Expansion of the genetic alphabet to include a third base pair would be a fundamental accomplishment that would not only have immediate utility for a number of biotechnology applications, such as site-specific labeling of DNA and RNA, but would also lay the foundation for a semi-synthetic organism with increased potential for information storage and retrieval. We have developed a class of unnatural base pairs, d5SICS-dNaM and dTPT3-dNaM that form based on packing and hydrophobic interactions rather than complementary H-bonding, but are nonetheless replicated and transcribed with efficiencies and fidelities approaching those of a natural base pair. Structural studies, as well as several practical applications of the unnatural base pairs will be discussed, as will our recent progress towards replicating DNA containing an unnatural base pair within a living cell.
Bio:
Dr. Romesberg received his Ph.D. in physical organic chemistry from Cornell University. After completing postdoctoral research at UC Berkeley, he joined the Department of Chemistry at The Scripps Research Institute in La Jolla, California, where he is currently an Associate Professor. Dr. Romesberg's lab at Scripps uses a broad range of interdisciplinary techniques to study different aspects of evolution, including femtosecond spectroscopy, organic chemistry, microbiology, genetics, and phage display. Major focuses in the lab include the development of novel antibiotics; the study of how evolution tailors protein dynamics; and the development of stable and replicable unnatural base pairs for the expansion of the genetic alphabet. Dr. Romesberg is the Principal Scientific Founder of two biotech companies, Achaogen and RQX pharmaceuticals.

Representative Publications:


