The Society for Mathematical Biology

SMB Newsletter
Volume 24 #2 - May 2011
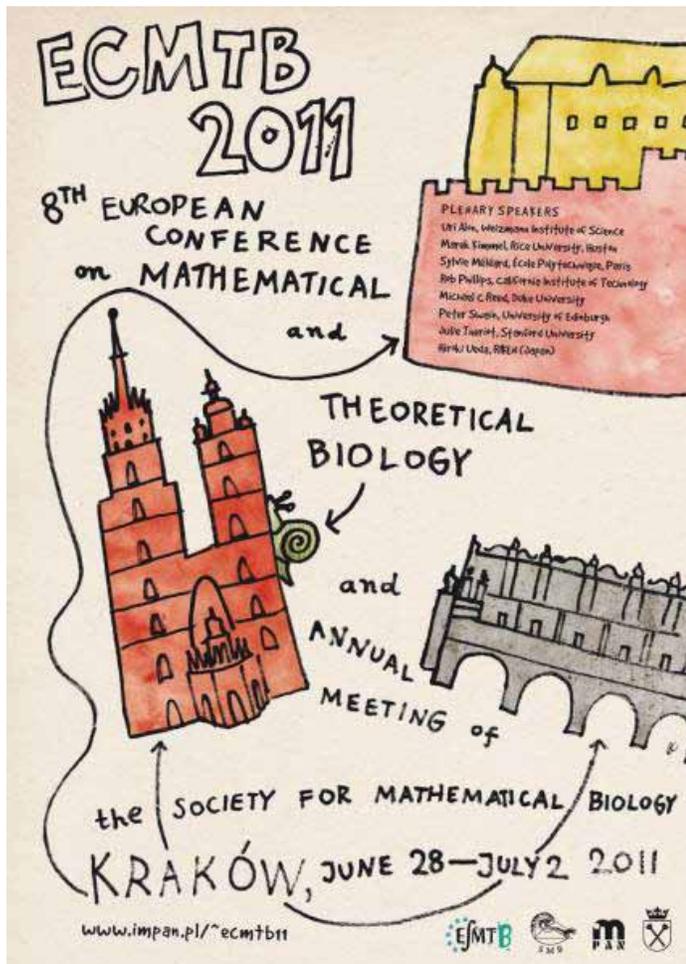
European Conference on Mathematical and Theoretical Biology 2011

www.impan.pl/~ecmtb11

Kraków, Poland
June 28 - July 2, 2011

Tidbits from the website: Sign up for mentoring. LOT Polish Airlines has special travel offer for delegates: 10% discount - for economy class booking at Travel Agent, PLL LOT offices and Call centre; 15% discount - for business and economy class booking at http://www.agentlot.com. The Discount/Event Code is LOC117. Thursday afternoon excursions: The Royal Tract, Memorial and Museum Auschwitz-Birkenau, The historic Salt Mine in Wieliczka. There are some opportunities of travel grants: ECMTB Travel Grants, Landahl Travel Grants, National Science Foundation Travel Grants for ECMTB 2011. See website for details on all of this and so much more!

Dear SMB members,

This is my sixth, and last, minor message as President of the SMB and it is rather difficult for me to figure out exactly where the last two years have gone—wherever they went, they did it rapidly.

I have been in Beijing, China for the past two weeks working with a colleague in the Zhou Pei-Yuan Center for Applied Mathematics, Tsinghua University, and it has been an experience to remember. In addition to the chance to work on some really interesting problems (e.g. how to intelligently tailor the administration of chemotherapy to minimize damage to the hematopoietic system), and give lectures to some extremely bright and well prepared students, the involvement (as a fly-on-the-wall) in university life has been fascinating. The day after arrival it was a trip to the Great Wall (where else?) and then the first weekend witnessed the Centenary Celebration for Tsinghua University on their beautiful 400 plus hectare campus. Over 50,000 people mobbed the campus both Saturday and Sunday, many on bikes (which made my own navigation on a bike somewhat problematic), but it was pure pleasure to see the cream of China's intellectual elite revel in a return to their Alma mater. Frankly, at the end of each weekend day I was exhausted. Then the following Friday, as another part of the celebration, there was a mass wedding of 200 couples who work at Tsinghua held on the main quad of the university right in front of the applied mathematics building. It was a sight to behold, and I have never seen so many brides and grooms in one place in my life. The campus has more or less returned to normal, and it seems almost anti-climactic!

At the initiative of Abdul-Aziz Yakubu from the SMB in conjunction with mathematical biologists in India (primary contact Pranay Goel), we will hold our first joint SMB-India meeting in Pune, 23-27 January, 2012. Gerda de Vries is heading a committee to pick plenary speakers from the SMB. Stay tuned for more information in the coming newsletters.

As I write this, we are within weeks of our upcoming joint meeting with the ESMTB in Krakow (28 June through 2 July, 2011), and from what I hear from Prof. Rudnicki—the point man for that conference—all is going smoothly and according to plan. Current registration stands at more than 800, with over 100 poster presentations, 325 section talks and 460+ mini-symposia talks. This is in addition to a bang-up list of plenary lectures as well as fascinating prize lectures. Complementing the scientific presentations is the Mentoring Scheme (www.impan.pl/~ecmtb11/index.php?file=ment.html) and a series of introductory lectures directed at young investigators and given by experts in their field (Stanislaw Cebrat, Andreas Deutsch, Peter Jagers, Eva Kisdi, and Andrea Pugliese). These will be held on Monday, 27th June (the day before the conference starts), on the New Campus of Jagiellonian University. On Thursday afternoon there are three different outings planned: a tour of The Royal Tract (main streets of Krakow, Main Square with Sukiennice and, finally, Wawel Castle); a visit to the Memorial and Museum Auschwitz-Birkenau; or a visit to the historic Salt Mine in Wieliczka. (see www.impan.pl/~ecmtb11/index.php?file=venu.html or www.impan.pl/~ecmtb11/index.php?file=sche.html&sub=socp.html). I know from personal experience that all three are well worth visiting, and whichever one you choose you will not be disappointed. Finally, according to Prof. Rudnicki, "It is now very likely that lunches will be provided for participants". So, all in all, this promises to be a wonderful scientific, educational, and social event and I hope that you are planning to attend. You can view the conference web site at www.impan.pl/~ecmtb11/index.php?file=main.html If you have not yet registered do it NOW. Prof. Rudnicki and his team have done a great job of organizing this meeting and it promises to be well worth the time to attend.

The final task that I will perform for the SMB at this meeting will be to hand over the reins to our incoming President, Gerda de Vries. It will be with a mixture of sadness (as the last two years have been exciting and educational for me) and anticipation as your choice for a new President is an excellent one

and I am sure that we can look forward to two years of further progress for the SMB.

It has been my honour and pleasure to serve as the President of the SMB. I predict and expect further growth in the SMB, stronger ties with sister societies around the world, and enhanced support for the translation of results from the marriage of mathematics and the biological sciences (broadly interpreted) into fundamental understanding of our biological world, the development of new areas of mathematics research, and the practical application of results in fundamental and applied realms of the biomedical sciences.

Have a good summer! I hope to see you in Krakow.

Sincerely,
Michael Mackey

News from NIMBioS

Recent events at NIMBioS:

NIMBioS Investigative Workshop: Solid Tumor Modeling, Jan. 19-21, 2011. Current achievements and challenges in modeling solid tumors in the human body were discussed, and areas that could improve our understanding of tumor development and treatment were identified. For more information about the workshop, visit www.nimbios.org/workshops/WS_tumor_modeling.html

NIMBioS Tutorial: Stochastic Modeling in Biology, March 16-18, 2011. This tutorial was designed to introduce selected topics in stochastic models with an emphasis on biological applications. Applications of Markov chain models and stochastic differential equations were explored in problems associated with enzyme kinetics, viral kinetics, drug pharmacokinetics, gene switching, population genetics, birth and death processes, age-structured population growth, and competition, predation, and epidemic processes. For more information about the tutorial, visit nimbios.org/tutorials/TT_stochastic_modeling

NIMBioS Investigative Workshop: Synchrony in Biological Systems Across Scales, April 11-13. Synchronous oscillatory activity and phase-locking in general are universal phenomena that occur in biological systems ranging from the level of intracellular dynamics to population dynamics across thousands of kilometers. This workshop brought together a diverse group of researchers from mathematics and statistics and the biological sciences to explore how ideas about the study of synchrony in one field can provide novel insights into questions of synchrony in another field. For more information about the workshop, visit nimbios.org/workshops/WS_synchrony

Upcoming events and opportunities at NIMBioS:

Requests for Support: September 1 is the deadline for submitting proposals for new scientific and educational activities at NIMBioS. Potential organizers of activities in areas of molecular biology, cell biology, network biology, immunology and systems biology are particularly encouraged to submit requests for support of Working Groups or Investigative Workshops. Application information is also available on our website for Postdoctoral Fellows, Sabbaticals and Short-term Visitors for activities beginning winter/spring 2012. Visit www.nimbios.org/research/

NIMBioS Investigative Workshop: Modeling Intracellular Movements, Oct. 24-26, 2011. Recent advances in live cell microscopy have resulted in a flood of time-lapse observations that reveal a high degree of motility inside cells. Quantitative analysis of these movements is necessary to gain a full understanding of intracellular dynamics and their regulation. NIMBioS is now accepting applications for the NIMBioS Investigative Workshop: Mathematical Modeling of Intracellular Movements, to be held October 24-26, 2011, at NIMBioS. The workshop aims to address to an interdisciplinary audience for the first time the major challenges for developing robust computational algorithms to reliably track intracellular dynamics. Application deadline: July 24, 2011. For more information about the workshop and how to apply, visit www.nimbios.org/workshops/WS_intracellular_mv

Workshop for Young Researchers in Mathematical Biology
August 29 - September 1, 2011

SPEAKERS
- Elizabeth Allman (Alaska @ Fairbanks)
- Julien Arino (Manitoba)
- Daniela Calvetti (Case Western)
- Jim Cushing (Arizona)
- Leon Glass (McGill)
- Feilim MacGabhann (Johns Hopkins)
- Jeffrey Saltzman (Merck & Co.)

For information on how to apply visit:
http://www.mbi.osu.edu/wyrmb/wyrmb2011.html

2011 Workshop for Young Researchers in Mathematical Biology at MBI

August 29 - September 1, 2011

This workshop is intended to broaden the scientific perspective of young researchers (primarily junior faculty, postdocs, and senior graduate students) in mathematical biology and to encourage interactions with other scientists.

Workshop activities include plenary talks and poster sessions, as well as group discussions on issues relevant to mathematical biologists. Several abstracts will be chosen for short talks as well as to be presented as a poster.

We cordially invite young mathematical biologists to participate. The application can be found here: https://visitor.mbi.ohio-state.edu/events.html?id=125

News from MBI

Workshop 6: Ocean Ecologies and their Physical Habitats in a Changing Climate, June 20 - July 1, www.mbi.osu.edu/2010/ws6description.html

2011 Summer Program in Mathematical Biology for Undergraduates. June 20-July 1, www.mbi.osu.edu/eduprograms/undergrad2011.html

2011 Summer Graduate Workshop, July 25-August 5, www.mbi.osu.edu/eduprograms/graduate2011.html

2011 Workshop for Young Researchers in Mathematical Biology, August 29 - September 1, www.mbi.osu.edu/wyrmb/wyrmb2011.html

Workshop 1: New Questions in Probability Theory Arising in Biological Systems, September 12-16, www.mbi.osu.edu/2011/ws1description.html

CTW: Spatio-Temporal Dynamics in Disease Ecology and Epidemiology October 10-14, www.mbi.osu.edu/2011/sdsdescription.html

Workshop 2: Stochastic Processes in Cell and Population Biology, October 24-28, www.mbi.osu.edu/2011/ws2description.html

First Joint Meeting of the AMS and SOMACHI 2010: Special Session: Applications of Differential and Difference Equations in Biology and Ecology

Robert Buchanan

A special session devoted to topics of interest to mathematical biologists and ecologists took place December 15-18, 2010 as part of the First Joint Meeting of the American Mathematical Society and the Sociedad de Matemática de Chile. The meeting was hosted by the Universidad De La Frontera in Pucón, Chile. The special session was organized by an international trio of applied mathematicians: J. Robert Buchanan (Millersville University of Pennsylvania, USA), Fernando Córdova Lepe (Universidad Católica de Maule, Chile), and Jorge Velasco Hernández (Instituto Mexicano del Petróleo, México). Nine presentations were given during the special session by mathematicians representing the US, Chile, and Europe. The speakers and the titles of their presentations: Pablo Aguirre, Invariant manifolds as thresholds for biologically relevant dynamics: basins of attractions and excitable behavior; Robert Buchanan, Modeling pioneer/climax interactions using Markov processes; Samuel Castillo, Existence and stability of almost periodic solutions of differential equation with generalized piecewise constant argument; Pedro Gajardo, Bargaining process for setting biological and productive thresholds that are sustainable; Anatoli Ivanov, Global stability and periodic solutions in some differential delay and difference models; Wyatt Mangum, A nonlinear difference equation model of the population biology and resistance evolution of the mite Varroa destructor, a parasite of honey bees; Gonzalo Robledo, An almost periodic SIS model with continuous and seasonal pulse contagion; Suzanne Sumner, Mathematical modeling of data describing worker bee aggression towards a foreign queen; Andrzej Swierniak, Controllability of models of antiangiogenic therapy

In many cases, the speaker discussed work that was done in collaboration with other researchers also in attendance at the special session. As can been seen from the titles above, the talks touched on a wide range of topics including apiculture, disease epidemics, and the treatment and destruction of tumors. Prof. Aguirre's presentation included amazing visualizations of manifolds surrounding homoclinic bifurcations. The special session also recognized the formation of a new collaborative research team of young mathematicians interested in mathematical biology and ecology, Maitere Aguerrea (Universidad de Talca, Chile), Guillermo Espinoza (Pontifica Universidad Católica de Chile), and Gerardo Chowell (Arizona State University, USA). This team will be mentored by Fernando Córdova Lepe and Jorge Velasco Hernández.

The presentations were interesting, informative, and well-received. The setting for the conference was absolutely beautiful. The joint meeting and special session will sustain and strengthen the ties between the mathematical communities in North and South America. The speakers and special session organizers wish to thank the World Outreach Committee of the Society for Mathematical Biology and the Society for Mathematical Biology itself for their generous financial support of the speakers at the special session. The travel support provided by the SMB to the presenters will pay dividends in terms of research in mathematical biology and ecology for many years.

Suzanne Sumner and Wyatt Mangum were two of the plenary speakers

Boarding the bus to the ASI

Report on the Second Advanced Study Institute on Mathematical Modeling in Conservation Biology at the Kenya Wildlife Service Training Institute

Sadie Ryan and Robyn Nadolny

In support of expanding the collaborative network and interdisciplinary knowledge base in the field of mathematical modeling of questions in conservation biology for Africans and Americans, researchers from the United States and six countries throughout Africa met in Naivasha, Kenya, from January 10-15, 2011. This second Advance Study Institute (ASI) was both a follow-up to the previous ASI held in South Africa in 2010, and a new ASI for a new cohort of students and researchers. The week was dedicated to a research-based, multidisciplinary, collaborative learning experience for graduate students from Kenya, Nigeria, South Africa, Tanzania, Tunisia, Ethiopia, and the United States. In addition, students from four project groups formed at the first ASI returned to work on their research face to face after six months of working remotely. This Advanced Study Institute (ASI) welcomed students from the fields of mathematics, ecology, conservation biology, and wildlife and natural resource management.

Researchers working in the fields of mathematical modeling and conservation biology (see list below) provided a series of lectures in population viability analysis, global climate change, harvesting, disease modeling, conservation genetics, remote sensing, reserve design, agent-based modeling and practical concerns in real-world conservation and management. These lectures established a common background among the students, while examining the range of fields pertinent to research into questions in mathematical modeling in conservation biology. These lectures were augmented with computational exercises, in multiple software platforms, giving students hands-on experience and coded examples to build on. The first evening gave us the opportunity to mingle and share research – new participants took part in a poster session, while returning groups presented their project research in progress. Inspired by presentations, new participants formed small groups in which they defined, and then pursued research into problems relevant to conservation and management efforts in Africa.

Selection of projects and the course of the research were guided carefully by the mentoring researchers (again, see list below) to encourage a diversity of concepts and ability of the outcome to inform real-world policy decisions once the research was accomplished. The student research projects included agent-based modeling of anti-poaching strategies amongst villages with human-elephant conflict, modifying epidemiological models of bovine tuberculosis in African buffalo to understand directed culling efforts in the face of different transmission scenarios, modeling population viability and management of impacts on the flamingoes in Lake Nakuru, and spatial modeling of landscape fragmentation and elephant movement corridors in Kenya. Returning students were given the bulk of the meeting time to continue working on the projects begun at the first ASI in South Africa and were encouraged to utilize available faculty to answer questions that arose during the course of their research.

Throughout the course of the ASI, returning participants were able to share experiences from their research projects with the new students and helped to mentor the newly formed groups. All participants eagerly engaged in cross-disciplinary dialogue, and were enthusiastic to learn new techniques that could be applied to their own research or challenges within their own countries. In addition to lectures and time spent on research, participants were given time to

informally discuss differences between US and African experiences in higher education. Two field trips were also taken so that African and US students could experience some of the parks and reserves near the KWSTI, including Lake Naivasha and Lake Nakuru National Park. The opportunity to observe lions, buffalo, flamingos and other "charismatic megafauna" in a wild setting gave rise to discussions on practical conservation techniques and contributed to the selection of regional-based research topics by the new participants.

All participants committed to continuing their research after the formal close of the ASI, working towards the production of a manuscript to be submitted for presentation and publication. In this way, the structure of the research experience not only expanded the students' understanding and capability within the field of mathematical conservation biology, but also continues to foster ongoing intercontinental collaborations with fellow students in hopes of generating a truly global cohort of life-long colleagues. Selected projects will be presented at this summer's meeting of SMB/ECMTB in a mini-symposium "Reports from US - African BioMathematics Initiative: Conservation Biology".

The organizers are very grateful to the Center for Discrete Mathematics and Theoretical Computer Science (DIMACS), the Mathematical Biosciences Institute at Ohio State University (MBI), the Society of Mathematical Biology (SMB), the London Mathematical Society (LMS), and the US National Science Foundation (NSF) for their generosity in supporting these efforts.

Further details about the Second ASI in Conservation Biology are available at the website: dimacs.rutgers.edu/Workshops/ASICBII/.

List of Advanced Study Institute Researchers and Mentors: Holly Gaff, Old Dominion University; Sadie Ryan, UC Santa Barbara; David Gauthier, Old Dominion University, James Osundwa, UN Environment Programme, Kenya; Michael Washington, CDC. We were also joined by Wandera Ogana, University of Nairobi; George Owiti, Principle of KWSTI Naivasha; the Vice Chancellor of the University of Nairobi; Anotida Madzvamuse, University of Sussex.

Faculty, students and KWS Staff

Positions Available

Postdoc: Molecular Simulation

We are currently looking for a post-doctoral researcher, who may be interested in joining our research line MBMS (Mathematical Biology and Molecular Simulation) www.bcamath.org/public_research/ctrl_research.php?accion=MBMS&vista=general which is one of the research lines of BCAM (Basque Center For Applied Mathematics) (www.bcamath.org), located in Bilbao, Spain. The mathematical formulation of the population equations includes integral equations, in particular renewal equations, and delay differential equations (DDE). We are trying to adapt the usual methods of linearization and bifurcation analysis using characteristic equations to the above types of equations. To compute from the characteristic equations stability boundaries in two-parameter space, we are developing numerical methods, which are a combination of numerical curve continuation and ODE solvers. Currently, we are working on several projects in cell population dynamics, in the fields of stem cell maturation, tumor dynamics and quiescence. The projects involve a collaboration with a laboratory of the Biosciences research center CIC BioGUNE. It would be desirable of the candidate to have an interest to become involved into our projects and to fit into one of the following profiles: (1) understanding of dynamical systems and their computational implementation, in particular, programming skills and experience in Matlab, preferably also C/C++. (2) background in infinite dimensional dynamical systems, e.g., integral equations, delay differential equations and/or experience or interest in state-dependent delay, Researchers who are interested in this project are encouraged to contact informally Philipp Getto at getto@bcamath.org

Postdoc: Mathematical Oncology

Applications are sought for the position of Postdoctoral Research Fellow to work under the supervision of Dr. Alexander R. A. Anderson on an exciting inter-disciplinary research project concerning the modelling of Cancer progression, development and treatment. We seek a talented individual with a PhD and background in applied mathematics, physics or a computational discipline to work in the unique research environment of the Integrated Mathematical Oncology (IMO). The successful candidate will have experience in modelling biological systems, with a preference for those with knowledge of signaling networks. As well as demonstrated creativity, high motivation, good communication skills and importantly, experience in developing/writing publications in peer reviewed high impact scientific journals. They should possess the ability to work independently and within the research group. A good understanding of biology and the desire to work closely with experimentalists and clinicians is also necessary. Preference will be given to candidates with the ability to program (C/C++/Java/Matlab), visualize and analyze numerical/experimental data. Direct cancer modelling experience would be preferred but is not a requirement. The IMO is housed within the H. Lee Moffitt Comprehensive Cancer Center which is a modern facility on the University of South Florida Campus that conducts research on various aspects of Cancer Biology with emphasis on translational research. Details on how to apply for this position directly can be found at: labpages.moffitt.org/andersona/jobs.html

Postdoc: Cardiac Calcium Dynamics and Arrhythmias

A Postdoctoral Research Fellow is sought to work on a NIH-funded project studying the role of calcium signaling on cardiac arrhythmias. The position will be under the supervision of Dr. Saleet Jafri in the School of Systems Biology at George Mason University located in Manassas, VA. The successful applicant would be expected to develop computational models of cardiac calcium dynamics using ordinary, partial, and stochastic differential equations. Hence, the ideal candidate would have previous experience in one or more of the following: developing computational models, computer programming, and a knowledge of cardiac physiology. The position will also involve interactions with collaborators working experimental (Dr. Jonathan Lederer) and computational modeling studies (Dr. Raimond Winslow) related to the project. The position can be renewed for multiple years and has a salary of approximately $42,000 per year. Interested candidates should apply online through jobs.gmu.edu/ and search for position number F9487z. Applicants should submit a CV with the names of three references knowledgeable with the candidates potential for

research or work experience. Questions may be addressed Dr. Saleet Jafri at sjafri@gmu.edu. The position will be open until filled.

Postdoc: Host-virus coevolution

We are recruiting a Research Fellow to participate in an exciting interdisciplinary collaboration between a mathematical modelling group of Dr. Ivana Gudelj, University of Exeter, UK and an experimental evolution group of Dr. Samantha Forde, University of California at Santa Cruz, US. The position is available from 1st September 2011 for the period of 3 years and will employ a combination of mathematical modelling and experimental microbial evolution to answer the following question: Why do some viruses evolve to be specialists while others are generalists? The successful applicant will be working on the development and analysis of mathematical models in Dr. Gudelj's lab at the University of Exeter, in close collaboration with experimental colleagues at the University of California at Santa Cruz. Applicants will posses a PhD in a quantitative discipline (math, physics, engineering or computer science) and ideally be familiar with ordinary differential equations, their use in modelling, analysis (Dynamical Systems techniques) and simulation. The successful candidate should be able to communicate effectively with individuals from a wide range of disciplines. More information about the project and how to apply can be found at: people.exeter.ac.uk/ig232/Positions.html

PhD: Principles of Genetic Evolution

A Marsden-funded PhD studentship is available in Paul Rainey's Experimental Evolution lab at the New Zealand Institute for Advanced Study (Auckland, NZ). This position provides an opportunity for an outstanding individual to contribute toward a long-term research program aimed at elucidating the principles of genetic evolution. Working as part of a multidisciplinary team, the student will be responsible for development of mathematical models that describe genetic evolution--particularly the factors that affect the translation of mutation into phenotypic variation. These models will take advantage of a well-established and uniquely powerful experimental system to explore the hypothesis that evolution proceeds via 'pathways of least resistance', that is, via those pathways that have the greatest capacity to translate

mutation into phenotypic variation (see McDonald et al 2009 Genetics). Informed by experimental insight, the student will use Bayesian approaches in conjunction with dynamic equations to create general predictive models. The successful candidate should be mathematically literate and have a strong interest in evolution and/or development. This post is of three years duration and available immediately. Any inquiries should be addressed to Eric Libby (e.libby@massey.ac.nz). To apply for the post please send a letter of interest/statement of purpose, CV, and the names of three referees to Vesna Davidovic-Alexander (v.davidovic-alexander@massey.ac.nz).

PhD: epidemiological modelling in animal metapopulation

The objective of the PhD is to model the spread of a pathogen in a metapopulation of cattle to evaluate control strategies at a regional scale relying on the management of between-herd animal movements based on herd epidemiological statuses. The application concerns the spread of the bovine viral diarrhoea virus (BVDV), responsible for large economic losses for farmers. Control programs targeting BVDV between-herd spread have been developed by farmers' organizations in Europe. The ex-ante evaluation of the efficacy of control strategies is therefore a major issue. The PhD student will model BVDV spread in a spatially explicit metapopulation of cattle, characterized by a density of herds of different types interacting via animal movements and neighboring relationships. The French cattle network first will be described using graph theory. The stochastic dynamic model developed will account for the diversity in within-herd infection dynamics by coupling epidemiological models at the herd scale and a model of pathogen spread on a spatial contact network. Model predictions will be compared with the observations performed in North-western France under a range of control strategies. For further information about this position, contact P. Ezanno (pauline.ezanno@oniris-nantes.fr) and E. Vergu (elisabeta.vergu@jouy.inra.fr). Application letters including a CV, research experience, a short statement of research interests, and contact details of two referees should be sent by email to both contacts. Selection of the PhD student will be done in May-June 2011. The position will start in October 2011.

Postdoc: computational cardiology

Two-year postdoc position to work on EPSRC project "BeatBox - HPC Environment for Biophysically and Anatomically Realistic Cardiac Simulations" (with a possible extension for another year), to develop software for simulation of electrical excitation in the heart. The candidate is expected to have a PhD in applied mathematics, physics or similar subject and experience in numerical mathematics and scientific programming. Experience in mathematical cardiology and in parallel computations will be advantageous. Details can be found at www.liv.ac.uk/working/job_vacancies/research/R-574815.htm and www.maths.liv.ac.uk/~vadim/projects/Bbx/index.html. Informal contacts welcome to the investigators of the project, Vadim Biktashev vnb@liv.ac.uk and Irina Biktasheva ivb@liv.ac.uk.

PhD: Healthcare Associated Infections

This research project will involve the development and application of an individual-based transmission model to investigate the spread of Clostridium difficile (C diff) in hospitals, the community, and long-term care homes. There is now a vaccine undergoing clinical trials, and this project will assess the effectiveness and cost-effectiveness of this vaccine to prevent illness in vulnerable groups. There has been mandatory reporting of C diff for all hospitals in England since 2004. This comprehensive surveillance system is run by the HPA and the data will be available to parameterize the mathematical model. This PhD will be based both at the London School of Hygiene & Tropical Medicine and the national infectious disease surveillance centre at the HPA in North London. The award is for 3 years and covers full-time fees and a stipend of over £16,000 per annum. The award is only available to UK or EU nationals. Applicants should have (or be about to finish) a relevant masters degree. Those with an undergraduate degree may be considered if they have considerable research experience in a relevant subject (mathematical modelling, statistics, or a related discipline with a strong quantitative component). Knowledge of infectious diseases and/or organization of health care services would be an advantage. For an informal discussion, applicants should e-mail Prof John Edmunds <john.edmunds@lshtm.ac.uk>. For further information on how to apply, please see www.lshtm.ac.uk/prospectus/funding/hospital_infection.html. Deadline for Application: 23 May 2011.

Postdoc: Hakodate, Japan

We are seeking 2 or 3 postdocs. Future University Hakodate is a small and compact university in Southend of Hokkaido island. www.fun.ac.jp/en/. Please send an email to Prof. T. Nakagaki (nakagaki@fun.ac.jp) for more information. (1) Postdoc(s): biomechanics of animal locomotion: legged and legless crawling. Emphasis has been put on whole body biology and primitive organisms like protozoa. True Slime Mold {*Physarum*} is the model organism that we have studied for 15 years. We expect a successful applicant to be curious about living system from both points of mathematical and ethological perspective. Applicant should have studied at least one of the following disciplines: continuum mechanics, rheology, fluid mechanics, nonlinear dynamics, perturbation theory, experimental ethology, macroscopic physiology, etc. (2) Postdoc: rheology of true slime mold {*Physarum*} and morphogenesis of tubular network through a whole body. The network plays a role of transport of nutrients, signals and body mass and re-built drastically in a few hours in response to spatio-temporal changes in environments. For 10 years, we have studied this model system of adaptive networks established by natural design. With this post doc, we would like to concentrate on two aspects: mathematical modeling of network morphogenesis and basic study of rheological dynamics of protoplasm and cell body.