Expanding the accessible chemical space by utilizing traditional organic chemistry, small transition-metal catalysts, and enzymes

Modern advancements in various fields, such as medicine, agriculture, and material sciences, rely on the synthesis and application of organic compounds. Continuous efforts to improve synthetic routes for efficiently accessing these targeted products stem from the development of innovative methodologies to construct and modify chemical scaffolds. Significant progress in organic synthesis has recently enabled the selective functionalization of the periphery and the remodeling of molecular skeletons. In this talk, diverse synthetic methods, spanning traditional organic chemistry, transition-metal catalysis, and biocatalysis are presented. The complementarity of these strategies facilitates the implementation of efficient syntheses to generate compounds for their application in various areas of chemical space. Advancements in ring expansion reactions mediated by the insertion of a nitrogen atom into carbocyclic cores are showcased, facilitating the construction of highly desirable *N*-heterocycles. Additionally, functionalization reactions catalyzed by nickel-based small molecular catalysts or engineered biocatalysts are demonstrated as useful tools due to their unique capability for selectively introducing functional handles. Overall, the versatility of these methods enables unique synthetic pathways that include diverse opportunities for the field of organic chemistry.

CV:

Julia Reisenbauer, born and raised in Austria, earned her Bachelor's and Master's degrees in Chemistry at ETH Zurich. After completing her Ph.D. research under the supervision of Prof. Bill Morandi, where she specialized in nickel-catalyzed transfer hydrocyanation reactions and conducted research in nitrogen atom insertion reactions, she moved to the US to pursue her postdoctoral studies. Currently, she is an SNSF fellow in the group of Prof. Frances H. Arnold at Caltech, developing new synthetic approaches by utilizing and engineering biocatalysts.