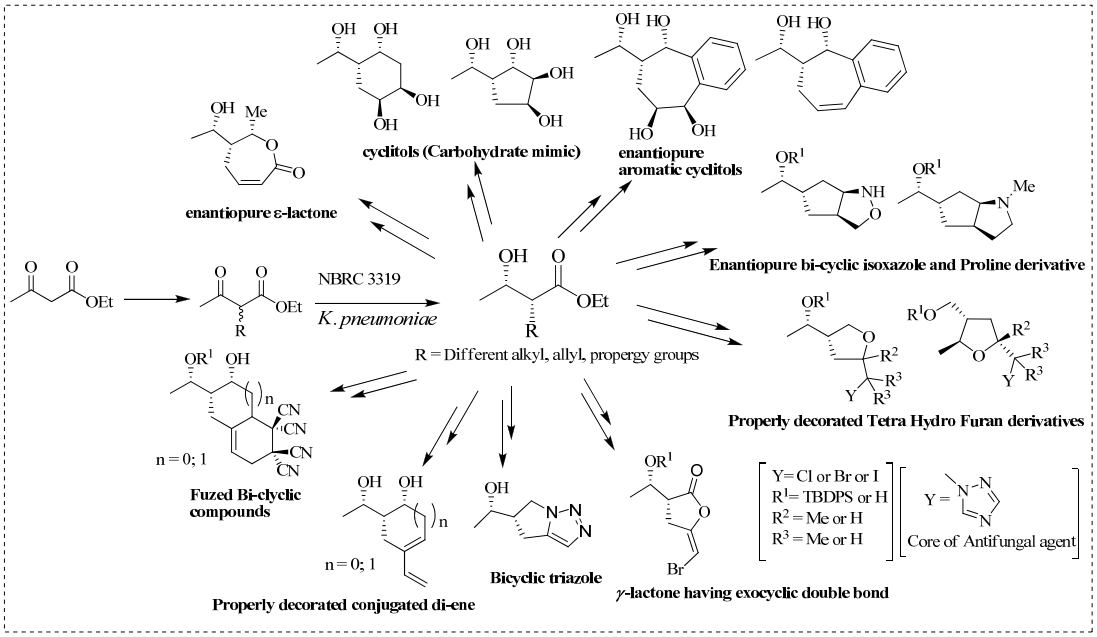
Thesis Title: Diversity Oriented Synthesis of Small Ring Carbocycles and Heterocycles from Biocatalytically Derived α-Substituted-β-Hydroxyesters

Abstract: Diversity oriented synthesis (DOS) has emerged as a new approach for the synthesis of a library of structurally diverse small molecules in recent time. An ideal DOS will be such an approach which can yield a large collection of the skeletally diverse molecule from simple starting precursors in an efficient and cost-effective manner. Using DOS, we can achieve a wide range of chemical entities including bioactive species and also unexplored chemical species. On the other hand, enantio and diastereoselective reduction of α-substituted-β-ketoesters through dynamic kinetic resolution (DKR) can be achieved using yeast and other microorganisms, and there are various reports in the scientific literature.

Our aim was to carry out a biocatalysis based reductive DKR method to synthesize various α-substituted-β-hydroxy esters first, then using the three active functional groups of the corresponding esters we planned to carry out reagent and transformation based DOS to synthesize various well-decorated stereochemically pure small ring carbocyclic and heterocyclic molecules such as enantiopure ε-lactone, carbohydrate mimic, aromatic cyclitols, bi-cyclic pyrrolidine and isoxazole derivatives, properly substituted tetrahydrofuran derivatives, γ-lactone, substituted bi-cyclic triazole and fused bi-cyclic molecules. All of the synthesized molecules are relatively unknown in the scientific literature but in some cases, have close structural resemblance with various bio-active natural products and active pharmaceutical ingredients (APIs).



Key Words: Diversity Oriented Synthesis, Bioreduction, DKR, Grignard reaction, RCM, *Syn*-dihydroxylation, Enyne metathesis, Halo-cyclization, Cycloaddition, Click-chemistry.