Steve Benner

Founder of the Westheimer Institute of Science and Technology
Founder of the Foundation for Applied Molecular Evolution (FfAME)

Work and research

Steven A. Benner is a former V.T. & Louise Jackson Distinguished Professor of Chemistry at the University of Florida Department of Chemistry. He was also a faculty member in the Department of Molecular Cell Biology. Benner left University of Florida in late December 2005 to found The Westheimer Institute of Science and Technology (TWIST) in Honor of Frank Westheimer. He also created the Foundation For Applied Molecular Evolution (FfAME).

Benner has also founded EraGen Biosciences and Firebird BioMolecular Sciences LLC. Benner joined the faculty at the University of Florida in 1997, after working at Harvard University and the Swiss Federal Institute of Technology Zurich. He received his B.S./M.S. in Molecular Biophysics and Biochemistry from Yale University, and his Ph.D. in Chemistry from Harvard University under the supervision of Robert Burns Woodward and Frank Westheimer.

More informations (Wikipedia)

+ The westheimer Institute of Science and Technology
+ Foundation for Applied Molecular Evolution
“The last half century of medical research has placed chemical structures behind much of biology, including human disease, the human genome, and the origin of life. Scientists at the Foundation have contributed broadly to these activities through innovative and polydisciplinary research in fields as diverse as chemistry, informatics, biology, geology, and astronomy. We are now taking the next steps, to place biological chemistry within its larger "systems" context, from the cell to the organism, and from there to the ecosystem and the planet. Emerging from this are new tools for systems biology and personalized medicine, as well as answers to some “big” questions: Where did we come from? What is our future? Are we alone?”

Research themes

Synthetic Biology and Artificial Darwinian Systems

Synthetic biology
Established by FfAME scientists a decade ago, the new field of synthetic biology seeks to use unnatural molecules to reproduce emergent behaviors from biology, including the ability to reproduce, evolve, and adapt. FfAME scientists have lead the field since its inception, generating the first fully functional artificial genetic systems, coupled artificial genetic systems with the formation of artificial proteins, and applied synthetic biology to problems in human medicine.

Artificial Darwinian systems
Under a major grant from the National Science Foundation, where the FfAME houses one of NSF’s Chemical Bonding Centers, and in collaboration with scientists at the Harvard Medical School and the Scripps Research Institute in La Jolla, FfAME scientists are rewriting in vitro evolution strategies.

DNA technology and systems biology
Origin of life
Human medical genomics
Computational biology

Recent publications

Directed Evolution of Polymerases To Accept Nucleotides with Nonstandard Hydrogen Bond Patterns


Conversion strategy using an expanded genetic alphabet to assay nucleic acids


The "strong" RNA world hypothesis. Fifty years old.

Neveu, Mark; Kim, Hyo-Joong; Benner, Steven A
Astrobiology 13 (4) (2013) DOI: 10.1089/ast.2012.0868

Models and Standards of Proof in Cross-Disciplinary Science: The Case of Arsenic DNA

Steven A. Benner, William Bains, and Sara Seager
Use of codon models in molecular dating and functional analysis

**Steven A. Benner**
Codon Evolution, ed. Gina M Cannarozzi, Adrian Scheider, Oxford University Press 133-144 (2012)

**Synthesis and Properties of 5-Cyano-Substituted Nucleoside Analog with a Donor-Donor-Acceptor Hydrogen-Bonding Pattern**

Hyo-Joong Kim, Fei Chen, and Steven A. Benner

**The Natural History of Class I Primate Alcohol Dehydrogenases Includes Gene Duplication, Gene Loss, and Gene Conversion**

Matthew A. Carrigan, Oleg Uryasev, Ross P. Davis, LanMin Zhai, Thomas D. Hurley, Steven A. Benner
PLOS One 7 (7), Public Library of Science (2012)

Recall of an expanded genetic alphabet by type-II restriction endonucleases and their application to analyze polymerase fidelity.

Chen, F; Yang, ZY; Yan, M; Alvarado, JB; Wang, G; Benner, SA
Nucl. Acids Res. 39 (9) 3949-3961 (2011)

**Synthetic Biology, Tinkering Biology, and Artificial Biology: A Perspective from Chemistry**

Benner, SA; Chen, F; Yang, ZY
Chemical Synthetic Biology, ed. Pier Luigi Luisi and Cristiano Chiarabelli, Wiley 69-106 (2011)

**Setting the Stage: The History, Chemistry, and Geobiology behind RNA**

Benner, SA; Kim, HJ; Yang, ZY

**Amplification, Mutation, and Sequencing of a Six-Letter Synthetic Genetic System**

Yang, Z; Chen, F; Alvarado, JB; Benner, SA
J. Am. Chem. Soc. 133 (38) 15105-15112 (2011)

The complete list of Steve Benner's publications