Ph.D. Open Seminar

Title of Thesis: **"Asymmetric Approach to Naturally Occurring Alkaloids Sharing 3a,3a'-Bis-Pyrrolo[2,3-*b*]indoline and Benzofuroindoline"**

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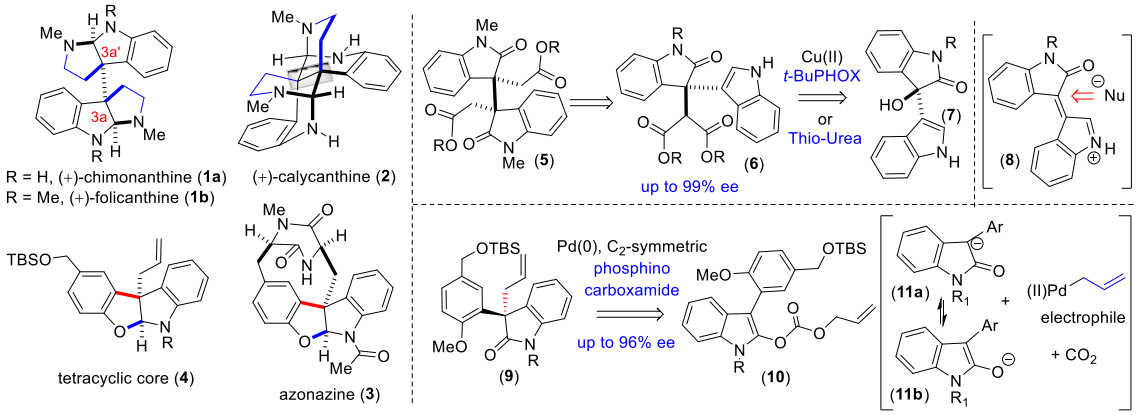
Date: **June 29, 2018** (Friday) Time: **4:00 PM** Venue: **AB2-401**

Abstract

The presence of all-carbon quaternary stereocenters invariably increases the difficulty of a chemical synthesis in the target molecule (**1-3**, Scheme 1).[1] A very limited number of reports on C–C bond-forming reactions that reliably assemble quaternary carbons are known in literature, due to the steric congestion imposed by the four attached carbons.[2] Towards this, architecturally intriguing dimeric hexahydropyrrolo[2,3-*b*]indole alkaloids (**1a-b**) and their rearranged scaffold (**2**) sharing quaternary stereocenters are widespread in nature and were isolated from various sources.[1a-b] Structurally, these alkaloids possess four contiguous stereogenic carbons, among those two of them are situated at the vicinal C3a-C3a' position (**1a-b** and **2**)[2] and thus are challenging target for synthetic community.[3] On the other hand, azonazine[4a] (**3**), having a unique hexacyclic dipeptide structure, isolated from Hawaiian marine sediment-derived fungus *Aspergillus insulicola*. Therefore, due to their intriguing architecture in addition to important biological activities, these alkaloids drew our interest.[4b-d]



Scheme 1. Selected architecturally intriguing indole alkaloids sharing quaternary stereogenic center.

As a part of my Ph.D. thesis, in Chapters I-III, I will discuss about the development of catalytic enantioselective malonate addition onto 3-hydroxy-2-oxindoles in the presence of Cu(II)-^{t}BuPHOX (up to 99% ee) and thio-urea (up to 95% ee) for the synthetic approaches to dimeric hexahydropyrrolo[2,3-*b*]indoline alkaloids (**1a-b**).[5a-b] In Chapter IV, I will discuss about catalytic asymmetric decarboxylative allylation (DcA) in the presence of Pd(0)-C_2-symmetric phosphine carboxamide ligands for the synthesis of 2-oxindoles (up to 96% ee) and its application in efficient synthesis of tetracyclic skeleton on azonazine (**3**).[5c]

References and Notes:

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2. (a) Mitsunuma, H.; Shibasaki, M.; Kanai, M.; Matsunaga, S. *Angew. Chem., Int. Ed.* **2012**, *51*, 5217. (b) Ghosh, S.; Chaudhuri, S.; Bisai, A. *Chem. –Eur. J.* **2015**, *21*, 17479.
3. (a) Ghosh, S.; Bhunia, S.; Kakde, B. N.; De, S.; Bisai, A. *Chem. Commun.* **2014**, *50*, 2434. (b) Kumar, N.; Das, M. K.; Ghosh, S.; Bisai, A. *Chem. Commun.* **2017**, *53*, 2170.
4. (a) Crews et. al. *Org. Lett.* **2010**, *12*, 4458. (b) Luo et. al. *J. Med. Chem.* **2005**, *48*, 986. (b) Kinthada, L. K.; Ghosh, S.; Babu, K. N.; Sharique, M.; Biswas, S.; Bisai, A. *Org. Biomol. Chem.* **2014**, *12*, 8152. (c) Babu, N. K.; Kinthada, L. K.; Ghosh, S.; Bisai, A. *Org. Biomol. Chem.* **2015**, *13*, 10641.
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