Tetrahedron Letters,Vol.25,No.35,pp 3913-3916,1984 0040-4039/84 $3.00 + .00
Printed in Great Britain

RHAZIMINE — A NEW ALKALOID FROM THE LEAVES OF *RHAZYA STRICTA*

ATTA-UR-RAHMAN* and SAJIDA KHANUM

H.E.J.Research Institute of Chemistry, University of Karachi,
Karachi-32/Pakistan.

Summary: Studies on the alkaloids in the leaves of *Rhazya stricta* have resulted in the isolation of a new alkaloid "rhazimine" (2) bearing a novel skeletal system closely related to the ajmaline group of alkaloids.

The crude alkaloidal material (180gm) isolated by conventional procedures[1,2] from 60kg of leaves of *Rhazya stricta* Decaisne was subjected to column chromatography over silica gel. Elution with ethyl acetate-methanol (10:1) afforded a mixture of three alkaloids which on purification by preparative TLC afforded 70mg of a new alkaloid, named "rhazimine", as a white crystalline material, m.p. 168°C (dec.) $[\alpha]_D CHCl_3 = + 131°$, pink coloured reaction with $CeSO_4$. The substance afforded a characteristic indolenine UV spectrum: λ_{max}MeOH 222nm (log ε 3.3906), 265nm (log ε 2.8642) and 290nm (log ε 2.7734); λ_{min}MeOH 250nm (log ε 2.8657) and 290nm (log ε 2.806). The IR spectrum showed absorptions at 1740 cm^{-1} (keto C=O), 1720 cm^{-1} (ester C=O) and 1630 cm^{-1} (>C=CH). High resolution MS afforded the molecular ion at m/z 350.1619 (18%) which agreed with the formula $C_{21}H_{22}N_2O_3$ (calcd. 350.1630) indicating the presence of twelve double bond equivalents in the molecule. Other fragments were present at m/z 322.1668 ($C_{20}H_{22}N_2O_2$, 6%, M^+-CO), 214.0864 ($C_{13}H_{12}NO_2$, 4%, ion a), 182.0603 ($C_{12}H_8NO$, 2%, ion b), 167.0738 ($C_{12}H_9N$, 1.7%, ion c) and 122.0967 ($C_8H_{12}N$, 100%, ion d).

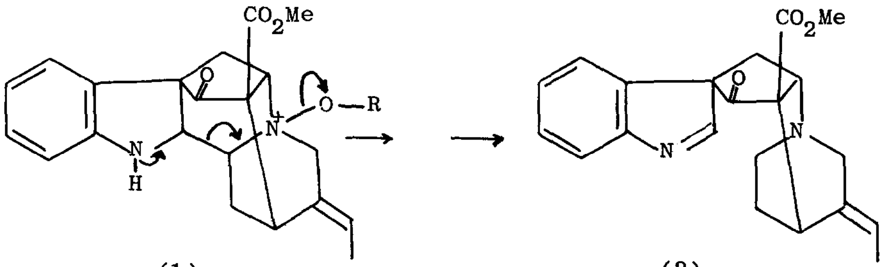
The ^{1}H-NMR spectrum ($CDCl_3$) showed a three proton double-doublet at δ 1.58 (J_1 = 7Hz, J_2 = 2.2Hz) which was assigned to the ethylidene methyl group. A three proton singlet at δ 3.51 was assigned to the ester methyl. A one proton quartet at δ 5.57 (J = 7Hz) was assigned to the olefinic proton of the ethylidene group. The aromatic protons afforded complex multiplets in the region δ 7.2-7.4. A low field singlet at δ 7.70 was of particular significance, its position being in agreement with that expected for an olefinic proton attached to a ketimine carbon.[3] Since indolenine alkaloids are normally substituted at C-2, it was suspected that rhazimine had an unusual *seco* structure with the C-2/C-3 bond cleaved.

The ^{13}C-NMR spectrum ($CDCl_3$) bore distinct similarities with the ^{13}C-NMR of alkaloids of the ajmaline series.[4] The spectrum showed a downfield signal at δ 214.11 which was assigned to the C-17 carbonyl carbon.[5] The ester carbonyl carbon resonated at δ 168.33. The signal at δ 160.55 was assigned to the C-2 carbon atom α- to the indolenine nitrogen. The chemical shift assignments for various carbon atoms of rhazimine are presented in Table (I). Gated spin echo (GASPE) measurements were carried out to confirm the assignments. Interestingly these showed unambiguously that a proton was attached to the ketimine carbon atom at C-2. Moreover the presence of two downfield methylenes and one methine α-to N_b (rather than one methylene and two methines α-to N_b encountered in ajmaline-type alkaloids)[7] was demonstrated by GASPE measurements and provided further support to the conclusion that the bond between C-2 and C-3 was broken in (2).

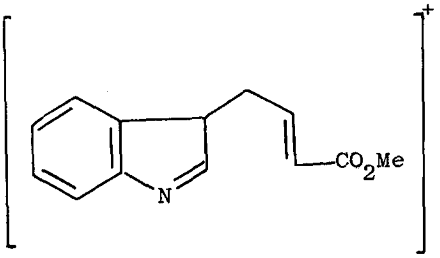
TABLE-I

Carbon	Chemical Shift	Carbon	Chemical Shift
2	160.55	13	142.70
3	51.55	14	31.93
5	61.01	15	37.24
6	30.25	16	58.07
7	63.07	17	214.11
8	137.46	18	12.86
9	128.23	19	120.84
10	125.00	20	137.32
11	127.88	21	52.92
12	128.69	OCH_3	52.01
		ester C=O	168.33

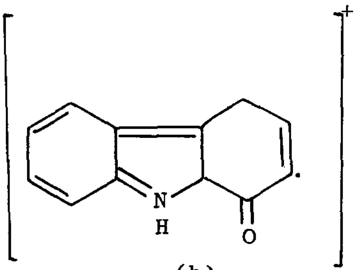
In the light of these data structure (2) is assigned to rhazimine. Rhazimine is the first member of a new group of ajmaline-type alkaloids in which the bond between C-2 and C-3 is broken. It may arise in the plant by intramolecular Polonovski elimination-reduction sequence (Scheme 1).



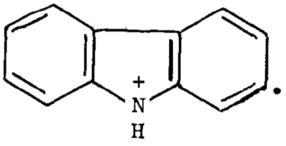
(1) Scheme 1 (2)



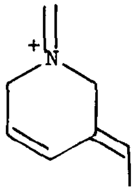
(a)



(b)



(c)



(d)

References

1. Y.Ahmad, K.Fatima, Atta-ur-Rahman, J.L.Occolowitz, B.A.Solheim, J.Clardy, R.L.Garnick and P.W.Le Quesne, *J.Am.Chem.Soc.*, **99**, 1943 (1977).
2. Atta-ur-Rahman and S.Khanum, *Phytochemistry*, **23**(3), 709 (1984).

3. "High Resolution NMR Spectra Catalogue" (Varian), N.S.Bhacca, D.P.Hollis, L.F.Johnson and E.A.Pier (1962,63).

4. T.A.Broadbent and E.G.Paul, *Heterocycles*, 20(5), 863 (1982).

5. A.Chatterjee, M.Chakrabarty, A.K.Ghosh, E.W.Hagaman and E.Wenkert, *Tetrahedron Lett.*, 3879 (1978).

6. M.Shamma and D.M.Hindenlang "C-13 NMR shift assignments of amines and alkaloids", Plenum Press, New York - London (1979).

7. B.Danieli, G.Palmisano and G.S.Ricca, *Tetrahedron Lett.*, 22(40), 4007 (1981).

(Received in UK 4 June 1984)