The Society for Mathematical Biology

SMB Newsletter
Volume 21 #3 - September 2008

SMB Annual Meeting Photos shown throughout this newsletter were provided courtesy of Ramit Mehr, Sharon Lubkin and Gibin Powathil.

Thanks to conference chair Siv Sivaloganathan (left) and SMB Pres. Avner Friedman for a great meeting!
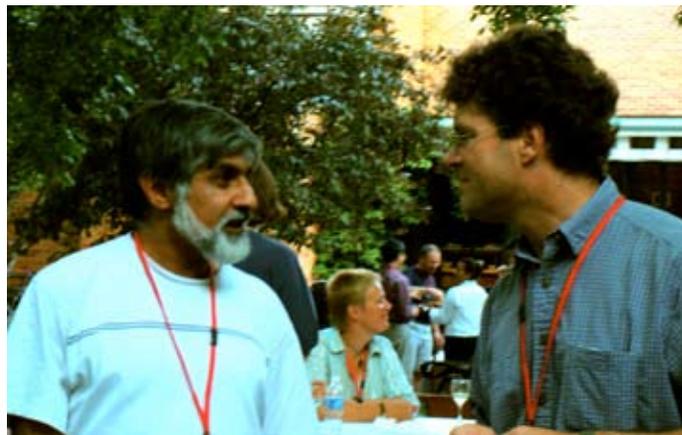
Philip Maini (left) and Mark Lewis

Rebecca Tyson, Gerda de Vries, Sharon Lubkin and Ramit Mehr (left to right) enjoy the Lee Segel reception.

Ray Mejia, Rubem Mondaini and Holly Gaff

The masses in search of the never-ending refreshments

Dear SMB Members:

We just concluded another very successful annual SMB conference. The conference was hosted by the University of Toronto and co-sponsored by the Fields Institute. There were 300 participants and over 200 submissions.

The organizing committee and its Chair, Siv Sivaloganathan have done a superb job in developing the program and in the logistic arrangements. This year, for the first time, Springer, in partnership with the Society for Mathematical Biology, awarded the Lee Segel Prize to Mark Lewis and Tomás de-Camino-Beck for the best paper published in the Bulletin of Mathematical Biology within the last two years, and to Emma Y. Jin and Christian M. Reidys for the best student paper published in the BMB during the same period.

The Torcom Chorbajian Lecture was initiated, with Melissa Knothe Tate's lecture on "Engineering an Ecosystem: Taking Cues from Nature's Paradigm to Build Tissue in the Lab and the Body."

The Board of the SMB held its annual meeting the day prior to the conference. Catriona Byrne, from Springer, and Philip Maini, the Editor, reviewed the state of the BMB. The journal is distributed to all members of the Society. The recent trend in library subscriptions is to move into electronic circulation. The BMB, as you know, publishes a large number of papers, and one of the challenges is to identify willing referees. The Board discussed ways and means to address this problem.

The Board received reports from its various committees. The Travel Committee invites applications by SMB members to support travel not only to the SMB annual conference, but also to support travel to other mathematical biology meetings. The World Outreach Committee (WOC), chaired by Aziz Yakubu, has been involved in the formation of the new African Society for Biomathematics (ASB) which was announced in January, 2008 during a mathematical biology conference held in Marrakesh. The first meeting of the ASB will take place in Cape Town, South Africa, next January. Another conference, jointly between SMB and the Chinese SMB will take place June 14-17, 2009 in Hangzhou; for details see http://www.biomath.net.

John Jungck, the chair of the Education

Committee, reported on the IUBS BioEd 2009, which will take place in Christchurch, New Zealand. The SMB will co-sponsor the conference.

The Board reaffirmed the venue for the next SMB annual conference: It will be held at the University of British Columbia in Vancouver, July 27-30, 2009 and it is co-chaired by Eric Cytrynbaum and Dan Coombs.

The Board voted to hold the 2010 SMB conference in Rio de Janeiro. The 2011 conference will be held jointly with the European Society for Mathematical and Theoretical Biology (ESMTB) at Krakow, Poland.

I would like to conclude this letter thanking the outgoing members of the Board for their dedication and efforts over the last four years: Meghan Burke, Yoh Iwasa and Rebecca Tyson and to thank Mark Chaplain the past president. I would also like to welcome the new members of the Board: Renee Fister, Mary Myerscough, and Santiago Schnell and the new President elect, Michael Mackey.

I wish you all a productive and enjoyable rest of the summer.

Sincerely,

Avner Friedman

SMB President

BioMath Days Ottawa, 2008
Robert Smith? and Frithjof Lutscher

Joe Tien, Dai Hai He and Robert Smith?

The workshop entitled "BioMath Days" was held at the University of Ottawa on March 28/29, 2008. The aims of the workshop were (1) to showcase the exciting research in mathematical biology that is emerging in many universities in Ontario and throughout Canada; (2) to serve as a forum for all the research groups inf mathematical biology in Ontario to meet and exchange ideas; and (3) to give young researchers the opportunity to present their work and meet some world-class researchers in the field. Due to the research interests of the two organizers (Frithjof Lutscher and Robert Smith?), the invited and contributed talks were mostly in the areas of mathematical ecology, epidemiology, immunology and evolution. Funding was kindly provided by the *Centre de Recherche de Mathématiques* (CRM), through the Distinguished Visitor's program; by the Society for Mathematical Biology; and by the MITACS Centre for disease modeling, as well as the University of Ottawa.

The four invited speakers and the titles of their respective presentations were (in alphabetical order): Chris Bauch (Guelph), "Wealth as a source of density dependence in human population growth: evidence from the demographic transition"; Gerda de Vries (Alberta), "Introduction to Models in Radiation Biology: From Cell Population Models to Tumour Control Probability Curves"; Karl Peter Hadeler (Tuebingen/Arizona State), "Quiescent Phases in Dynamical Systems and in Biological Modeling"; Pauline van den Driessche (Victoria), "Models for Influenza".

These speakers represent a range of experience, from early career to senior mathematicians. The provided talks, while quite different, were uniformly excellent and engaged a great deal of discussion among the audience, allowing students and postdocs the chance to discuss the issues with more established researchers.

The eleven contributed talks were grouped loosely into ecology on the first day and epidemiology on the second day (see detailed schedule at the workshop website: http://www.mathstat.uottawa.ca/~fluts037/BMD/BMD_2008.html). Participants came from several different groups, some from within Canada (McMaster University, U of Guelph, U of New Brunswick, U of Ottawa, York University), some from the United States (U of Michigan, Yale) and one participant from as far as Brazil. A book prize was offered, but in the end the judges (the four invited speakers) found it impossible to choose merely one excellent talk. It was thus decided to award two prizes instead. The winners were Joe Tien (McMaster) and Eunha Shim (Yale).

The workshop schedule allowed for many informal discussions, e.g. over lunch and during the reception on the first evening. Participants enjoyed these discussions as much as they did the lectures that were all very well presented. Students and postdoctoral fellows were excited to meet some of the leading researchers in the field, who in turn were inspired by the younger generation and their enthusiasm. The following quotes from participants summarize the overall atmosphere. "Many thanks for inviting me to BioMath Days, which I really enjoyed. Your excellent organisation produced a very pleasant atmosphere for the great talks and discussions. I certainly hope that BioMath days are repeated periodically!" - Pauline van den Driessche. "Thank you again for the opportunity to give the talks and I expect to participate [in] other conferences at University of Ottawa." - Aquino Espindola. "Thanks very much for the invitation, I also enjoyed the meeting very much!" - Chris Bauch

In summary, small meetings like this are an invaluable way for young researchers to interact with more established academics in a personalised way. It allows for an exchange of ideas across the seniority threshold that most larger conferences cannot hope to achieve and helps set students and postdocs on their path to academic success.

Report from the 2008
Society for Mathematical Biology
Annual Meeting
Colin Turner

The 2008 Society for Mathematical Biology Conference (July 30 - August 2) brought together 330 mathematicians, scientists, statisticians and computer scientists (and of course an entire spectrum of hybrids of these) in Toronto, a city as diverse as the backgrounds of the meeting's participants. Those fortunate enough to arrive early enjoyed a pre-conference reception at the Fields Institute (a primary host and sponsor of this year's event) on the evening of July 29th; the next morning (8:15 am sharp!) brought the meeting to its official commencement in the Medical Sciences building of the University of Toronto.

Following introductory remarks, the first plenary talk, "Mechanochemistry and motility," was delivered by L. Mahadevan of Harvard University. This inspiring lecture served as a springboard into the various minisymposia and contributed talk sessions that made up the bulk of the three-and-a-half conference days. These sessions focused on a broad range of aspects of mathematical biology, giving attendees much choice. Other plenary speakers included Timothy Secomb, Herb Levine, Natalia Komarova, Yicang Zhou, Mark Lewis and Martin Golubitsky; these speakers discussed varied and distinct topics but were consistently excellent. Between talks, guests were able to refresh at coffee

Many excellent posters were presented at this year's meeting.

and tea breaks, during which fruit skewers and pastries were never scarce.

On Thursday, a new SMB tradition began as the first Lee Segel Prizes were awarded. These prizes, which are to be awarded biennially, recognize what are determined to be the best student-authored and overall articles appearing in the Bulletin of Mathematical Biology over the previous two years. The inaugural Lee Segel Prizes went to Emma Y. Jin in the student category for her work "Asymptotic Enumeration of RNA Structures with Pseudoknots" (with Christian M. Reidys) and to Tomás de-Camino-Beck and Mark Lewis for "A New Method for Calculating Net Reproductive Rate from Graph Reduction with Applications to the Control of Invasive Species." As Tomás was unable to attend, Mark gave an excellent presentation on their work; Emma Jin also gave an exceptional presentation on the research that earned her the prize. Following these talks, conference attendees retreated to a lavish reception at Massey College, a lush oasis in the heart of the U of T campus. The setting was further enhanced by the ideal weather, which shocked locals by continuing to cooperate for (almost) the entire conference.

With Friday came the annual poster viewing, as over 70 students and post-docs competed for glory (and more tangible prizes) in an event that truly foreshadowed the coming Olympic Games, which at this point were only a week away. While all posters were interesting and appreciated, the top honours went to Luay Almassalha of the University of Michigan in the graduate student category "Understanding the formation of the Arabidopsis root epidermis through an intimate collaboration between

The Medical Sciences auditorium at the University of Toronto was home for the superb plenary talks.
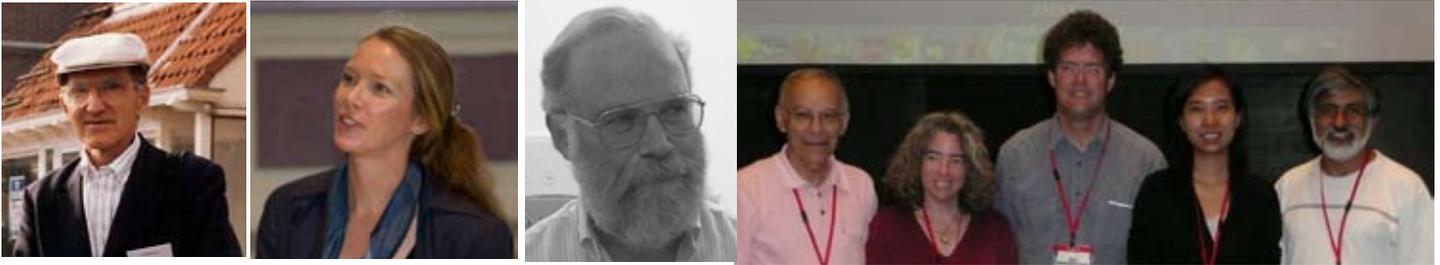
Above from left to right: Torcom Chorbajian, Melissa Knothe Tate, Lee Segel, Avner Friedman, Sharon Lubkin, Mark Lewis, Emma Y. Jin and Philip Maini

Torcom Chorbajian Lecture

The first Torcom Chorbajian Lecture (was given by **Melissa Knothe Tate** and was titled "Engineering an Ecosystem: Taking Cues from Nature's Paradigm to Build Tissue in the Lab and the Body"
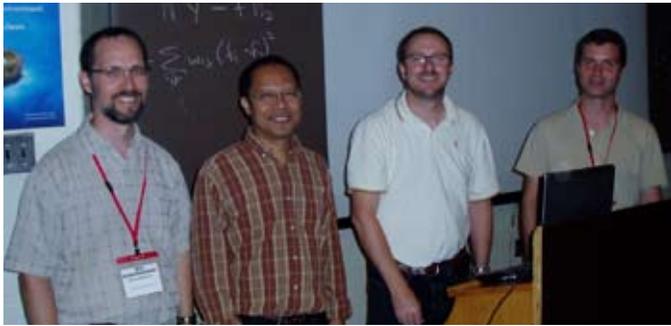
The minisymposia and contributed talk sessions showcased a variety of math biology fields of interest.

Lee A. Segel Prize

The first biennial Lee A. Segel Prize for Best Student Paper in the Bulletin of Mathematical Biology was awarded to **Emma Y. Jin** and **Christian M. Reidys** in recognition of their distinguished paper "Asymptotic Enumeration of RNA Structures with Pseudoknots"

The first biennial Lee A. Segel Prize for Best Paper in the Bulletin of Mathematical Biology was awarded to **Tomás de-Camino-Beck** and **Mark A. Lewis** in recognition of their distinguished paper "A New Method for Calculating Net Reproductive Rate from Graph Reduction with Applications to the Control of Invasive Species"

Lee Segel Prize Committee: Avner Friedman, President; Sharon Lubkin, Publications Chair; Philip Maini, BMB Editor

modeling and experiment" and Richard Brown of the University of Canterbury (NZ) "A meta-population model for the growth of nassella tussock" for best poster by a postdoctoral fellow. To recognize the significant contribution of undergraduate researchers to this year's event, the organizers also awarded a top undergraduate poster prize to Jacob Barker and Naomi Pollica of the University of Vermont "A statistical approach to population studies of Chagas Disease". Congratulations to the winners, as well as to all who participated!

This day was made even more memorable by the presentation of the first annual Torcom Chorbajian Lecture, given by Melissa Knothe Tate, "Engineering an Ecosystem: Taking Cues from Nature's Paradigm to Build Tissue in the Lab and the Body". This lecture series pays tribute to the (continued) service of Torcom Chorbajian, who was a founding member of the SMB and has served as its treasurer continually for over 30 years. His generosity of time and spirit cannot be overstated. The Torcom Reception followed

the Lecture; the time went quickly, but not as quickly as the free liquor, as the conference attendees prepared for the banquet. The banquet was a lively affair that culminated with the after-dinner speech, wherein Vito Quaranta humourously pondered the sometimes-obscure relationship between mathematicians and biologists.

Saturday morning contained the last of the talks of the 2008 SMB Conference. Some lucky guests were able to experience the (relatively) nearby Niagara Falls following the conclusion of the meeting, before once again dispersing until next year's conference in Vancouver. Many people deserve thanks for helping to facilitate this year's meeting, but perhaps none more so than the chair of the local organizing committee, Siv Sivaloganathan. So, thanks to Siv and the rest of the organizing committee, the executives of the SMB, the staff of the Fields Institute, and of course to all of the attendees for the success of this year's meeting in Toronto. See you next year in Vancouver!

My Career in Mathematical Biology
A Personal Journey

Jim Keener

Over the course of my career, I have had the pleasure of watching and participating in a minor way in the emergence of this major field of study, the field of Mathematical Biology. When I completed my PhD in 1972, I was a card-carrying applied mathematician, but knew nothing whatsoever about biology (except what little I had learned and then forgotten from my ninth grade biology class). One of the hot topics of the seventies was bifurcation theory, and in an effort to keep abreast of the latest developments, I read the paper by Li and Yorke, "Period Three Implies Chaos" (perhaps the most influential and improperly quoted paper of all time). As supplemental reading, I also read a paper by Otto Rossler, in which he made an off-hand comment about the reason that the heartbeat could be chaotic. Intrigued and curious about the validity of his claim, I decided I needed to learn something about cardiology, so picked up an introductory medical school textbook on cardiology by Guyton. What I discovered was a lot of low-hanging fruit, namely interesting dynamical behaviors that had received no attention from the applied mathematical community. I quickly became the leading mathematician studying cardiology, an easy matter when you are the ONLY mathematician studying cardiology.

I didn't really recognize that Math Biology was a legitimate field of study until I moved to the University of Utah in 1978 at the invitation of Frank Hoppensteadt. It was his vision to start a new group in Mathematical Biology, and shortly after I came, he brought Hans Othmer and then Aaron Fogelson, Philip Maini, and Simon Tavare. When Philip moved to Oxford a few years later, Mark Lewis came as his replacement. Being in a group of critical mass with similar interests turned out to be quite significant for me.

Meetings are an important part of a developing career, and in my case, there were several that were memorable. Perhaps the most memorable was a 4-day backpacking workshop that Paul Fife and I organized in the summer of 1981 in Salt Creek Canyon in the Canyonlands of southern Utah. Art Winfree, John Tyson, Leon Glass, John Rinzel, Jim Cushing, and Joe Keller gave informal talks using a rollup white board on an easel constructed of dead tree limbs (no laptops!), in the shade of a large sandstone amphitheatre. Talks were in the morning and evening. Among the most memorable features of the meeting, aside from talking science under the stars until late at night, were the 100+ degree afternoons, the flies, and the ten mile hike out to the vehicles.

A second backpacking meeting two years later (Lee Segel came along this time) was made memorable by torrential downpour and muddy roads that made driving quite treacherous.

Gordon Conferences were also as important to me as they were formative. Sitting in the lawn at the Tilton School in animated discussions with Art Winfree, Leon Glass, and Steve Strogatz is unforgettable. The first Gordon Conference I attended I played basketball in my hiking boots. I didn't mind, but Bard Ermentrout still complains about his bruised shins from my tenacious rebounding efforts.

My collaboration with John Tyson started in the Fall of 1984. Jim Murray had just started the Centre for Mathematical Biology at Oxford and invited George Oster, Art Winfree, John Tyson, Gary Odell, and John Rinzel to spend the Fall there. Afternoon tea was memorable as we scribbled on the erasable table tops in the lounge of the Maths Institute. It was there that John Tyson and I started talking about spiral waves at the pub next door to the Institute, the same pub that was frequented by C.S. Lewis and J. R. R. Tolkien. Clearly, their work has had a much greater impact than ours, but it was fun sitting in the seats of giants, pretending. My collaboration with John Tyson had its zenith in 1986 during walks, visiting pubs around Oberwolfach, at a meeting organized by Willi Jaeger.

The work of Soviet scientists at Puschino has also had a major impact on me. It became personal in 1989 when I met a group of them, including Val Krinski, Sasha Panfilov and Arkady Pertsov at a meeting in Leeds. It was the first time they were allowed to travel to the West, although they were accompanied by not-so-inconspicuous non-scientific escorts. The following year Sasha was able to come to Utah, where he stayed for three years. As you probably know, Sasha can make a computer sing, and at Utah he did simulations of cardiac dynamics that I found wonderfully inspirational. I use some of these simulations in talks that I give to this day.

My career took its next big step when one day in 1994 I received an email from an unusual fellow named James Sneyd. It was an inquiry to see if I was interested in collaborating on a book. It seems that James had exhausted his list of famous potential collaborators, so had resorted to a mass emailing, an early example of a spam. He did not suggest that my share for signing on would be in the hundreds of millions of dollars following the death of his wealthy uncle, but only that he was willing to work hard (which, by the way, he did!). Not noticing that the email came from Nigeria (actually it came from UCLA), I agreed to participate in the project. Anyway, since I knew so little about physiology, I thought it would be a good way to learn the subject. The result, four years later, is something that I am quite proud of and am happy to take credit for. James did a fantastic job!

Other highlights of my career were more spread out. These are the many students that I have had the privilege and pleasure of mentoring. They taught me much more than I could ever teach them. But if you ever run into one of them be sure to ask them about the Hodgkin-Huxley Macarena.

I have had the opportunity to study and learn about many areas of biology and have seen how mathematics can help us understand some of the intriguing mysteries of life. The world of biology is incredibly fascinating, and I have only been able to scratch a tiny part of its surface. I am grateful to all you wonderful taxpayers for allowing me to put your tax dollars to work; it's much better than leaning on a broom. More than that, though, it's the people, my students, collaborators, and colleagues who have made the story what it is. And then there is this mystery that there is a mystery to be explored and the Source of that mystery, to Whom all the credit truly belongs.

Selected Publications:

J. P. Keener, Principles of Applied Mathematics; Transformation and Approximation, 2nd edition, Perseus Books, 1999.

J. P. Keener and J. Sneyd, Mathematical Physiology, 2nd edition, Springer, 2008.

J. P. Keener, A model for length control of flagellar hooks of Salmonella typhimurium, J. Theoretical Biology, 234, 263-275 (2005).

B. E. Peercy and J. P. Keener, Coupled cell model of border zone arrhythmias, SIAM J. Appl. Dyn. Sys, 4, 679-710 (2005).

N. Cogan and J. P. Keener, Channel formation in gels, SIAM J. Appl. Math, 65, 1839-1854 (2005).

J.P. Keener, Stochastic Calcium Oscillations, Math. Med. Biol. 23, 1-25 (2006).

J. P. Keener, How Salmonella Typhimurium measure the length of their flagellar filaments, Bull. Math. Biol. 68:1761-1778 (2006).

R. D. Guy, A. Fogelson, and J. P. Keener, Fibrin growth in a shear flow, Mathematical Medicine and Biology, 24, 111-130 (2007).

L. Copene and J. P. Keener, Ephaptic coupling of cardiac cells through the junctional electrical potential, J Math Biol, 57, (2008).

J. P. Keener, Invariant Manifold Reductions for Markovian Ion Channel Dynamics, J. Math. Biol., 2008

Meet the SMB Education Committee

The SMB Education Committee Membership for 2008 consists of the following members: Meghan Burke, Kennesaw State University; Tim Comar, Benedictine University; Renee Fister, Murray State University; Holly Gaff, ex officio, Old Dominion University; Meredith Greer, Bates College; Michael Martin, Johnson County Community College; Jason Miller, Truman State University; Raina Robeva, Sweet Briar College; Rebecca Tyson, University of British Columbia Okanagan; and John R. Jungck, Chair, Beloit College.

The goals of the SMB Education Committee are to enhance the SMB membership's understanding of mathematical biology education initiatives, to facilitate the sharing of information from multiple programs for the membership, and to increase awareness of opportunities to effect change in learning. Such opportunities range from support for undergraduate research in mathematical biology, for course and curriculum development, for faculty development workshops, for identification of shareable resources, for symposia, contributed papers, and poster presentations at professional meetings and workshops, and to mutually support publication of peer contributions in mathematical biology education. In addition, the committee aims to provide support for undergraduate and graduate students to make connections to graduate, postdoctoral, and/ or industrial programs to further their training and careers in mathematical biology.

One UBM team at Truman applies image analytic techniques to measure the gravitropic sensitivity of flax (Linum usitatissimum).

NSF Interdisciplinary Training for Undergraduates in Biological and Mathematical Sciences (UBM)
An Overview and Personal Perspective

K. Renee Fister (Murray State University) and Jason E. Miller (Truman State University)

Affectionately referred to as the UBM program, this program was created by the NSF in 2004 to promote innovative undergraduate education and research opportunities for students interested in work at the intersection of mathematics and biology. Several SMB members are participating in or running UBM programs at their institutions, and we think this NSF program will be of particular interest to the broader SMB membership.

A primary goal of the UBM program is to equip students with the skills to pursue graduate studies and careers at the intersection of these two fields. The beauty of the UBM programs is that they all incorporate interdisciplinary teams of students and faculty that work on biomathematical research projects. Since NSF's UBM program is a joint project of the NSF Education and Human Resources, Biological Sciences, and Mathematical and Physical Sciences Directorates, there is a serious commitment at the NSF and by the 32 grant awarded institutions and consortia to effect change in the undergraduate mathematical biological education curriculum. Initially, the UBM proposals addressed the concepts that (1) teams of students work on original research in mathematical biology and (2) the awardee institutions enhance the mathematical biology education experience beyond those directly involved in the program. Within the last two years, there has been a restructuring of the program into an educational institutionalization award for five years and a group research award for three years. The group award is encouraged to effect curricular change, but such work is not a requirement.

Supported programs take as many different forms as there are awards. Yet each of the programs conveys some common benefits. Obvious benefits are improvements in students' ability to work at the intersection of mathematics and biology. All undergraduate students in one discipline develop skills in the partner discipline. Imagine sending a
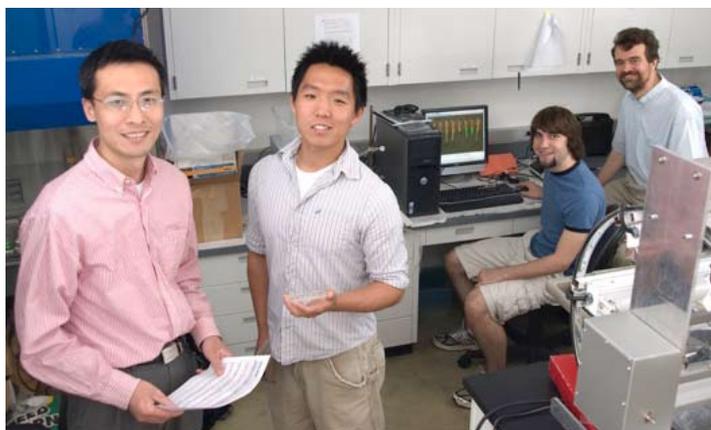
reluctant mathematics major out in the field to collect data and then sharing their delight in learning that they enjoy that dirty work. Or vice versa, the idea that a biology student gets excited about making connections with quantitative tools and modeling mechanisms that she had originally believed would be too hard to learn. The growth that the students (and faculty) experience in learning new techniques and strategies to address biomathematical problems is invaluable. For example, faculty who participate in these programs serve as a research mentor for undergraduate students, write research papers, and learn to work and communicate as part of a multidisciplinary team. Students who participate engage in real mathematical biology research, and both faculty and students help effect changes through course curriculum development that has the potential to revolutionize undergraduate mathematical biology education nationally.

For more information about the NSF's UBM program, see the online solicitation at http://www. nsf.gov/funding/pgm_summ.jsp?pims_id=12207. For further information about the specific UBM programs, Jason Miller at Truman State University has been awarded funding from SMB to create an online database that provides information about these programs with specific projects and educational curriculum endeavors. This information will be of great value to the SMB community, and we encourage you to visit http://mathbio.truman.edu/SMBed/ as the project develops.

UBM students at Murray State gathers field data.

Biocalculus Workshop
at Benedictine University

Timothy D. Comar

During the first week of June 2008, twenty-two people met at Benedictine University in Lisle, IL to participate in the MAA PREP Workshop, Biocalculus: Design Calculus Courses for Life Science Students. The primary goal of the workshop was to help mathematicians at both four-year and two-year institutions design and implement biocalculus courses and integrate biological applications into existing calculus courses.

Participants took part in a variety of lectures, discussions, and hands-on computer laboratory activities. Participants were introduced to different biocalculus course structures and the issues related to implementing such courses. Participants explored sample computer laboratory projects using Excel, Maple, and MATLAB. Presenters and participants discussed ways to develop collaborations with biologists to best integrate mathematics and biology into their calculus courses. Upon conclusion of this workshop, the participants were able to create or modify biocalculus courses, create or adapt computer laboratory projects for use in their calculus courses, and utilize presented resources for integrating biological content into their calculus courses.

The workshop was organized by Timothy D. Comar of Benedictine University with assistance from Michael Martin of Johnson County Community College. In addition to talks and activities given by Comar and Martin, other featured speakers included Olcay Akman of Illinois State University, Raina Robeva of Sweet Briar College, and Elsa Schaefer of Marymount University. The workshop was primarily supported by the PRofessional Enhancement Program (PREP) of the Mathematical Association of America (MAA). The workshop also benefited from a travel grant from the SMB to help defray travel costs to the workshop. The workshop was also endorsed by the Special Interest Group in Mathematical and Computational Biology of the MAA (BIOSIGMAA). The organizers plan to run a similar workshop in future summers.

Positions Available

Postdoctoral and Predoctoral Positions
BioDynamics
Boston University

Postdoctoral and Predoctoral positions are available for "BioDynamics at Boston University", a Research and Training Grant funded by the NSF. The RTG group is associated with the Center for BioDynamics (CBD). The senior faculty members of this group are from Mathematics (U. Eden, E. Kolaczyk, N. Kopell (PI), T. Kaper, C. E. Wayne) and Biomedical Engineering (J. Collins, D. Segre, K. Sen). Research themes of the RTG focus on analysis of systems with multiple time-scales, applications of dynamical systems to neuroscience, and applications of dynamical systems to genetic regulatory networks. For information about collaborative activities of this group, please see cbd.bu.edu. Postdoctoral applications should be sent to: Joan Butler, Center for BioDynamics, 111 Cummington Street, Boston University, Boston MA 02215. Please include a CV and a cover letter stating the reasons you are appropriate for this group. Also have 3 letters of recommendation sent to the CBD. Applications will be reviewed starting from Dec. 1, 2008. Interested Ph.D. candidates should apply to one of the associated departments and mention interest in the CBD and this RTG grant. Information about applications to the Math Dept. can be found at http://www.bu.edu/grs/academics/admissions/index.html. For the BME Dept. see http://www.bu.edu/eng/grad/apply. Applicants must be US citizens or resident aliens. Successful Postdoctoral candidates will teach one course per semester, including opportunities to design and/or teach new interdisciplinary curricula. For further possible positions associated with the CBD, please see http:/www.cbd.bu.edu.

Postdoctoral Fellowship
Modeling Metabolism and Body Weight Regulation
NIH

A postdoctoral fellowship is available in the Laboratory of Biological Modeling at the National Institute of Diabetes & Digestive & Kidney Diseases, one of the National Institutes of Health located in Bethesda, Maryland. The successful candidate will develop mathematical models of whole-body metabolism and body weight regulation in collaboration with experimental physiologists. Applicants should possess a Ph.D. degree in Applied Mathematics, Engineering, Physics, Biochemistry, Physiology, Nutrition, or a related field. The successful candidate will have strong quantitative and mathematical abilities and an interest in studying the regulation of metabolism in humans. Salary will be commensurate with experience according to NIH guidelines. Please send your CV and a list of 3 references to: Kevin Hall, Ph. D., Laboratory of Biological Modeling, National Institute of Diabetes & Digestive & Kidney Diseases, National Institutes of Health, 12A South Drive, Room 4007, Bethesda, MD 20892-5621. Email: kevinh@niddk.nih.gov.

Postdoctoral Position
Mathematical Ecology
Stellenbosch University

Mathematical models and simulations play a crucial role in advancing the science of ecology. An urgent issue, hitherto, is to set up a mathematical theory (model) for ecological communities so that the community (macroecological) structures, patterns and dynamics can be explained. A postdoctoral position is open for building such a unified, mathematical understanding of ecological communities. The model should address the scaling pattern of species distribution and diversity, and have the potential to predict the responses of ecological communities to disturbances (such as biological invasions and climatic changes). Applications of the nonlinear theory (e.g. fractal, chaos, self-organization, catastrophe and maximum entropy), as well as appropriate mathematical and modelling methods (e.g. set theory and cellular automata) should be considered in building the model. Specifically, three questions regarding the biological invasion are also of concern: localization and time lag in biological invasion; diffusion and jump-dispersal of invasive species; the changes of structure and dynamics of recipient communities. Candidates with a strong mathematical/theoretical ecology background are required, and a good understanding of ecological systems (e.g. macroecology, spatial ecology, population genetics, invasion biology, etc.) is also preferred. The candidate should send a two-page project description, accompanied by a detail CV, two/three publication reprints and the contact details of two references by email to

Dr. Cang Hui (chui@sun.ac.za). Detailed information about the DST-NRF Centre of Excellence for Invasion Biology, Department of Botany and Zoology, University of Stellenbosch, South Africa, can be found on the website http://academic.sun.ac.za/cib/. The starting time of this position can be negotiated but the end of 2008 would be preferred. This position will remain open until an appropriate candidate is selected.

PhD Scholarships
Mathematical Physiology
University of Auckland

Edmund Crampin and James Sneyd have two PhD scholarships available at the University of Auckland, New Zealand. The project is funded by the NIH and involves the construction and study of a model of saliva secretion. The project is in collaboration with experimental groups at the University of Rochester, USA. The successful applicants will have an MSc, or the equivalent, in mathematical biology, applied mathematics, physics, biophysics, bioengineering, or some similar discipline, and will be interested in physiology. A knowledge of calcium dynamics and fluid transport will be helpful but not required. Since the project will include computational approaches, some familiarity with numerical methods will also be helpful. Both scholarships are potentially for three years. The University of Auckland is New Zealand's leading research university and has an international reputation in the field of mathematical physiology. Successful applicants will join an active research team that spans many areas of mathematical and computational physiology. The weather is warm year round but it rains a lot. Still, the beaches are lovely. There are many worse places to live. Anybody who is interested should contact James Sneyd (sneyd@math.auckland.ac.nz) or Edmund Crampin (e.crampin@auckland.ac.nz).

Senior Post-doctoral Research Associate
Computational Biology
The University of Coimbra

Financed by the Portuguese government initiative for research jobs Ciência 2008, the Center for Neurosciences and Cell Biology (CNC, University of Coimbra) wishes to appoint one research scientist in the area of Computational Biology at the Auxiliary Investigator level. The salary will be in the range of 3040/month/14 months/year. Appointments are held for 5 years, submitted to yearly renewals. Candidates must have a background in engineering (physical, chemical, biomedical, electrical or informatics), physics, or applied mathematics, and a strong publication record. A Ph. D. degree at the time of application and documentable strong mathematical and computer programming skills are additional mandatory requirements. Two or more years of post-doctoral experience and documentable working experience in parameter estimation / model discrimination from time series of biochemical variables are strongly preferred. The successful candidate is expected to develop effective methods, algorithms and software for parameter estimation and model discrimination from time series of metabolomic and tracer data. S/he will be responsible for effective implementation of all the necessary mathematical/computational steps in this process, from optimization of experimental design to error estimation, and must be willing to collaborate with modelers and experimentalists towards designing successful experiments. S/he is also expected to collaborate with other members of the team towards developing improved methods for systems-analysis of biochemical processes. The position requires a self-motivated and proactive attitude towards research work, initiative for exploring new biologically motivated problems, and willingness to explore synergies with the research environment. The successful candidate will be integrated in the Molecular Systems Biology Group (MSBG) at CNC, but will be encouraged to incubate his/her own group over the duration of the appointment. MSBG is doing highly relevant research in systems analysis of metabolic processes and towards understanding the design principles of biochemical networks. It is leading an ambitious research program towards discovering and experimentally validating design principles of highly prevalent metabolic circuits, and collaborates with strong groups at the University of California – Davis, the Massachusetts Institute of Technology (MIT), and the University of Pennsylvania, among others. Applicants should forward, no later than September 10, 2008, a cover letter detailing motivation, training, work experience and future plans, a curriculum vitae, a publications list, and three references or recommendation letters to the following address: silviacnc@gmail.com. All applications must clearly indicate job reference C2008-7/2008:MSBG. Incomplete applications will be discarded. Please address any legal/formal questions about this position to silviacnc@gmail.com, and scientific questions to salvador@cnc.uc.pt.

Two Postdoc Positions
European Network of Excellence (EuroPhysiome)
Evry, France

A Postdoctoral Position is immediately available in the Virtual Physiological Human Network of Excellence (VPH-NoE) (a European Union FP7 project), for the SAPHIR Exemplar Project. The position involves adaptation of VPH Toolkit techniques to an existing multi-organ mathematical model (see http://saphir.ibisc.fr/) of blood pressure regulation and fluids balance (funded by the French ANR (National Research Agency)). In particular, this job involves a variety of physiological modeling techniques and ICT tools for sharing and cooperative development with a patient-specific clinical endpoint. Models and parameter data will be curated in appropriate databases. Our laboratory uses a multidisciplinary environment for multi-scale modeling in physiology, including markup languages (such as CellML), physiological parameter databases, and ontology development. Candidates must have a degree in biomedical engineering or a Ph.D. in one of the relevant fields. The host laboratory is part of the Evry Genopole, near Paris, and the job also involves substantial travel for collaboration with laboratories in England and other EU countries. Applicants should submit a curriculum vitae, a description of research interests, and a list of three people willing to write letters of reference to S. Randall Thomas Ph.D., IBISC CNRS FRE 3190, Tour Evry 2, 91000 Evry, France; email:srthomas@ibisc.univ-evry.fr, website: http://physiome.ibisc.fr/~srt/

PhD Studentship
Integrative Biology
University of Nottingham

Modelling the methionine/folate cycles within the ovarian follicle (Reference: SCI391). There is emerging evidence to indicate that inadequate levels of folate and vitamin B12 in the diet of intending mothers around the time of conception can have long-term effects on offspring health quite separate from their well-published effects on neural tube defects such as spina bifida in infants. These long-term effects are thought to arise as a consequence of epigenetic modifications to DNA methylation in the egg and early embryo which, in turn, arise because of the actions of these B vitamins within the linked methionine/folate cycles. Given the complexities of these cycles, it is difficult to predict the outcome, in terms of methylation reactions, of altered nutrient inputs. The aim of this studentship, therefore, is to establish models of the methionine/folate cycle specifically within the ovarian follicle and germ cell so that the effects of maternal diet around the time of conception can be better predicted. Students should have an undergraduate or Masters degree in mathematics, engineering, biology or the medical sciences. This studentship is available for a period of four years from September 2008 and provides the standard postgraduate stipend, though there are potential funding restrictions for non-EU students. Informal enquiries may be addressed to Dr K Sinclair (Email: Kevin.Sinclair@Nottingham.ac.uk) or Professor Helen Byrne (email: Helen.Byrne@nottingham.ac.uk) Applications (preferably by Email), with a detailed CV (including expected or actual degree class), together with the names and email addresses of at least two academic referees, should be sent to Dr K Sinclair, School of Biosciences, The University of Nottingham, Sutton Bonington Campus, Loughborough, Leicestershire, LE12 5RD. Email: Kevin.Sinclair@Nottingham.ac.uk.

International Conference on Mathematical Biology and Annual Meeting of The Society for Mathematical Biology
July 27-30, 2009
University of British Columbia
Vancouver Campus