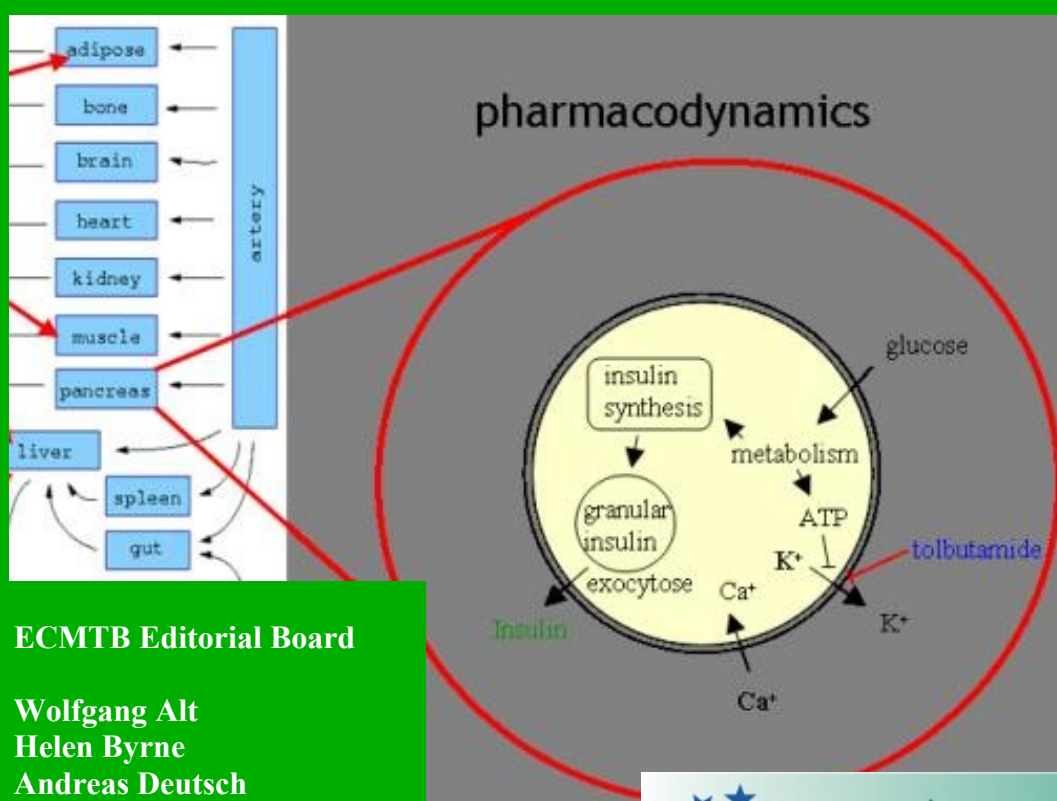


ECMTB Communications



ECMTB Editorial Board

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A European Forum for Information, Presentation and Exchange
Official Communication Bulletin of the ESMTB
European Society for Mathematical and Theoretical Biology

EDITORIAL

Dear Society members, dear friends of mathematical and theoretical biology.

The past year 2005 was filled with a series of moving events, of which the most important and impressive one was our 6th triennial *European Conference on Mathematical and Theoretical Biology (ECMTB 2005)* which beautifully and successfully was organized and guided by Andreas Deutsch together with his friendly young team in Dresden (Germany). Those of you, who could not participate and have not yet been informed by one of the 810 (!) participants from all over the world about presentations and congregations that took place during 5 enjoyable days in June throughout all floors of the Technical University main lecture building, are referred to the report and some additional informations in the section “Society News” (on page 7) and “History” (starting on page 18).

Indeed, we found it worth to mention the *History* of our Society, which during this month has reached the considerable age of 15, so that we can present a brief “*Review of 15 years ESMTB*” (page 18) summarizing some of the most important movements and results that have been initiated or supported by our still growing Society. The number of (paying) members has now exceeded 300 – and many of the new scientist or students that joined the ESMTB, have already been educated in two or more disciplines within the wide but interconnected range between Mathematics, Biophysics, Biology and Medicine.

However, fate and success of the Society were remarkably driven by several of the “old” members who have been present and active since the times of foundation. Some of them have been mentioned and honored previously (see the obituary on *O. Arino* in ECMTB #6 and, in the preceding issue ECMTB #7, the laurea on *J.D. Murray*, the report on a 60th birthday symposium for *H. Metz*, as well as the announcement of the 70th birthday special JMB issue for *K.P. Haderler* appearing this year). Now, during 2005 we were happy to congratulate two other founding members to their 65th birthday, namely *V. Capasso*, see report on the Workshop “Math everywhere” (page 3) and my own former advisor *W. Jäger*, who was celebrated during a Workshop “Challenges in Modeling and Applied Analysis” at Heidelberg University.

Finally we want to draw your attention to our brief report about the *General Assembly of the Society* during the Dresden Conference (page 8), the *Activity Report* by the former president (page 20) and presentations of the newly elected Board members (page 9). The Board’s work is going to start at the beginning of this year and it will certainly profit from your support. Your comments or questions are welcome anytime – just contact one of the Board members – or just write a contribution to one of the coming issues of these Communications. Thanks a lot!

For the Editorial Board,
Wolfgang Alt

The **closing date** for submissions to the next issue *COMMUNICATIONS* # 9 will be **September 30st, 2006**. Please send, preferably by e-mail, any information, reports and other material to the managing editor **Wolfgang Alt**, *Theoretische Biologie, IZMB, Universität Bonn, Kirschallee 1, D-53115 Bonn, Germany*, wolf.alt@uni-bonn.de

Those who are interested in the Society or want to have more information, please visit our Society web site at

www.esmtb.org

The form on the following page can be used by members to pay the fee – by not-yet-members to register. Thanks!

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<http://www.esmtb.org>

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VK60

Math Everywhere
Deterministic and Stochastic Modelling
in Biomedicine, Economics and Industry



HONORING VINCENZO CAPASSO

The International Workshop “*Math Everywhere: Deterministic and Stochastic Modelling in Biomedicine, Economics and Industry*” took place in *Milano, Italy, September 4-6, 2005*.

It was organised in honour of Vincenzo Capasso’s 60th birthday.

It was a successful meeting involving many prestigious scientists, in particular mathematicians from all over the world. In a very friendly and relaxed atmosphere, they discussed relevant innovative mathematical methods that have been developed to analyze mathematically complex systems arising in connection with real industrial,

economic and social problems. The main feature of the meeting was the variety of the themes discussed both from the mathematical and the applied point of view, at an impressively high scientific level. It reflected the wide spectrum of scientific interests of *Vincenzo Capasso (VK)*, ranging from his first papers on the mathematical foundations of Quantum Mechanics in the early 70s, through his fundamental work on reaction-diffusion systems, control problems and stochasticity of epidemic systems, up to the most recent work on spatio-temporal systems with evolving stochastic geometries. His work is published in many papers and in the frequently cited book ‘*Mathematical Structures of Epidemic Systems*’ (Lecture Notes in Biomathematics, Springer).

In this work, which involved a number of students and collaborators from various universities in Europe, a series of open problems were tackled including the strong coupling of evolution equations for (stochastic) geometries with the evolution equations of the underlying fields at different scales. Vincenzo Capasso opened new mathematical problems at the interface of geometric measure theory, stochastic geometry, stochastic analysis and statistics for evolution problems regarding densities or concentrations. These are the relevant quantities describing phenomena in real-world applications. His most important overall goal in research is to be useful to the applied sciences. Along these lines, theoretically oriented talks were delivered by his colleagues and collaborators *Denis Bosq* on statistical prediction, *Ely Merzbach* and *Gail Ivanoff* on set-indexed stochastic processes, *Marcello De Giosa* on dynamic boolean models, *Andro Mikelic* on the analysis of fluid-structure interaction, *Edoardo Beretta* on delay-differential equations, and *Sebastian Anita* on stabilization of diffusive partial differential systems.

“Math Everywhere”: this is the perfect way to synthesize the point of view of VK about the role played by mathematics in nature and all human activities. As he put it: *“It is important that our scientific community appreciates the importance of theory and mathematics to face the enormous challenges that arise from the emerging fields of Biology and Medicine, Industry and Economics to improve quality of life.”* His enthusiasm and new ideas brought him to this challenging mission. By transferring methods and tools from one field to another, by learning novel mathematical methods and ideas from the observation of real world phenomena and behaviour, and by approaching specific industrial problems, within both the Italian and European community, he accepted a fundamental role in establishing and reinforcing communication channels between Academia (methods) and Industry (applications). He himself is a driving force of the scientific and technological progress that we observe in our daily lives.

During the workshop, many scientists stressed this fundamental role VK embodies: *Stefano Paveri-Fontana*, his colleague and friend since the early days of their academic career, spoke of the large variety and originality of VK's scientific contributions; *Gianpiero Sironi*, prorector of the University of Milano, *Marcello Pignanelli*, Dean of the Faculty of Science, and *Antonio Lanteri*, Chairman of the Math Department spoke of VK's

efforts in establishing at first MIRIAM, the Milan Research Centre for Industrial and Applied Mathematics, and more recently ADAMSS, the Interdisciplinary Centre for Mathematical Modelling, Statistical Analysis, and Computational Simulation for Scientific and Technological Innovation. These centers aim at regular interaction between Mathematics and all other research areas, to further innovation in industry, finance, medicine, public services, etc., in collaboration with a number of other centers, universities and public research bodies, companies, organically linked with similar activities at common levels of excellence in Europe, and elsewhere.

Mats Gyllenberg, President of the European Society for Mathematical and Theoretical Biology (ESMTB) reminded us that VK played a leading role in the foundation of the society, and that, during his six years as vice president and president, the society benefited enormously from the ideas, initiatives and stimuli he gave. Thanks to his enthusiasm and endless willingness to work for the society and promote it, the ESMTB today is home to a large number of members, sustains excellent scientific activities, and has acquired international recognition in all related scientific communities. It is worth mentioning that under the presidency of VK the *Journal of Mathematical Biology* has become the official journal of the Society as a forum open to all scientists dedicated to these themes worldwide. VK played an important role for the development of biomathematics not only in Europe but also in Italy, by participating in the foundation of CIMAB, the Italian University Consortium for Mathematics for Environment and Biology, as testified by its president *Antonio Fasano*. *Pierluigi Colli*, on behalf of the Italian based International Centre for Summer Schools in Mathematics (CIME), stressed the special role played by VK in promoting and encouraging in collaboration with public and private bodies the training of young mathematicians capable to meet the growing needs of mathematical skills in all fields of applied science and technology.

This special attention of VK for the training of young researchers comes from his belief that they are the vital core of any scientific activity. Strong is his ability to convey his enthusiasm to young scientists. For him it is easy to communicate what he deeply believes. So it seems natural that he played a key role in establishing and coordinating, as first chairman, the educational committee of the European Consortium of Mathematics in Industry (ECMI), as stressed by President *Luis Bonilla*. In that role he

designed and ran the first ECMI Modelling week in Bari (Italy), a successful template for a yearly event run at many other educational centres of the European consortium, and imitated in many other countries abroad. VK himself was President of ECMI during 1999-2001; ECMI was established in 1986 by ten European Mathematical Institutes who took joint responsibility of offering their collective knowledge and expertise to the development of a competitive European industry. For about 10 years, VK was the European coordinator of the most successful ECMI Special Interest Group (SIG), on "Polymers", and recently he has established and still coordinates the new SIG on "Shape and Size in Biotechnology and Medicine". In addition, VK established the new Springer Series on Mathematics in Industry, the ECMI subseries of which he is currently managing editor. For this series he edited a number of volumes, including a monograph on polymers as a result of the long lasting European collaboration within ECMI-SIG.

Jacques Periaux, former research director of Dassault Aviation (France) reported of the intensive and enthusiastic efforts of VK in establishing and running, as a member of its Executive Committee, the European Network of Excellence MACSI-net, a joint venture of ECMI and ECCOMAS chaired by the late *Jacques Luis Lions*. VK was in charge in particular of the Training Committee and of the Life Sciences Committee. Periaux, being in charge of the Committee for Industrial Relations, and VK organized together various successful events within the network, in particular a Summer School on Control and Optimization of Complex Systems, dedicated to J.L. Lions who had always shown great interest for such topics. Periaux recalled the long-term collaboration of VK with J.L. Lions, from the foundation of SASIAM in Bari, 1984, one of the first school on Industrial Mathematics, to the foundation of the European Centre for Advanced Computing (CERFACS) in Toulouse to the coordination of a UNESCO Initiative for Environmental Issues in Venice. VK himself likes to remember that Lions once said to him: "*But you really want to mathematize everything?*"

Masayasu Mimura, President of the Japanese SIAM, emphasized the long history of collaboration and friendship with VK, since their first encounter in 1977 at the Centre for Mathematical Biology, established in Oxford by their common scientific advisor *Jim Murray*, who unfortunately could not attend the workshop due to health problems.

Andrea Di Liddo, now Professor at the University of Foggia, reported on the pioneering work of VK in establishing, and chairing for ten years (1985-1995) the CNR Institute for Applied Mathematics (IRMA) in Bari. Most of his collaborators now occupy relevant academic positions in different areas of Applied Mathematics, ranging from biostatistics, geostatistics, mathematical finance and economics, to probability and mathematical statistics, and, as a special mention, mathematical geography.

Laura Sacerdote, Professor at the University of Torino, recalled the intensive work done by VK in reinforcing the PhD program in Computational Mathematics and Operation Research of the interuniversity consortium Genova, Milano, Milano Politecnico, Pavia, and Torino. His idea of the graduate school has been so successful, thanks to the support of all colleagues in the consortium, that most former PhD students occupy academic positions in Italy. VK left the coordinating position after having designed and implemented a new program entitled Mathematics and Statistics for the Computational Sciences. It is worth mentioning that the conference was attended by many of "his" former PhD students (as they like to call themselves).

Marek Niezgodka, Director of the ICM in Warsaw, reported on the recent joint action by himself, VK and Willi Jäger for establishing a European Graduate School on Mathematics and Statistics in the Computational Sciences, through a strict coordination of the existing local programs. *Liliana Ironi*, also on behalf of *Franco Brezzi* (Director of IMATI-CNR) reported on the stimulating role played by VK as a member of the scientific committee of the IAN-CNR in Pavia for ten years.

The workshop mirrored all these lively experiences. Lectures on biomathematics and mathematical medicine were delivered: by *Mats Gyllenberg* on physiologically structured populations, by *Antonio Fasano* on mathematical models for tumour cords; by *Piero Colli Franzone* on modelling and simulation of the bioelectrical behavior of cardiac tissue; and by *Masayasu Mimura* on self-organized patterns in bacterial colonies. ESMTB minisymposia were held: by *Andrea Pugliese* on epidemics models; by *Paolo Fergola* on allelopathic competition models; by *Andrea De Gaetano* and *Pasquale Palumbo* on distributed-delay models of the glucose-insulin homeostasis; by *Zvia Agur* on mathematical theory to clinical application in cancer drug design; by *Marek Niezgodka* on modelling complex developments in biosystems; by *Franz Kappel* on

cardiovascular modeling; by *Philip Maini* on modelling aspects of vascular cancer; by *Toshio Sekimura* on pattern formation in butterflies; by *Odo Diekmann* on diffusion models for the dependence of climate on the favourable habitat for a species; by *Karl P. Hadeler* on coupled dynamics, quiescent states, and reaction diffusion system. We had lectures on industrial applications by *Luis L. Bonilla* on the kinetics of nucleation and growth processes and two ECMI minisymposia with lectures by *Martin Burger* on level set methods and crystal growth, *Jacques Periaux* on challenging multi criteria problems in aeronautics, by *Donato Posa* on space-time covariance models; *Rainer Burkard* on modelling and optimizing batch processes in the chemical industry, and *Andrea Di Liddo* on optimal marketing.

The opening lecture by *Grace Yang* was entitled “*Stochastic Modeling and Estimation in Neutron Lifetime Experiment*”. Grace has always been quoted by VK as his most influential scientific advisor, especially for introducing him to one of the most prestigious Schools of Mathematical Statistics, the one lead by Jerzy Neyman and Lucien LeCam. Thanks to Grace, he had the chance to meet both these scientists. Indeed, his first relevant paper in probability was on asymptotics of the Neyman-Scott model of epidemics, a pioneering model of stochastic point processes. It was written by an enthusiastic and brilliant young scientist under the guidance of Grace, first during the Summer School on Biomathematics at the Scuola Normale Superiore in Pisa (1972), and later at the Department of Mathematics of the University of Maryland, in the US (1973) .

The closing lecture was delivered by another one of VK's very influential friends and mentors, *Willi Jäger*, on multiscale modelling in biosciences: ion transport through membranes. Prof. Jäger (Heidelberg), founder and Director of the IWR, not only strongly influenced VK scientifically by stimulating and encouraging him to face hard mathematical problems in the general area of nonlinear multiscale systems. They both shared the view of “*Mathematics Everywhere*”, supported by a genuine interest in facing challenging problems in biomedicine. They both tackled problems of great relevance for the quality of life of human beings, by means of different mathematical methods, and often creating problem-driven new ones.

During the three-day meeting a poster session also reflected the actual widespread interests of VK in many of his collaborator's work: from the stochastic

interacting particle systems modelling ants colonies, crystallization, price “herding” in collaboration with *Daniela Morale*; to stochastic geometry and shape analysis with application to crystallization of polymers and angiogenesis, in collaboration with *Alessandra Micheletti*; hybrid models and mesoscales with application to crystallization with *Martin Burger*; multi-parameter martingales and dimension reduction problems in collaboration with *Giacomo Aletti*, moving boundary problem in collaboration with *Stefano Patti* and *Alessandra Micheletti*; invariant density estimators in collaboration with *Annamaria Bianchi* and *Denis Bosq*, autoregressive processes in topological spaces with *Enea Bongiorno*; random sets as geometric distributions with *Elena Villa*. More posters were presented by former students of VK: on IFS Estimators by *Davide La Torre*; level set methods in evolution problems by *Ramon Escobedo*; and bio-fluid dynamics problems by *Filippo Notarnicola*. *Christina Surulescu* presented a poster on stochastic signal modelling.



This meeting was made possible thanks to various sources of funding: the University of Milano and in particular MIRIAM; the University of Foggia; the European Society of Theoretical and Mathematical Biology; and the European Consortium for Mathematics in Industry. Thanks to ECMI three young researchers got a fellowship to support their local expenses. Various other institutions have sponsored the initiative, including SIMAI, CIMAB, CIME, and Springer. The proceedings of this meeting will be published by Springer.

We are happy to say that everyone very much enjoyed the very warm atmosphere, and the fantastic richness of scientific ideas that have pervaded the whole meeting.

*Daniela Morale, Alessandra Micheletti
ADAMSS, Milano*

SOCIETY NEWS

The ECMTB 2005 brings mathematics and biology together.

July 18-22, 2005, Dresden, Germany

The ECMTB 2005 in Dresden was the big annual event in the calendar of mathematical biologists. The *European Conference on Mathematical and Theoretical Biology 2005* offered a unique opportunity for mathematicians, bio-scientists and science educators to communicate their latest results and new research directions in mathematical modeling, theoretical biology and medicine.

The conference, which constitutes also the 6th tri-annual meeting of the European Society for Mathematical and Theoretical Biology (ESMTB) took place July 18th to 22nd in the beautiful, eight century old city of Dresden and was been attended by more than 800 scientists and students from all over the world.

The five days of the conferences began on Monday morning and continued until Friday afternoon with 15 keynote lectures, 36 mini-symposia and contributed presentations with a total of approximately 450 talks and 300 posters.

The program featured new applications of mathematics in biology and medicine ranging from questions of cellular organization, organismic development to the evolution of whole populations. The different subjects and mathematical tools discussed at the conference talks were highly interdisciplinary, stemming from computational biology, mathematics, computer science, and physics.

Among the many interesting talks I would particularly mention those by *A. Csikasz-Nagy* (Regulatory networks, Budapest University of Technology and Economics, Molecular Network Dynamics Research Group) for applying simple mathematical models, one- and two-parameter bifurcation diagrams analysis, to describe the very complex systems of the cell cycle regulation in different organisms, by *E. Tanaka* (Development, Max-Planck Institute of Molecular Cell Biology and Genetics) and by *S. Pääbo* (Evolution and ecology, Max Planck Institute for Evolutionary Anthropology) because more related to crucial biological questions. Ely Tanaka discussed recent research results and implication for modeling pattern formation during

limb and tail regeneration in vertebrates, while Savante Pääbo presented a global comparison of differences in content of segmental duplication between human and chimpanzee and discussed new experimental and computational approaches. Both subjects represent biological and mathematical challenges and will have significant implications in the future of medicine and philosophy of life sciences.

Special emphasis was given to topics related to inter-disciplinary education: with a quiz-game for the audience, *Lou Gross* (Inter-disciplinary education, University of Tennessee) introduced the problem of defining the standards of educational quality at several educational levels for interdisciplinary fields like mathematical, computational and theoretical biology. The last key-note lecture by *Hans Westerhoff* (Regulatory networks, BioCentrum), about the usefulness of a systems biology approach to understanding intracellular signal transduction and computer replica (www.siliconcells.net), completed the spectrum of conference topics.

Apart from the plenary lectures, many other talks were scientifically remarkable. Among them were *Peletier's* (Cellular biophysics, Technische Universiteit Eindhoven), *Binder's* (Regulatory networks, Institute of Biology, Theoretical Biophysics, Humboldt University Berlin) and *Hunding's* (Cellular biophysics, Dept. Chemistry, Univ. Copenhagen).

But ECMTB 2005 was not as much about big names as about young scientists: the mentoring program was planed to establish a social and professional network between junior and senior colleagues by sharing background information and career experiences. Last but not least: this year's Akira Okubo price has been awarded to Prof. *Jim Murray*, one of the pioneers of mathematical biology. The Akira Okubo Lecture was presented as an evening talk open to the public.

The interplay between mathematical tools and biological problems is the core of mathematical and theoretical biology, an exciting and fast growing field in which interdisciplinary collaboration is essential for progress. In my opinion, the ECMTB 2005 was a great success not only because it gave the opportunity to foster such interdisciplinary

collaboration at all levels from the most junior graduate students to Nobel laureates, but also because of the excellent work of the organizing committee. The social program was very well composed and offered the possibility to extend scientific discussions and see the beautiful landscapes and buildings in the Elbe Valley. Dresden represents one unique example of a successful network: more than 15 research institutions - like the Medizinisch-Theoretisches Zentrum (MTZ), the Max Planck Institute for the Physics of Complex Systems (MPI-PKS), MPI-CBG, the Biology Faculty and the Medical Faculty and top technical university TUD - form a tight science cluster of multi-disciplinary research projects that will bring Dresden on the map of life sciences and biotechnology.

Two among the many Emails we received recently:

Dear Conference Organizers, thanks for such a wonderful conference. I enjoyed the science and I enjoyed the social events. You all did a great job...

...ECMTB2005 has been an extraordinary Conference. Congratulations!!! The organization of this congress has been excellent.

Perla Del Conte-Zerial

Further information: <http://www.ECMTB2005.org/>

General Assembly of the ESMTB

During the 6th European Conference on Mathematical and Theoretical Biology in Dresden (ECMTB2005) the triennial General Assembly of our Society (ESMTB) took place on Thursday, June 17, 2005. The president, *Mats Gyllenberg*, presented an *Activity Report 2003 – 2005* (see on page 20).

After some discussion the announcement was given, that for the next period of three years (2006 – 2008) five new Board members have to be elected in order to replace those, who have to leave the Board, namely *Marcelline Kaufmann*, *Vlastimil Krivan*, *Philippe Tracqui*, our secretary *Hans Heesterbeek* as well as our president *Mats Gyllenberg*. Thanks to them were expressed by Society members for there engagement during six years!

Those members remaining “on Board”, are listed here together with the e-mail code, under which they can be reached:

Helen Byrne helen.byrne@maths.nottingham.ac.uk
Rafael Bravo rafael.bravo@uah.es
Andreas Deutsch deutsch@zhr.tu-dresden.de
Luigi Preziosi luigi.preziosi@polito.it
Wolfgang Alt wolf.alt@uni-bonn.de

A first series of candidates for new board members was proposed during the Meeting and those attending

gave brief presentations by themselves. The treasurer of the Society, *Andreas Deutsch*, was asked to organize the on-line bullet until September 30, 2005. Thus, the final list of candidates including their “profiles” was sent to all members by e-mail for voting. The number of on-line votes, 146 out of 303 ESMTB members, almost reached the level of 50%.

Result of the Board election ballot, September 2005:

1.	Carlos A. Braumann (Portugal)	69
2.	Eva Kisdi (Finland)	62
3.	Hans Westerhoff (Netherlands)	58
4.	Jean-Christophe Poggiale (France)	54
5.	Christine Jacob (France)	51

6.	Andrey A. Polezhaev (Russia)	48
7.	Attila Csikasz-Nagy (Hungary)	45
8.	Ryszard Rudnicki (Poland)	45
9.	Lia Hemerik (Netherlands)	41
10.	Henrik Jeldtoft Jensen (United Kingdom)	41
11.	Viggo Andreasen (Denmark)	37

The first five candidates constitute the additional new members of the Board for the years 2006 – 2009. Their written profiles are again published below together with e-mail codes. The first Meeting of the new Board will be in Bonn on February 18, 2006.

Profiles of the new Board Members

CARLOS A. BRAUMANN

braumann@uevora.pt

I am Professor and the next Head of Department of Mathematics at the University of Evora, Portugal. My undergraduate education was on Applied Mathematics and my Ph. D. thesis (State University of New York at Stony Brook, Ecology and Evolution Program) dealt with stochastic models for populations living in a randomly varying environment. That has been my main research topic, including issues like population extinction, existence of a stationary distribution for the populations, estimation, prediction, applications to harvesting, and use of Ito or Stratonovich calculus in stochastic differential equations models.

Usually, one takes a specific model and studies its properties, believing that they apply to the populations being modelled. Frequently, these properties do not stand even slight modifications in the model. So, I prefer to use general models, with very few assumptions, in order to reach robust conclusions concerning the properties of the populations.

I have some managerial experience as Vice-Rector and President of the Scientific Council of my University, and also as Director of a research centre, where I now lead a project on stochastic and statistical modelling in life sciences. I have also been involved in the organization (twice as president of the organizing committee and editor of the proceedings) of several national and international scientific meetings.

Being a founding member of ESMTB, I have seen it develop, slowly but steadily, from just an intention to a mature society playing a key role in the development of an increasingly important scientific field. So, when I was asked to accept the nomination as a candidate for the Society's Board, I saw it as an excellent opportunity to contribute to a worthy cause. There is still great potential for growth in the membership and for improving the services ESMTB provides to its members and to society. Areas of possible improvement include making our field more visible in academic programs and also in the media, offering grants to enable young researchers to participate in conferences, increasing support to summer schools and scientific meetings, raising the

information content of the website, and improving agreements with publishers of relevant journals and books for discounts to the members. I also firmly believe that the members should be consulted to define the directions and priorities of ESMTB development and, in this way, ensure that the Board is truly representative of its members.

CHRISTINE JACOB

Christine.Jacob@jouy.inra.fr

I am working in the French National Agronomical Research Institute (INRA) as a research director in applied mathematics. My current research field concerns stochastic modelling in biology and estimation of processes parameters. My goals consist in solving particular problems in a rigorous and optimal way, to determine the meaning and the limit of mathematical tools, and to produce new generic tools in modelling, prediction analysis, and estimation of the parameters, starting from particular problems.

During the last ten years, my main fields of biological applications concerned RNA folding (prediction of the functional secondary structure based on a sequential stochastic folding modelled by a jump process, Q-PCR (estimation of the efficiency and the initial population size using branching processes), epidemiology (mainly BVD, BSE, SEI models, SIS models: modelling of the evolution of the disease, prediction, estimation).

I also belong to the French Mathematical Society (SMF), to the Applied and Industrial Mathematical Society (SMAI), and to the ReX NeuroPrion (for evaluating risks in Transmissible Spongiform Encephalopathies)

EVA KISDI

kisdi@mappi.helsinki.fi

Hungarian by origin, Eva Kisdi is now a resident of Finland and a researcher at the Department of Mathematics and Statistics of the University of Helsinki. She has a background in biology and a career in mathematical ecology. Most of her work contributed to adaptive dynamics, which models the evolution and diversification of populations under

natural selection as derived explicitly from the underlying (and possibly complex) ecological interactions. She is also interested in population and metapopulation dynamics, the evolution of life histories, game theory, and the theory of speciation. She values and enjoys teaching, and has organised a number of symposia to facilitate scientific interactions. She is an editor of *Evolutionary Ecology Research* and served on the Scientific Committee of ECMTB 2005.

On the Board, she will aim at strengthening the role of ESMTB as a central source of information and exchange between European researchers in mathematical biology. This will include extended coverage of conferences, job openings, grant information, courses, workshops, student exchange possibilities, educational material, and the like on the ESMTB website, and possibly a daily updated mailing list for fast exchanges. She would like to make contact with other scientific societies (e.g. the European Society for Evolutionary Biology) whose members work in related areas, to facilitate the flow of information all the way from experimental biology to (almost) pure mathematics and back. She would like to support meetings and courses that bring together students and young scientists from different countries with distinguished researchers of their field by publicizing such events and, as much as possibilities permit, also support such meetings financially.

JEAN-CHRISTOPHE POGGIALE

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I am 38 years old, married and have one daughter. I have a background in geometry and started to apply geometrical methods to the study of ecological models during my PhD thesis. I am now professor at the University of Mediterranean in Marseille (France), working in the Laboratory of Marine Microbiology, Geochemistry and Ecology. I have been interested in the field of mathematical and theoretical ecology since 1992. I am trying to adapt and/or develop methods to deal with ecological models involving different time scales and different organisation levels. These methods are applied to the study of marine ecosystems models. Since 1992, I have been interested in the development of mathematical and theoretical biology and I am an active member of the French Society of Theoretical Biology. I think that the relation between the French researchers in theoretical and mathematical biology and the

ESMTB may be improved and I would work in this way. I also aim to promote a high level of education in theoretical and mathematical ecology for young mathematicians and biologists. I have an experience in the organisation of interdisciplinary international schools in mathematical ecology and even in the organisation of international conferences (AICME I Spain, September 1999 and II Spain, September 2003). I am interested to develop these activities at the European level and even at a larger scale.

HANS V. WESTERHOFF

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See the profile already written for the elections 2002, printed in ECMTB #4 on page 11.

Hans V. Westerhoff (www.bio.vu.nl/hwconf) is Professor of Systems Biology, Manchester Centre for Integrative Systems Biology, Manchester Interdisciplinary Biocentre (60 %), the University of Manchester, as well as Professor of Molecular Cell Physiology, Free University Amsterdam, BioCentre Amsterdam (40%) and Professor of Mathematical Biochemistry, University of Amsterdam, BioCentre Amsterdam. He has been actively engaged in theoretical and experimental studies of cases where interactions lead to new properties that are important for biological function. Most of this work has been focusing at the levels between molecules and living cells, but more recently there have been escapades to ecology and whole body human physiology. The work is perhaps best summarized by the term Systems Biology. In terms of theory, Westerhoff has been developing the mechanism-based version of Non-Equilibrium Thermodynamics (MNET), the version of Metabolic Control Theory that also addresses gene expression and signal transduction (Hierarchical Control Theory), a stochastic theory on biological free-energy transduction, and Ecological Control Analysis. He coauthored 11 citation classics. He is further the driving force behind the Silicon cell program, which aims at making precise replica models of intracellular pathways, and make these available for experimentation on the wwweb (cf. www.siliconcell.net). Westerhoff has been co-organizing the 2004 International Conference on System Biology (850 participants), organizing the first FEBS advanced course on Systems Biology (March 2005), is in steering committees of various National Systems Biology programs (Germany, UK).

Minutes of the last Board Meeting

Dresden, Tuesday 19 July 2005

Meeting starts 13:40

Present: *Mats Gyllenberg* (chair), *Wolfgang Alt*, *Helen Byrne*, *Andreas Deutsch*, *Luigi Preziosi*, *Philippe Tracqui*, *Rafael Bravo de la Parra* (minutes).

Absent with apology: *Hans Heesterbeek*, *Marcelline Kaufman*, *Vlastimil Krivan*

1. Adoption of agenda

The proposed agenda is accepted.

2. Minutes of March 7th, 2005 meeting in Grenoble

Minutes are approved.

3. Activities report

Mats Gyllenberg read the draft of the report on board activity in the last three years that he had prepared to be presented during the General Assembly of the Society. The draft was discussed and accepted.

4. Financial Report

Andreas Deutsch explained that the counts of 2004 had already the approval of the auditors though one of them, Kalle Parvinen, did suggest an improvement in their presentation. Andreas Deutsch was already taking care of it.

Concerning the counts of 2005, Andreas Deutsch pointed out the important increase in membership along this year with the corresponding rise of the incomes of the Society.

5. Agreement with Springer Verlag

The final draft of the new contract to be signed with Springer Verlag is discussed. The significant change included in it is that every paying member of the Society will receive hard copies of JMB issues. It was general opinion that

the agreement takes care generously of all the demands of the Society and so the President and Vice-President were authorised to sign the contract.

6. ESMTB conference 2008

At this point *Mark Chaplain* was welcome to the meeting to expose his proposal for the next ESMTB conference to be held in 2008. He describes the infrastructure facilities of Edinburgh concerning accommodation and venue of the meeting as well as the composition of the organization team, who has a well reputed experience in this kind of job.

The general opinion of the board on this proposal was very positive and finally it was formally decided to accept it for the organization of the ESMTB conference 2008.

7. Proposal of membership fees to be approved in the general assembly

It was decided to maintain 2005 fees for 2006.

8. Election 2005 for new board members.

It was decided to inform in the General Assembly as well as to every member of the Society of the deadlines of the election procedure and of the possibility of any member to become a candidate.

9. Time and place of next meeting

The board will not arrange a meeting with its present composition except if it is required.

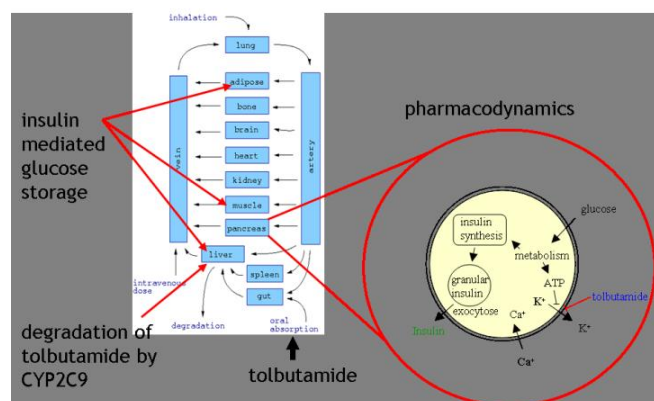
The meeting finished by thanking all the leaving members: Mats Gyllenberg, Hans Heesterbeek, Marcelline Kaufman, Vlastimil Krivan and Philippe Tracqui for their most helpful work during the last six years in favour of the ESMTB.

RESEARCH GROUPS

Junior Research Group "Computational Physiology"

Free University of Berlin and DFG Research Center MATHEON, Berlin, Germany

The junior research group (JRG) is active in the field of mathematical modelling and numerical analysis of multiscale problems for stochastic and deterministic systems, with a strong focus on applications to life sciences. The current projects are on conformation dynamics, hybrid modelling and pharmacokinetics.



Conformation dynamics: There are many problems in physics, biology, medicine, where the length and time scales of interest remain entirely beyond the computational capacity currently available, and will remain out of reach in the foreseeable future. As a consequence, there is an increasing need for simplified, reduced descriptions. Reduced models may provide insight and numerical simulations for larger length scales and longer time scales, but of course at the cost of discarding some level of detail. Instead of simply neglecting some degrees of freedom, one is rather interested in reduced models that incorporate into their dynamical behaviour the effective influence of the neglected coordinates. In this context, the JRG aims at developing mathematical tools and numerical algorithms for the identification and efficient simulation of reduced model systems. In cooperation with the Bio Computing Group (FU Berlin) and the Molecular Dynamics Group (ZIB) we developed novel mathematical techniques for the identification of metastable behaviour in Markovian systems, in

particular in application to the conformation dynamics of drug-like molecules.

Hybrid modelling: Simulation of signal pathways and gene-regulatory networks often requires a stochastic formulation of the reaction kinetics in order to correctly capture the influence of small numbers of molecules and relevant fluctuations. On the other hand, metabolic networks with large numbers of molecules and continuously occurring reaction are successfully modelled by the deterministic formulation of chemical reaction kinetics (based on the law of mass action). Aiming at more detailed cellular systems consisting of gene-regulatory networks and signalling pathways coupled to metabolic networks, the aim of the project is to devise adaptive numerical schemes for the simulation of coupled stochastic and deterministic models of biochemical reaction systems and its mathematical justification. Moreover, we are interested in the efficient solution of the chemical master equation. Within this project, we cooperate with experimentally working groups at the Free University of Berlin (Microbiology) and the EMBL (Heidelberg), as well as with theoretical oriented groups at the Max Planck Institute for Molecular Genetics (Berlin) and CERMICS & INRIA (Paris).

Pharmacokinetics: Pharmacokinetics is the study of the drug/xenobiotic-organism interaction, in particular the investigation of absorption, distribution, metabolism, excretion and toxicological (ADMETox) processes. In the past decade, considerable progress was made with the use of computational approaches, in particular in the early stage of the drug discovery process. As a result, modelling and simulation is possible prior to any in vivo experiments. Studying ADMETox profiles is used to identify and understand the physiological mechanisms that are most relevant from the point of view of pharmacokinetics. The JRG aims at designing generic physiologically based pharmacokinetic models coupled to metabolic and regulatory pathways on a mechanistic basis in order to analyze effect-related biomarkers (see figure). A second topic is the design of models and efficient mathematical techniques to capture the effects of natural variability on the kinetics. In cooperation with Computing in Technology (CiT), the JRG develops a modular, application-specific and user-friendly virtual lab for modelling and simulation in

pharmacokinetics/dynamics. We moreover cooperate with the Federal Institute for Risk Assessment (BfR) Berlin, pharmaceutical companies, and the Charite Berlin.

The JRG is supported within the DFG Research Center MATHEON "Mathematics for key technologies: Modeling, simulation, and optimization of real-world processes" (www.matheon.de). It is involved in the International Max Planck Research School "Computational Biology and Scientific Computing", Berlin, and the COST B25 action. At the time, a postdoc, two PhD students and four Master students work within the group. For further details please visit URL <http://compphysiol.mi.fu-berlin.de>.

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Wolfgang Pauli
Mathematical physicist (1900 – 1958)
Wien, Hamburg, Kopenhagen, Zürich, Princeton

Wolfgang Pauli Institute (WPI)

Vienna, Austria

More information about the institute can be found at: www.wpi.ac.at

The Wolfgang Pauli Institute (WPI), located in the centre of Vienna, Austria, is a "Center of Excellence" in mathematics, computer science, physics and areas of their application, from biology to chemistry and finance. Two different programs within the institute provide an international invitation scheme: whereas the "Pauli Fellows Program" intends to bring international scientists to Vienna for six months periods, the "Thematic Programs" typically involve shorter research visits, workshops and conferences.

Topic of the thematic program *Mathematical Biology 2004*, organized by Yasmin Dolak-Struß (RICAM, Linz), Hans Othmer (University of Minnesota, Minneapolis), Benoit Perthame (ENS, Paris), Christian Schmeiser (University of Vienna) and Angela Stevens (MPI, Leipzig), was the application of mathematical methods to problems from theoretical biology and biophysics.

Main activities within the framework of this program were two workshops: the *Workshop on Modelling of Cell Motility and Angiogenesis*, Nov. 8-12, 2004, and the *Workshop on Cell Motility and Cytoskeletal Dynamics*, Nov 10-12, 2005. The aim of the meetings was to bring together both theoreticians and biologists and to stimulate discussions and an exchange of ideas between the two groups. Both meetings took place in a very informal and relaxed setting, with plenty of time between talks to work and to discuss together. Right from the beginning, there was a strong interaction between the audience and the speakers, and lively discussions took place. In particular, the ease of interaction between experimentalists and mathematicians was remarkable. The participants agreed that this thematic program could be the starting point of a series of similar events in mathematical biology hosted by the WPI..

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RECENT THESES

Modelling and Mathematical Analysis of Population Dynamics Problems

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This thesis in mathematical eco-epidemiology is divided into two parts. The first part concerns predator-prey systems in the presence of a transmissible infection. In this part, two models are elaborated and studied. In both models, the prey is divided into two classes: susceptible and infected. The first model is a classical model in the sense that the functional response is only prey dependent, while in the second model it is ratio-dependent. Analytical study is performed and qualitative results are obtained with respect to the main bifurcation parameter, which is the rate of infection. We show that there exists a threshold value, below which the system is unstable, above which the system is stable, and a Hopf bifurcation occurs at the critical value. Numerical simulations are performed to illustrate the analytical finding.

The second part of my thesis deals with the problem of interactions between zooplankton and toxic phytoplankton. The main objective in this part is to study the impact of toxic substances released by some phytoplankton species on the qualitative behaviour of the system. In this part, different effects of the toxin are considered; instantaneous and also delayed effect, discrete and distributed delay. Different models are developed and studied analytically. The main parameters here are the toxin efficiency parameter and the delay parameter. Several mathematical results are obtained and interpreted ecologically. Among other qualitative results, we showed occurrence of supercritical Hopf bifurcation with respect to the delay and toxicity. Collected data is analysed and compared with the analytical results. The model with discrete delay is in close agreement with the data.

In both parts of my thesis, the main conclusion is that the presence of an infection or the presence of toxic substances in the system may be beneficial to the system and may act as a biological control.

Key-words: Predator-Prey, Zooplankton-Toxic Phytoplankton, Stability, Bifurcation, Delay Differential Equations.

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Mathematical and Computer Modelling of Social Behaviour in Animal Societies: Alignment in a Fish School.

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In this work we deal with some of the mathematical aspects of the phenomenon of social organization. We are mainly interested in alignment, the process by which an individual turns to adapt its orientation to that of its neighbors. There are two general frameworks when modelling such problems: the Lagrangian viewpoint and the Eulerian one. In this contribution, a mixed Lagrangian-Eulerian approach was undertaken. The Lagrangian model (also known as individual based model, IBM) is given via a system of stochastic differential equations. It provides a virtual world where fish forming a school try to adopt a common angular position. The Eulerian model (PDE) describes fluxes of individuals structured by the angular orientation of their body with respect to a fixed direction in a plane. The main qualitative outcome of this work establishes the onset of alignment, starting off at some value of a correction parameter, as a result of a transcritical

bifurcation. A transition from dispersion-dominant to alignment-dominant can be observed in the IBM experiments. A related PDE model (Eulerian) is used to determine the transition with sufficient accuracy.

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[3] M. Adiou, The interplay between individual based computer simulation and mathematical analysis in a fish school, *Actes du 6^e Colloque Africain sur la recherche en Informatique, proceedings de CARI (2002)* 385 - 393.

Mathematical Modelling of Complex Biological Systems: A Kinetic Theory Approach

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The aim of the thesis is modelling the immune response to aggressive hosts by methods of applied mathematics. Mathematical models suitable to describe the evolution of the system are developed and the related qualitative and computational analysis is performed.

The first part of the thesis deals with some methodological aspects on the derivation of the generalized kinetic (Boltzmann-type) equation for large systems of interacting entities. Then, a model able to describe some aspects of the competition between immune and tumor cells is derived. Finally, a more general model of immune response is proposed.

The second part of the thesis deals with a qualitative and quantitative analysis of the models. Well-posedness of the initial-value problems is analyzed and special attention is paid to study the asymptotic behaviour of the solutions. A computational analysis is carried out with attention to the biological interpretation of the results.

Continuous Growth Models for Soft Biological Tissues

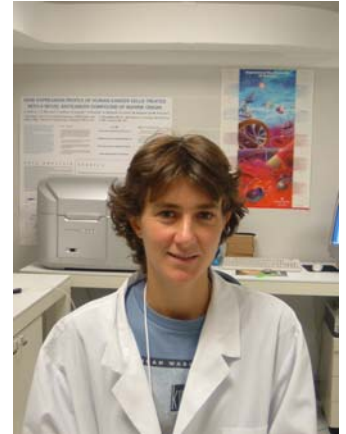
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This thesis deals with typical arguments of biomechanics of soft biological tissues, such as skin, lung, tendons, blood vessels.

The first part of this thesis is a review of the fundamental mechanical properties that characterize this kind of biological tissues (nonlinearity, inhomogeneity, anisotropy, viscoelasticity, incompressibility), with a particular attention to blood vessels. The study focuses on the concept of residual stress and on the processes of growth and remodelling that lead the evolution of soft tissues subject to the complex interaction with the surrounding environment. From the mathematical point of view, the main efforts are toward the formulation of a suitable constitutive model capable to describe the experimentally proved interaction between the stress state of the body and growth, and the numerical validation of the model. After a detailed description of the kinematics of volumetric growth and the formulation of the suitable balance laws for a body with varying mass, a dissipative principle involving standard and “accretive” forces is used in order to find the evolution equation for growth, in which the coupling between stress and growth is expressed in terms of an Eshelby-like tensor. The numerical simulations refer, as a preliminary stage, to infinitesimal strain of an artery, modeled as an axisymmetric annulus of linear isotropic elastic material. For displacement boundary conditions, the results agree with the qualitative analysis; in fact, the radial stress evolves toward an equilibrium value, called homeostatic stress. When we apply a normal load at the internal wall of the cylinder, simulating increasing pressure, the only way to reach a steady state is to assume that the material is inhomogeneous.



Evolution of Sex-Ratio in Structured Population Dynamics

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In this Thesis we address the study of some non-linear evolution equations (e.g. pde's) modelling the dynamics of sexually-reproducing structured populations, with special emphasis on *biological evolution* driven by natural selection. The latter is incorporated into the models through the adaptive dynamics, which is a way of describing how the hereditary characteristics of the population evolve. The sex-ratio, defined as the proportion between females and males, is analyzed from the evolutionary point of view. The memoir is divided into two parts plus a brief introduction to age-structured population dynamics (Chapter 1).

The first part (Chapter 2) is devoted to a model for the dynamics of a sequential hermaphrodite species, i.e. a population where every individual functions early in life as one sex (specifically as a female) and then switches to the other sex for the rest of its life, and the sex-reversal occurs at a specific age which is considered as a non-negative random variable. This phenomenon happens in a variety of animals including fish species like the sea bream (*sparus aurata*), the anemonefish, the parrotfish and the blue-headed wrasse (*thalassoma bifasciatum*). First of all we introduce the basic hypotheses and the parameters of the model: the probability law of the age at sex-reversal, the non-linear (due to the sexual reproduction) birth function giving the influx of newborns, and the density-dependent per capital mortality rate. The complete system (which displays the birth, transition and death processes) for the age-densities of females and males, is formulated and derived in the form of non-linear integral equations as well as the smooth version in the form of a nonlocal non-linear first-order hyperbolic partial differential equations (partial integro-differential equations) with boundary, at age zero, and initial conditions. We take the former approach because of the lack of regularity, and in the latter the transition from female to male is given in terms of the derivative of the probability law.

In Section 2.3 we show the existence and uniqueness of global solutions which are non-negative and

biologically meaningful for the present model. We introduce additional hypotheses, namely, suitable Lipschitz conditions on the birth function and the mortality rate. In Section 2.4 we show that the system can be reduced to the *intrinsic sex-ratio subspace* where the dynamics is given by a single non-linear integral equation for the age-density of individuals of both sexes. An explicit form of the birth function, in terms of the fertility rates, is derived for latter numerical purposes. It corresponds to a Holling type II functional response, and it is based on the fact that females arrange its time in looking for mates and handling the production of new offspring. The expected searching time is $1/(\text{number of males})$, whereas the expected handling time is a constant.

Section 2.5 studies the asymptotic behaviour of the solutions as time tends to infinity. We have determined a sufficient condition for having bounded trajectories and the possibility of non-trivial dynamics. On the other hand we have seen that the *extinction equilibrium* is always locally asymptotically stable, displaying the Allee effect, which is a common feature of sexually-reproducing populations.

In Section 2.6 we address the stationary problem, i.e. we look for solutions independent of time in L_1^+ . The non-trivial steady states are determined according to a scalar non-linear equation for the total population at equilibrium as an independent variable. We end the section by illustrating two cases. The first one is the (non-linear) case of neglecting the competition for the resources, obtaining that there is at most a non-trivial steady state which is unstable. An explicit expression of this equilibrium is given, and the instability is obtained by means of a linearization procedure. The second case, which is rather general, includes some sort of competition and we have found two non-trivial equilibria for each value of the expected age at sex-reversal in a bounded open interval. Both cases are depicted in a bifurcation diagram, for two choices of the probability law (Heaviside/exponential).

The theory of *accretive operators*, i.e. those such that its resolvent operator is a non-expansive map, is needed in order to study the local stability of equilibria for the general case. A proof of the principle of linearized stability for the reduced system is given in Appendix A, and it is based on a principle for non-linear evolution equations governed by accretive operators, where the stability is determined by the accretiveness of an associated linear operator. In Section 2.7 we rewrite the reduced

system as an evolution equation and introduce additional hypotheses, mainly, suitable conditions on the regularity of the birth function and the mortality rate. Finally we get a sufficient condition for the local stability without computing the spectrum of the linear part.

Considering phenotypic evolution in the context of diploid population models, in Section 2.8 we study the evolutionary dynamics of the age at sex-reversal. The function-valued trait considered is the probability law. We assume a resident population at stable equilibrium and consider a small invading/mutant population made up of *heterozygotes*, and *homozygotes* ($1/4$ 0). We have used convex analysis in order to show that an unbeatable strategy or evolutionarily stable strategy (ESS) is a Heaviside step function: all individuals of the population change sex at the same age. More precisely, the computation of such an (infinite dimensional) strategy is based on linear/quasi-linear optimization on compact convex sets. Our result is a generalization of the one obtained by Charnov. Finally, Section 2.9 is devoted to the adaptive value of the sex-ratio of the population at equilibrium, which is in general different from one. However, if the fertilities are age independent then the sex-ratio equals to one. In addition, assuming also an age independent mortality we have that the transition from female to male takes place at 69.3% of the life expectancy of the population.

The second part (Chapter 3) is devoted to a model for the sexual phase of a haplodiploid species (monogonont rotifers) which exhibits the so-called *cyclic parthenogenesis* (both forms of reproduction: non-sexual and sexual). Monogonont rotifers are small micro-invertebrate animals who inhabit aquatic media with seasonal variations. The original system, which was introduced by Aparici, Carmona and Serra from the department of ecology at the University of Valencia, is formulated in the form of nonlocal non-linear first order hyperbolic partial differential equations. The state variables are the age-densities of virgin mictic females (male-producing), mated mictic females (resting egg-producing), and haploid males, whereas the time-independent parameters of the model are the per capita mortality rates, the male-female encounter rate, the recruitment rate of mictic females, the fertility of male-producing mictic females, the age at maturity for females, and the threshold age of fertilization (which is less than or equal to the maturation age). The transition from virgin to mated is given in terms of the characteristic function of the fertilization period and the total

population of haploid males. The equation for mated mictic females turns out to be uncoupled from the others, so we focus on the other ones. Scaling the units in age, time and population we have reduced the number of parameters to only four: the new mortality rates, the new threshold age of fertilization, and the new encounter rate. As a result, we obtain the reduced and nondimensionalized system.

Section 3.3 addresses the stationary problem, i.e. we look for time-independent solutions in $W_{1,1}$. We have found that there is a unique continuous steady state which can be written in terms of the total male population at equilibrium. The latter is obtained as the unique solution of a scalar non-linear equation.

Section 3.4 studies the local stability of the equilibrium by means of a linearization procedure. On the one hand, we analyze the characteristic equation obtaining complex solutions that cross the imaginary axis, and on the other hand we prove a principle of linearized stability which is based on a semilinear formulation in L_1 , and the fact that the essential growth bound is negative (as usual in this kind of equations). The linear stability analysis reveals that the equilibrium is stable for values of the parameters in a large region containing the empirical ones. However, it can be unstable for values not too far.

In Section 3.5 we apply a Hopf bifurcation theorem in an infinite dimensional setting. We check that there is a pair of conjugate eigenvalues on the imaginary axis which cross with positive speed. Rewriting the system as a non-linear evolution equation and computing both the adjoint and the resolvent operators (the latter solving a linear ode with piecewise constant coefficients), we can determine if the bifurcation is *subcritical* or *supercritical*. As a result, we have shown the appearance of a stable limit cycle (isolated periodic orbit).

Section 3.6 is devoted to the numerical solution of the problem. We have designed an explicit numerical scheme based on both analytical and numerical integration along the characteristic curves. Several numerical experiments are presented. The numerical simulations confirm and extend the analytical results obtained.

Modelling cell aggregation in vasculogenesis

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Vasculogenesis, i.e. self-assembly of endothelial cells leading to capillary network formation, has been the object of many experimental investigations in recent years, due to its relevance both in physiological and in pathological conditions. In the thesis, we introduce some mathematical models describing cell aggregation as a consequence either of mechanical forces appearing between the cells and the substratum of extracellular matrix, or of chemotactic mechanisms. It seems reasonable that the two classes of models (based on chemotaxis and mechanical interaction with substratum) provide somehow complementary descriptions of the vasculogenesis process: the so called PaCh model (Persistence and Chemotaxis model) has been shown to successfully describe early, migration dominated stages of network formation while mechanical models apparently contain some of the ingredients which are necessary to describe later, strain-dominated stages (see [1]). We perform a detailed linear stability analysis for three models of in vitro vasculogenesis (originally proposed in [1], [2], [3]), with the aim of checking their potential for structure formation starting from initial data representing a continuum cell monolayer.

The important feature of PaCh model is that its simplification leads to an aggregation model of Keller-Segel type (see e.g. [4]). The main characteristic of such models is a possibility of finite time blow-up of solutions. However, in the aggregation model derived in the thesis, a certain pressure mechanism is introduced. The reason for such a mechanism is that crowded zones exhibit high cell pressure. Moreover, cells due to their positive size, cannot penetrate each other and therefore, the pressure at high cell densities should grow sufficiently fast. We show that for such a pressure function the solution to aggregation model cannot blow up in finite (or infinite) time. The computer simulations performed in the thesis show that for certain choices of the pressure function the solution to the aggregation model is not only bounded but tends even to form a peak of a cylinder form, which can be treated as the cell aggregate.

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HISTORY: REVIEW OF 15 YEARS ESMTB

In the year 1991, just after the borders between Eastern and Western Europe had been opened, the “*European Society for Mathematical and Theoretical Biology (ESMTB)*” was founded at a general public meeting on **January 10, 1991** during the first European Conference on *Mathematics Applied to Biology and Medicine* which took place in the scenic ski resort “**Alpe d’Huez**” near Grenoble, organized by *Jacques Demongeot* and *Vincenzo Capasso*. The initiative for an own European Society in addition to the then already existing international *Society for Mathematical Biology (SMB)* reached back to frequent discussions between participants and organizers of the regular triennial International Workshops on “*Mathematical Biology*” at the German Research Institute in Oberwolfach. Under the important “assistants of this birth process” were

Stuart Kauffman and Lee A. Segel. More details on the (pre-)history of the foundation process and the first years of the Society can be found in the first issue of the *Communications* (ECMTB #1, 2000) with an article by *Vincenzo Capasso*, then president.

Statutes of the Society were signed on January 20, 1992 in Grenoble by the “Provisionary Board” consisting of *Jim Murray* (President), *Jacques Demongeot* (Secretary), *Vincenzo Capasso* (Education), *Karl-Peter Hadeler* (European Community) and *Willi Jäger* (Conferences). According to the Statutes, the Board can appoint “Advisory Councils” for specific tasks or “Scientific Committees” on specific topics, see also below. (You can read the currently valid, slightly changed Statutes in ECMTB #4, 2003, page 2).

The first issue of the (since 1988 distributed) ***Biomathematics Newsletter*** (BMN No.6) after founding ESMTB, published in June 1991 a “Questionnaire” that had been filled out by 47 coming members during the Conference, wherein they made some interesting and still valid suggestions:

- *The Board should contact regional organizations* (such as the Dutch or French Society) *because of shared membership*
- *Topical meetings and workshops should be organized between the triennial Conferences*
- *Students in the Society should be organized and have an own folder for circulation*

Moreover, several letters by scientists from Eastern European countries were reprinted, who asked for financial help and collegial ties with their (partially newly founded) institutions as, for example, the Klaipeda University in Lithuania or the Czech Academy in Prag, which had to cancel a planned International Workshop “What is computer simulations of biological systems good for” because of serious financial problems. Essentially, the situation has not really improved since those times in the 1990’s, when Eastern Europe was, in comparison to now, even better represented on our Conferences or, for instance, in the list of “Newsletter Coordinators”: they came from 15 countries, out of which were 10 Western and 4 Eastern European countries (Russia, CSFR, Hungary and Bulgaria) as well as Israel.

The Newsletter in March 1992 (BMN No.8) was distributed to more than 250 scientists with 15% living in Eastern Europe (compare current Society statistics below). Each scientist had given his address, working area and references to his/her recent publications. The ***working areas*** were distributed as follows

52%	Population Dynamics and Evolution
29%	Physiology, Neurobiology and Medical Applications
19%	Growth, Morphogenesis and Patterns

From the very beginning, one of the most visible activities of the community represented by ESMTB were the ***Summer Schools***, just to mention a few of them

- “*Evolutionary Dynamics*” 1992 (Trento, I)
- “*Biology and Mathematics of Cell Proliferation*” 1997 (St. Flour, F) organized by SFTB
- “*Mathematics inspired by Biology*” 1997 (Martina Franca, I) organized by CIME

In 2000 the Board engaged a sub-committee, initially with *Ovide Arino* and *Philip Maini*, in order to

establish a ***Permanent European Summer School***, which since then took place almost every year:

- 2000 Martina Franca (Italy): “*Spatial Structures in Biology and Ecology: Models and Methods*”
- 2001 Sigüenza (Spain): “*Cells*”
- 2002 Urbino (Italy): “*Dynamical Systems arising in Physiology and Medicine*”
- 2004 Corsica (France): “*Ecological Modeling*”
- 2005 Graz (Austria): The **Ovide Arino Biomath. Summer School** on “*Control Theory with Modeling Applications to Physiology and Medicine*”

Also in 2000, the Board engaged a sub-committee, with *Marc Chaplain*, *Hans Heesterbeek* and *Philippe Tracqui* in order to establish a ***Student Travel Fund*** allowing PhD students and young post-docs to participate in Conferences and Workshops. Up to 10 travel awards were offered per year (see ECMTB #2, Society News, page 4).

Teaching Experience in our interdisciplinary field has been a central topic, at least in the beginning when Lee A. Segel presented his survey article about “*A course in mathematical modeling for biologists*” at the Weizman Institute (BMN No.6, 1991)

The series of ***European Initiatives*** were undertaken by the ESMTB within the 5th and 6th European Community Framework Programme:

ESF-Networks:

Immune Systems and Tumour Growth or *Dynamics of Complex Systems in Biosciences*

EU Networks of Excellence (MACSI):

European Working Group *Shape and Size in Biotechnology and Medicine*

Marie-Curie Research Training Networks:

Modeling, Mathematical Methods and Computer Simulation of Tumour Growth and Therapy

EUC Program: Information Society Technologies

Biology-inspired Techniques for Self-organization in Dynamical Networks

The most prominent activity of our Society is visible in the organization of the internationally well-known

European Conferences:

2nd European Conferences on “Mathematics Applied to Biology and Medicine”

December 15-18, 1993

at Ecole Normale Supérieure de Lyon, France

Organizers: *Pierre Auger & Jacques Demongeot*

Published in *J. Biol. Systems* 3,1-4 (1995)

3rd European Conferences on “Mathematics Applied to Biology and Medicine”

October 6-10, 1996

at University Heidelberg, Germany

Organizer: *Willi Jäger*

4th European and International Conference on “Theory & Mathematics in Biology & Medicine”

(combined with the annual meeting of SMB)

June 29 – July 3, 1999

at Frije Universiteit Amsterdam, The Netherlands

Organizer: *André de Roos*

5th European Conference on “Mathematical Modeling & Computing in Biology and Medicine”

July 2-6, 2002

at Università di Milano, Italy

Organizer: *Vincenzo Capasso*

Published in the MIRIAM Project Series,

ESCUAPIO Pub. Co., Bologna, Italy, 2003

Finally, for the **6th European Conference** in Dresden, Germany, see the report on **ECMTB 2005** on page 7. The Proceedings will be published in 5 Volumes at Birkhäuser-Verlag during this year.

The number of participants during these Conferences have steadily increased:

- More than 500 in Amsterdam (1999) including 144 ESMTB members
- There were almost 700 in Milano (2002) including 215 registered ESMTB members

Now at the Conference in Dresden (2005) the organizers counted **810** participants coming from all over the world (as the statistics on the other page shows) including **170 ESMTB** members as well as **180 SMB** members (notice that almost **50** of them have a joint SMB-ESMTB membership!). Thus, the Conference attracted world wide more than **500** scientists and students, not (yet!) belonging to one of our two Societies. Alone ESMTB has gained around 100 new members within the process of *fee-reduced registration* for the Dresden Conference, in particular from Germany and surrounding countries! See also the second membership statistics on the following page.

Notice that the **7th European Conference** to be organized by ESMTB in **2008** will take place at the University of Edinburgh, Scotland, and will be arranged by *Marc Chaplain*, who currently is also the president of SMB.

Activity Report 2003 – 2005 by the President

1. The Board

According to the Statutes the board has ten members. The term of each Board member is six years. The terms overlap such that every three years five Board members step down and five new members are elected. The last election was held in fall 2002 with five new Board members being elected [for the names see page 8; the editor]. During the period the Board has met five times: In Turku (21.2.2003), Bonn (19.9.2003), Utrecht (16.2.2004), Grenoble (7.3.2005) and in Dresden (19.7.2005). At the constituting meeting in Turku the President, Vice-President, Secretary and Treasurer were elected.

2. Members

On January 1, 2003, the Society had 110 paying members, while the present number is 295 (July 2005). [See the current statistics on the other page!]

3. Newsletter

The European Communications of Mathematical and Theoretical Biology has appeared twice [essentially once] per year and has been sent to all members.

4. Journal

From 1.1.2003 the Journal of Mathematical Biology (JMB) has been the official journal of the Society. According to the contract between Springer and ESMTB signed in 2002, the membership benefits included the electronic version of the journal. The society had to pay a sum of 10 000 EUR annually for this and other benefits. In

2003 the Board formally cancelled the agreement from 1.1.2004, because it felt the fee too high. However, the Board continued to negotiate about new terms with Springer. The outcome was positive: Even if a formal contract does not exist presently, JMB continues to be the official journal of ESMTB and the previous membership benefits are still valid. Recently, the ESMTB and Springer has agreed upon a new contract, which will be signed in a few weeks. The main points of the new contract are: Every paying member receives the paper copy of the journal. The Society pays 20 EUR per member for this and other services. The draft of the agreement is in the Appendix.

5. Conferences and Summer schools

ECMTB 2005 was organized in Dresden, Germany during July 18 - 22, 2005 as a joint meeting of ESMTB and the Society for Mathematical Biology (SMB). The conference had more than 800 registered participants, 1100 applied but 300 had to be rejected.

In connection with the conference an introductory course on some concepts in mathematical biology was arranged and it attracted 190 students. ECMTB 2005 was supported by the European Commission with 150 000 EUR.

The former President of ESMTB, Professor Vincenzo Capasso has celebrated his 60th birthday this year and a conference in his honour has been organized in Milan in September 2005. A special ESMTB workshop took place at the conference. ESMTB summer schools have been arranged [for details see page 18 above]. The Society

submitted a corresponding proposal to the European Commission for the next five years and it has supported conferences and meetings for young researchers.

6. Relations with other organizations

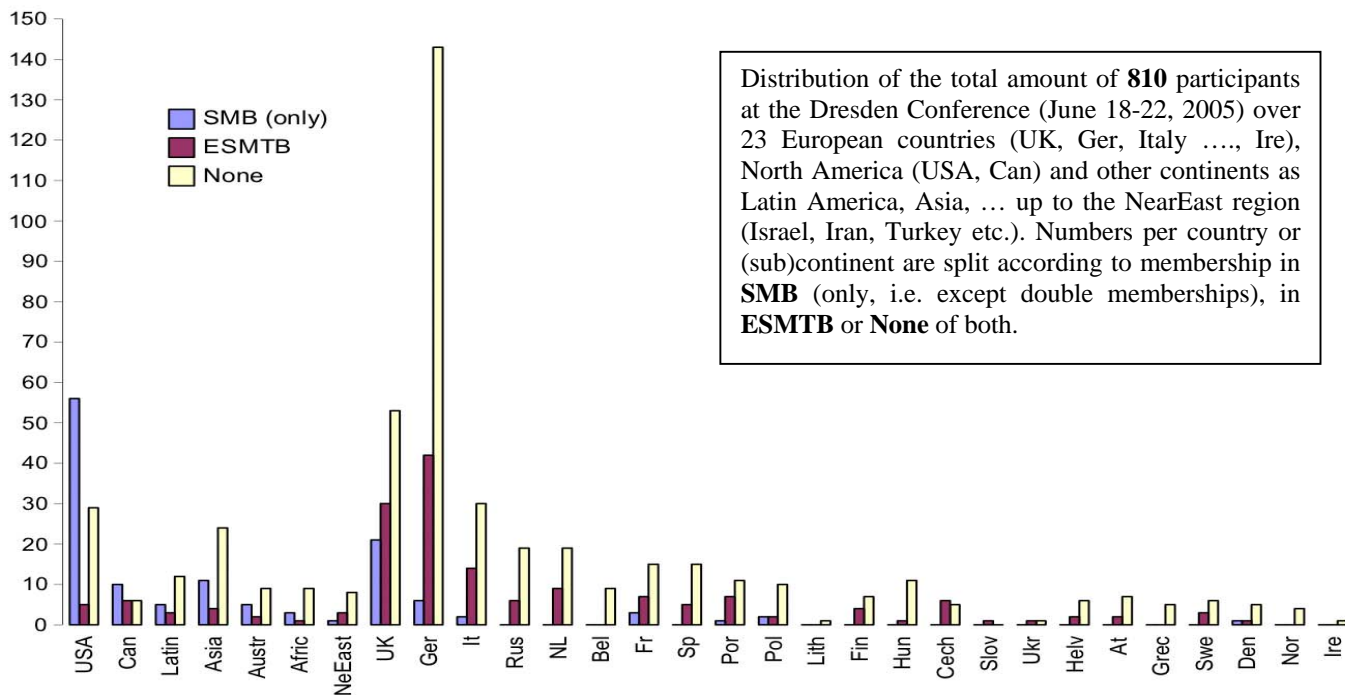
The Society is a member of the European Mathematical Society (EMS) and the International Council for Industrial and Applied Mathematics (ICIAM) and is represented in these organizations by its President. The next ICIAM congress will be held in Zurich in 2007 and Biomathematics will be represented by a plenary speaker. Andreas Deutsch, Luigi Preziosi and Wolfgang Alt will organize an embedded ESMTB meeting at the congress. ESMTB has promoted mathematical biology through advisory committees of NEST (New and Emerging

Science and Technology Programme of the European Commission). ESMTB has intensified its collaboration with SMB. Especially in connection with the organization of the ECMTB 2005 this cooperation has been very constructive.

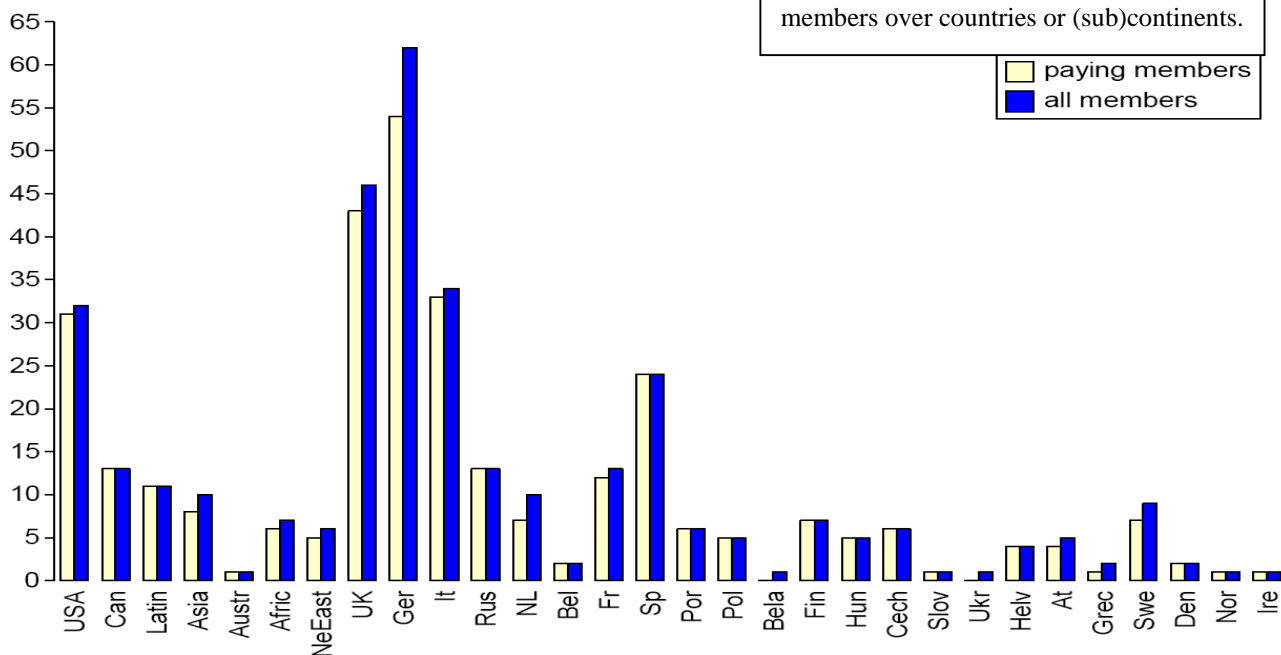
7. Honorary Doctorate to Prof. James Murray

The first president of ESMTB, Professor James Murray, received an Honorary Doctorate at the University of Milan on June 3, 2004. Both the President and the past President of ESMTB were present at the occasion.

*Mats Gyllenberg
President of ESMTB*



Distribution of the total amount of **810** participants at the Dresden Conference (June 18-22, 2005) over 23 European countries (UK, Ger, Italy, Ire), North America (USA, Can) and other continents as Latin America, Asia, ... up to the NearEast region (Israel, Iran, Turkey etc.). Numbers per country or (sub)continent are split according to membership in **SMB** (only, i.e. except double memberships), in **ESMTB** or **None** of both.



Distribution of the currently **339** ESMTB members over countries or (sub)continents.

PAST ACTIVITIES

25th seminar of the Société Francophone de Biologie Théorique (SFBT)

June 13-14, 2005. Saint-Flour, France

This year's annual seminar of the SFBT was organised by Professor *Janine Guespin-Michel* and her colleagues from the university of Rouen. The aim was to consider *signals and structures from the dynamic point of view*, which is different from that usually adopted by biologists. This excluded talking about receptor-signal-coupling or describing static structures. Instead, it required the use of models to describe and understand dynamic processes.

The seminar was organised with reference to the biological levels of organisation; dynamics of signals and responses at the cellular level (invited speakers, *Michel Thellier*, Rouen and the French academy of sciences, and *Ulrich Lütge*, Darmstadt) dynamics of cell and intercellular structures (invited speaker *Jean-Louis Martiel*, Grenoble), and dynamics of signal and structures at the integrated levels, from cells to organisms (invited speaker, *Georgia Barlowatz*, Evry). These questions were closely related to the models used to solve them and, in each session, several modelling methods were described, ranging from the qualitative methods of logical analysis or game theory, to quantitative methods based on differential equations. The multiscales-multiformalisms models were particularly important to couple different levels of organisations or different time scales of the signals and responses.

To study the dynamics of structures, the concept of hyperstructures was put forward, together with modelling and simulation of the kinetics of functioning-dependent hyperstructures containing two or three agents, or with modelling of the plasticity of cellular structures.

A question then arose, and a round table was held (chaired by Dr Alfredo Hernandez, Rennes) in order to address it: "*Are the different methods used to study the dynamics of signals and structures common to all levels of organisation or are some of them at least restricted to some of these levels?*"

Jeanine Guespin: janine.guespin@wanadoo.fr
<http://sfbt.lami.univ-evry.fr/en/index.htm#initial>

IV Summer School Focus on Mathematical Models in Life Science: Theory and Simulation

July 1-5, 2005, Dobbiaco (Bolzano, Italy)

Dobbiaco is a pretty mountain village situated in the North-East of Italy, rather close to the border with Austria. It was chosen five years ago as the venue of the first Summer School organized by the "Dipartimento di Scienze Matematiche", University of Trieste, Italy, and from then on it has never been changed. During these years, the goal of the Summer Schools was to offer to their participants (largely PhD students and young researchers coming from Italy, and partly from other countries) highly qualified lectures on various topics of pure and applied mathematics, ranging from Time Delay Equations and Control Theory to Numerical Treatment of Dynamical Systems and Numerical Methods for Evolution Equations. Since 2004 also the "Institut für Technische Mathematik, Geometrie und Bauinformatik" of the University of Innsbruck, Austria, has taken part in the organization of the Summer School.

This year's focus was on mathematical models in life science, from the point of view of both theory and simulation. Two sessions of alternate lectures were scheduled every day in the morning and in the afternoon, given by professor *Mimmo Iannelli* (University of Trento, Italy) and professor *Alfio Quarteroni* (École Polytechnique Fédérale de Lausanne, Switzerland, and Politecnico di Milano, Italy).

Professor Iannelli talked about the mathematical modeling of epidemics, presenting various models to describe the evolution and the diffusion of outbreaks among the individuals within a certain population, as well as of infections between two (or even more) different populations or different groups of individuals coming in contact with each other. Some of these models use ordinary differential equations to track the time evolution of macroscopic state variables of interest, such as the number of susceptible, infective and immune individuals; others rely instead on partial differential equations in order to take into account the so called "internal clock of the disease", that is the characteristic time scale of an

infection, which may differ dramatically from that of the demographic processes.

Professor Quarteroni addressed the mathematical modeling of the blood flow inside large vessels, with special emphasis on the interactions between the blood and the elastic wall of the arteries. The main feature of the approach to the problem was the use of the ALE (Arbitrary Lagrangian-Eulerian) formulation of the equations, which allows a simultaneous description of both the liquid and the solid component, in spite of the fact that they are classically considered under the conceptually different Eulerian and Lagrangian points of view respectively. Furthermore, the ALE formulation provides a powerful numerical tool toward the simulation of this complex system, being particularly suitable for the Finite Elements and Finite Volumes techniques.

*Andrea Tosin, Dipartimento di Matematica,
Politecnico di Torino
www.dmi.units.it/~torelli/scuola2005.html*

Graz Summer School: Control Theory with Modeling Applications to Physiology and Medicine

July 24 -August 5, 2005, Graz, Austria

The purpose of this summer school was to encourage research in mathematics with modeling applications to physiology and medicine. Courses were designed for Post Doctoral researchers, PhD students, and established scientists who wanted to gain insight into the area of modeling physiological systems. The organizer for this school was the Mathematics and Medical Physiology Group of the Institute for Mathematics and Scientific Computing at the University of Graz, Austria, with the organizing committee composed of Mostafa Bachar, Jerry Batzel, and Franz Kappel.

Courses included Delay Differential Equations and Stochastic Processes, Control Theory, Cardiovascular and Respiratory Control System Modeling, Experimental Design, Drug Therapy Design, Insulin-Glucose Control, and Electrophysiology and Heart Control. Eighteen teachers from the fields of mathematics, physiology, bioengineering, medical practice, and industry participated.

The organizing idea of this summer school was to have all students and teachers accommodated at the

same site to allow for interaction during and after each day of classes. The school venue, Schloss Seggau, was an ideal venue to satisfy this goal. Course notes available at the web page to students were published for each teacher and course. Further information can be found at the school web page. The web page address for the school is

www.uni-graz.at/biomath/summerschool/index.html

Jerry Batzel, Mostafa Bachar

Successes and Failures of Continuous Models for Discrete Systems

September 5-8, 2005, Bristol, UK

Bristol Centre for Applied Nonlinear Mathematics (BCANM) organized its 4th international workshop. This time the event was devoted to Successes and Failures of Continuous Models for Discrete Systems. As its name suggests, the goal of the workshop was to address a fundamental issue of the modelling of discrete systems, the bridge between discrete and continuum approximations. The leading questions were: *How (and when) could a continuum approximation be derived? And what can you learn from it?*

The workshop gathered people from different disciplines: traffic, granular media, and quantum mechanics, among many others, and comprised presentations of contributed and invited talks, as well as poster sessions. In each presentation the speaker stressed the connection between the discrete system and the continuous approach that he was introducing. Beyond the details of each model it soon became evident that the mathematical structure was usually the same regardless of the application. This, plus the nice and friendly atmosphere provided by the organizers, *Eddie Wilson, Alan Champneys and John Hogan*, in the beautiful dining room of the Engineers Houses motivated passionate and fruitful discussions during coffee breaks and lunches. Some highlights of the conference (or in other words, what I found particularly interesting) were the discussion during *Jim Keener's* lecture on the bistable equation, the "derivation" of the coarse-grained equation for vehicular traffic presented by *Dirk Helbing*, and the explanation for the mean field approach (continuum theory) for granular media provided by *Stefan Luding*.

*Fernando Peruani
TU-Dresden and*

*MPI for the Physics of Complex Systems, Germany
peruani@mpipks-dresden.mpg.de*

Workshop: Computational Life Sciences

October 12-15, 2005, Innsbruck, Austria

organized by

Alfredo Bellen, Alexander Ostermann and Mechthild Thalhammer

The workshop took place in Innsbruck at the Hotel Grauer Bär and was focused on models based on *differential equations* and *delay differential equations* (in the widest sense), arising from biological problems. In particular, it was concerned with the mathematical properties and the numerical aspects of such models.

The goal of the workshop was to bring together people working in the field as well as PhD students who want to start in this area. In this respect, it was a complement of a tutorial summer school on *Mathematical Models in Life Science: Theory and Simulation*, previously held in Dobbiaco/Toblach (Italy) on July 1-5, 2005 (see report above). Moreover, both, the Workshop and the School, were the fifth of a series started in 2000, jointly organized by the Institut für Mathematik of the University of Innsbruck and the Dipartimento di Matematica e Informatica of the University of Trieste, and partially supported by the European Union and the County Tyrol within the INTERREG IIIA project.

The program consisted in two plenary talks by *Alfio Quarteroni* (Ecole Polytechnique Fédérale de Lausanne) and by submitted talks. The first day, in the morning, after an opening welcome by the organizers, the first lecture by Quarteroni concerned "*Some recent advances on the mathematical model of cardiovascular flows*". Then a number of talks followed, dealing with arterial flow modeling and other biomedical problems. The afternoon was devoted to numerical methods for delayed equations with applications to population problems, and was concluded by *Hermann Brunner* (Memorial University of Newfoundland), with a lecture on "*High-order collocation methods for weakly singular Volterra functional equations with nonlinear delays*".

The second day of the Workshop started with a second plenary lecture by Quarteroni on "*Modeling and simulations in technology, environment and sport*". Contributed talks followed, dealing with modeling problems in different fields such as skiing, tourism, electrical activity of the heart, and molecular systems. A nice excursion in the afternoon allowed to enjoy the natural beauties of the region surrounding Innsbruck and to taste local products.

Finally, the Workshop concluded in the morning of Saturday, October 15, with talks on numerical methods and specific problems in insect flight, radiobiology, cellular networks.

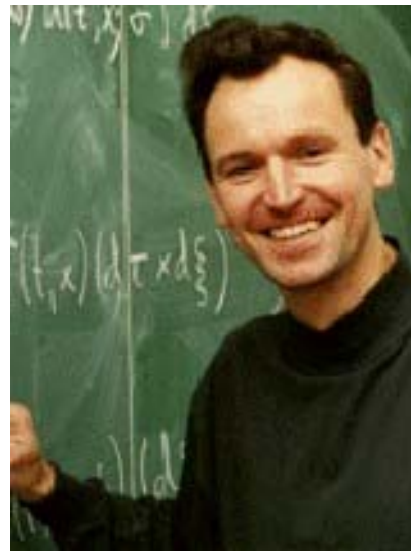
Further information on the Workshop can be found on the site:

<http://techmath.uibk.ac.at/numbau/alex/events/conference2005.html>

Workshop on Mathematical Biology

December 19, Helsinki, Finland

For celebration of the 50th birthday of Mats Gyllenberg.



In response to an invitation by the *Biomathematics Group* in the Department of Mathematics and Statistics at the University of Helsinki, on 19 December 2005 a handful of visitors and many locals converged for a "Workshop on Mathematical Biology" - a rapid fire of talks from as diverse fields as connecting molecular data to metapopulation evolution (FRS Ilkka Hanski), the functional response of predators (Hans Metz), Bayesian classification algorithms (Timo Koski), nonlinearly perturbed stochastic systems (Dmitrii Silvestrov), the robustness of species coexistence (Géza Meszéna), modelling respiratory airflow to aid the treatment of sleep apnea (Tero Aittokallio), the dynamics of general competitive systems (Yi Wang), and adaptive dynamic models of evolution (Kalle Parvinen, Eva Kisdi).

It was exciting to be able to peek into so many facets of mathematical biology on a single day, but also quite an achievement simply to follow. Our outgoing president Mats Gyllenberg, however, pursues active research in each field! His closest collaborators gathered for this workshop to congratulate his 50th anniversary. Mats tried all the way to maintain a low profile. But he was strongly outnumbered by his friends, who insisted on celebrating him with the best

they could offer: The fruits of decades of joint work, and the fruits of the scientific school Mats has built up since he took a professor's chair in Finland. We wish him many more years of brilliance - and, for ourselves, many more years of Mats.

Eva Kisdi

ANNOUNCEMENTS

The Marie Curie Early Stage Training Network MMBNOTT

hosted by the *Centre for Mathematical Medicine, School of Mathematical Sciences, University of Nottingham, UK*

offers vacancies for ten 36-month full-time PhD Fellowships for early-stage researchers to undertake cross-disciplinary training in the application of mathematics and statistics to topics in medicine and biology. Fellowships are available *from 1 September 2006 and 1 June 2007* and are open to non-UK nationals.

For full details of the training programme, available research projects, eligibility requirements and application procedures please see

www.maths.nottingham.ac.uk/mmbnott



6th Framework Programme: Marie Curie Conferences and Training Courses – Series of Events

The European Commission has launched its last call for the current MRC programme with a budget of 12,25 Million Euro. Applications for projects can be sent in until *May 17, 2006*.

Supported will be the organization of a series of courses or high-ranked conferences with special training value, as well as the participation of scientists in these events. The EU money shall mainly be given to young scientist (with less than four years research experience after graduation) but also some senior researchers (4-10 years after graduation).

Applications can be made by institutions as Universities or Science Organizations. The planned events can have the character of training courses or conferences or combination of both. One project should consist of at least four events, each of which should not last longer than 4 weeks and take place in a EU or associated country. Number of participants per event should not exceed 150 and a certain distribution between several nationalities should be regarded.

More information under

[http://fp6.cordis.lu/
index.cfm?fuseaction=UserSite.FP6CallsPage](http://fp6.cordis.lu/index.cfm?fuseaction=UserSite.FP6CallsPage)

EMS Summer School 2006: Mathematical Models of the Heart

5-12 May 2006
Svalbard, Norway

Simula Research Laboratory is organizing a summer school in Mathematical Models of the Heart. The event will take place at the arctic island Svalbard.

Glenn Terje Lines <glennli@simula.no>

For further information visit:

<http://home.simula.no/ems2006>

ISNB 2006 3rd International Symposium on Networks in Bioinformatics

May 29 – 31, 2006
Science Park Amsterdam
University of Amsterdam, the Netherlands

The understanding of biological networks such as metabolic and signal transduction pathways is crucial for understanding molecular and cellular processes in the organism or system under study. This field is subject of lively research and both experimental and computational approaches are used to elucidate the biological networks. The bioinformatics of biological networks involves a broad range of research and approaches. Research includes the identification of regulatory elements in DNA, genome context analysis, modeling and simulation of pathways, reconstruction of pathways from experimental data, visualization of pathways, and the representation of pathways in database, graphs and markup languages. To accelerate our understanding of the (dynamics) of biological networks it is seems imperative that these efforts are combined and subsequently have to be applied to real biological problems. It is clear that this field of research can only advance when bioinformaticians and experimental biologists (for example working on model organisms such as *Drosophila* and organisms with a relatively simple and basal body plan such as sponges and scleractinian corals) work closely together. During this three day symposium we will bring together researchers from different disciplines (biology, mathematics and computational sciences) working on different aspects of networks to exchange ideas and approaches.

The first day of the symposium is scheduled for introductory lectures. During the first day of the symposium we have scheduled six introductory lectures, which aim at introducing specific subjects to the audience. The lectures are open for all

participants and will provide background knowledge for the scientific presentations.

For more program and registration details

<http://isnb.amc.uva.nl/>

This symposium is supported by the Netherlands Bioinformatics Centre (NBIC; www.nbic.nl), The Academic Medical Center (AMC; www.amc.nl), The Netherlands Organisation for Scientific Research (NWO; www.nwo.nl), IOP Genomics (www.senternovem.nl/iopgenomics/)

Gordon Research Conference on Theoretical Biology and Biomathematics

June 4-9, 2006
Tilton, New Hampshire, USA

Paul C. Bressloff (Chair)

Stephen Coombes (Vice-chair)

The GRC in theoretical biology and biomathematics has a long tradition in covering a wide range of topics at the forefront of biology in an informal and friendly atmosphere. We encourage anyone interested in quantitative approaches to biology to attend the next meeting, which will have sessions in the following areas:

Noise in biological systems (Chair: Andre Longtin)
Biological polymers and membranes (Chair: Alex Levine)

Biological networks (Chair: Reka Albert)

Social insects (Chair: Fred Adler)

Ecological Stoichiometry (Chair: Roger Nisbet)

Calcium dynamics (Chair: James Sneyd)

Synaptic plasticity (Chair: Jonathan Rubin)

Cancer (Chair: Helen Byrne)

Lee Segel (Chair: Rob de Boer)

More details on the GRC homepage

www.grc.uri.edu/programs/2006/theobio.htm

NETTAB 2006

Distributed Applications, Web Services, Tools and GRID Infrastructures for Bioinformatics

July 3-6, 2006

*Polaris Sardinian Science and Technology Park,
Pula, Sardinia, Italy*

This is the sixth in a series of workshops that intend to introduce and discuss some of the most innovative and promising network tools and applications in bioinformatics.

You can have a look at the presentation of the NETTAB 2006 workshop given by Giuliano Armano at the end of the NETTAB 2005 workshop:

<http://www.nettab.org/2005/docs/NETTAB2005>

_ ArmanoRivised.pdf

STAMM 2006

International Symposium on Trends in Applications of Mathematics to Mechanics

July 10-14, 2006

University of Technology, Vienna

Scope:

The history of both mechanics and mathematics shows much evidence of the beneficial influence of each of these disciplines on the other. Mechanics is understood here in the broad sense of the word, including any relevant physical phenomena. It is the purpose of this symposium to promote the interaction of mathematics and mechanics by presentations and discussions of research at the interface of the two disciplines. The symposium is the fifteenth in a series of meetings organized under the auspices of the International Society for the Interaction of Mechanics and Mathematics (ISIMM).

Topics are e.g.:

- Biological/smart materials and systems
- Instabilities in non-linear systems
- Asymptotic methods applied to solids, fluids, and fluids-solids interactions

Any scientist interested in the topics is free to attend. Scientists with specialization in theoretical and computational mechanics and in mathematics applied to mechanics are encouraged to submit an abstract and give a presentation or exhibit a poster.

<http://stamm06.mechanik.tuwien.ac.at>

Fifteenth Annual Computational Neuroscience Meeting CNS*2006

July 16 - July 20, 2006

Edinburgh, UK

CNS*2006 will be held in Edinburgh, UK from Sunday, July 16 to Thursday, July 20, 2006. The main meeting will be July 16-18 followed by two days of workshops on July 19 and 20. The meeting will take place in the heart of medieval 'Old Town' close to plenty of arts and entertainment. Edinburgh can be reached from Edinburgh or Glasgow International Airports.

www.cnsorg.org

ESOF 2006

2nd European Open Forum

July 15-19, 2006

Deutsches Museum, München, Germany

ESOF2006 is the second pan-European General Science Meeting to be held in Munich at the Forum am Deutschen Museum and the Deutsches Museum from July 15th to 19th, 2006. As the name indicates, Euroscience Open Forum was brought to life by [Euroscience](http://www.euroscience.org), a grass-roots scientific organisation founded in 1997 with over 2000 members in 40 countries.

During this important science festival, current issues related to scientific research are presented through exhibitions, symposia, talk shows and cultural events.

www.esof2006.org

SMB / SIAM Life Sciences annual meeting

July 31-Aug 3, 2006

*Brownstone Hotel & Conference Center,
Raleigh, North Carolina, USA*

Themes:

Ecology, Environmental and Evolutionary Biology
Genomics
Imaging
Neuroscience
Structural Biology
Modeling Diseases
Biomathematics in Industry
Biology
Toxicology
Stochastic effects in Biology
Cell Motility

Further information about the conference at:

www.smb.org/meetings/index.shtml

International Congress of Mathematicians

August 22-30, 2006

Madrid, Spain

(Sect. 18) Applications of Mathematics in the Sciences

- Mathematics applied to the physical sciences, life sciences, social sciences, and technology.
- Mathematics in interdisciplinary research.
- The interplay of mathematical modeling and mathematical analysis and its impact on the understanding of scientific phenomena.

Date for submission of abstracts: March 30, 2006

For more details see www.icm2006.org

CIBB 2006

Third International Meeting on Computational Intelligence Methods for Bioinformatics and Biostatistics

August 29-31, 2006

Genova, Italy

Meeting Website: <http://cibb06.disi.unige.it/>

Graduate Program for Computational Biology and Scientific Computing

The International Max Planck Research School for Computational Biology and Scientific Computing, a joint graduate program of the Free University of Berlin and the Max Planck Institute for Molecular Genetics, Berlin, invites applications for a PhD program. The PhD program is designed as a 3-year program starting in autumn 2006 and is open for international students.

The closing date for applications is **February 28, 2006**.

A poster can be downloaded from www.imprs-cbsc.mpg.de/download/poster2006.pdf

For further details and the application procedure, please visit www.imprs-cbsc.mpg.de

Lee Segel Memorial Fund

As many of you will no doubt be aware, the Department of Mathematics and Computer Science at the Weizmann Institute has set up the Lee Segel Memorial Fund to grant research prizes to PhD students and post-doctoral fellows in Theoretical Biology.

Any individual may contribute to this fund to Professor Zvi Artstein, Dean of Mathematics and Computer Science at the Weizmann Institute: www.wisdom.weizmann.ac.il/~zvika/

ICIAM 2007

6th International Congress on Industrial and Applied Mathematics

July 16-20, 2007

Zürich, Switzerland

Congress Website: www.iciam07.ch/invitation

We welcome not only colleagues in the field from academia but also those persons, especially from industry and the sciences, who make applications of mathematics in their work. We wish also to extend this welcome to those who enjoy having contact with mathematicians as well as to those who are generally interested in finding out what is currently happening in this exciting field.

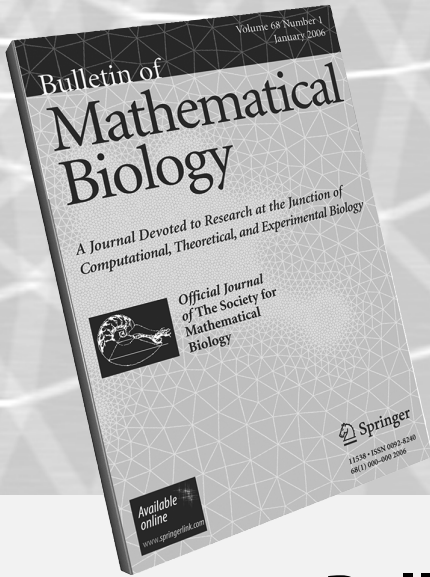
The congress is held under the auspices of the International Council for Industrial and Applied Mathematics, [ICIAM](http://www.iciam.ch), an international body consisting of approximately 25 professional applied mathematical societies and mathematical societies with a strong membership of applied mathematicians [including *ESMTB*; added by editor].

There will be 27 invited speakers selected by the [Scientific Program Committee](http://www.iciam.ch/scientific-program-committee). The papers by the invited speakers will be published by the [EMS-ph](http://www.ems-ph.org), the publishing house of the European Mathematical Society, [EMS](http://www.emis.de). We aim for a scientific program with more than 400 minisymposia and sessions of contributed talks. We expect more than 2000 participants and we hope that half of the participants will contribute presentations.

At ICIAM 2003 the new feature of *Embedded Meetings* was introduced. We believe that these embedded meetings will make the overall program of the ICIAM 2007 Congress even richer.

Rolf Jeltsch
Chief Organizer

Our Society ESMTB plans to organize such an embedded meeting in ICIAM 2007 with the general topic "*Computational Cell Biology*". Tentative organizers will be *Wolfgang Alt*, *Andreas Deutsch* and *Luigi Preziosi*. Any suggestion may be forwarded to one of them (see the e-mail addresses on page 8).



New from Springer in 2006

Bulletin of Mathematical Biology

A Journal Devoted to Research at the Junction of Computational,
Theoretical and Experimental Biology

Official Journal of **The Society for Mathematical Biology**

Editor: **Philip K. Maini**, Centre for Mathematical Biology, Oxford, UK

Associate Editors: R.M. Anderson, J.-P. Changeux, P. Hogeweg, S.A. Levin, H. Meinhardt,
E. Mizraji, A. Mogilner, J.D. Murray, C. Neuhauser, G.M. Odell, F. Oosawa, G. Oster,
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