

Synthetic Studies on *Lycopodium* Alkaloid, (+)-Magellaninone and (-)-Magellanine

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(+)-Magellaninone and (-)-magellanine were isolated from *Lycopodium magellanicum* and characterized by Castillo, MacLean, and co-workers in the 1970s. These alkaloids possess not only a highly compact common tetracyclic framework consisting of 17 carbons with several functional groups such as an unsaturated carbonyl functionality and a hydroxy moiety, but also 6 contiguous stereogenic centers involving a quaternary carbon atom. Because of those unique structures, these alkaloids have attracted many synthetic chemists, and several groups had already accomplished the total synthesis of them.

In our laboratory, we have developed the highly stereoselective intramolecular Pauson-Khand reaction with $\text{Co}_2(\text{CO})_8$ to construct bicyclo[3.3.0]octenone and bicyclo[4.3.0]nonenone frameworks from the corresponding enynes derived from diethyl tartrate. Our endeavor is now focused on total synthesis of (+)-magellaninone and (-)-magellanine from diethyl L-tartrate via the common tetracyclic framework based on the dual stereoselective Pauson-Khand reaction. Thus, all four rings of the tetracyclic structure could be stereoselectively constructed starting from the simple enyne by two times of Pauson-Khand reaction. The cyclopentenone moiety of the tetracyclic carbon frameworks, thus formed, was successfully converted into the piperidine skeleton. Now, the study of this program faces to the last step leading to the target alkaloids.