Synthetic Organic Chemists at a Crossroads –Challenges and Possibilities–

Iwao Ojima
University Distinguished Professor
Director, Institute of Chemical Biology & Drug Discovery
State University of New York at Stony Brook

(Received July 6, 2009; E-mail: iojima@notes.cc.sunysb.edu)

Synthetic organic chemists are at a crossroads in academia and industry worldwide. Although synthetic organic chemistry will continue to be crucial for the advancement of life science and material science through its unparalleled ability to create new molecules, the situation surrounding synthetic organic chemists is changing rapidly, reflecting increasingly interdisciplinary and multidisciplinary nature of the advancement in modern sciences as well as the globalization of corporate operations including research and development.

Synthetic organic chemistry established its own territory as well as community decades ago, and became one of the most popular and powerful disciplines in chemical sciences. This success was clearly supported by the strong needs and steady growth of pharmaceutical and chemical industries. However, the operation and research in these industries are facing numerous challenges worldwide. In parallel, the academic research is also making substantial changes from traditional approaches and infrastructures, at least in the United States.

I have been witnessing various changes in chemical research and education in the U.S. for a quarter of century. Until early 1990s, the infrastructure of graduate research in chemistry in the U.S. followed more or less traditional disciplines. However, it changed dramatically through 1990s. A kind of “revolution” started from biological sciences, which launched “borderless” graduate research programs to accommodate multidisciplinary needs for their research and lure talented graduate students. Their success in sweeping out traditional disciplines and constructing multidisciplinary infrastructure naturally gave substantial influence on other graduate programs. As a consequence, the requirements for current and future researchers are not the same as those 10 years ago since the cutting-edge high-impact research in any field requires the formation of a project team, consisting of researchers from different disciplines, to tackle significant and challenging problems.

In order for synthetic organic chemists to take leadership or make critical contributions in biomedical research, they must have very good understanding and working knowledge of biology, biological approaches and biophysical methods, especially chemical, structural and computational biology, to correctly capture and prove the significance and hypothesis of the entire project.

Therefore, graduate students and postdoctoral researchers in my laboratory and many others in the U.S. are being trained to run biophysical analyses, *in vitro* biological activity evaluations, expressing target proteins, and/or various programs and techniques in computational/structural biology *by themselves* under supervision of expert collaborators, in addition to the development of new and efficient synthetic methods and methodologies as well as execution of multi-step synthesis and/or combinatorial/parallel syntheses. Obviously, they will be the next generation leaders of synthetic organic chemists who can face and handle enormous challenges and opportunities in the era of fertile multi-disciplinary research at the biomedical interface that can eventually contribute to the real needs of human society. This can be regarded as an evolution in synthetic organic chemists, which is very exciting.