Studies toward the Total Synthesis of Azinomycin A

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Azinomycins A and B, isolated from *Streptomyces griseofuscus*, are an antitumor antibiotic bearing a unique 4-hydroxy-1-azabicyclo[3.1.0]hexane ring system. These natural products form a covalent interstrand cross-link between suitably disposed purine bases in DNA by opening of their highly reactive 1-azabicyclo[3.1.0]hexane and oxirane moieties. The mode of action, intriguing structures and prominent antitumor activities makes azinomycins attractive targets for total synthesis, and a number of synthetic studies have been reported. While Coleman *et al*. succeeded in the total synthesis of azinomycin A, the other synthetic studies have been prevented by significant instability of the 4-hydroxy-1-azabicyclo[3.1.0]hexane moiety.

We previously reported that a 3,4-epoxypiperidine structure, a constructional isomer of the 4-hydroxy-1-azabicyclo[3.1.0]hexane ring system, works as a novel and simple DNA cleavage molecular unit. It occurred to us that azinomycin analouges having a 3,4-epoxypiperidine structure in place of the 4-hydroxy-1-azabicyclo[3.1.0]hexane ring could be a key precursor for the synthesis of azinomycins. According to this idea, we have achieved the synthesis of the desired 3,4-epoxypiperidine derivative *via* 24 steps from D-arabinose. Conversion of the 3,4-epoxypiperidine derivative into azinomycin A is in progress, and the details will be presented.