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A PYRIDINE ALKALOID FROM *CEROPEGIA JUNCEA*

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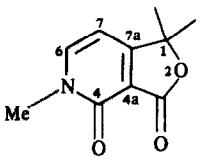
Key Word Index—*Ceropegia juncea*; Asclepiadaceae; pyridine-alkaloid; cerpegin.

Abstract—Cerpegin, a new pyridine alkaloid, has been isolated from *Ceropegia juncea* together with lupeol. Based on spectroscopic methods the structure of this alkaloid has been elucidated as 3,4-dioxo-1,1,5-trimethyl-1,3,4,5-tetrahydrofuro-[3,4-*c*]-pyridine.

INTRODUCTION

Ceropegia juncea Roxb. is reported to be the source of 'Soma', a plant drug of the Ayurvedic system of medicine with a wide variety of uses [1]. The alcoholic extract of the plant was found to possess antipyretic, analgesic, local anaesthetic, antiulcer, mast-cell stabilising, hepato-protective, tranquilising and hypotensive activities in experimental animals. The total alkaloidal fraction exhibited promising tranquilising, hypotensive and local anaesthetic activities and was devoid of side effects as borne out by sub-acute toxicity studies [2]. We deal with the isolation and structural elucidation of a new pyridone derivative, cerpegin, together with the triterpene lupeol from this hitherto phytochemically unexamined plant. Pyridones are relatively rare in nature.



1

RESULTS AND DISCUSSION

The shade-dried powdered whole plant was successively extracted with *n*-hexane and 90% ethanol. The *n*-hexane extract was saponified with 5% alcoholic KOH and the unsaponified portion on column chromatography over silica gel gave lupeol and three minor compounds. The latter could not be characterized due to poor yield.

The 90% ethanol extract was treated with 2% H_2SO_4 and partitioned into basic and non-basic fractions. The chloroform solubles of the basic fraction on column

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chromatography over basic alumina afforded a new alkaloid, designated as cerpegin (**1**). Compound **1** had IR bands at 1675 and 1750 (cm^{-1}) which can be assigned respectively to the carbonyls of α-pyridone [3] and α,β-unsaturated-γ-lactone systems. The UV spectrum exhibited absorption maxima at 207, 210, 216, 234 and 316 nm showing extended conjugation.

The ^1H NMR spectrum of **1** indicated the presence of a NMe group (δ3.50), two tertiary methyls attached to a carbon carrying oxygen (δ1.54) and two protons of the pyridone ring (δ6.10 and 7.43, $J = 5$ Hz). The ^{13}C NMR spectrum also supported the presence of the amide and γ-lactone functions (δ166.24 and 171.92). Based on the above data, the structure of **1** has been elucidated as 3,4-dioxo-1,1,5-trimethyl-1,3,4,5-tetrahydrofuro-[3,4-*c*]-pyridine.

EXPERIMENTAL

Mp: uncorr. IR: KBr discs. UV: 90% EtOH. ^1H NMR (90 MHz) and ^{13}C NMR (100 MHz): $CDCl_3$ and DMSO-d_6, TMS as int. standard.

The plant material was collected in the Tirunelveli District, Tamil Nadu, India. An authenticated voucher specimen was deposited in the Pharmacognosy Department of Madras Medical college.

Shade-dried and coarsely powdered whole plant (*ca* 1 kg) was exhaustively extracted with *n*-hexane and 90% EtOH by a cold percolation method (72 hr). The *n*-hexane extract was saponified with 5% alc. KOH and the unsaponified portion was extracted with Et_2O. The Et_2O extract on CC over silica gel (100–200 mesh) yielded lupeol (250 mg), the identity of which was confirmed by the analysis of its spectroscopic data (IR, ^1H NMR and MS) as well as by comparison with an authentic sample (mmp and co TLC).

Isolation of cerpegin. The 90% EtOH extract was concd *in vacuo* to a syrupy mass and treated with 2% H_2SO_4. The aq. acidic extract was cooled and basified with aq. NH_3 to pH 10 and extracted with $CHCl_3$ (3 × 200 ml). The $CHCl_3$ phases were bulked, dried over Na_2SO_4, concd and chromatographed over a column of basic alumina. Elution with $CHCl_3$–MeOH (9:1) afforded cerpegin, (500 mg), $C_{10}H_{11}NO_3$ ($[M]^+$ 193), mp 268–270° ($CHCl_3$–MeOH) (Found: C, 61.92; H, 5.92; N, 7.59. $C_{10}H_{11}NO_3$ requires: C, 62.18; H, 5.70; N, 7.25. IR ν_{max}^{KBr} cm^{-1}: 1750, 1675, 1600, 1550, 1375, 1300, 1150, 1080, 1040 (w), 950, 900, 880, 810, 680; UV $\lambda_{max}^{90\%\ EtOH}$ nm: 207, 210, 216, 234, 316; ^1H NMR (90 MHz, $CDCl_3$): δ1.54 (6H, *s*, 2 × Me), 3.50 (3H, *s*, =NMe), 6.10 and 7.43 (1H each, *d*, $J = 5$ Hz, H-7 and H-6); ^{13}C NMR (100 MHz, DMSO-d_6): δ82.10 (C-1), 171.92 (C-3), 109.74 (C-4a), 166.24 (C-4), 147.66 (C-6), 98.24 (C-7), 157.00 (C-7a), 25.36 (2 × Me), 36.75 (N-Me); MS *m/z* (rel. int.): 193 $[M]^+$ (79.12), 178 $[M-Me]^+$ (100), 150 $[M-Me-CO]^+$ (8.45), 136 (9.80), 108 (12.86), 79 (11.56), 42 (61.46), 28 (29.39), 18 (13.77).

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