

**Title:** "Biosynthesis of  $\beta$ -Lactam Antibiotics and the Force of Convergent Evolution"

**Abstract:** Despite their use for more than 60 years, the  $\beta$ -lactam antibiotics, represented most familiarly by the penicillins and cephalosporins, remain the most widely used anti-infectives in human medicine. Four structurally distinct clans occur naturally, and the more recently discovered of these are vital to combatting the rising specter of bacterial resistance. Members of this class of antibiotics contain strained monocyclic and bicyclic ring systems whose chemical potential is essential to their antimicrobial activity. Ingenious and efficient chemical strategies have been uncovered that assemble each of these four families and propel their thermodynamically uphill ascent during biosynthesis. These convergent evolutionary solutions will be described and discussed.

## CRAIG A. TOWNSEND

Professor Townsend was born in Chicago and was an undergraduate at Williams College. After receiving his Ph.D. in organic chemistry from Yale, he held an International Exchange Postdoctoral Fellowship from the Swiss National Science Foundation at the Eidgenössische Technische Hochschule in Zürich and joined the faculty at Johns Hopkins in 1976 where he is currently the Alsoph H. Corwin Professor of Chemistry. He has been a Research Fellow of the Alfred P. Sloan Foundation, a Camille, a Henry Dreyfus Foundation Teacher-Scholar, and was elected Fellow of the AAAS in 2000. He has received an Arthur C. Cope Scholar Award, Maryland Chemist of the Year Award, the Stuart Pharmaceuticals (now Astra/Zeneca) Award in Chemistry and the A. I. Scott Medal for Excellence in Biological Chemistry Research. He has served the NIH, the ACS, The Office of Technology Assessment, the Council of the Gordon Research Conferences and is Chairman-Elect of the Biological Division of the American Chemical Society. He has been a consultant and Scientific Advisory Board member to large and small pharma. He is currently on the Editorial Advisory Boards of *Chemistry & Biology* and *Bioorganic Chemistry*.

Research programs in Dr. Townsend's group are broadly in the area of bioorganic chemistry with specific interests in natural product biosynthesis, the enzymology and molecular biology of secondary metabolism and molecular medicine. Underlying these studies are interests in reaction mechanism and synthesis, notably biomimetic synthesis, mechanistic enzymology, protein structure and protein engineering, exploration of the genetic organization and over-expression of biosynthetic enzymes, and the study of and the design and synthesis of modulators of lipid metabolism leading to practical treatments for cancer, tuberculosis and obesity. He has published over 200 papers and reviews.