

# Prelog Lecture 2004

Eidgenössische Technische Hochschule Zürich  
Laboratorium für Organische Chemie

**Abstract:** On Monday, November 8, 2004, the rector Prof. Dr. K. Osterwalder presented the Prelog Medal 2004 to **Prof. Dr. Marvin H. Caruthers**, University of Colorado, USA. The title of the lecture that followed was 'Recent Developments in DNA and RNA Synthesis'.

**Keywords:** Caruthers, M.H. · Prelog Lecture

Foto R. Häfliger



Konrad Osterwalder

Marvin H. Caruthers

**Marvin H. Caruthers** is Professor of Chemistry and Biochemistry at the University of Colorado. He received his B.S. from Iowa State University in 1962 and his Ph.D. with Robert L. Letsinger at Northwestern University in 1968. He joined the faculty of the University of Colorado in 1973 after several years as a research scientist with H.G. Khorana at the University of Wisconsin and M.I.T. His research interests focus on the synthesis of oligonucleotides, oligonucleotide analogs, and nucleic acid biochemistry.

Caruthers' major scientific achievement is his pioneering research in nucleic acid chemistry resulting in new methods which are universally used for the chemical synthesis of DNA. This chemistry has made synthetic DNA available to biochemists, molecular biologists, and biologists. Synthetic DNA has become an essential research tool for an ever-increasing number of applications such as expressing heterologous genes in bacteria and yeast, identifying and isolating genes from various organisms using chromosome mapping and polymerase chain reaction, sequencing DNA such as the human genome project, carrying

out the site-specific mutagenesis of genes, developing DNA chips for diagnostic applications of proteins with DNA, and most recently, in designing potential therapeutics for drug use. The rapid, chemical synthesis of DNA is one of the cornerstone technologies that has fueled the development of biotechnology worldwide and greatly expanded basic research in cell and molecular biology.

Professor Caruthers' current research focuses on the further development of DNA and RNA chemistries. One objective is to modify this chemistry so that it is completely compatible for use in DNA chips. These advances will enable scientists to have a cheap, reliable DNA chip technology useful for addressing the large number of biological questions that are now possible as a result of recent advances in sequencing the human genome. Another major objective is to develop a new, rapid method for analyzing single nucleotide polymorphisms (SNPs) in the human genome. These SNPs, if readily accessible, can be used to diagnose diseases, develop new drugs, and to complete many experiments in basic research. Other current research focuses on the development of new DNA analogs potentially useful as therapeutic drugs and the synthesis of RNA for use in many basic research applications.

Because synthetic DNA has so many commercial applications, Professor Caruthers has also been very active in the biotechnology area. Several other scientists and venture capitalists, including Caruthers, established two major biotechnology companies in 1980. One of these was Applied Biosystems, which marketed so-called 'gene machines' based on the DNA synthesis methods developed by the Caruthers laboratory. This company, purchased by Perkin Elmer in 1992 still domi-

nates the gene machine business. The other, Amgen Inc., is the top U.S. biotechnology company with annual sales exceeding eight billion dollars and a staff of approximately 10,000. Caruthers continues to be active in the biotechnology arena as he is a co-founder of Genomica Corporation (1997), Array BioPharma (1997), and Dharmacon (1996).

Professor Caruthers is a past chairman of his Department (1992–1995) and serves on various college and university committees and boards. He has published more than 150 manuscripts in highly regarded journals. Among other honors was a Guggenheim Fellow (1981), and he was awarded the Elliott Cresson Medal of the Franklin Institute (1994). He has been elected to the US National Academy of Sciences (1994) and the American Academy of Arts & Sciences (1994).

## Former Prelog Lecturers

1986	Kurt Mislow
1987	Meier Lahav and Leslie Leiserowitz
1988	K. Barry Sharpless
1989	Jeremy R. Knowles
1990	Henri B. Kagan
1991	Clayton H. Heathcock
1992	J. Michael McBride
1993	Hisashi Yamamoto
1994	Jean-Pierre Sauvage
1995	Yoshito Kishi
1996	David M.J. Lilley
1997	Günter Helmchen
1998	Lia Addadi
1999	David Evans
2000	Helmut Schwarz
2001	Robert H. Grubbs
2002	David E. Cane
2004	Andreas Pfaltz