ORGANIC SEMINAR

Raymond Martinez

Graduate Student | Uyeda Group | Purdue University

"Chloroalkane-Derived Carbenes and Carbynes for Catalytic Asymmetric Cyclopropanations"

Cyclopropanes exhibit a unique three-dimensional structure of great interest to pharmaceutical chemists. Most asymmetric transition metal-catalyzed routes utilize diazoalkanes as carbene precursors, which require resonance stabilizing groups on large scales and are often selective for trans-substituted products. Our lab has pioneered the use of dichloroalkanes with cobalt catalysts for asymmetric reductive cyclopropanation. Dimethyl- and spirocyclopropane products are synthesized in highly enantioenriched form, unencumbered by stabilizing groups. *Cis*-substitution is consistently favored over *trans* when conducting boryl- and silylcyclopropanations, directed by the large *N*-aryl substituent of our ligand. Furthermore, when chloroform is used in place of a dichloroalkane, it acts as a carbyne equivalent to form metallocyclopropane intermediates, which can be further functionalized to halo-, aryl-, allyl-, alkynyl-, vinyl-, and other substituted cyclopropanes. High enantioenrichment and *cis*-selectivity are maintained throughout, providing a novel route to *cis*-analogues of *trans*-arylcyclopropyl bioactive compounds.