

MEETINGS

Computational Cell Biology

March 6–9 162 participants

ARRANGED BY **Thomas Pollard**, Yale University
Les Loew, University of Connecticut Health Center
John Tyson, Virginia Polytechnic Institute & State University

The molecular pathways and networks that regulate many aspects of cell physiology are now known in great detail, and they are so complex as to defy reliable understanding by informal, intuitive reasoning. During the past 10 years, it has become clear that computer simulations based on realistic biophysical models of regulatory networks can be useful in rationalizing diverse published observations and in guiding new experimental studies. Success in this endeavor requires close collaboration among life scientists, mathematical modelers, and computer scientists. In March 2001, Les Loew and his colleagues at the University of Connecticut Health Center hosted the first multidisciplinary workshop on Computational Cell Biology at the Cranwell Center in Lenox, Massachusetts. The meeting was attended by an enthusiastic group of quantitative biochemists and cell biologists, modeling experts, and software developers. The first meeting featured oral presentations and poster sessions that highlighted the interplay between experiments and models and a unique afternoon session of software demonstrations. By popular demand, the UConn group hosted two more workshops, in 2003 and 2005. At the third meeting, a leadership group was commissioned to find a more permanent “home” for the meeting, with Cold Spring Harbor Lab identified as the first place to try. When approached with this idea, David Stewart immediately gave his full support and scheduled the first Computational Cell Biology Meeting at Cold Spring Harbor in March 2007.

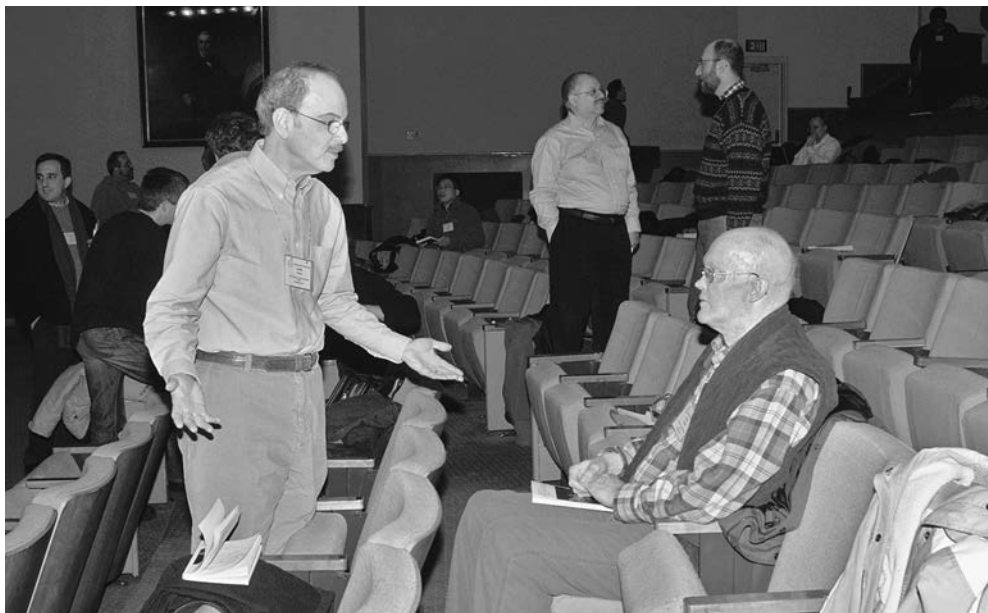


T. Pollard, L. Loew, J. Tyson

The 2007 meeting was organized by John Tyson, Les Loew, and Tom Pollard, assisted by a distinguished panel of session chairs. The format of the original workshops was maintained, including the popular software demos, along with an emphasis on the most mature areas of the field (calcium signaling, protein signaling networks, cytoskeleton and motility, development, bacterial physiology, cell growth, division, and death). For oral presentations, the Lenox meetings had relied on invited talks by established leaders in the field. For the CSH meeting, a decision was made to choose most oral presentations from abstracts submitted by registered participants. For such a young, evolving field of science, this was a risky decision, but it proved to be a great success. Many young graduate students and postdocs were given a chance to showcase their work before an interdisciplinary audience, and they were successful in illustrating the power of a combined experimental-theoretical attack on outstanding problems in cell biology. The quality of the poster session was also extremely high.

The meeting opened with a Keynote Address by Adam Arkin, who described his group's novel achievements in engineering the molecular regulatory networks of bacteria to desirable ends, such as identifying, attacking, and killing tumor cells. These themes were taken up by young investigators (You, Emonet, Weinberger, and Shou) who are building designer microorganisms.

Filling in at the last minute for a hospitalized Sydney Brenner, Tom Pollard gave the second Keynote Address on cell motility and cell septation. The associated session included talks by Les Loew, who is modeling Pollard's ideas about actin dynamics; Julie Theriot, who is collaborating with Alex Mogilner on cell shape and movement; and four young researchers (Civelekoglu, Needleman, Vavylonis, and Sun), who are working on the mechanics of cell division. Protein signaling networks were covered by



S. Sreenath, C. Athale

senior lecturers (Kholodenko and Sorkin) and junior scientists (Albert, Bakal, Bromberg, and Kinkhabwala). Calcium signaling was covered by senior lecturers (Augustine, Ehrlich, and Smith) and by a talented young African-American (Sherry-Ann Brown). Development was covered by senior lecturers (Reinitz and Shvartsman) and junior scientists (Umulis and Papatsenko). The cell cycle session featured young investigators (Guang Yao on the G₁-to-S transition in mammalian cells, and Joe Pomerening, on the role of positive feedback in regulating mitosis in embryos and somatic cells) and established investigators (Frank Uhlmann and Bela Novak on exit from mitosis in budding yeast). The meeting ended on a somber note (cell death), featuring beautiful work on p53 signaling (Galit Lahav and John Wagner) and caspase activation (John Albeck).

The uniformly high quality of the science reported at this meeting and the cooperative spirit of the experimentalists, theoreticians, and computer scientists in attendance confirmed the decision of the Cold Spring Harbor Meetings staff to welcome Computational Cell Biology into their regular meeting schedule. The meeting will continue on its biennial schedule (March, 2009) for the indefinite future. Quantitative measurements and realistic mathematical modeling are here to stay in molecular cell biology, and this CSHL meeting promises to be a flagship venue for reporting the best developing work in the field.

The meeting was well supported by a grant from the National Institutes of Health, through the National Technology Center on Networks and Pathways at the University of Connecticut Health Center. This support is sufficient for at least one more meeting on a similar scale.

PROGRAM

Keynote Address: Signaling, Uncertainty, and Design of Natural and Artificial Cellular Systems

A. Arkin, *University of California, Berkeley*

Microbial Physiology

Chairpersons: A. Arkin, *University of California, Berkeley*; F. Arnold, *California Institute of Technology, Pasadena*

Motility and Mitosis

Chairpersons: A. Mogilner, *University of California, Davis*; J. Theriot, *Stanford University School of Medicine, California*

Development

Chairpersons: S. Shvartsman, *Princeton University, New Jersey*; J. Reinitz, *Stony Brook University, New York*

Keynote Address: The Comprehensive and the Comprehensible

S. Brenner, *Salk Institute of Biological Studies*

Cell Signaling I

Chairperson: R. Iyengar, *Mount Sinai School of Medicine, New York*

Cell Signaling II

Chairperson: B. Kholodenko, *Thomas Jefferson University, Philadelphia, Pennsylvania*

Calcium Signaling

Chairpersons: G. Dupont, *Université Libre de Bruxelles, Belgium*; B. Ehrlich, *Yale University School of Medicine, New Haven, Connecticut*

Software Presentations

Chairpersons: R.D. Phair, *Integrative Bioinformatics, Rockville, Maryland*; P. Mendes, *Virginia Bioinformatics Institute, Blacksburg*

Cell Division Cycle

Chairperson: B. Novak, *Budapest University of Technology & Economics, Hungary*

DNA Damage and Cell Death

Chairperson: Y. Lazebnik, *Cold Spring Harbor Laboratory*



A. Cowan, J. Wagner



C. Fall, I. Moraru