Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally, Ranga Reddy Dist., Hyderabad – 500 046

Seminar

Stereodivergent Syntheses to Natural Products Preparations Using Enzymes

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Enzymes are exquisite catalysts that are capable of providing unparalleled levels of chemo-, regio-, diastereo- and enantioselectivity. We have leveraged these properties of enzymes to establish biocatalytic methods and one-pot multienzyme cascades for the stereodivergent synthesis of six and seven-membered N-heterocycles such as tetrahydroquinolines, and tetrahydro-1,2, & 3-benzazepines with therapeutic potential. Furthermore, the challenge of building complex natural products in a lab using existing chemistry is overcome by taking inspiration from the biosynthetic pathways that are perfected to synthesize such molecules with ease. We have made an elegant selection of putative biosynthetic enzymes to establish one-pot multienzyme cascades containing ene- and naphthol reductases to synthesize (+)-isoshinanolone and other related natural naphthalenones. In another work, modified bisanthraquinones containing eight chiral centres were synthesized by using just a single enzyme in a biomimetic manner. The strategy relies on the use of putative anthrol reductases from fungi in a three-step chemoenzymatic synthesis of (–)-rugulosin, (–)-luteoskyrin, and (–)-deoxyluteoskyrin starting from anthraquinones. These biocatalytic methods give facile access to biologically active complex molecules as well as pharmaceutically relevant N-heterocycles.

Tuesday, Feb 4th 2025

14:30 Hrs (Tea / Coffee 14:15 Hrs)

Auditorium, TIFRH