PLANNING AND OPERATION IN THE MULTISTEP ALKALOID SYNTHESIS

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[I] Synthesis of Serratinine, 8-Deoxyserratinine and Fawcettimine

A preliminary planning (indicated by ⟹) includes three unsettled steps (Ⓐ,Ⓑ,Ⓒ). Ⓐ The selective addition direction was secured by using 2-methyl-5-acrylic ester-1,4-benzoquinone. Ⓑ The desired selectivity was obtained using excess pyrrolidine-AcOH in MeOH. Ⓒ The nitrogen containing rings were constructed via an aziridinium ring. Reduction of the triketone gave dl-serratinine.[1] A preliminary planning includes three matters for investigation (Ⓓ,Ⓔ,Ⓕ). Ⓓ The stereoselective addition of butadiene was found in the presence of Lewis acids. Ⓔ The desired selectivity was obtained using morpholine-camphoric acid in Et_2O-HMPA. Ⓕ The nitogen containing ring was constructed through epoxides completing synthesis of dl-8-deoxyserratinine and dl-fawcettimine.[2]

[II] Synthesis of Pumiliotoxin C and Synthetic Approach to Histrionicotoxin

The first synthesis of pumiliotoxin C was achieved starting from tetrahydoindanone.[3,4] The stereoselctive synthesis was completed using the bicyclo[2.2.2]octane derivative synthesized by the Diels-Alder reaction of acrylonitrile with new type diene 1,3-bis(trimethylsiloxycyclohexa)-1,3-diene. The key intermediate possessing three of four chiral centers of the toxin was obtained from the bicyclo compound in one operation. Alkylation of lactam carbonyl gave pumiliotoxin C.[5] Synthesis of perhydrohistrionicotoxin has been reported by several groups[4] and an alternative synthesis is undertaking.

References

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