

Multifaceted Approaches to Understanding Synthetic Organic Chemistry and Its Societal Relevance



Montague – CTE Scholar
Prof. Daniel Romo, Dept. of Chemistry
 (1998 – 2000: Chemistry)

Motivation: As educators, we have a responsibility to provide the encouragement, excitement, relevance, and motivation that students need to get the most out of their educational experience. Except for the highly motivated students, the absence of relevance leads to an absence of motivation and ultimately results in lower grades for a course.

Approach 1: To convey the "excitement and relevance" of organic chemistry when applicable, I bring in the societal relevance of the chemistry we are discussing e.g. show reactions being discussed in class and tie into how they have been implemented on large scale for drug synthesis (example: halohydrin reaction of alkenes used in the large scale synthesis of Crixivan, an anti-AIDS drug developed at Merck).

Multimedia Approaches to Understanding the Societal Relevance of Organic Chemistry: The Introductory Organic Chemistry Lecture

Discovery of a Novel Anti-Angiogenic Natural Product

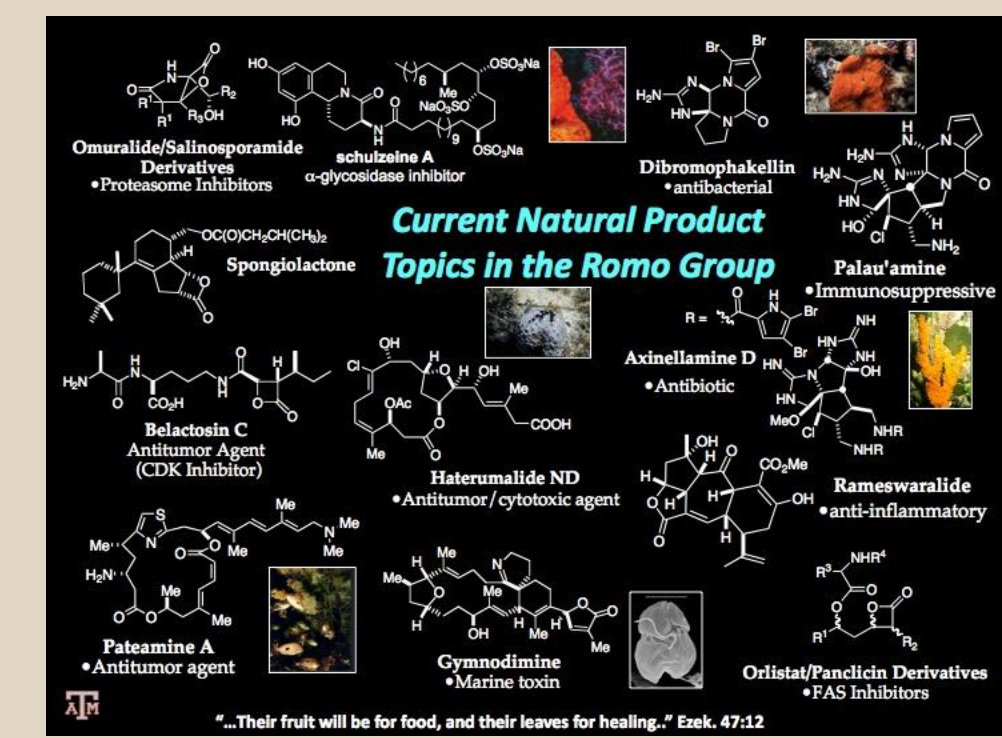
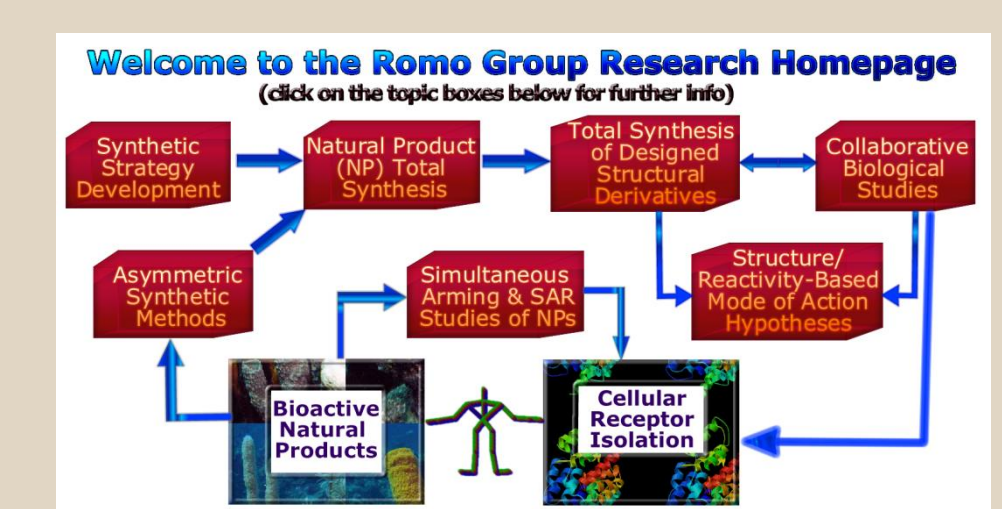
Showing real world examples of how organic synthesis impacts:
 -Basic Cell Biology
 -Drug Discovery & Development
 -Materials Science

Total Synthesis and Cell Biology of Pateamine A

Approach 2: A second approach to convey the "excitement and relevance" of organic chemistry is when possible and pertinent to the subject being discussed in class, I try to tie in some of the research being carried out in my own laboratory into classroom discussion.

Romo Group Research: Chemistry and Biology of Natural Products

<http://www.chem.tamu.edu/rgroup/romo/>



The Development of Crixivan® at Merck

Animated Screen Showing Milestones of Development

Interview with a synthetic organic chemist involved in process development and written up in Wall Street Journal (optimization of a key step)
 Key step related to reaction learned in class!

Interview with a bioorganic chemist who solved the X-ray structure of natural product-protein complex

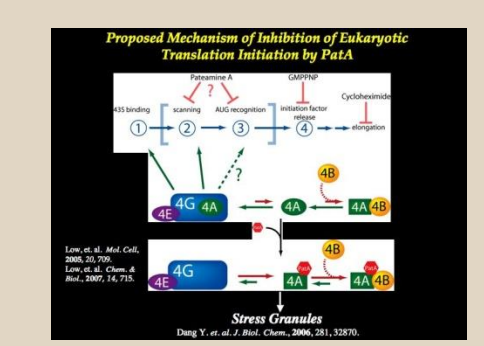
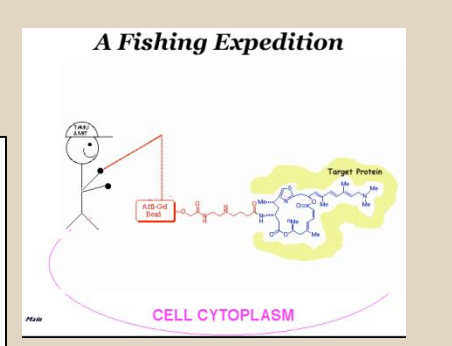
Interview with molecular biologist who identified the cellular receptor of fumagillin
 Reactions used to make cellular probe are ones studied in class

Structure discussed to point out functional groups also being learned in class

Animated slide showing various structural representations of organic molecules learned in class

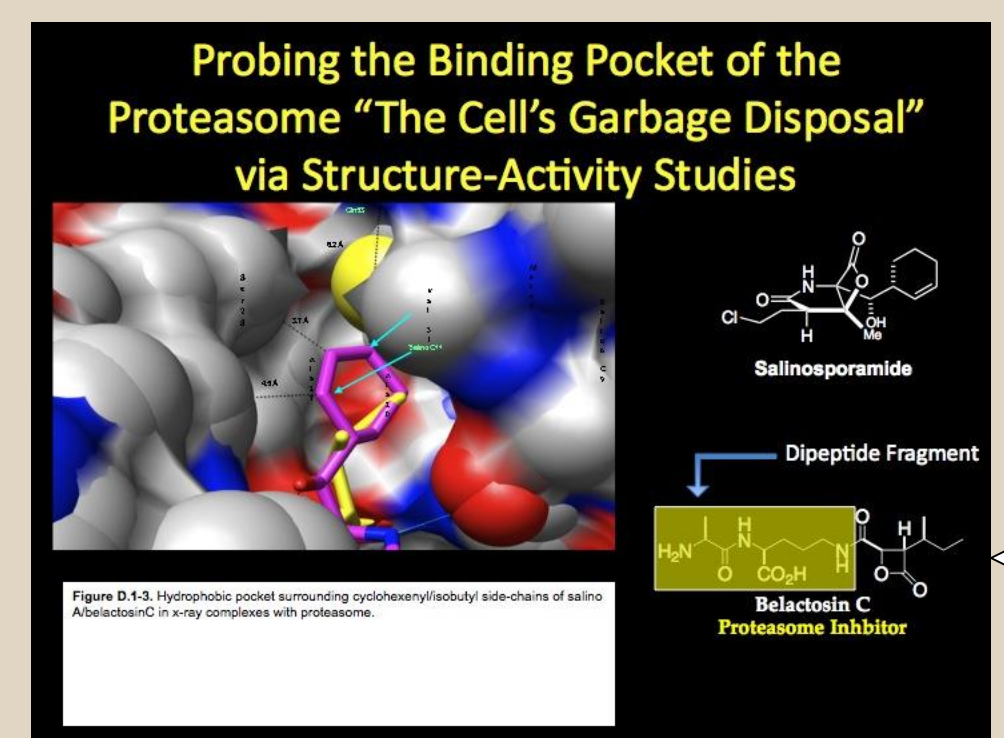
Reactions utilized in the total synthesis of pateamine A are brought into the lecture when similar reactions are being discussed.

Natural Products as Probes of Cellular Function: The Story of the Marine Sponge Natural Product Pateamine A, A Novel Mammalian Protein Synthesis Inhibitor and Potential Anticancer Agent



Chemistry Majors Laboratory: Bringing Research into the Teaching Laboratory

A Taste of Medicinal Chemistry



Approach 3: A third approach to convey the "excitement and relevance" of organic chemistry is brought into the chemistry major's laboratory. The idea is to import some of the research being carried out in my own laboratory in the form of an actual laboratory experiment.

Students are given an opportunity to participate in structure-activity relationship studies of belactosin C, a novel proteasome inhibitor and potential anticancer agent being studied in my research group. In the process, they learn how to synthesize an amide bond, a key bond found in proteins.

Visiting High School Science Teachers

Motivation: Educators recognize the importance of reaching the next generation of college students at the earliest stage possible to excite them at an early age into fields important to our nation in years to come with science being a high priority. For these reasons, I have strived to present these multimedia presentations to visiting science teachers during TAMU summer courses (Chem 689; Vickie Williamson) with the hopes of enabling them to pass on this excitement. In addition, I have visited local elementary schools to hopefully excite them about science at a very early age!

Outreach to Local Elementary Schools

