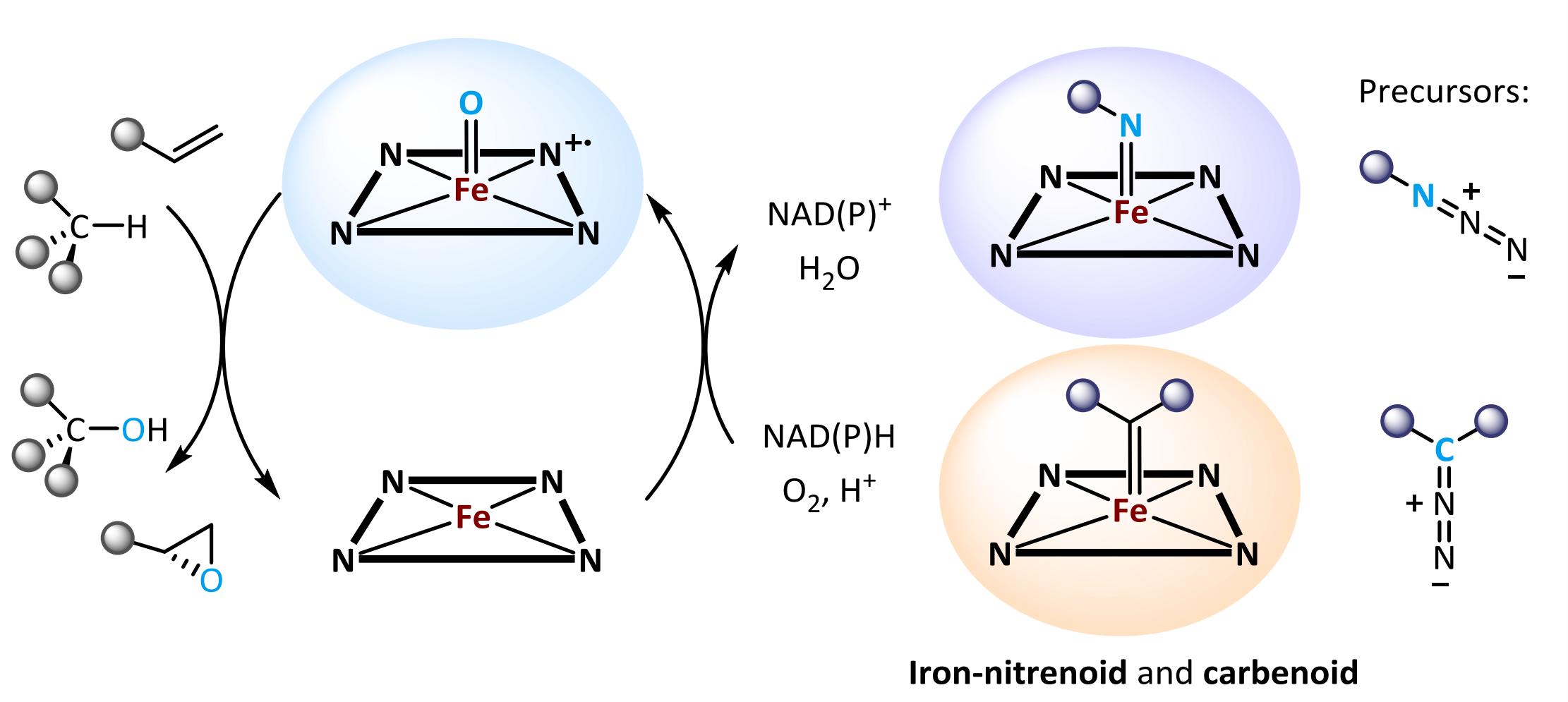


Directed Evolution Research in the Arnold Lab

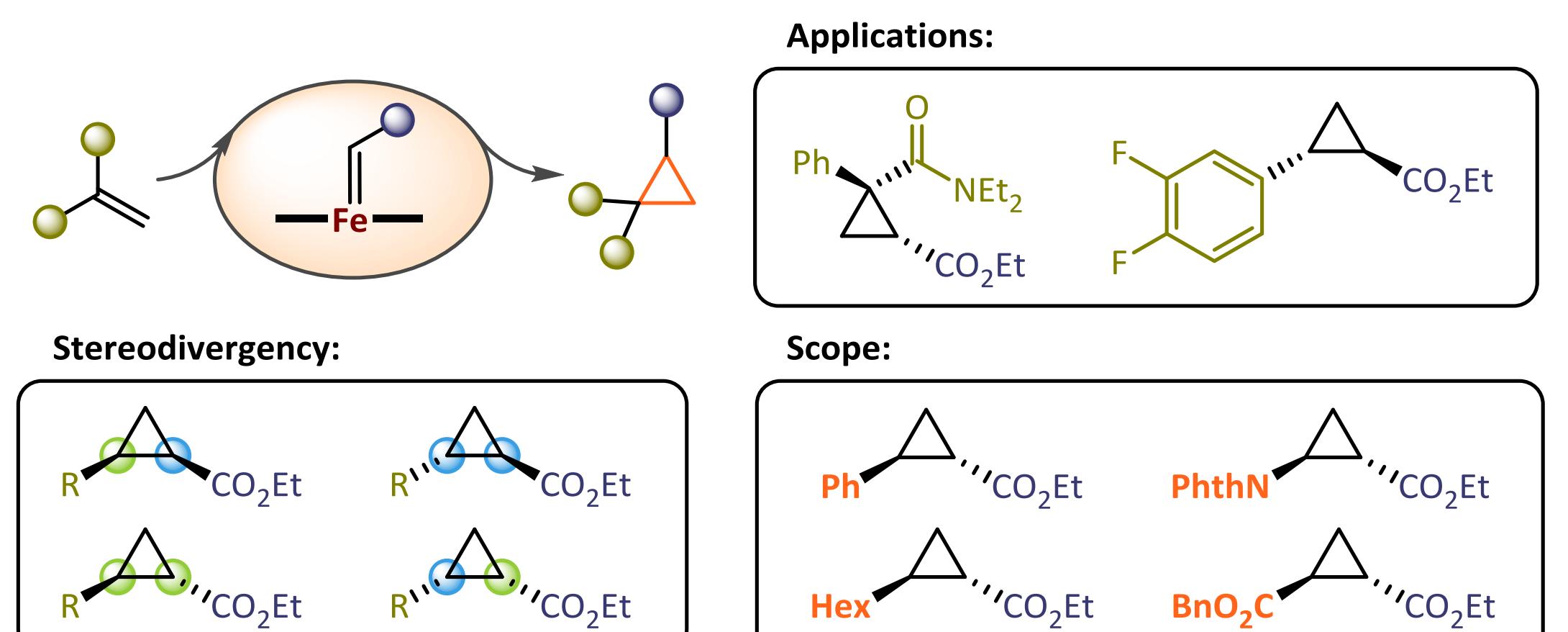
Kai Chen, Frances H. Arnold

Exploring Non-Native Heme Protein Chemistry

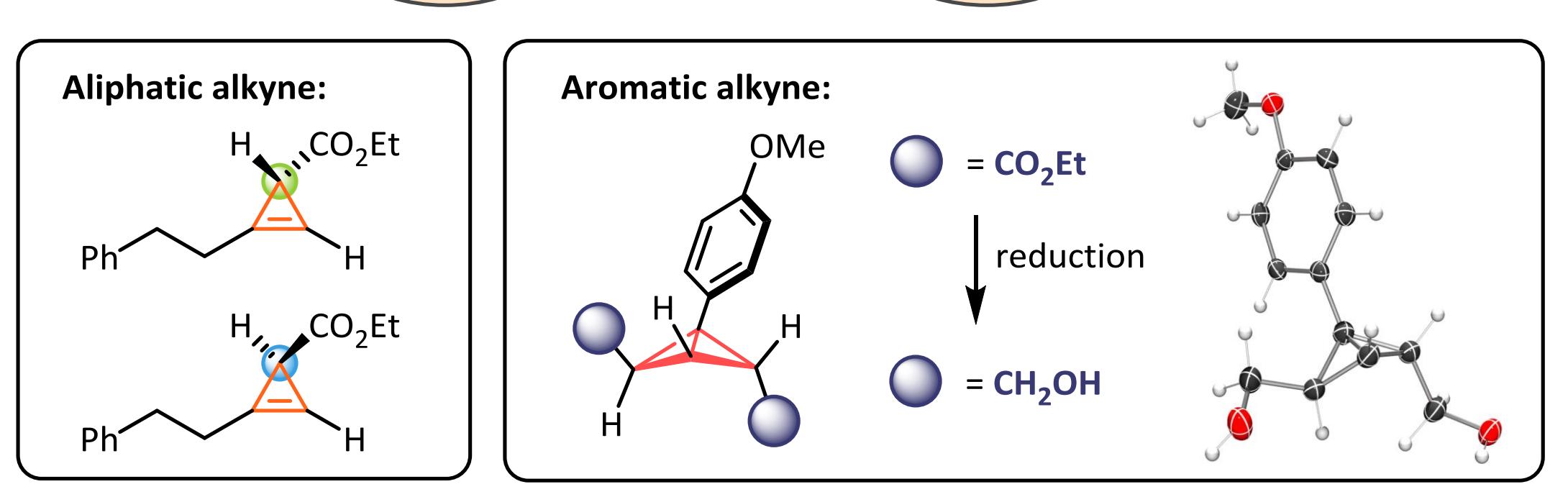


Carbene Chemistry with Heme Proteins

New Enzymatic Approaches to Strained Carbocycles

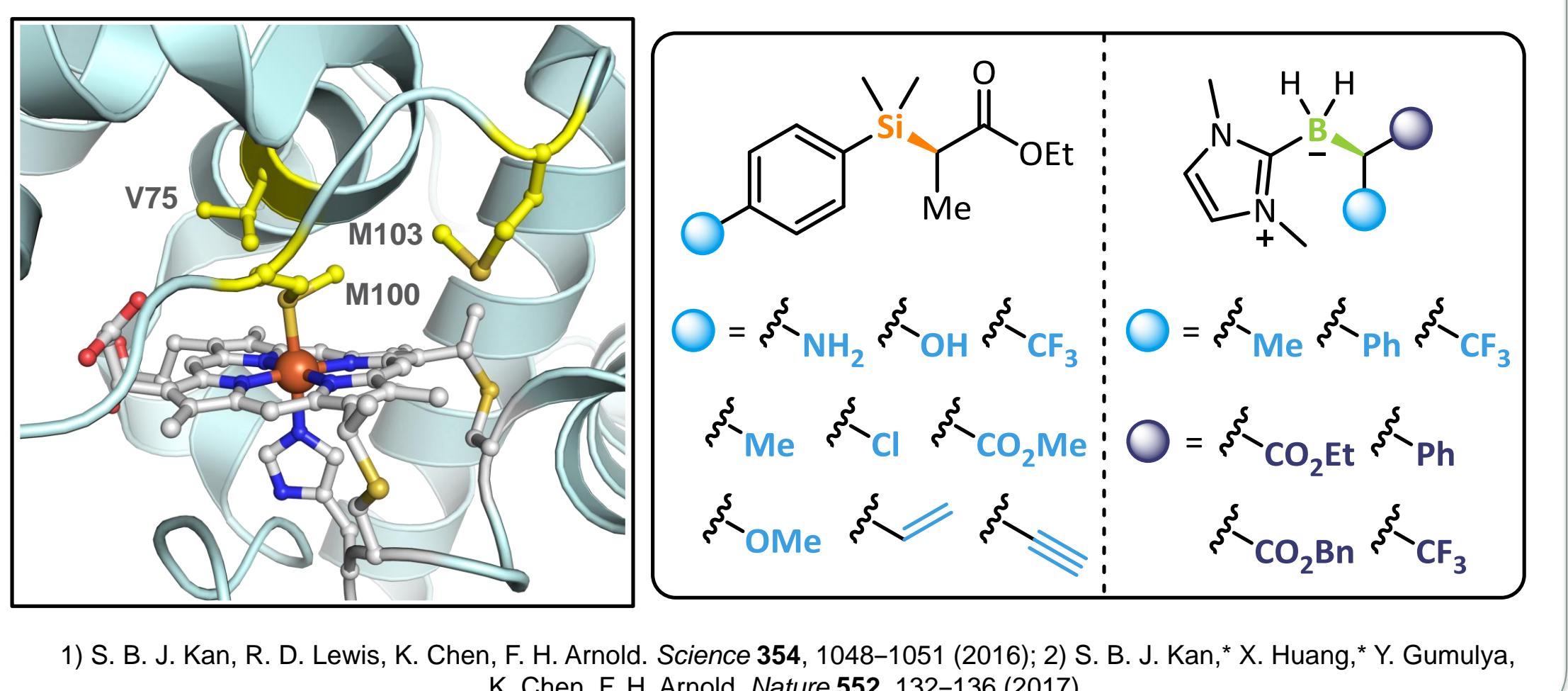
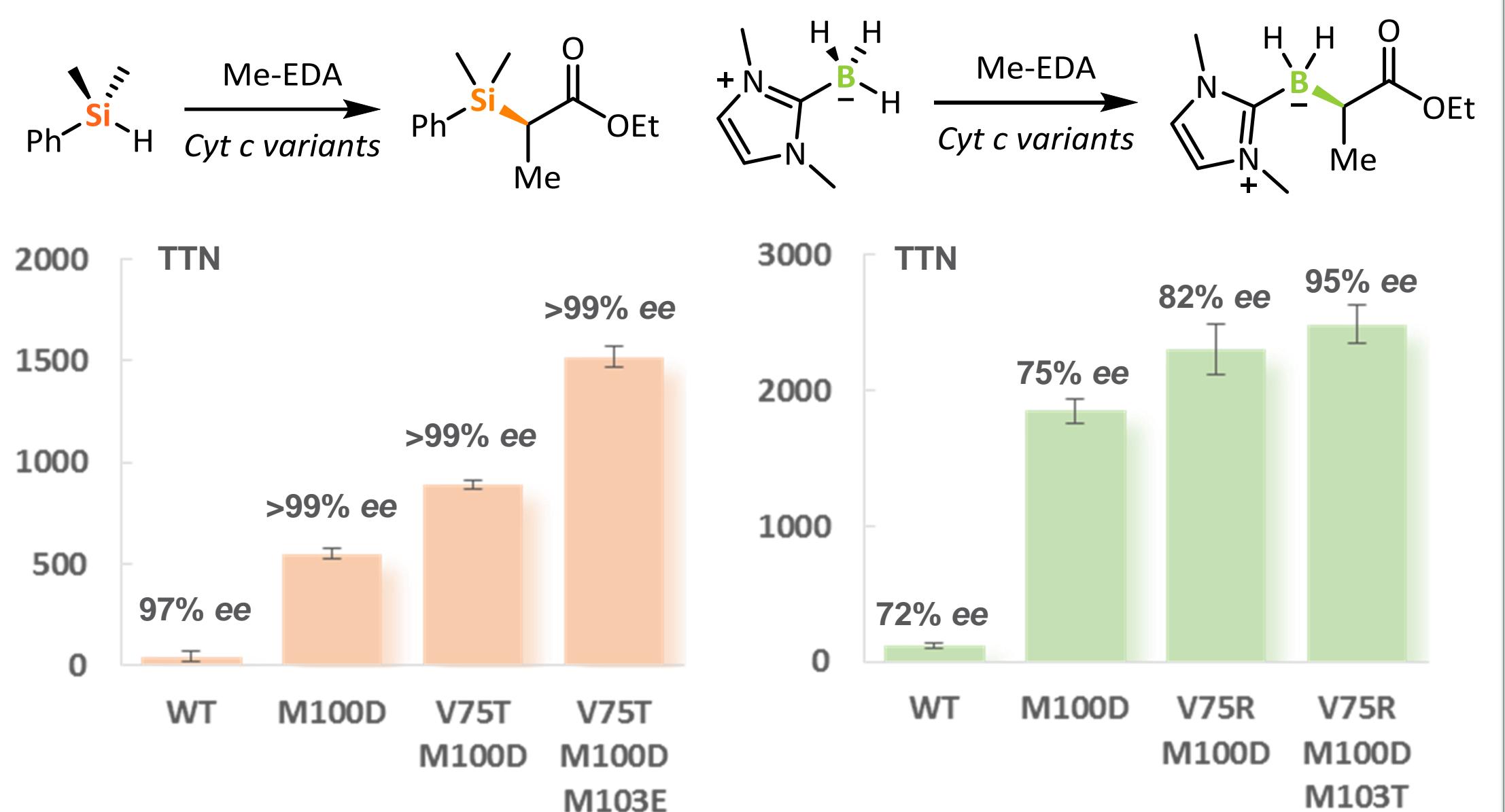


1) *Science* 339, 307–310 (2013); 2) *Nat. Chem. Bio.* 9, 485–487 (2013); 3) *Angew. Chem. Int. Ed.* 126, 6928–6931 (2014); 4) *ACS Cat.* 6, 7810–7813 (2016); 4) *ACS Cent. Sci.* 2018, 10.1021/acscentsci.7b00548; 5) *ACS Cat.* 2018, 10.1021/acscatal.7b04423.



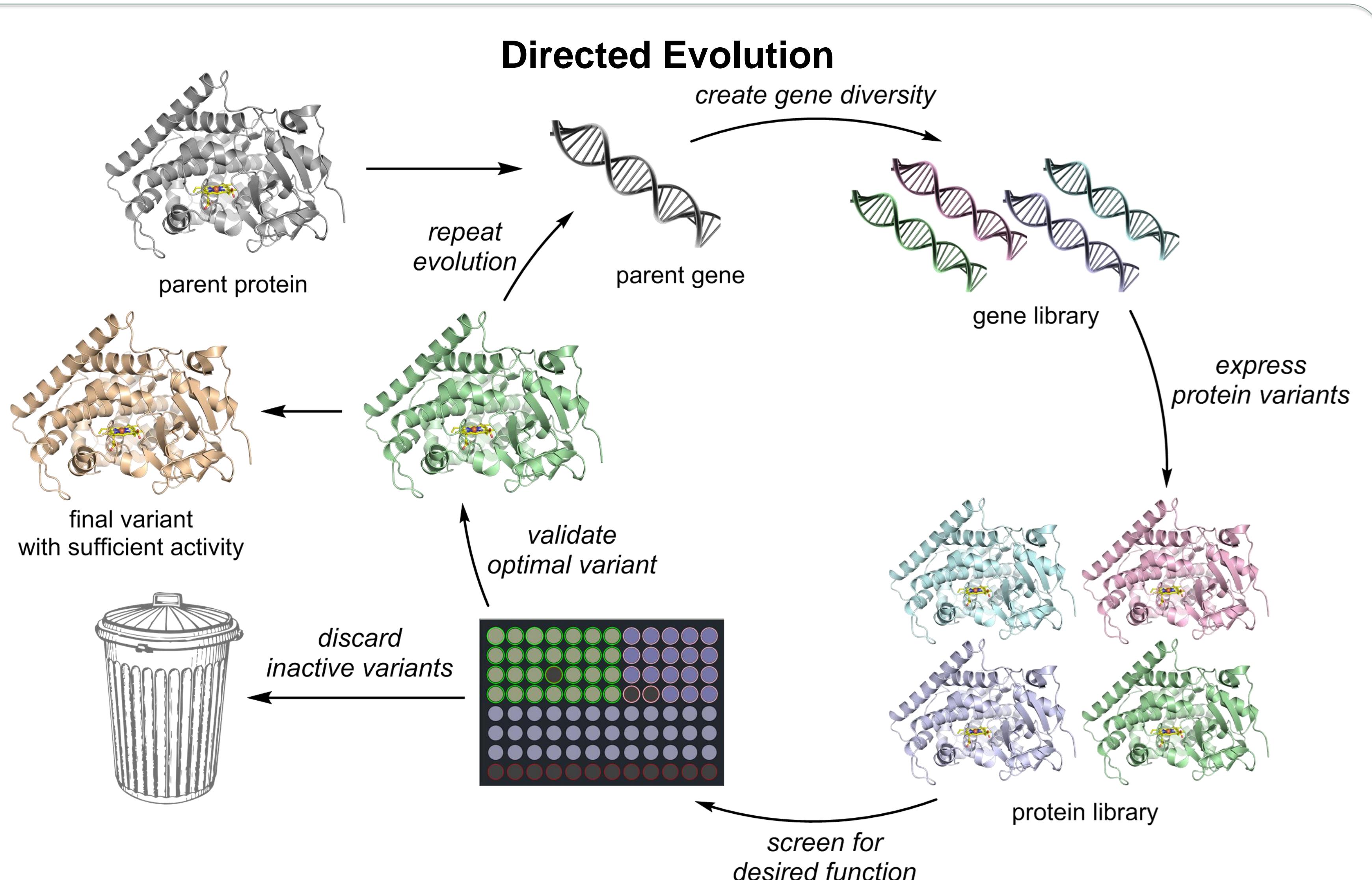
K. Chen, X. Huang, S. B. J. Kan, R. K. Zhang, F. H. Arnold. *Science* 360, 71–75 (2018).

Bringing New Elements to Life: C-Si/B Bond Formation



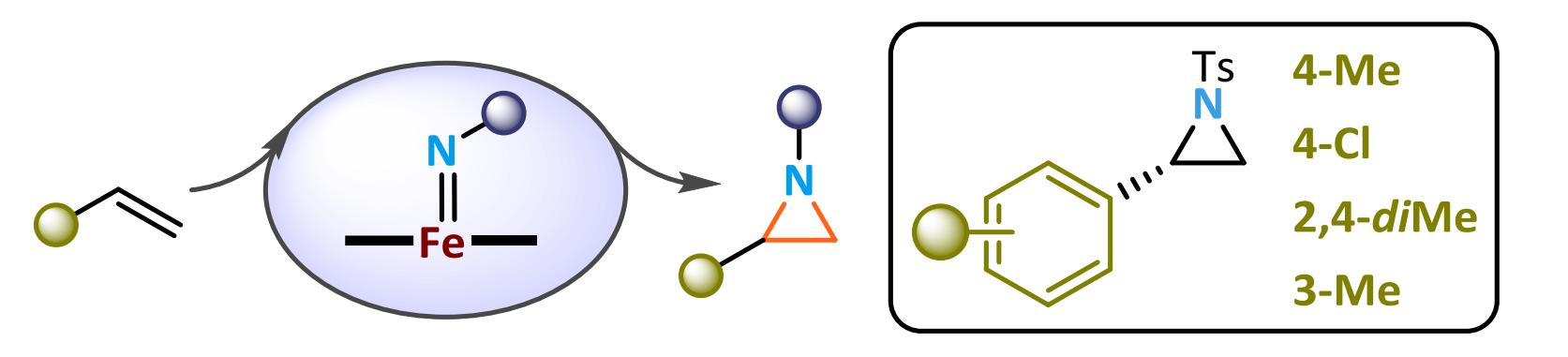
1) S. B. J. Kan, R. D. Lewis, K. Chen, F. H. Arnold. *Science* 354, 1048–1051 (2016); 2) S. B. J. Kan,* X. Huang,* Y. Gumulya, K. Chen, F. H. Arnold. *Nature* 552, 132–136 (2017).

Directed Evolution



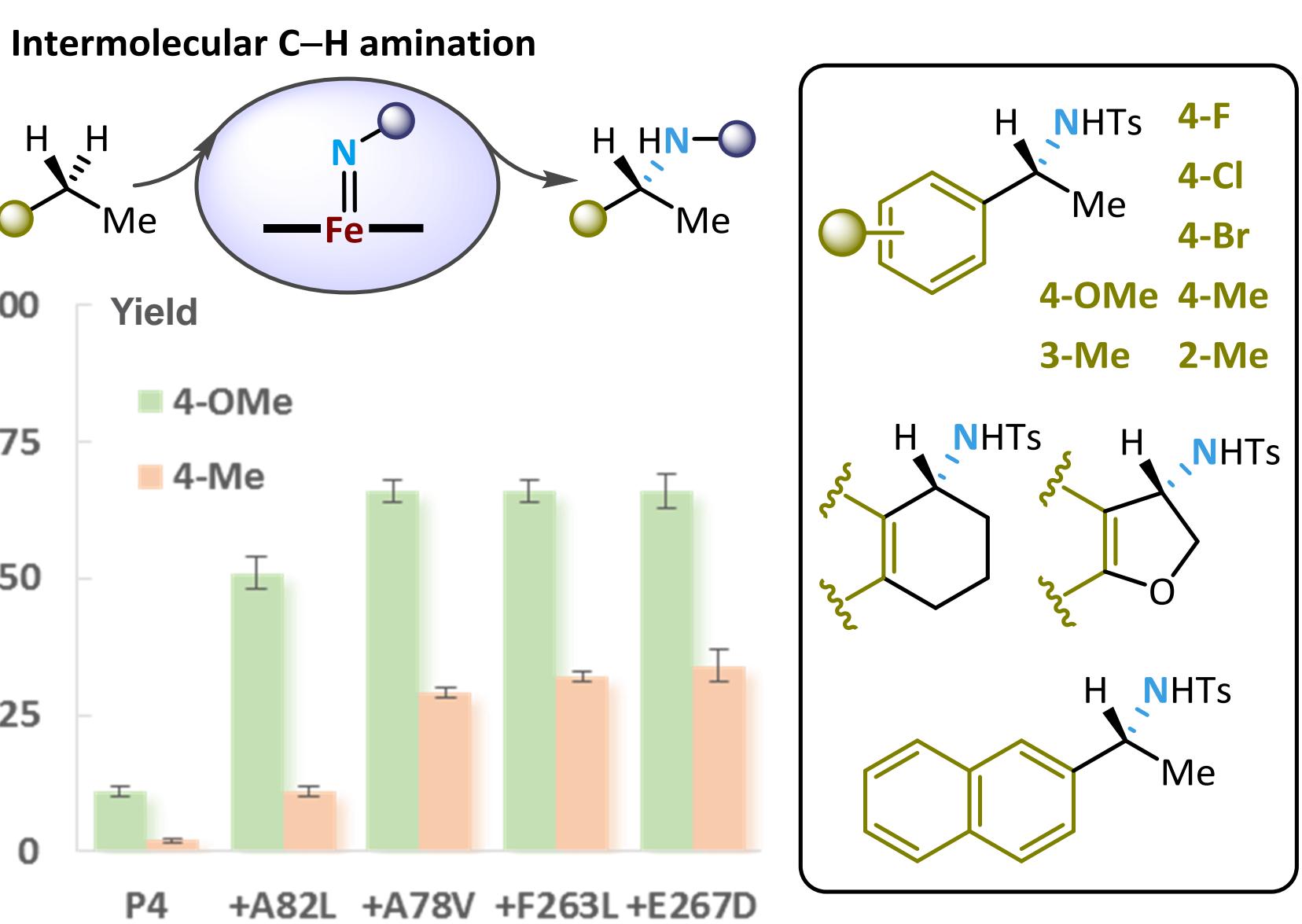
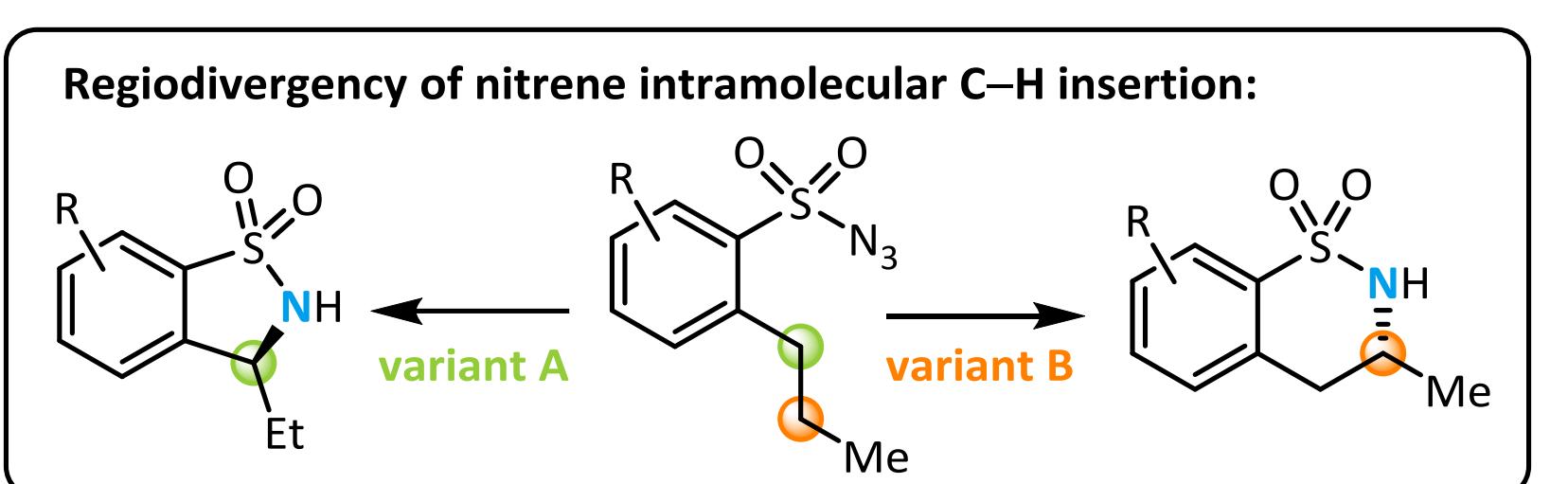
Nitrene Chemistry

Aziridine Formation through Nitrene Transfer



C. C. Farwell,* R. K. Zhang,* J. A. McIntosh, T. K. Hyster, F. H. Arnold. *ACS Cent. Sci.* 1, 89–93 (2015).

C-H Bond Insertion of Nitrene

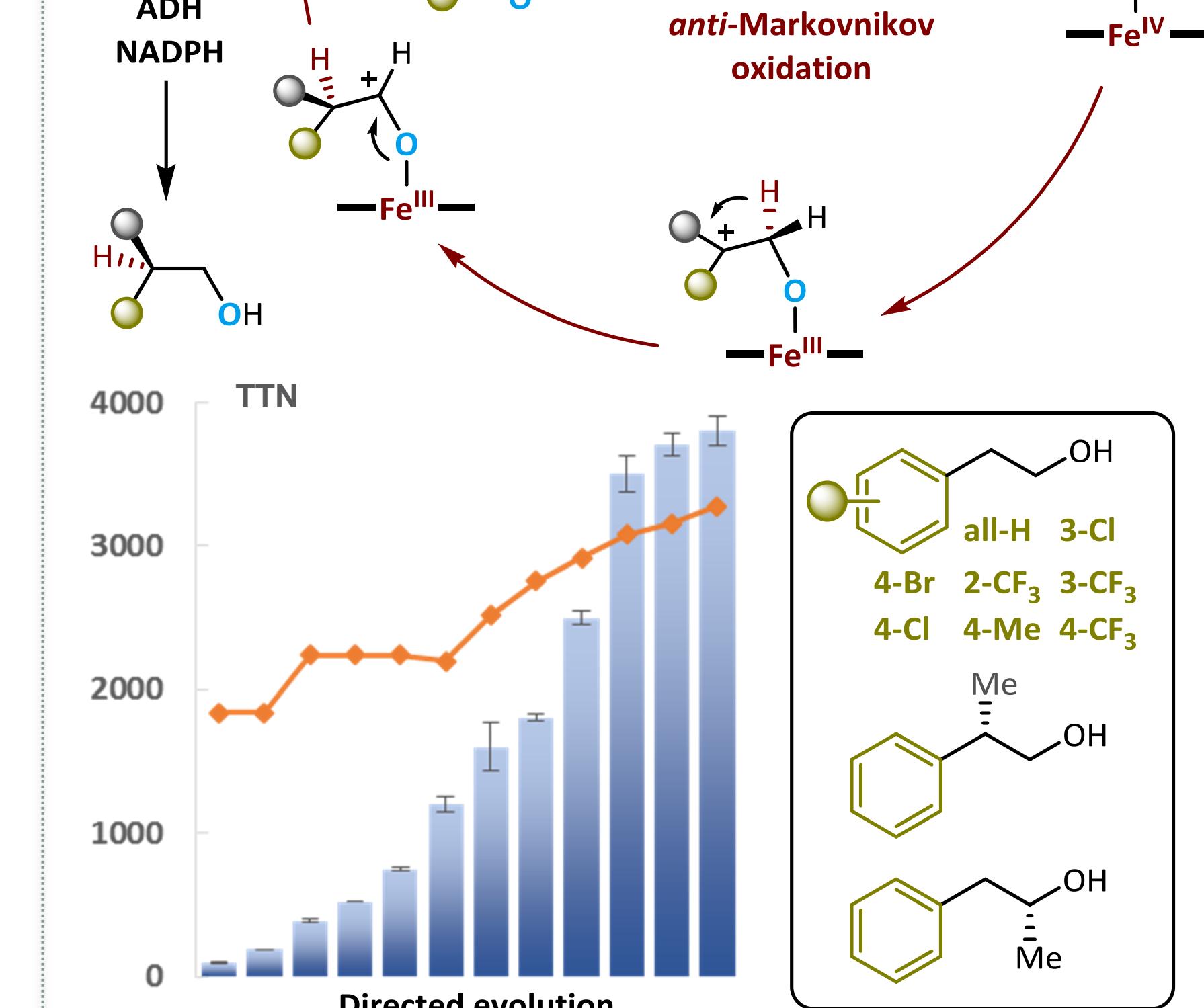
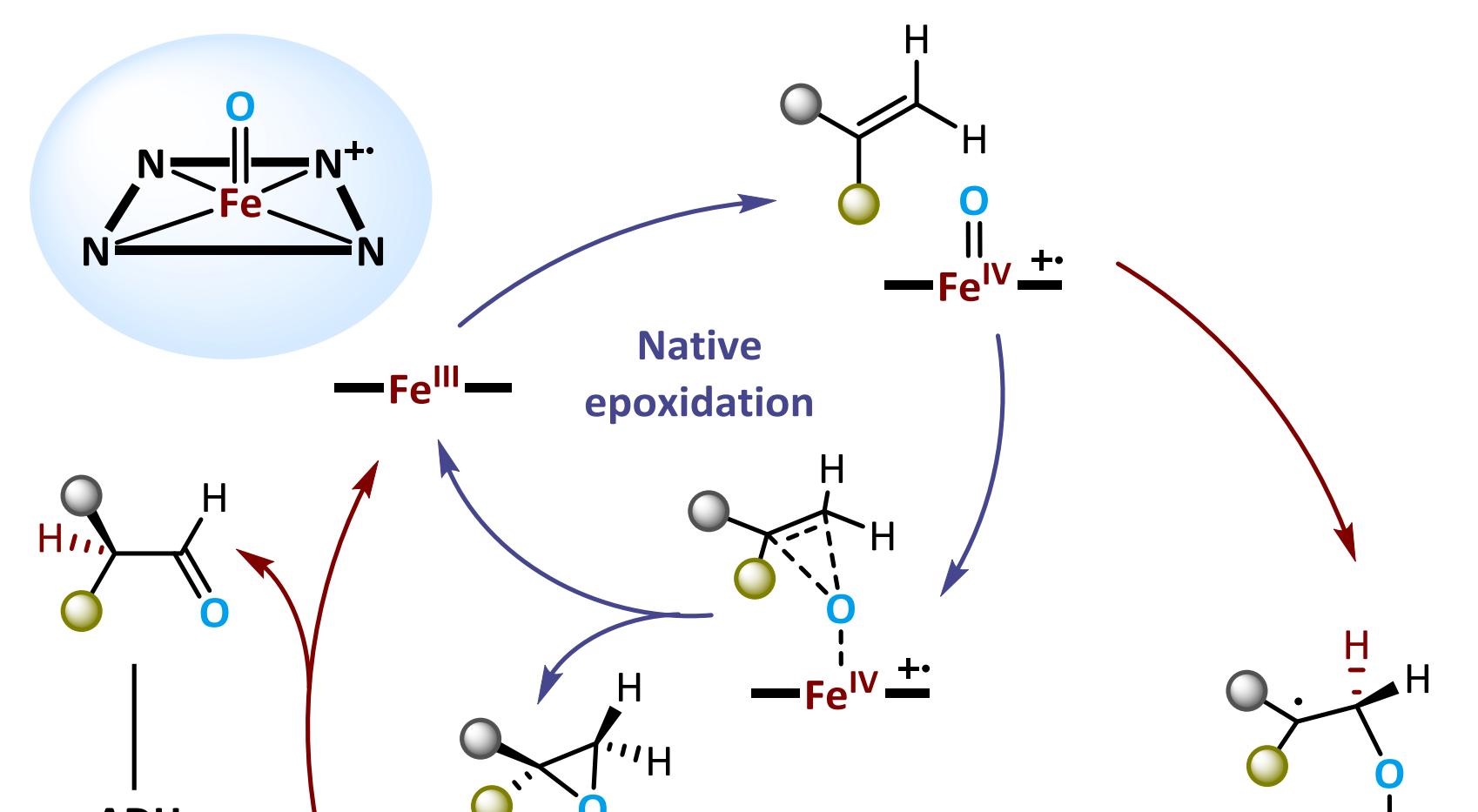


1) T. K. Hyster, F. H. Arnold, et al. *J. Am. Chem. Soc.* 136, 15505–15508 (2014); 2) C. K. Prier,* R. K. Zhang,* A. R. Buller, S. Brinkmann-Chen, F. H. Arnold. *Nat. Chem.* 9, 629–634 (2017).

The work displayed on this poster is an overview of research performed by many Arnold lab members over the past five years.



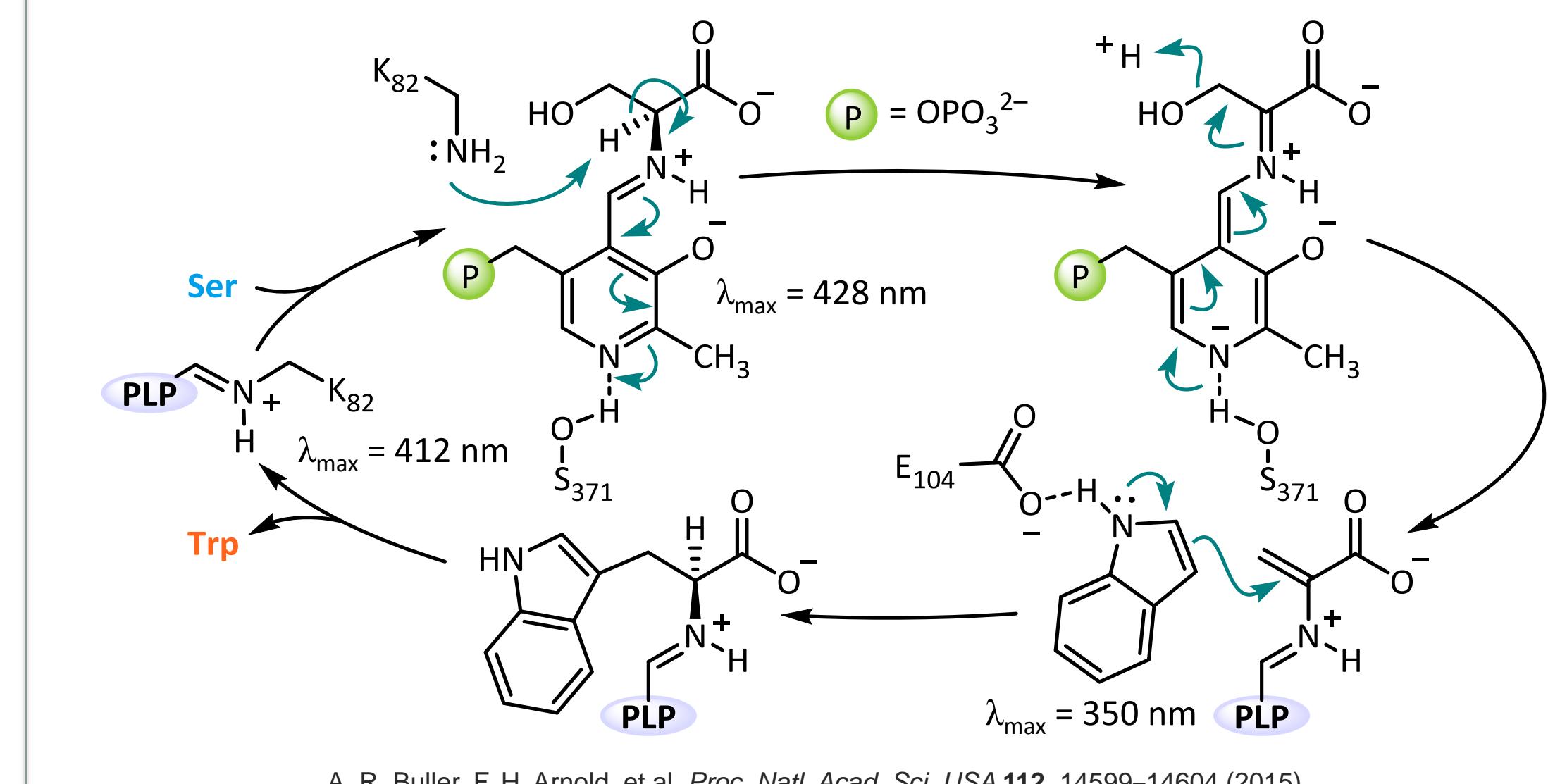
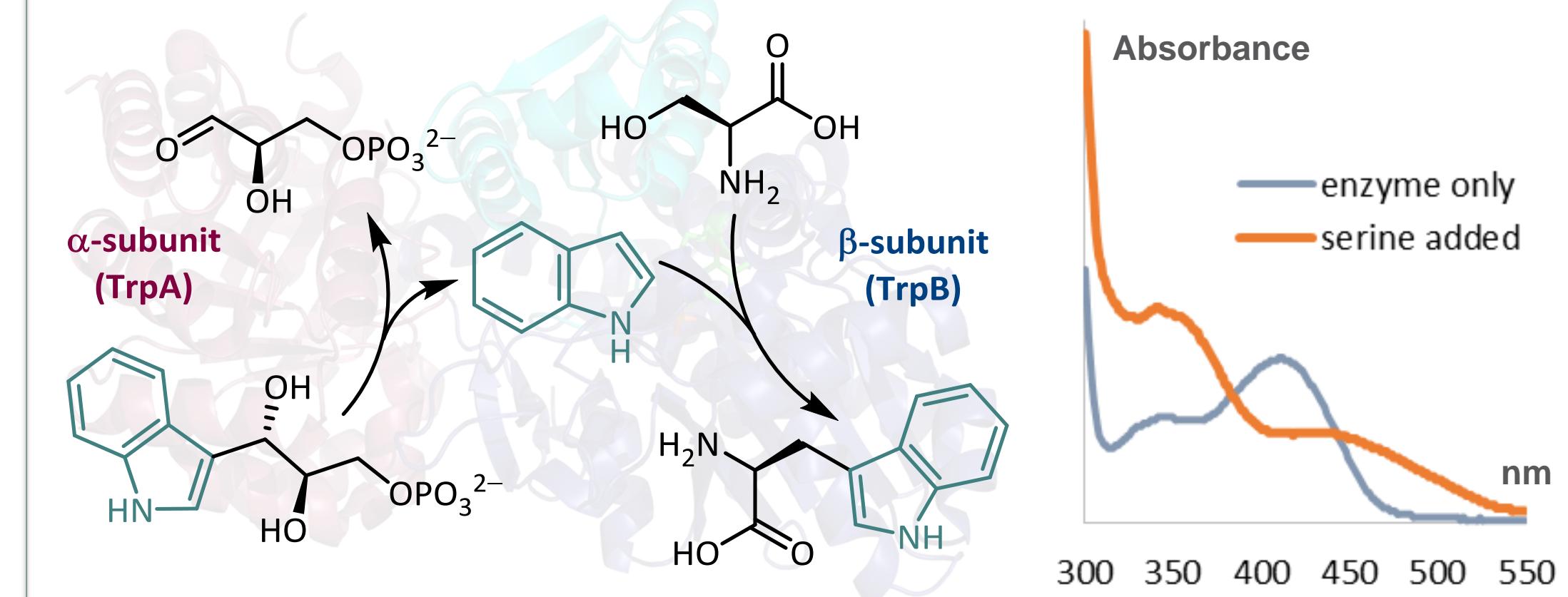
anti-Markovnikov Alkene Oxidation



S. C. Hammer, G. Kubik, E. Watkins, S. Huang, H. Minges, F. H. Arnold. *Science* 358, 215–218 (2017).

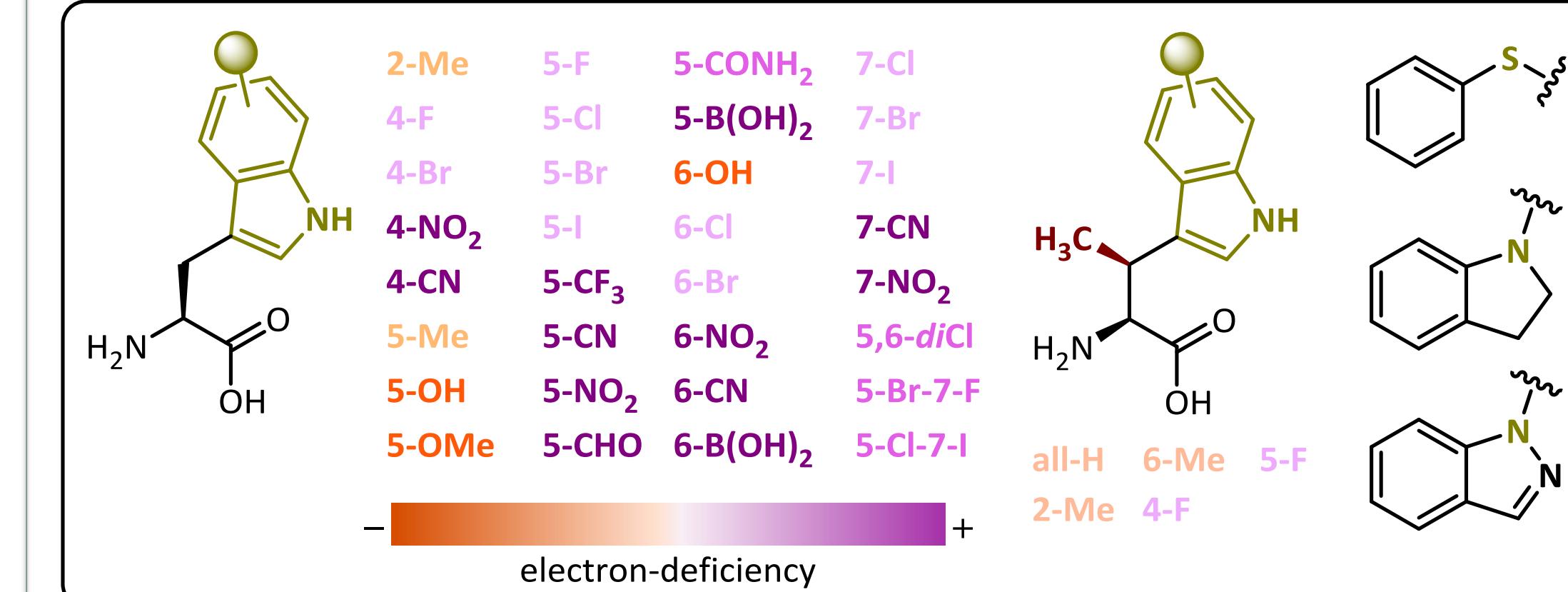
Synthesis of Tryptophan Analogs

Engineering Allosteric Activation in TrpB



A. R. Buller, F. H. Arnold, et al. *Proc. Natl. Acad. Sci. USA* 112, 14599–14604 (2015).

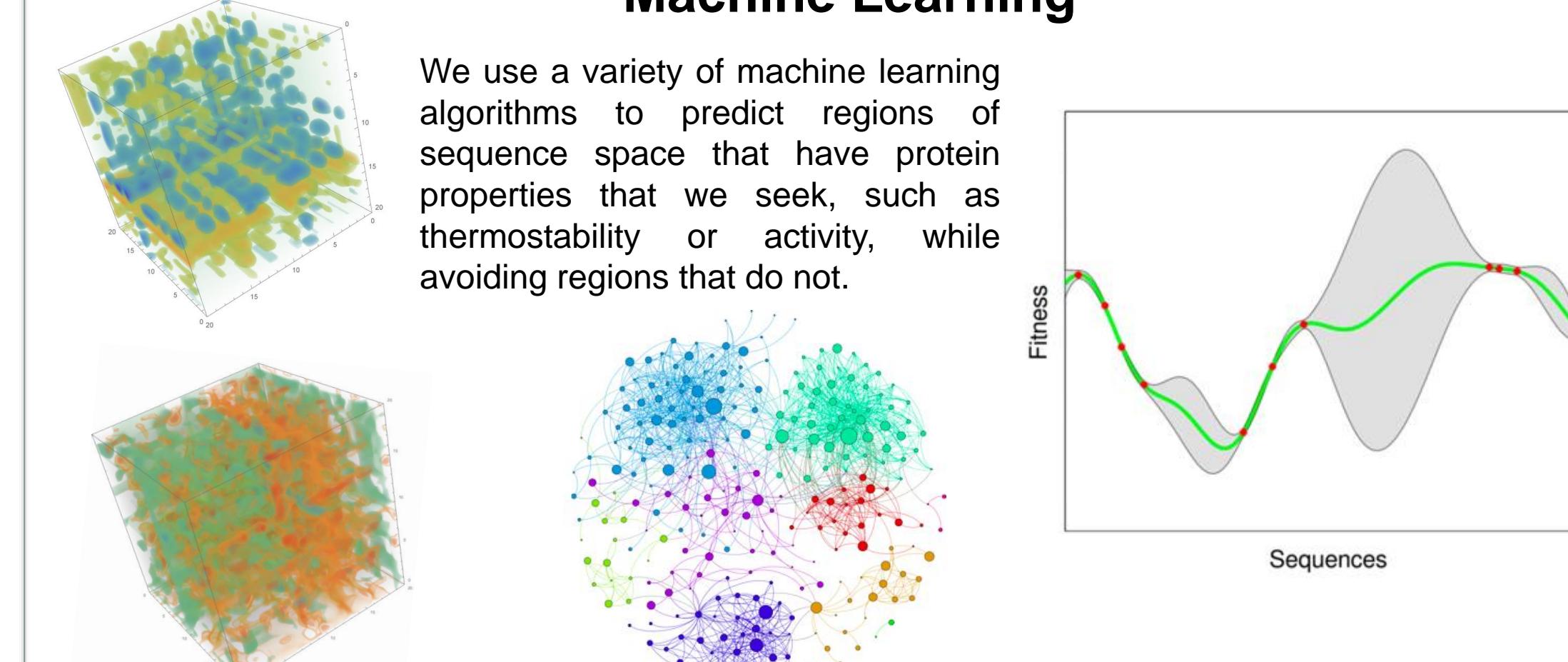
Synthesis of Non-Canonical Amino Acids



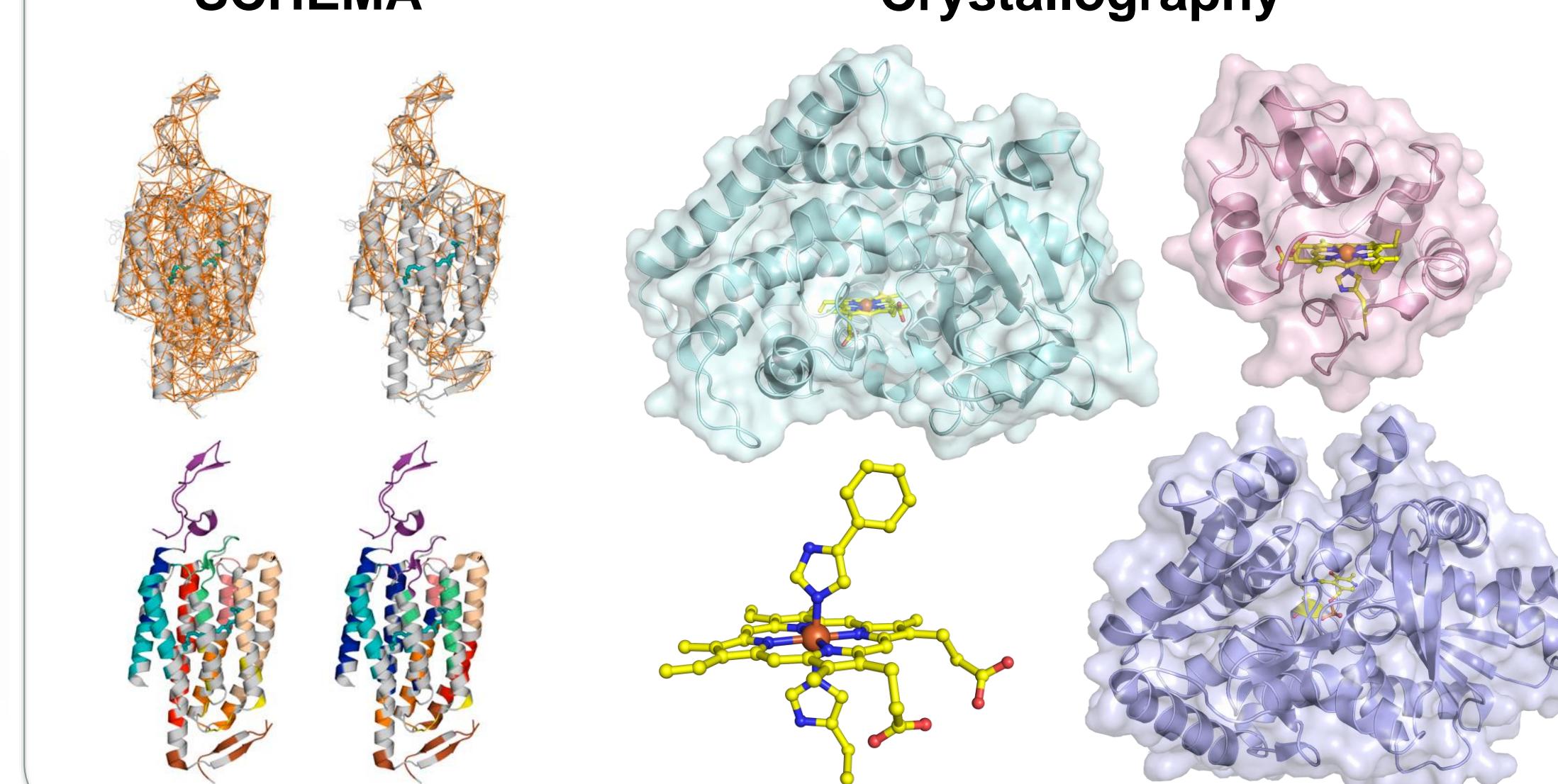
1) M. Herger,* P. van Roye,* et al. *J. Am. Chem. Soc.* 138, 8388–8391 (2016); 2) J. Murciano-Calles,* D. K. Romney,* et al. *Angew. Chem. Int. Ed.* 55, 11577–11581 (2016); 3) D. K. Romney, et al. *J. Am. Chem. Soc.* 139, 10769–10776 (2017).

Methods in Protein Engineering

Machine Learning



SCHEMA



Crystallography