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 $\Rightarrow$) includes three unsettled steps (A,B,C).

A The selective addition direction was secured by using 2-methyl-5-acrylic ester-1,4-benzoquinone.  B The desired selectivity was obtained using excess pyrrolidine-AcOH in MeOH.  C The nitrogen containing rings were constructed via an aziridinium ring. Reduction of the triketone gave dl-serratinine.  A preliminary planning includes three matters for investigation (D,E,F).

D The stereoselective addition of butadiene was found in the presence of Lewis acids.  E The desired selectivity was obtained using morpholine-camphoric acid in Et$_2$O-HMPA.  F The nitrogen containing ring was constructed through epoxides completing synthesis of dl-$\delta$-deoxyserratinine and dl-fawcettimine.

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

The first synthesis of pumiliotoxin C was achieved starting from tetrahydoindanone. The stereoselective 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(trimethylsiloxy)cyclohexa)-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. Synthesis of perhydrohistrionicotoxin has been reported by several groups and an alternative synthesis is undertaking.

References