

**Ph.D. Open Seminar**  
**Department of Chemistry, IISER Bhopal**

Topic of Seminar: "Asymmetric Total Synthesis of C-3 Prenylated Hexahydro[2,3-*b*]Pyrroloindoline Alkaloids"

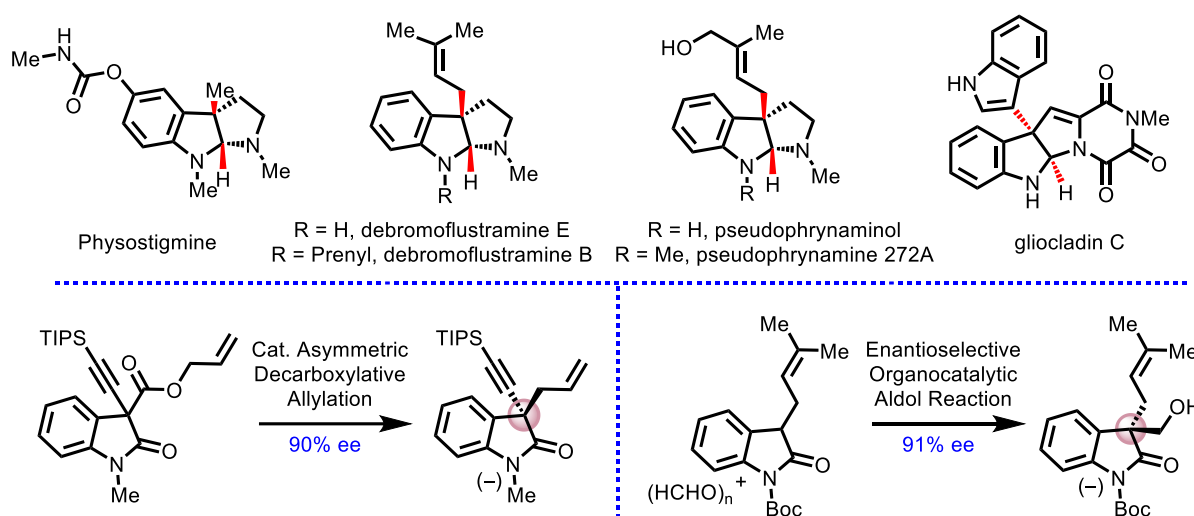
Speaker: **Mr. Arindam Maity** (Thesis Supervisor: **Prof. Alakesh Bisai**)  
Date: **May 8, 2020**

Roll No.: **1610203**

Time: **9:00 AM**

**Abstract**

Naturally occurring hexahydro-[2,3-*b*]-pyrroloindole alkaloids constitute a large class of secondary metabolites that are formally derived from *L*-tryptophan.<sup>1</sup> They are frequently found in a range of natural alkaloids,<sup>2</sup> numerous marketed drugs and drug candidates. Especially, the hexahydropyrrolo-[2,3-*b*]-indole alkaloids having a prenyl moiety adjacent to the pseudobenzyl 3a-site, viz. flustramines, pseudophrynamines, sellaginelic acid and pseudophrynaminol have gained considerable attention owing to their potential biological activities.<sup>3a-b</sup>



**Figure 1.** C-3 Prenylated Hexahydro-[2,3-*b*]-Pyrroloindoline Alkaloids with all-carbon quaternary stereocentres

During my Ph.D. programme, I undertook synthetic approaches to C-3 methylated and Prenylated hexahydro-[2,3-*b*]-pyrroloindoline alkaloids following a highly enantio and diastereoselective methodology which builds all-carbon quaternary stereocentres *via* oxidative electrophilic alkylation,<sup>4a-d</sup> organocatalytic aldol reaction affording 91% ee<sup>5a-c</sup> and decarboxylative alkylations with 20:1 dr.<sup>6a-c</sup> These strategies have eventually been applied in the total synthesis of (+)- and (-)-flustramines, pseudophrynamines and pseudophrynaminol.

**References and Notes:**

- (1) "Alkaloids from the Medicinal Plants of New Caledonia": T. Skvenet, J. Pusset in *The Alkaloids: Chemistry and Pharmacology*, Vol. 48 (Ed.: G. A. Cordell), Academic Press, New York, 1996, pp. 58 – 59. (2) Kobayashi, J.; Ishibashi, M. *Alkaloids* **1992**, *41*, 41.
- (3) (a) Holst, P. B.; Anthoni, U.; Christophersen, C.; Nielsen, P. H. *J. Nat. Prod.* **1994**, *57*, 997–1000. (b) Smith, B. P.; Tyler, M. J.; Kaneko, T.; Garraffo, H. M.; Spande, T. F.; Daly, J. W. *J. Nat. Prod.* **2002**, *65*, 439–447.
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- (5) (a) De, S.; Das, K. M.; Bhunia, S.; Bisai, A. *Org. Lett.* **2015**, *17*, 5922. (b) **Maity, A.**; Das, K. M.; Bisai, A. *Manuscript under preparation*. (c) **Maity, A.**; Roy, A.; Bisai, A. *Manuscript under preparation*.
- (6) (a) Kumar, N.; **Maity, A.**; Gavit, R. V.; Bisai, A. *Chem. Comm.* **2018**, *54*, 9083. (b) Kumar, N.; Gavit, R. V.; **Maity, A.**; Bisai, A. *J. Org. Chem.* **2018**, *83*, 10709. (c) **Maity, A.**; Kumar, N.; Das, K. M.; Bisai, A. *work under progress*.