Novel 2-Amino-3-pyrazol-5-yl-pyridines from the Reaction of 5-Chloro-1,8-naphthyridines with Hydrazine Hydrate and their Cyclisation to Pyrazolo[1,5-*c*]pyrido[3,2-*e*]pyrimidines, a New Ring System

By R. A. BOWIE

(*Imperial Chemical Industries Limited, Pharmaceuticals Division, Alderley Park, Macclesfield, Cheshire* SK10 4TG)

Summary 5-Chloro-1,8-naphthyridines react with hydrazine hydrate to give 2-amino-3-pyrazol-5-yl-pyridines, which can form pyrazolo [1,5-*c*]pyrido[3,2-e]pyrimidines with triethyl ortho-esters.

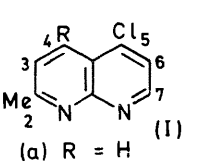
WHEN 5-chloro-1,8-naphthyridines (Ia and Ib) are treated with an excess of hydrazine hydrate in a sealed tube at 120—150° for 5 h, 2-amino-3-pyrazol-5-yl-pyridines (IIa and IIb) are obtained respectively. The isomeric 2-methyl- and 2,4-dimethyl-5-hydrazino-1,8-naphthyridines (IVa and IVb) were synthesised and shown to be different from (IIa) and (IIb) respectively.

Chemical shifts (in τ values) and coupling constants (in Hz)

Compound	Solvent	3-H	4-H	$J_{3,4}$	$J_{6,7}$
(IIa)	$CDCl_3$	2·32(d)	3·32(d)	2·2	—
(IIb)	$(CD_3)_2SO$	2·25(d)	3·62(d)	2·2	—
(III)	$CDCl_3$	2·40(d)	3·40(d)	2·2	—
(IVa)	$(CD_3)_2SO$	—	—	—	6·4
(IVb)	$(CD_3)_2SO$	—	—	—	7·0

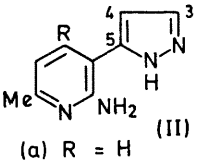
The evidence from n.m.r. spectroscopy is shown in the Table. The coupling constants $J_{3,4}$ for the pyrazolo-pyridines (IIa) and IIb) are found to be similar to those of (III) and other known mono-substituted pyrazoles[1] ($J_{3,4}$ 1·7—2·3 Hz) but different to the coupling constants $J_{6,7}$ for naphthyridines.

Treatment of these novel pyrazolo-pyridines (IIa and IIb) with triethyl ortho-esters in ethanol under reflux give pyrazolo[1,5-*c*]pyrido[3,2-*e*]pyrimidines (V a—d)—a hitherto unreported ring system. The elemental analyses and spectral data are consistent with the suggested structures (V a—d).



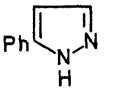
(I)

(a) R = H
(b) R = Me

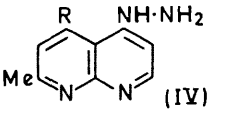


(II)

(a) R = H
(b) R = Me

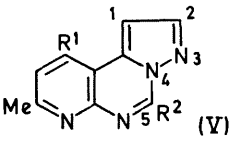


(III)



(IV)

(a) R = H
(b) R = Me



(V)

(a) R^1 = H, R^2 = H
(b) R^1 = Me, R^2 = H
(c) R^1 = H, R^2 = Me
(d) R^1 = Me, R^2 = Me

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[1] J. Elguero, R. Jacquier, and H. C. N. Tien Duc, *Bull. Soc. chim. France*, 1966, 3727.