

SHORT COMMUNICATION

ISOLATION OF RICINIDINE FROM PLANT SOURCE

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Abstract—On the basis of physical and chemical studies, a pyridone alkaloid isolated from *Trewia nudiflora* has been identified as ricinidine.

INTRODUCTION

WHILE searching for new plant hormone from indigenous sources, *Trewia nudiflora* L. (Euphorbiaceae) was examined, because it enjoys great reputation in folk medicine.¹ A preliminary report on the constitution of its oil,² isolation of β -sitosterol and taraxerone from its stem bark³ and the isolation and structure elucidation of a new pyridone alkaloid, nudiflorine,⁴ from its leaves have been published. From the seeds of *T. nudiflora*, ricinidine has now been isolated. Though ricinidine has been known as a synthetic compound for many years, its occurrence in nature has not been reported previously.

RESULTS AND DISCUSSION

The biogenetic precursor of pyridine alkaloids is nicotinic acid which has been shown to originate from a C₄-unit such as succinic acid and a C₃-unit such as glycerol. Ricinidine and nudiflorine may then be formed as shown below.⁴

Ricinidine, isolated from *Trewia*, C₇H₆N₂O ($M = 134$ from mass spectrometry), crystallizes from CHCl₃-ether mixture in needles, m.p. 146, R_f 0.69 (butanol:formic acid:water, 10:1:9) and is neutral in character. It exhibits absorption maxima in u.v. spectrum, λ_{\max} 210 ($\log \epsilon$ 4.02), 234 ($\log \epsilon$ 3.69) and 334 nm ($\log \epsilon$ 3.95) which remain unchanged in acid and alkali (typical of a 2-pyridone nucleus) and in the i.r. spectrum, it shows absorption peaks at 2200 (—CN), 1660 (conjugated amide) and 1610 cm⁻¹ (—C=CH—). It contains one —NMe, as shown by the NMR spectrum. Ricinidine does not dissolve in acid or alkali in the cold but does so when heated. On hydrolysis with 57% H₂SO₄ it yields pyridone-3-carboxylic acid,⁷ C₇H₇NO₃, m.p. 184°, λ_{\max} 235 ($\log \epsilon$ 3.72) and 330 nm ($\log \epsilon$ 3.98), ν_{\max} 3020 (OH of $\alpha\beta$ -unsaturated —CO₂H), 1715 (—CO of the —CO₂H), 1660 (conjugated NCO) and 1605 cm⁻¹.

¹ R. N. CHOPRA, S. L. NAYAR and I. C. CHOPRA, *Glossary of Indian Medicinal Plants*, p. 246, C.S.I.R., New Delhi (1956).

² S. SARKAR and M. M. CHAKRABORTY, *Sci. & Cult.* **21**, 473 (1956).

³ N. ADITYACHAUDHURY and G. GANGULI, *Indian J. Chem.* **2**, 171 (1964).

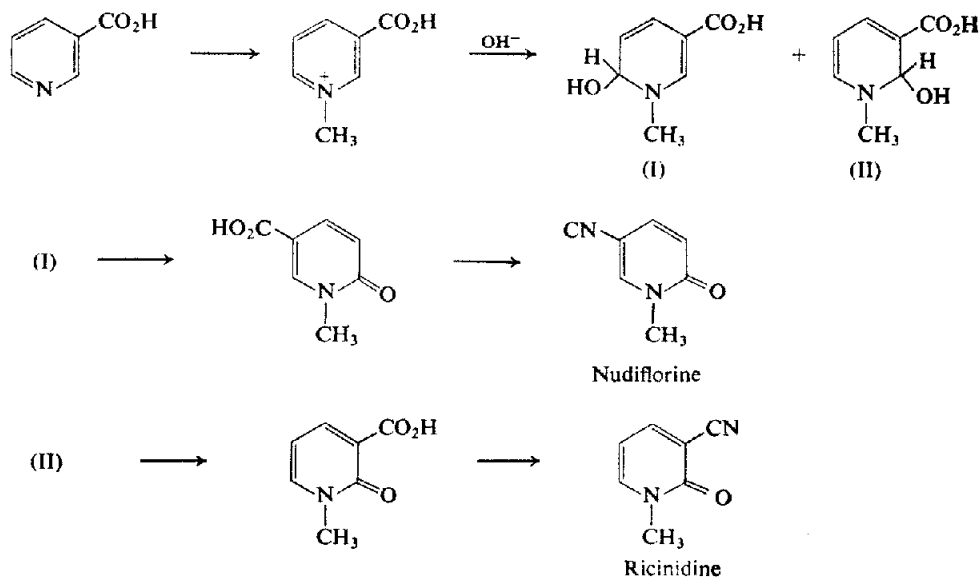
⁴ R. MUKHERJEE and A. CHATTERJEE, *Tetrahedron* **22**, 1461 (1966).

⁵ J. M. ESSERY, P. F. JUBY, L. MARION and E. TURNBULL, *Can. J. Chem.* **41**, 1142 (1963).

⁶ P. F. JUBY and L. MARION, *Can. J. Chem.* **41**, 117 (1963).

⁷ R. ALLOUF and R. MUNIER, *Bull. Soc. Chim. Biol.* **34**, 196 (1952).

(—C=CH—). Finally, the identity of our compound with ricinidine was obtained from m.m.p., co-chromatography and its superimposable i.r. spectrum with that of an authentic sample.



EXPERIMENTAL

All the m.ps reported are uncorrected, the u.v. spectra were taken in EtOH solution, unless otherwise specified, and the NMR spectra were taken in a varian A-60 spectrometer in CDCl_3 solution with SiMe_4 as internal reference.

Isolation of Ricinidine

The defatted plant material was extracted in a soxhlet with CHCl_3 , the extract concentrated (100 ml) and chromatographed over Brockmann alumina. After washing the column with petrol, ether and benzene, ricinidine was eluted with chloroform and crystallized from CHCl_3 -ether in needles, m.p. 146° $[\alpha]_D^{20} \pm 0^\circ$ (CHCl_3), $M=134$ (mass spectrometry). (Found: C, 62.76; H, 4.50; N, 20.92. Calc. for $\text{C}_7\text{H}_6\text{N}_2\text{O}$; C, 62.68; H, 4.47; N, 20.89.)

Acid Hydrolysis of Ricinidine

Ricinidine (100 mg) was refluxed with 57% H_2SO_4 (1.5 ml) for 6 hr. The reaction product was cooled, diluted with 2 ml water and pH adjusted to 6 when crystals of pyridone-3-carboxylic acid appeared. This was crystallized from water in needles, m.p. 184° . (Found: C, 54.90; H, 4.76; N, 8.99. $\text{C}_7\text{H}_7\text{NO}_3$ required: C, 54.91; H, 4.58; N, 9.14%.)

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