

EDITORIAL

Chemical Biology / Biological Chemistry



The revolution in molecular biology that began a half century ago with the structure of DNA recently culminated in the sequencing of the human genome. The latter project represents the most ambitious effort ever undertaken to elucidate chemical constitution. It dramatically illustrates the fact that biological research is becoming increasingly a molecular science, indeed that biology itself is really a branch of chemistry.

Of course, chemists have been interested in biological molecules and processes for a long time. The concepts and tools of chemistry have helped to elucidate the structures of countless natural products and to unravel the basic biochemical processes that make life possible. Chemists have assiduously searched for molecules with interesting biological activity and have developed effective means to synthesize such compounds. It is consequently no great surprise that advances in modern structural, molecular and cellular biology continue to offer both inspiration and exciting challenges to chemists.

Current research at the interface of chemistry and biology is phenomenally diverse. It includes bioorganic and combinatorial chemistry, classical biochemistry, enzymology and medicinal chemistry, and extends even to cell biology. For lack of a better term, these interdisciplinary activities can be described as 'Biological Chemistry' or 'Chemical Biology'. These designations, often used interchangeably, imply complementary philosophical approaches. On the one hand, biological methods, such as mutagenesis and natural selection, are exploited to answer chemical questions about enzyme mechanism or protein folding. On the other hand, chemical methods, with a particular emphasis on rational design and synthesis, are used to probe and manipulate biological systems.

This issue of CHIMIA highlights the efforts of 18 different research groups in Switzerland active in the areas of Chemical Biology and Biological Chemistry. Like the field itself, the reviews of their work are thematically diverse. The topics covered include design and synthesis of small molecules for selective interactions with enzymes or protein receptors; use of chemically constrained amino acids and nucleotides as probes of structure and function; development of new methods to create and/or screen for novel enzymes and protein receptors; model systems to examine biological catalysis and channel formation; studies of DNA damage and repair; protein folding and assembly; and opportunities for chemists in the new areas of genomics and proteomics. While biology seeks to explain the natural world, chemists are just as interested in manipulating it – or in inventing new worlds. This creative spirit, which starts where nature leaves off, is a common thread running through all contributions in this issue.

I extend thanks to the contributors to this volume for their thoughtful reviews. It is hoped that their perspectives will interest a wide spectrum of readers, making a few converts, perhaps, and stimulating further advances in this rapidly developing field.

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With great pleasure the Editorial Board of CHIMIA warmly thanks the coordinating guest editor Prof. Donald Hilvert for his enormous effort in planning and collating the present attractive selection of contributions to the topic of 'Chemical Biology/Biological Chemistry' with this large group of authors.