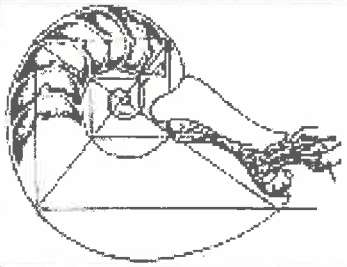

Mathematical Biology Newsletter

Volume 11 #3 - September 1998

The Society for Mathematical Biology

Edited by: Elizabeth H. Scholl

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August 1998

Dear SMB member:

The SMB elections have now been tallied. My thanks to all candidates and congratulations to Alan Hastings, President-elect, and new board members Mark Chaplain, Sharon Lubkin, and Lisa Sattenspiel. Thanks also to retiring board members Stephen Ellner, Ray Mejia, and Robert Miura as well as Leah Edelstein-Keshet, the Past-president.

The annual meeting for the Society was held in conjunction with the SIAM annual meeting on July 13-17, 1998. More details about the meeting can be found elsewhere in the newsletter. However, a couple of impressions stand out. The attendance at all the scientific sessions was good, and at some of the sessions it was excellent with all the seats filled in a reasonable-sized room. The attendance reflects the reputation of the speakers as well as the relevance and importance of the scientific content. In addition there was good attendance at the annual meeting and poster session, which was held in the impressive new Fields Institute for Research in Mathematical Sciences on the campus of the University of Toronto. Another positive impression is that there is currently a demand for researchers who have joint expertise and interest in mathematics and biology. At the session that I organized on Employment Opportunities in Biotechnology, several of the speakers noted the difficulties that businesses have had in trying to find talented job candidates with strong interdisciplinary training. This is good news for students training in these directions.

At the board meeting and business meeting, it was agreed that the Society should form a World Outreach Committee, whose goal it will be to foster mathematical biology in developing countries, and to especially assist young scientists. Although our society is small, I am optimistic we can have a positive impact. A committee is now being formed and future newsletters will have additional details.

We also heard from Anne Guillaume, who is in charge of the Bulletin of Mathematical Biology at Academic Press. The transition of the Bulletin to Academic Press has gone smoothly. In addition the Bulletin is now available electronically. SMB members who subscribed to the electronic version should have received their password and instructions for use of the electronic version. In view of the start-up difficulties of implementing the electronic version, everyone who subscribed to the electronic version last year, will have the subscription to the electronic version extended to next year (the costs for the printed version are included in the annual dues).

All the best for the new academic year.

Sincerely,

Leon Glass

I would like to thank the SMB membership for their show of confidence in electing me SMB President. I am looking forward to working with Leon Glass during the next year and learning how the organization has been run. I would also be happy to hear from any member of SMB at amhasting@ucdavis.edu with ideas for future directions, suggestions, or any questions. I hope that I will be able to continue the development of the society and further the society as a means of intellectual exchange and promotion of mathematical biology. During the next year I will be formulating more detailed plans.

Sincerely,

Alan Hastings

A Report on the SMB Annual Meeting, Toronto, Ontario, Canada, July 13-17, 1998

by Meghan A. Burke

The Society for Mathematical Biology held its Annual Meeting July 13-17, 1998, at the University of Toronto campus, in conjunction with the Society for Industrial and Applied Mathematics (SIAM) Annual Meeting. The weather in Toronto was just beautiful the entire week -- sunny and 80 degrees. And the Blue Jays beat the New York Yankees during our presence!

The plenary sessions, given by Richard Karp (speaking on discrete mathematics as a tool for molecular biology), Jurg Ott (statistics of genetic mapping) and G. M. Crippen (a mixed integer program for models of drug receptor sites) impressed large numbers of applied mathematicians in the round Convocation Hall at the center of campus.

There were also a wide variety of Minisymposia, ranging in topic from Fisheries (organized by Ransom Myers) to DNA Computing (organized by Lila Kari). Minisymposium attendees were treated to examples of theoretical population biology talks (or in James Sneyd's case, VIDEOS!) organized by Denise Kirschner (but chaired ably in her absence by Leon Glass). Other minisymposia included Time Delays in Physiological and Neural Systems (organized by Jacques Belair), Unstable Periodic Orbits in Biology (Daniel T. Kaplan), and Mathematical Modeling in Physiology (Jonathan Bell and E. Bruce Pitman).

Several of the Minisymposia addressed practical aspects of the Mathematical Biologists' world. John Jungck organized a lively session on Interactive Mathematical Biology's Role in Curriculum Reform -- complete with an interactive exercise for the audience care of Jim Cornette. (An aside for those who participated -- we had left one slice out of the sum. In the end, we got the volume of the potato SPOT ON!) In addition, Leon Glass organized a session on Employment Opportunities for Applied Mathematicians in Biotechnology where a packed house heard about the variety of environments where one can use mathematics in biotechnology. Jamie Cuticchia, Frank Tobin, Jeffrey Sachs, and Thomas Paterson also shared insights into their current research problems.

Two contributed presentation sessions also discussed some interesting current work. The highly awaited poster session was another place for presenters to show their latest and greatest results, and there they had the advantage of very fine refreshments to add to the festive atmosphere. The poster session followed the annual business meeting where we heard about all the exciting developments of the society. These developments can generally be found at the SMB website, http://www.smb.org.

A related minisymposium was also held in conjunction with the SIAM Annual Meeting: a Mathematical Biology session sponsored by the Association for Women in Mathematics. This was just one of four minisymposia and a poster session associated with the AWM Workshop. The workshop, held every year in conjunction with the SIAM Annual Meeting in summer and the Joint Mathematics Meetings in winter, sponsors women postdocs (within 5 years of finishing a Ph.D.) and graduate students to attend the meetings and to present their research. In addition to being a terrific experience of presenting to an interested audience, the workshop provided an opportunity to meet and be mentored by more senior mathematicians. One of the minisymposia, which drew a standing-room-only crowd, was even on the topic of Career Planning and Career Experiences. The value of this experience cannot be overstated, and interested women are urged to apply for next year's workshop. Application deadline is early, January 3, 1999, as next year's SIAM Annual Meeting is early, in May in ATLANTA! Check the new AWM website at http://www.awm-math.org.

And next year's Society for Mathematical Biology meeting will be June 29-July 3, 1999, in AMSTERDAM, in conjunction with the 4th European Society for Mathematical and Theoretical Biology meeting. Hope to see you there for another inspiring meeting!

(See also in this issue "A Report of Some Session at the Annual Meeting" by Raymond Mejia)

A Report of Some Sessions at the Annual Meeting

by Raymond Mejia

The SMB Annual Meeting was held at the University of Toronto July 13-17. It was held in conjunction with SIAM's Annual and Discrete Mathematics Meetings. The meeting was well attended; by my estimate over 1000 registered, and over 100 attendees participated in the SMB meeting/poster session/reception on Wednesday evening at the Fields Institute.

A brief summary of each talk is included where possible.

A short course, "Introduction to Computational Genomics" by Mark W. Perlin preceded the meeting on Sunday.

An introduction to what genomics is included current efforts in information science and chemistry, the goal to understand the cellular operating system and organisms as well as diagnosis and treatment of disease, and methods used: informatics as well as the physical and biological sciences. The rudiments of biotechnology included informatics and chemistry of DNA, hybridization, and the polymerase chain reaction. The mathematical perspective included information processing as central to genomics plus experimental design, analysis and examples of applications.

Genetic mapping was described, including recombination, linkage maps, markers and traits followed by microsatellite genotyping, laboratory experiments and data interpretation methods and examples.

Radiation hybrid mapping discussed included association of DNA markers to locations, mathematical methods used and sample maps.

Plenary talks during the week included:

G. M. Crippen, "A Mixed Integer Program for Deducing Objective Models of Drug Receptor Sites from Experimental Binding Data".

That small drug molecules must bind to a particular site on a large receptor protein is an essential step to producing a desired biological response in drug discovery. The speaker presented an objective way of finding a range of models that deduce receptor site's shape and energetics of interaction to predict the binding of other molecules with estimated uncertainties.

Jurg Ott, "Statistical Aspects of Genetic Mapping in Human Families".

Approaches to gene mapping using nonparametric statistics and open problems were discussed.

Richard M. Karp, "Discrete Mathematics as a Tool for Molecular Biology"

Combinatorial problems that arise in radiation hybrid mapping, sequence-tagged-site mapping and restriction mapping were discussed as well as combinatorial problems that arise in the analysis of gene expression data.

Minisymposia of special interest included the following:

Fisheries (Organizer: Ransom Myers; Speakers: Robert McKelvey, Russell Millar, Michael Fogarty, Ransom Myers)

DNA Computing: Arrival of Biological Mathematics (Organizer: Lila Kari; Speakers: Lila Kari, Masami Hagiya, John Reif, Laura Landweber)

Lila Kari, in "DNA Computing: Arrival of Biological Mathematics", addressed two questions proposed by Adleman [Molecular computation of solutions to combinatorial problems. Science. 1994 Nov 11; 266(5187): 1021-1024], namely: (1) Does EVERY computing problem have a DNA-based solution? and (2) Is it possible, at least theoretically, to construct programmable "test-tube" DNA computers? The answer was in the affirmative for a formal model of DNA computing based on contextual insertions and deletions.

(Article continued on next page)

Mathematical Biology (Organizer Suzanne Lenhart; Speakers: Meghan Burke, Zhilian Feng, Ramit Mehr, Rebecca Tyson)
Ramit Mehr, in "Modelling the Metadynamics of Lymphocyte Repertoires", described how receptor genes rearrange from segment libraries to create highly diverse repertoires to recognize most antigens. The biology was described for modelling repertoire metadynamics, from the stochastic generation of new clones, through competition between clones, through competition between clones to emergent properties including learning and memory.

Discrete Math/Modeling (Organizer: Brigitte Servatius; Speakers: Katherine St. John, Sharon Crook, Joan Remski, Graciela Cerezo)
Sharon Crook, in "Modelling Cortical Oscillations with Networks of Coupled Phase Oscillators", used such models to examine mechanisms that affect cortical dynamics.

Graciela Cerezo, in "Modelling the Distributional Dynamics of a Clam Population along the Coasts of Argentina", presented a model of the life cycle of Mesodesma mactroides integrated with a model of the physical environment. Results of a discrete model and a continuous model that couples the coastal population dynamics of the species with transport processes in the ocean were shown, as was how these may help to create restoration and conservation of the species.

Time Delays in Physiological and Neural Systems (Organizer: Jacques Belair; Speakers: Coraci Malta, Harold Layton, John Milton, Jacques Belair)
Harold Layton, in "Oscillations in the Tubuloglomerular Feedback System", described a model of the TGF pathway that shows oscillations arising from two distributed delays; namely, the time for fluid to travel up the thick ascending loop of Henle, and the time for macula densa cells to sense the fluid composition delivered to the distal tubules. Model results predict that for a sufficiently large feedback loop gain magnitude, the oscillations have the potential to decouple water and NaCl delivery to the distal nephron.

John Milton, in "Multistability in Neural Computer Devices (NCD)", discussed multistability in prototype NCDs involving Aplysia motoneurons and the human pupil light reflex.

Jacques Belair, in "Timing and Delays in Drug Administration", described the need to take into account time delays due to circulation in the design of therapeutic drug treatments. Examples were given of both beneficial as well as undesirable oscillations due to treatment strategies.

Interactive Mathematical Biology's Role in Curriculum Reform (Organizer: John Jungck; Speakers: John Jungck, James Haefner, Evans Afenya, James Cornette)

Theoretical Population Biology: Examples at Multiple Scales (Organizer: Denise Kirschner; Speakers: Suzanne Lenhart, Ramit Mehr, James Sneyd, Michael Savageau)
Ramit Mehr, in "Modeling B Cell Repertoire Shift", described how antibodies dominating the secondary immune response are often produced by different B cell lineage from that which dominated the primary response. A mathematical model and computer simulations of the dynamics of competing B cell clones was used to examine the various hypotheses that attempt to explain repertoire shift. In combination with experimental data, the suggestion was made that differentiation of mature B cells and their earlier development may use the same mechanisms.

James Sneyd, in "Talking with Nonlinear Waves: Coordination in Cell Populations", described how the theory of nonlinear waves can be used to study intracellular communication, and how the mathematical problems differ for different cell types. Examples included cardiac tissue, the liver, the hippocampus, and the trachea.

Michael Savageau, in "Function, Design and Evolution of Gene Circuitry", presented a quantitative theory to predict selection of the mode of control as well as minimum, maximum and nominal values for gene cycle time in an organism.

(Article continued on next page)

Unstable Periodic Orbits in Biology: Identification and Control (Organizers: Daniel Kaplan and James Collins; Speakers: William Ditto, Frank Moss, Daniel Gauthier, James Collins)
William Ditto, in "Unstable Fixed Points in Biological Systems: Tips, Traps and Techniques", demonstrated control of fixed points in human atrial and canine ventricular fibrilation and in rat hippocampal slices.

Employment Opportunities for Applied Mathematicians in Biotechnology (Organizer: Leon Glass; Speakers: Jamie Cuticchia, Thomas Paterson, Frank Tobin, Jeffrey Sachs)

Mathematical Modeling in Physiology (Organizers: Jonathan Bell and Bruce Pitman; Speakers: James Collins, Timothy Lewis, Arthur Sherman, Gregory Smith)
James Collins, in "Noise-Enhanced Dynamics in Sensory Neurons", showed how noise can enhance the detection and transmission of weak signals in certain nonlinear systems. Stochastic resonance behavior was demonstrated in single model neurons, networks of model neurons, rat cutaneous motor neurons and the human-touch sensation system.

Timothy Lewis, in "The Effects of Nonexcitable Regions on Signal Propagation in Excitable Media: Propagation Failure and Reflection", demonstrated and gave examples of dynamical mechanisms that form the basis of arrythmia-generating phenomena of propagation failure and reflection in a cardiac tissue model.

Arthur Sherman, in "Heterogeneous Patterns of Pancreatic Beta-Cell Activity Studied with Modelling and Dynamic Current Clamp" described how pancreatic islet response might be constructed from isolated cell activity,

Gregory Smith, in "Fourier Analysis of Sinusoidally Driven Thalamocortical Relay Neurons and a Minimal Integrate-and-Fire-or-Burst Model", showed results of a minimal IFB model that reproduces many of the features of thalamocortical relay cell responses to sinusoidal current injection. The model is constrained using Fourier analysis of intracellular records from cat thalamic slices and experimental observations.

Contributed presentations of special interest included:
Gerda de Vries, in *"Effect of Noise on the Emergent Collective Behaviour of Diffusively Coupled Biological Oscillators"*, demonstrated that the addition of noise produces a stochastic resonance-like phenomenon that increases the coupling range over which bursting develops from tonically spiking isolated cells.

Rebecca Tyson, *in "Model and Analysis of Chemotactic Salmonella Typhimurium Patterns in Semi-Solid Medium"*, presented a mathematical model of a chemotactic phenomenon that induces bacteria to form large spatial patterns. A nonlinear analysis predicted the parameter regions in which certain limited pattern types exist, namely, spots and stripes, and it was shown how these patterns relate to patterns obtained experimentally.

Carl Panetta, in *"Mathematically Modeling the Effects of Paclitaxel and Cisplatin on Cancer"*, described models to study the cell kinetics of the cancer and the pharmacokinetics of the two drugs paclitaxel and cisplatin, and used the models to explain results seen clinically and suggest effective treatment regimens.

Jonathan Bell, in *"Direct and Inverse Problems Associated with Modeling the Dynamics of a Skin Receptor"*, described the development of a non-classical cable model for the nerve ending and the appropriate oblique boundary conditions. Conditions for the boundary potential to reach threshold were given, and initial work on recovering properties of the stimulus based on additional boundary and voltage measurements was presented.

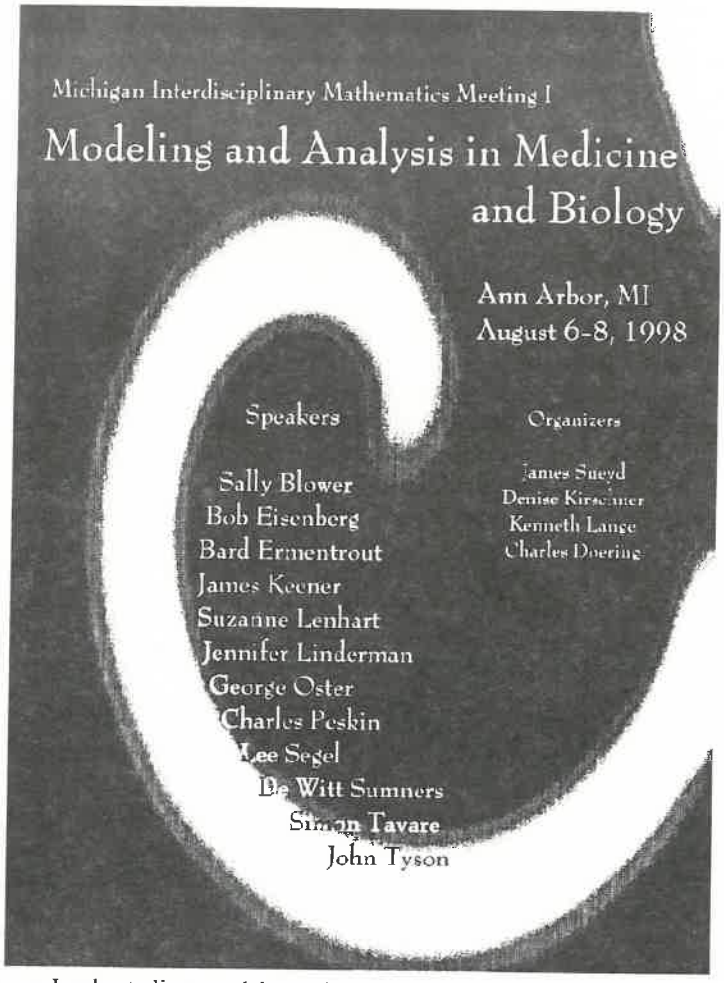
Jonathan Rubin, in *"Synchronization Mechanisms in Neuronal Network Models with Fast Inhibitory Synapses"*, used new neuronal models and more complicated neuronal architectures to show that stable, synchronous oscillations can be produced by fast inhibitory coupling. Crucial qualitative differences in inhibitory synchronization mechanisms were shown when additional network complexity is considered.

The First Michigan Interdisciplinary Mathematics Meeting on the topic Modeling and Analysis in Medicine and Biology

by James Sneyd

The first Michigan Interdisciplinary Mathematics Meeting on the topic Modeling and Analysis in Medicine and Biology was held in the Mathematics Department of the University of Michigan, at the beginning of August. There was an excellent lineup of speakers, all of whom gave wonderful talks, there was a conference banquet at the Michigan League, and a number of posters rounded out the meeting.

Day 1. We heard first from Charles Peskin, who showed impressive videos of his latest computational results on blood flow in the heart, and then from Sally Blower, who described her work on the emergence of antiviral drug resistance. In the afternoon, George Oster gave us a wonderful tour of various complicated bits and pieces inside cells that build ATP, and finally Bard Ermentrout, in an impressive display of restraint and gentility, educated us on the properties of waves in synaptically coupled neuronal populations.



Day 2. First Lee Segel talked about the role of feedback, particularly spatially localised feedback, in the control of the immune system, and then our very own Jennifer Linderman (from the University of Michigan that is) discussed ligand efficacy, and showed us, among other things, that drug companies don't always do the right thing in their search for new drugs. Neither do rock stars I suspect. James Keener, almost defibrillating in front of our very eyes, gave an excited and exciting demonstration of the powers of homogenization, and the usefulness of arms as models of channel gates. This was when he wasn't trying to advertise his new book. I hear this book is very good and you should all go out and buy at least one copy. (See more details in this newsletter.) Finally, John Tyson, in typical calm and collected fashion, led us through some of the intricacies of the cell division cycle.

Day 3. We began with De Witt Sumners, who showed us that knot all topology is pure as the driven snow, but can actually (horrors) be useful. Very broadening to the mind. Simon Tavare talked about stochastic models and their use in the study of evolution and hereditary diseases. Finally Robert Eisenberg applied the Eisenberg certainty principle (as first proposed by B. Ermentrout of course) to models of ionic channel flow, and Suzanne Lenhart discussed how the principles of optimal control can be applied to the study of population models. Her talk of killing beavers caused some disturbance, but she reassured us that she does not do the dirty deed in person.

Overall, an excellent conference (I have to say this, as I helped to organise it), and we (Charlie Doering, Denise Kirschner, Kenneth Lange, and myself) thank all those who participated. Future MIMMs will be held each year, but they won't be on Mathematical Biology, and I won't be organising them. This is a good thing.

Elections for the SMB.

by Denise Kirschner

Elections we just held for the available positions on the board of directors for the Society of Mathematical Biology, together with the position of President-Elect. They were held during the month of June. Three positions were available on the board of directors, and the following candidates were elected: Mark Chaplain, Sharon Lubkin, and Lisa Sattenspiel. Each will serve a three-year tenure. For the position of President-elect, Alan Hastings was elected.

Congratulations to all of you! We look forward to having you serve.

Finally, thanks to all those members who were on the ballot for their dedication and willingness to participate. We greatly appreciate your efforts. Also, thanks go to Torcom Chorbajian, SMB treasurer for compiling, distributing and counting the ballots.

Results on Survey for Abstract Services

by R. Capelli

The following information is a collection of the results from the Society for Mathematical Biology's survey on abstract services.

Total responses received: 5

Responses to questions.

1. *Do you currently subscribe, or have you ever subscribed to, an abstract service?*
   No - 4
   Yes - 1
   Which service? CCOD

2. *If so:*
   What is the cost of this service? $1000 / year
   How many journals are covered by the service? Too many to count
   How often do you receive information from these services (eg weekly, monthly)? weekly
   Are you satisfied with this service? Yes

3. *If not, would you be interested in signing up to such a service?*
   Yes - 3
   No - 0

Other responses:
"Hmmm. I think first I would have to be persuaded that it's worth my time. If someone could do that, then of course I'd be interested! At the moment however, I find it hard enough just to get the BMB read."

Article on NIH Funding

by Denise Kirschner

There is a heightened awareness regarding the importance of mathematical modeling research in biology and medicine among several of the National Institutes of Health (NIH). As members will recall we prepared a survey of funding and presented the results in the last newsletter. Since that time several announcements have been made by the NIH which are of great interest to the membership.

The most appropriate response to these program announcements is the submission of high quality applications by the membership of the SMB. As Dr. Leon Glass, President of the SMB has emphasized that the NIH will judge the need for funding mathematical biology research applications based on the number and quality of applications that are received. He strongly encourages SMB members who are working in areas that may be eligible for funding under these program announcements to apply for support. The SMB is working to ensure that a pool of qualified reviewers is available to the NIH.

You can easily download the announcements directly from NIH at the URL's listed below. A program announcement from the NIH allows you to apply for grants under the normal NIH cycles, but indicates that your grant is geared to a research area that NIH has announced they are interested in funding. The main homepage for the NIH is http://www.nih.gov.
Information regarding submissions and forms and other information can be found there.

1) http://www.nih.gov/grants/guide/pa-files/PA-98-024.html.
This announcement is entitled: SUPPLEMENTS FOR THE STUDY OF COMPLEX BIOLOGICAL SYSTEMS.

The purpose of this initiative is to support new quantitative approaches to the study of complex, fundamental biological processes by encouraging non-traditional collaborations across disciplinary lines. The National Institute of General Medical Sciences (NIGMS) will provide supplements to existing NIGMS grants to support the salary and expenses of collaborating investigators such as physicists, engineers, mathematicians, and other experts with quantitative skills relevant to the analysis of complex systems. It is expected that the collaboration will result in new directions for the parent project, or new research projects that will compete for independent funding.

2) http://www.nih.gov/grants/guide/pa-files/PA-98-077.html
This announcement is entitled: QUANTITATIVE APPROACHES TO THE ANALYSIS OF COMPLEX BIOLOGICAL SYSTEMS.

The purpose of this program announcement is to advertise National Institute of General Medical Sciences (NIGMS) and National Institute of Mental Health (NIMH) interest in supporting research projects that develop quantitative approaches to describe, analyze, and predict the behavior of complex biological systems, especially those requiring the integration of potentially large amounts of molecular, biochemical, cell biological, and physiological data. Such studies, adapted to the analysis of complex systems in humans, will ultimately have an impact on the treatment of human disorders and disease. These projects are expected to require the participation of individuals with diverse expertise and therefore to be of a collaborative and cross-disciplinary nature. Applicants are strongly encouraged to consider research areas in which systems approaches are likely to make significant contributions. These include NIGMS supported research on basic studies in genetics, biochemistry, neuroscience, cell biology, and developmental biology that typically utilize non-human model systems; basic studies in pharmacology, physiology, metabolic engineering, anesthesiology, and inflammation, burn, and trauma. The NIMH expresses particular interest in studies using mathematical, computational, or theoretical approaches to understanding the fundamental biological mechanisms underlying behavior.

3) http://www.nih.gov/grants/guide/pa-files/PA-98-083.html
This announcement is entitled: SHORT COURSES ON MATHEMATICAL AND STATISTICAL TOOLS FOR THE STUDY OF COMPLEX PHENOTYPES AND COMPLEX SYSTEMS

The purpose of this program announcement is to provide support for short courses or workshops to assist scientists in preparing for research on complex phenotypes and complex systems. This award is for scientists studying complex phenotypes and/or complex systems must have strong backgrounds both in biology and in the analysis and interpretation of very complex data. It is important that biologists have a solid understanding of the available mathematical and computational tools so that they can use the tools constructively. Biologists may also require instruction in the language and applications of mathematics and statistics in order to collaborate with mathematicians about biological complexity. Scientists with mathematical skills who wish to apply their knowledge to studies of complexity may also require instruction on the nature, issues, and language of biological research.

Special Thematic Summer on Mathematical Biology
May 31-August 27, 1999
Pacific Institute for the Mathematical Sciences
University of British Columbia
Vancouver, B.C. Canada

A Special Thematic Summer on Mathematical Biology will be held at the University of British Columbia, Vancouver, B.C. Canada during June, July, and August 1999. The purpose of this Special Thematic Summer is to bring together researchers at various levels of expertise in an environment where focused talks will be given in several different areas of mathematical biology. This Special Thematic Summer is sponsored by the Pacific Institute for the Mathematical Sciences (a consortium of five universities - Simon Fraser University, University of Alberta, University of British Columbia, University of Calgary, and University of Victoria).

The workshops for this Special Thematic Summer and each organizer are:

- Genomics (Michael Waterman, University of Southern California) - May 31 - June 11, 1999
- Physiology (Robert Miura, University of British Columbia) - June 14-25,1999
- Epidemiology (Pauline van den Driessche, University of Victoria) - July 19-30, 1999
- Ecology (Marc Mangel, University of California, Santa Cruz) - August 2-13, 1999
- Cell Biology (Leah Keshet, University of British Columbia) - August 16-27,1999

(A break of three weeks in the latter part of June and first half of July is to allow participants and speakers to attend the International Conference on Theory and Mathematics in Biology and Medicine in Amsterdam (June 29-July 3, 1999; the Annual Meeting of the Society for Mathematical Biology is being held in conjunction with this conference) and the International Conference on Industrial and Applied Mathematics in Edinburgh (July 5-9, 1999).)

Each of the five workshops in this Special Summer program will run for two weeks and will include tutorial, general, and research talks. Formal talks by invited speakers will be interspersed with informal seminars, and there will be ample time for detailed discussions among the participants. More details on the workshops, updates on the invited speakers, and application forms can be found at the website:
http://pims.math.ca/sections/activities/bio.html

Some financial support for graduate students, postdoctoral fellows, and other participants will be available to help defray travel and local living expenses. Graduate students and postdoctoral fellows must include a curriculum vitae, a letter of recommendation, and a letter of intent along with their application forms. Due to the limitation on funds, participants are encouraged to seek funds from other sources for travel and living expenses.

Applications and further inquiries should be sent to:

Director's Office
Pacific Institute for the Mathematical Sciences Rooms 210-218
Old Auditorium Annex
1924 West Mall
Vancouver, B.C. V6T 1Z2
Canada

E-mail: pims@math.ubc.ca
Phone: 604-822-3922
Fax: 604-822-0883

Web Site Announcement

contributed by Ronald N. Kostoff/ONR

I. JUNE 1998 ADDITION - SCIENCE AND TECHNOLOGY INNOVATION

A monograph entitled "SCIENCE AND TECHNOLOGY INNOVATION" was added to the web site http://www.dtic.mil/dtic/kostoff/index.html in June 1998. This thirty-page document describes two novel complementary approaches for systematically enhancing the process of innovation and discovery. One approach is workshop-based and the other is literature-based. Both approaches have the common feature of exploring knowledge from very disparate technical disciplines and technologies, and transferring insights and understanding from one or more disparate technical areas to other technical areas. While either approach can be performed independently to enable innovation and discovery, it is highly recommended that the approaches be combined into a single process. This integrated approach utilizes the strengths of each component technique to provide a synergy, which can lead more efficiently to innovation than the sum of the two approaches performed separately. It has the potential to be a major breakthrough for the systematic promotion of innovation and discovery.

II. APRIL 1998 ADDITION - SCIENCE AND TECHNOLOGY METRICS

A monograph entitled "SCIENCE AND TECHNOLOGY METRICS" was added to this web site in April 1998. The document describes:

a) why S&T assessment and evaluation have become important;
b) why metrics have become important for quality S&T evaluation;
c) what types of metrics are available for S&T evaluation, and
d) how metrics have been and can be applied to prospective and retrospective S&T assessment and evaluation.

Many case studies of metrics applications are summarized. The monograph discusses how metrics can be integrated with other evaluation tools to address the requirements of the Government Performance and Results Act of 1993 (GPRA). This comprehensive metrics monograph is self-contained, with 14 Appendices, and can serve as an information resource with over 5600 text and suggested reading references.

III. AUGUST 1997 ADDITIONS - ASSESSMENT/ PEER REVIEW/ ROADMAPS

There are three other documents on this web site of potential interest to science and technology managers/ sponsors/ administrators/ planners/ transitioners/ researchers and developers/ evaluators and assessors. They are:

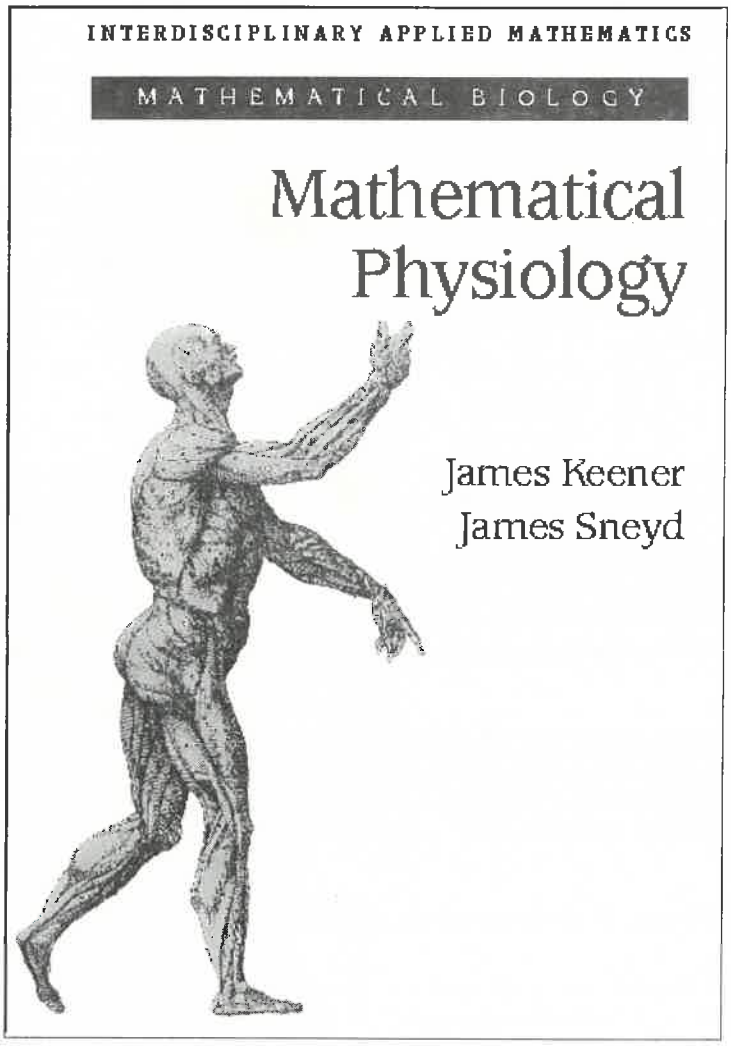
1) The Handbook of Research Impact Assessment
2) Research Program Peer Review: Principles, Practices, Protocols
3) Science and Technology Roadmaps

All three documents:

I. provide extensive background on the importance of the topic;
II. present the theory and principles underlying successful utilization of the methods and techniques discussed;
III. describe many case studies of successful applications, and
IV. provide thousands of useful references.

The Twin Jim Physiology Wunderbook

by James Keener and James Sneyd



To appear in September with Springer.

- Approx. 780 pages
- Lots of nice pictures (347 to be precise)
- Get an early thrill by viewing the table of contents below.

List Price $69.95
Special price for SMB members (Wow, what a deal).

Order your very own copy from the enclosed flyer (Even though Springer hasn't yet got the title correct.) Buy two.

Here's a list of the chapters.

Part I
Cellular Physiology. Biochemical Reactions.- Cellular Homeostasis.- Membrane Ion Channels.- Excitability.-Calcium Dynamics.- Bursting Electrical Activity.- Intercellular Communication.- Passive Electrical Flow in Neurons.- Nonlinear Wave Propagation.- Wave Propagation in Higher Dimensions.- Cardiac Propagation.- Calcium Waves.-Regulation of Cell Function.-

Part II
Systems Physiology.- Cardiac Rhythmicity.- The Circulatory System.- Blood.- Respiration.- Muscle.- Hormone Physiology.- Renal Physiology.- The Gastrointestinal System.- The Retina and Vision.- The Inner Ear

http://www.math.lsa.umich.edu/~jsneyd/Physiol_Book/Physiol_Book.html

Please note there were quite a few new job openings advertised in the latest digests.
You can view recent digests at ftp://ftp.ncifcrf.gov/smb/digest/