,7,4'-trihydroxyflavanone) and (+)-afzelechin (5,7,4'-trihydroxyflavan-3-ol) were identified by NMR, IR, mmp and CoTLC and derivative formation [3-6]. The glycosides prunin (naringenin 7-O-glucoside) and cosmosiin (apigenin 7-O-glucoside) were identified by their physical data [6,7] and hydrolytic conversion to glucose together with naringenin and apigenin respectively.

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ACHILLIN AND DEACETYLMATRICARIN FROM TWO *ARTEMISIA* SPECIES

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Key Word Index—*Artemisia ludoviciana*; *A. klotzchiana*; Compositae; essential oil; camphor; borneol; achillin; deacetylmatricarin; 3,5-dihydroxy-6,7,8-trimethoxyflavone.

Plants. *Artemisia ludoviciana*, Nutt (Voucher specimen 7294) collected in Punta de la Loma, N.L.; *A. klotzchiana*, Basser (Voucher specimen 7393) collected in San Roberto, N.L. Both plants have the trivial name of “estafiate” and are used for stomach ailments.

Previous work. The *Artemisia* genus contains more than 300 species and geographical races many of which have been scrutinized by chemists [1]. Four santanolides, ludovicin-A, -B, -C [2] and ludolbin [3] has been isolated from *A. ludoviciana*, but only the essential oil of *A. klotzchiana* has been studied, GLC showing principally camphor and borneol.

Present work. The sesquiterpene lactones, deacetylmatricarin and achillin, originally obtained from other members of the same tribe the *Anthemideae*, have been found in both species and supports the concept of geographic races. The high

yield of camphor and borneol from the essential oil of *A. ludoviciana* may have an important economical and chemotaxonomic value. The presence of 3,5-dihydroxy-6,7,8-trimethoxy flavone, an isomer of euparolin and eupatilin the cytotoxic flavonoids from *Eupatorium serratum* [5], also is of chemotaxonomic interest.

EXPERIMENTAL

Steam distillation. From 1 kg of the aerial part of fresh *A. ludoviciana*, 12 ml of yellowish oil were obtained, sp. gr.²⁴ 0.897; η_D^{25} 1.4764 $[\alpha]_D^{25} + 2$; GLC showed camphor, (52%) borneol (25%), phellandrene (4%), α -pinene (3%), plus 13 other minor constituents. As reported, the aerial part (1 kg) of *A. klotzchiana* afforded 8 ml of a bluish essential oil η_D^{25} 1.4665 $[\alpha]_D^{25}$, rich in camphor (35%) and borneol (40%).

Extraction of dried and milled plant material. Light petrol extraction of 498 g of *A. ludoviciana* afforded 1.22 g of achillin, mmp Co-TLC IR, NMR, $[\alpha]$ together with 0.84 g of camphor. *A. klotzchiana* (500 g) was extracted with CHCl_3 affording 15 g of resinous extract, which on Si gel chromatography gave 506 mg of deacetyl-matricarin mmp Co-TLC, IR, NMR, $[\alpha]_D^{25}$