A conference of crosstalk: the Gordon Research Conference in Bioorganic Chemistry

The Gordon Research Conference in Bioorganic Chemistry aims to increase the opportunities for interaction and collaboration between organic chemistry and biology. Suggestions on how to achieve these goals from the readers of *Chemistry & Biology* are welcome.

Chemistry & Biology August 1995, **2**:501–502

Since its inception four years ago, the Gordon Research Conference in Bioorganic Chemistry has developed into the central forum for a burgeoning, self-defining field of research which is replacing traditional barriers between organic chemistry and biology with intellectual and technical conduits for innovation. The most recent conference, co-chaired by Glenn Prestwich and Michael Pavia was held on June 18-23 at Proctor Academy, and made it clearer than ever how the field and the conference 'glow' with the creative energy unleashed in closing the chemistry/biology circuit. Increasingly, researchers who were trained as chemists are bringing a new angle to biological problems, and those trained as biologists are finding that their efforts to understand their system lead them into experiments that look very much like chemistry. Like *Chemistry & Biology*, the conference aims to bring these groups together, to foster their interaction, and to report on their successes. The overlap between the aims of the journal and those of the conference is underscored by the recent Crosstalk, Review, and Research Paper contributions by four speakers at the 1995 conference [1–4]. Thus, it seems appropriate to offer the readers of *Chemistry & Biology* a perspective on the types of topics covered by the conference, and an opportunity to influence the topics to be covered next year and in the future.

Bioorganic chemistry is a field of many cutting edges, with crosstalk involving physical, synthetic, and medicinal organic chemistry, biochemistry, and molecular and structural biology at its heart, providing the critical connections needed to define opportunities and meet challenges which have important implications of both a scientific and practical nature. Attendees at the first three conferences were treated to lecture and poster presentations outlining some of the latest advances in:

- Molecular recognition and chemical transformation in signal transduction
- Rational (structure-based), and combinatorial (diversity-based) drug design
- Understanding and engineering primary and secondary metabolic pathways
- Protein structure, function and design
- Nucleic acid structure, function and design
- Carbohydrate structure, function and design
- Membrane structure, function and design
- Total synthesis of compounds with molecular weights ranging from 10^2 to more than 10^4
- Biomimetic receptors, catalysts, membranes, channels, and materials
- Molecular self-assembly
- Drug resistance
- Generation and stabilization of reactive intermediates by living systems, and
- New or improved approaches to the study of complex systems

Given the interdisciplinary nature of bioorganic chemistry, presentations at the conference typically draw from and contribute to knowledge in several areas. This can be illustrated with single, now-published examples from each of the first three conferences. At the 1992 conference (co-chaired by Barbara Imperiali and Craig Townsend), Fraser Stoddart [5] described some of the wonderful molecular and material progeny that result from marrying self-assembly approaches with host–guest complexation. At the 1993 meeting (co-chaired by Paul Bartlett and George Trainor), Dennis Dougherty (see [6] and references therein) used results from gas- and solution-phase physical measurements, *ab initio* calculations, Monte Carlo simulations, biomimetic receptors and catalysts, and neurobiology to call attention to and understand an important force in biomolecular structure and function, the cation–π interaction. In the short space of his fifty-minute lecture at the 1994 meeting (co-chaired by David Lynn and Dale Kempf), Chris Walsh (see [7] and references therein) traced the biomedical phenomenon of vancomycin resistance in *Enterococci* all the way

from its genetic roots, through its cell-signaling and regulatory events to its biochemical basis in altered cell-wall biosynthesis, and finally to the corruption of a single hydrogen bond within the supramolecular complexes of vancomycin with the cell-wall precursor! Similarly stimulating and broad-ranging presentations were made at the fourth conference. Since the presentations followed the spirit of the Gordon Research Conferences in describing mostly unpublished work, it would be inappropriate to divulge details of the findings unveiled at this meeting, but it can be said that attendees left with exciting new concepts of how to design, synthesize, characterize, fold, splice, and use proteins; a new understanding of the relationship between neurodegenerative diseases and protein aggregation; new methods to probe reactive biomolecules *in situ*; new concepts in how to create highly specific ligands and receptors for nucleic acids; new ways to think about the processes of molecular recognition of carbohydrates used by biological systems, and new ways to divert cellular metabolism for one's own purposes (not to mention new ideas on how to find rivers beneath railway bridges in the dark, and a new understanding of how volleyball is not meant to be played).

The Gordon Research Conference in Bioorganic Chemistry has a bright future, as evidenced by the increasing melding of ideas at the chemistry/biology interface and the youth, diversity, and involvement of the conferees: in 1994, for example, one-third of the conferees had not previously attended a Gordon Research Conference and another half had attended five or fewer such conferences; 40 % came from non-academic positions; 19 % were female and 14 % came from outside of the U.S.; more than 80 % presented lectures, posters, or served as session chairs. It would be nice to be able to offer statistics on the numbers of biologists versus chemists, but an attempt to generate these statistics failed miserably, since many attendees defied classification as one or the other.

At the conference, lectures from the field's eminent leaders intermingle with the blood, sweat, and tears of the educational process, as seen in the posters of graduate students, postdoctoral researchers, and young independent scientists. Providing opportunities for crosstalk between established bioorganic chemists and beginning investigators was one of the main motivating factors for the conference founders, and remains a primary focus of the conference.

The rate of fundamental discovery in bioorganic chemistry far outstrips the rate at which advances can be presented at an annual gathering. Thus, despite the breadth of topics addressed in the first four conferences, a table of lobster-stuffed conferee diners at this year's meeting was quickly able to overwhelm next year's co-chairs Craig Wilcox and Amy Trainor with ideas for themes and speakers for next year's conference, which will be held at Plymouth State College June 23-28, 1996. Even so, Craig and Amy welcome further suggestions from the readership of *Chemistry & Biology*, and applications for next year's conference. (Craig is available by e-mail (daylite@unixd1.cis.pitt.edu) or Fax (412-624-8552), and Amy may be reached by Fax (302-886-5382)). Tony Czarnik and I will organize and co-chair the 1997 Conference, and we look forward to bringing you information about the meeting and a request for your input next year.

References.

1. Lansbury Jr, P.T. & Caughey, B. (1995). The chemistry of scrapie infection: implications of the 'ice 9' metaphor. *Chemistry & Biology* **2**, 1–5.
2. Czarnik, A.W. (1995). Desperately seeking sensors. *Chemistry & Biology* **2**, 423–428.
3. Tsoi, C.J. & Khosla, C. (1995). Combinatorial biosynthesis of 'unnatural' natural products: the polyketide example. *Chemistry & Biology* **2**, 355–362
4. Chang, C-y.; Niblack, B.; Walker, B. & Bayley, H. (1995) A photogenerated pore-forming protein. *Chemistry & Biology* **2**, 391–400
5. Anelli, P.L. *et al.*, & Williams, D.J. (1992) Molecular Meccano. 1. [2]rotaxanes and a [2]catenane made to order *J. Am. Chem. Soc.* **114**, 193–218.
6. Kearney, P.C., Mizoue, L.S., Kumpf, R.A., Forman, J.E., McCurdy, A. & Dougherty, D.A. (1993). Molecular recognition in aqueous media. New binding studies provide further insights into the cation–π interaction and related phenomena *J. Am. Chem. Soc.* **115**, 9907–9919.
7. Wu, Z., Wright, G.D. & Walsh, C.T. (1995). Overexpression, purification, and characterization of VanX, a D-, D-dipeptidase which is essential for vancomycin resistance in *Enterococcus faecium* BM4147 *Biochemistry* **34**, 2455–2463.

John H Griffin, Department of Chemistry, Stanford University, Stanford, CA 94305-5080, USA.