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

Topic of Seminar: **"Synthetic Approaches to Alkaloids Sharing Hexacyclic 3a,3a'-bis-Pyrrolo[2,3-*b*]indoline Scaffolds: Total Synthesis of (+)- and (–)-Calycanthidine"**

Speaker: **Mr. Avishek Roy (Thesis Supervisor:Prof. Alakesh Bisai)** Roll No.:**1510204**
Date:**July 03, 2019** Time: **4:30 PM** Venue:**AB2-401**


## Abstract

A number of naturally occurringdimerichexahydropyrroloindole (HPI) alkaloids (Figure 1), includinghomo- and hetero-dimeric scaffolds, exhibit important biological activities such as antifungal and cytostatic properties.[1]Structurally, these molecules usually incorporate a couple of sterically hindered vicinal all-carbon quaternary stereocenters at C3a and C3a′, which is regarded as "a daunting challenge" from an organic synthesis perspective.[1a]Due to the steric congestion imposed by the four attached carbons, a very limited number of reports on C–C bond-forming reactions that reliably assemble quaternary carbons are known in literature and hence it puts forward a greatsynthetic challenge.[1d] The challenge is aggravated even further when two all-carbon quaternary stereocenters are contiguous.Notwithstanding, one of the ways to solve this problem is typically by installing the quaternary stereocenters sequentially.[2-3]

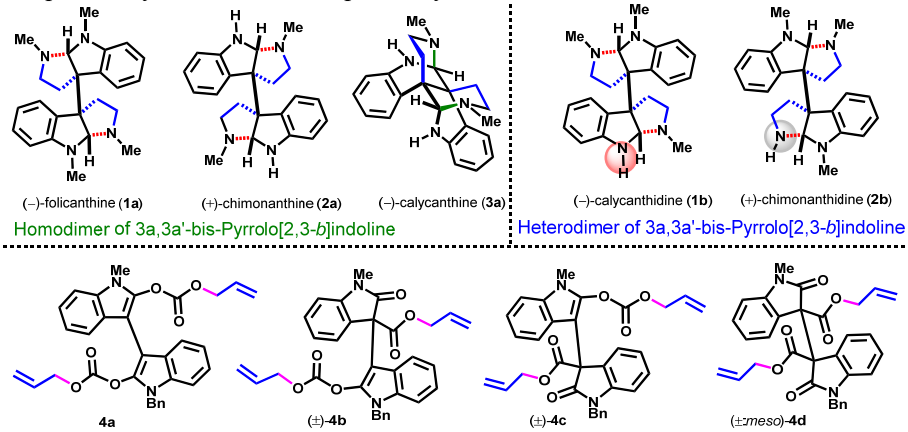


**Figure.**Dimericindole alkaloids sharing vicinal all-carbon quaternary stereocenters.

During my Ph.D. programme, I undertook synthetic approaches to the alkaloids having hexacyclic 3a,3a'-bis-pyrrolo[2,3-*b*]indoline ring systems[4a-b]following a highly enantio-, chemo-, and diastereoselective methodology which builds vicinal all-carbon quaternary stereocenters*via* double decarboxylativeallylation reactions of compound type**4** to afford products in 92% enantioselectivity with ~17:1 dr (Figure). The strategy has eventually been applied in the total synthesis of (+)- and (-)-calycanthidne.[5]


**References and Notes:**


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2. (a) Chaudhuri, S.; Bhunia, S.;**Roy, A.**; Das, M. K.;Bisai, A. *Org. Lett.***2018**, *20*, 288. (b) Kumar, N.; Maity, A.; Gavit, V. R.; Bisai, A. *Chem. Commun.***2018**, *54*, 9083. (c) Ghosh, S.; Chaudhuri, S.; Bisai,A. *Chem. -Eur. J.***2015**, 21, 17479.
3. (a) Babu, N.; **Roy**, **A.**;Singh, M.; Bisai, A. *Org. Lett.***2018**, *20*, 6327. (b) Kumar, N.; Das, M. K.; Ghosh, S.; Bisai, A. *Chem. Commun.***2017**, *53*, 2170. (c) Babu, N.; Kinthada, L. K.; Das, P. P.; Bisai,A. *Chem. Commun.***2018**, *54*, 7963. (d) De, S.; Das, M. K.; **Roy**, **A.**;Bisai, A. *J. Org. Chem.***2016**, *81*, 12258.
4. Pyrrolo[2,3-*b*]indoline synthesis under oxidative condition, see; (a) **A. Roy**, M. K. Das, S. Chaudhuri, A. Bisai, *J. Org. Chem.***2018**, *83*, 403-421. (c) **Roy, A.**; Maity, A.; Das, M. K.; Bisai, A. *Manuscript Submitted.*
5. (a) **Roy, A.**; Shaheeda, S.; Babu, K. N.; Bisai, A. *Manuscript Submitted*. (b) **Roy, A.**; Shaheeda, S.; Maity, A.; *Manuscript under preparation*.