Biomimetic Synthesis of a Key *Erythrina* Alkaloid Precursor

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Summary A ready and direct synthesis of the dibenzazonine (**7**), *via* VOF_3 oxidation of (±)-*N*-trifluoroacetylnorprotosinomenine (**3**) to the (±)-spirodienone (**5**), and high-yield conversion of (**5**) into (**7**) is reported.

THE dibenzazonine (**7**) has been shown to be a key intermediate in the *in vitro*[1] and *in vivo*[2] formation of erysodienone (**9**). In turn, (**9**) has been shown to be a genuine precursor of *Erythrina* alkaloids such as erythraline (**10**) in *Erythrina crista galli*. The proerythrinadienone (**6**) has been proposed as a biosynthetic precursor of the dibenzazonine (**7**),[1,2] in view of the demonstrated incorporation of norprotosinomenine (**4**) into *Erythrina* alkaloids. However, earlier efforts to prepare (**6**) for attempts at transformation to (**7**) have been unsuccessful,[2] and (**7**) has been prepared solely by reduction of erysodienone (**9**). We now report a direct and efficient synthesis of (**7**) by a route which parallels the proposed biosynthetic pathway.

(±)-*O*,*O*-Dibenzylnorprotosinomenine (**1**)[3] was treated with trifluoroacetic anhydride and pyridine in methylene chloride to yield the *N*-trifluoroacetyl derivative (**2**), (m.p. 131—132·5 °C, 95%).† Catalytic hydrogenolysis of (**2**) over 10% palladium on charcoal in ethanol gave (±)-*N*-trifluoroacetylnorprotosinomenine (**3**), (m.p. 150—151 °C, 93%). When (**3**) was oxidized with $VOCl_3$[4] in anhydrous methylene chloride, the dienone (**5**), m.p. 221—223 °C (lit.[5] 222—223 °C), was obtained in 11% yield. On the other hand, oxidation of (**3**) in anhydrous methylene chloride with VOF_3 in anhydrous ethyl acetate at −10 °C gave (**5**) in 40% yield.‡ Treatment of (**5**) with 1N NaOH in anhydrous methanol at room temperature for 30 min followed by reduction with sodium borohydride yielded the dibenzazonine (**7**)§ in 80% yield. The conversion of (**5**) to (**7**) presumably proceeds by alkaline solvolysis of (**5**) to (**6**), rearrangement to (**8**), and subsequent reduction of (**8**) to (**7**).

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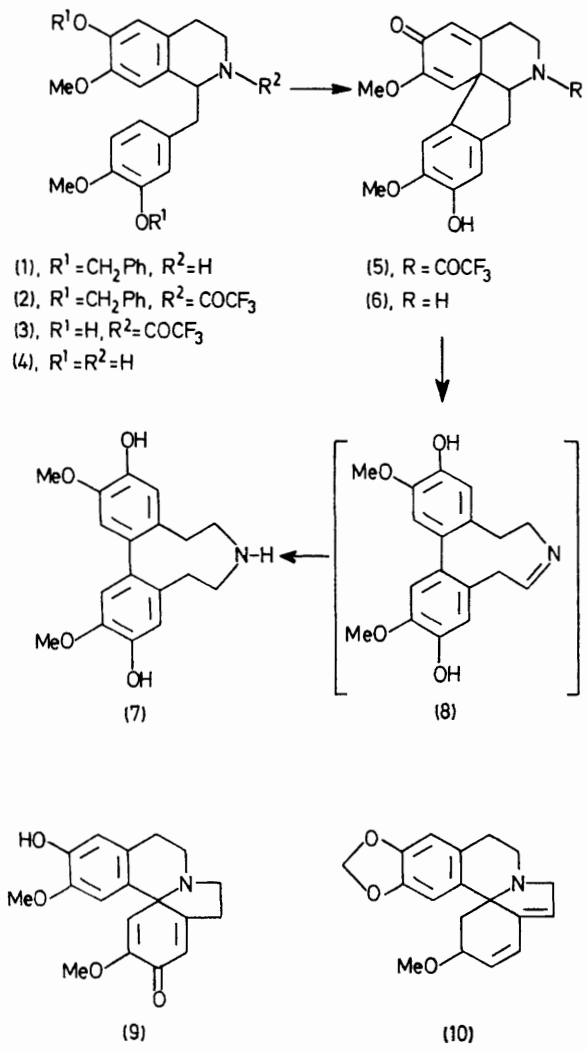

† All new compounds were characterized by satisfactory analytical and spectral data. The structural formulae containing asymmetric atoms refer to racemic compounds.

‡ The spirodienone (**5**) was obtained earlier in *ca.* 12% yield by photolytic synthesis.[5]

§ The melting point, i.r., u.v., n.m.r., and mass spectra were in good agreement with those reported for dibenzazonine (**7**).[1]

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