Domino Strategies for Syntheses of Natural Products and New Molecular Scaffolds

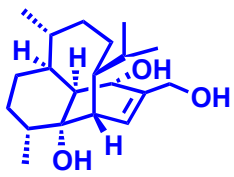
Krishna Kaliappan

Indian Institute of Technology Bombay, Mumbai, Maharastra, India

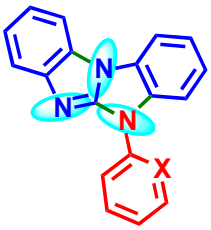
Our group has been engaged in designing simple and efficient domino strategies for the syntheses of natural products and natural product like molecules. In this lecture, our efforts leading to syntheses of vinigrol, cyclic guanidines and *N*-heterocyclic amides will be discussed in details.

Vinigrol, a unique diterpene, containing the decahydro-1,5-butanonaphthalene carbon skeleton has been shown to exhibit a broad spectrum of biological activity. Besides the multiple sites of oxygenation, vinigrol contains a tricyclic core having a *cis*-fused [4.4.0] system bridged by an eight-membered ring and eight contiguous stereocenters. We recently reported an enantioselective formal synthesis of vinigrol, involving a **1-2-3 strategy** (**one pot** and **2-reactions with the formation of 3-rings**), leading to the core structure of vinigrol from its stereochemically well-defined acyclic precursor.

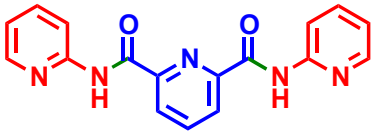
The cyclic guanidines and *N*-heterocyclic amides are important structural units present in biologically active drug molecules. However, the existing methods suffer from harsh conditions, narrow functional group tolerance, poor atom economy, low yielding and so; it warrants an efficient protocol for their syntheses. We have developed a one-pot Cu-catalyzed cascade routes to these unique cyclic guanidines and *N*-heterocyclic amides from readily available starting materials.



Vinigrol



Cyclic guanidines



N-Heterocyclic amides