Mathematical Biology Newsletter

Society for Mathematical Biology | Volume 3, Number 3 | June, 1989

SMB MEETINGS

OXFORD MEETING

The Society is co-sponsoring, in conjunction with the Institute for Mathematics and Applications and The Institute of Biology, a conference on The Mathematical Theory of the Dynamics of Biological Systems, at the University of Oxford, July 4–7, 1989.

On Tuesday, July 4th, the program consists of a workshop comprised of four sessions:

- **J. D. Murray**, Modelling the Development of Pattern
- **J. Gani**, Stochastic Methods for Epidemics
- **S. Levin**, Models for Ecosystems
- **R. M. May**, Chaos Models

On Wednesday, July 5th,a special program will commemorate the 50th anniversary of the *Bulletin of Mathematical Biology* and the 40th anniversary of Pergamon Press. The event, supported jointly by SMB and Pergamon Press will consist of presentations by seven contemporary experts, each reviewing the classic papers in their areas and discussing the ramifications for present and future research. The program, entitled *Classics of Theoretical Biology*, has been organized by **Marc Mangel**. The speakers and the authors of the classic papers are:

- **J. D. Murray** on Development (Turing)
- **J. M. Rinzel** on Neurophysiology (Hodgkin and Huxley)
- **J. D. Cowan** on Neurophysiology (McCulloch and Pitts)
- **W. Provine** on Population Genetics (Fisher, Wright and Haldane)
- **R. M. Anderson** on Epidemiology (Kermack and McKendrick)
- **R. M. May** on Ecology (Hutchinson, Lindemann and Skellam)
- **W. J. Reed** on Bioeconomics (Gordon, Schaefer and Hotelling)

S. A. Levin will preside. The proceedings of Classics Day will be published as a special issue of the *Bulletin of Mathematical Biology* and as a separate volume by Pergamon Press.

Thursday and Friday, July 6th and 7th, the program consists of invited and contributed research papers. The invited speakers for the Research Papers days include:

- **C. Castillo-Chavez**
- **J. Demongeot**
- **K. Dietz**
- **D. Ludwig**
- **H. C. J. Godfray**
- **J. H. Harwood**
- **J. W. Horwood**
- **G. A. Parker**
- **A. Pomiankowski**
- **W. J. Reed**
- **K. Stokes.**

TORONTO MEETING

The 1989 Annual Meeting of the Society will be held in conjunction with the American Institute of Biological Sciences (AIBS) Meeting in Toronto during the week of August 6–10. The *Symposium on Some Mathematical Questions in Biology* (Monday, August 7) will feature the topic *Sex Allocation and Sex Change: Experiments and Models*. The Symposium is co-sponsored by the American Mathematical Society (AMS), the Society for Industrial and Applied Mathematics (SIAM), and the Society for Mathematical Biology (SMB). **Marc Mangel**, Department of Zoology, University of California, Davis, is the organizer and will be presiding.

Symposium on Some Mathematical Questions in Biology:
Sex Allocation and Sex Change: Experiments and Models.
Monday, August 7, 1989

9:00 a.m. **Paulette Bierzychudek**, Department of Biology, Pomona College, Claremont. *The adaptive advantage of sexual reproduction in plants.*

10:00 a.m. **Maureen Stanton**, Department of Botany, University of California, Davis. *Natural selection and allocation to sexual reproduction in flowering plants.*

11:00 a.m. **Sabin Lessard**, Department of Mathematics, University of Montreal. *Population genetics of sex allocation.*

2:00 p.m. **Donna Fernandes**, University of Liverpool. *Sex change in terrestrial slugs: Social and ecological factors.*

3:00 p.m. **Peter Petraitis**, Department of Biology, University of Pennsylvania, Philadelphia. *Dynamics of sex change in Capitellid polychaetes.*

4:00 p.m. **Chris Petersen**, Friday Harbor Laboratories, Washington, and University of Toronto. *Sex allocation in simultaneous hermaphrodites.*

5:00 p.m. **Curt Lively**, Rutgers University, New Brunswick. *Male allocation and the cost of sex under local family competition.*

The **Board of Directors** will meet at noon on Monday, August 7. The **SMB Annual Business Meeting and Mixer** will also be held on Monday, August 7, at 6 p.m. Locations of all the above will appear in the Program.

1990 MEETING

The 1990 AMS-SIAM-SMB Symposium on Some Mathematical Questions in Biology is being organized by Jack D. Cowan of the University of Chicago. The topic of the Symposium will be *Neural Nets*. Additional information will follow in the next newsletter.

OTHER MEETINGS

Mathematics at the Service of Man. (July 4–7, 1989, at the Barcelona Science Museum, Barcelona, Spain.) The purpose of the meeting is to encourage interdisciplinary communication between researchers in Mathematics at the Service of Man. This is the third conference in a series, the first of which was held in 1977 and the second in 1982. The conference will focus on three principal topics: simulation, artificial intelligence, and decision making. Biological issues are expected to play a prominent role. The chairman of the conference is David Cardus, Baylor College of Medicine. For additional information contact: 3rd W.C.M.S.M., Ultramar Express, S.A., Rambla 107, E-08002 Barcelona, Spain. Telephone (in Spain): 93-3011212; (from abroad) 34-3-3011212. Telex 51569. Telefax 3024886.

Latin American Biomathematicians Sponsor International Congress. The Fourth International Congress on Biomathematics will be held in Lima, Peru, from September 18 to 23, 1989. The Congress is organized by the Latin American Association of Biomathematics (ALAB). The meeting will be comprised of lectures of 60 to 90 minutes and shorter communications (10 to 20 minutes). Registration is $20 for ALAB members and $30 for nonmembers. Publication of the proceedings is planned. The organizers wish to draw attention to two prizes to be awarded at the Congress. One will be for the best paper presented, and another for the best work done by researchers during the last two years. The latter is being presented in honor of Nicolas Rashevsky and bears his name. Further information may be obtained from Emilio Isla Cruzado (Chinchon 185, Lima 27, Peru) or Jorge Garate Salazar (Norberto Maro 2670, Urb. Los Cipresses, Lima 1, Peru.)

Mathematical Models in Experimental Nutrition. The Clinical Nutrition Research Unit and the Division of Continuing Medical Education, Vanderbilt University Medical Center, are sponsoring *Mathematical Models in Experimental Nutrition: Advances in Amino Acid and Carbohydrate Metabolism*, October 15–18, 1989, Park Vista Hotel, Gatlinburg, Tennessee. This conference will present recent advances in research on the metabolism of amino acids and carbohydrates, and on state-of-the-art methods of mathematical modeling.

Several of the listed faculty of the symposium are SMB members: C. Cobelli, D. Foster, J. Jacquez, K. Kootsey, D. Mikulecky, and K. Norwich. For further information, contact Marsha Bain, CME Course Coordinator, Vanderbilt Division of Continuing Medical Education, CCC-5326, MCN, Nashville, TN 37232-2337. Phone 615/322-4030.

International Conference on Differential Equations and Applications to Biology and Population Dynamics. January 10–13, 1990, Claremont, California. This conference is to honor **Kenneth Cooke** on the occasion of his 65th birthday and to celebrate his extraordinarily fruitful scientific career and his numerous contributions to differential equations and to their applications to biology and population dynamics. Survey lectures will be given by Kenneth Cooke, Karl Hadeler, Jack Hale, Mimmo Iannelli, Simon Levin, Jean Mawhin, George Sell and Paul Waltman. Further information may be obtained from Stavros Busenberg, Harvey Mudd College, Claremont, CA 91711.

International Neural Network Society Second Annual Meeting. The SMB co-sponsored the first annual meeting of the International Neural Network Society (INNS) in 1988, and had agreed to co-sponsor the second annual meeting. The meeting was originally scheduled for September 1989, but now will be held January 15–19, 1990, as a joint IEEE/INNS meeting at the Omni Shoreham Hotel, Washington, D.C. Additional information will be forthcoming in the next Newsletter.

International Conferences in Prague in 1990.
The J. E. Purkyne Association of Czechoslovak Medical Societies under the auspices of the International Medical Information Association is organizing an International Conference, *Medical Informatics and Medical Education* together with a satellite International Symposium, *Mathematical Approaches to Brain Functioning Diagnostics*, to be held in the Prague Palace of Culture, September 3–7, 1990. Ivan Dvorak is the general secretary of these meetings. The SMB will be co-sponsoring *Mathematical Approaches to Brain Functioning Diagnostics*. A brief description of the main topics of each follows:

MEDICAL INFORMATICS AND MEDICAL EDUCATION

- The role of computers and new information media in medical education.
- Medical informatics curriculum in pregraduate medical education.
- Teaching medical informatics to clinicians and medical practitioners.
- The use of new information technologies and methodologies in educational processes in medicine.
- Educational aspects of medical expert systems.
- Research in medical informatics and medical education.

For further information please contact: Dr. Jana Zvárová, CSc., Association of Czechoslovak Medical Societies, J. E. Purkyne, IMIA Conference, P. O. Box 88, Prague 2, CS - 12026, Czechoslovakia.

MATHEMATICAL APPROACHES TO BRAIN FUNCTIONING DIAGNOSTICS

- General mathematical models of brain functioning.
- Event relocated brain electrical activity.
- Random process models of brain electrical activity.
- Dynamical system approach to brain functioning analysis.
- Modeling of brain cognitive information processing.
- Brain activity mapping.
- Artificial intelligence approaches to brain functioning analysis.
- Mathematical modelling of humoral and pharmacological brain functioning control.

Limited financial support for participants mostly from developing countries is under negotiation.

For further information, please contact: Dr. Ivan Dvorák, CSc., Association of Czechoslovak Medical Societies, J. E. Purkyne, IBRO Symposium, P. O. Box 88, Prague 2, CS 12026 Czechoslovakia.

NEURONET '90. Also in Prague, and immediately following the above two meetings, September 8–12, 1990, an International Symposium on Neural Networks and Neural Computing will be held. Papers are expected to cover the following topics:

- neurodynamics
- neurobiology: experiments and models
- self-organization
- adaptive strategies
- networks architectures
- optimization
- vision and image processing
- knowledge data processing
- signal processing
- electronic and optical implementation
- robotics and control
- applications

Further information may be obtained by writing to NEURONET '90, Institute of Computer Sciences, Czechoslovak Academy of Sciences, 182 07 Prague, P. O. Box 5, Czechoslovakia. Telex: SAPO 122162. Telephone: + 42 84 66 69, [84 57 20].

European Meeting on Mathematical Biology. A European Meeting on Mathematical Biology, which will be co-sponsored by the SMB, is scheduled for December, 1990, Grenoble, France. It is being organized under the chairmanship of Vincenzo Capasso at the invitation of Simon Levin. The Organizing Committee consists of J. Murray (UK), W. Jager (F.R. Germany), L. Segel (Israel), J. Demongeot (France), O. Diekmann (The Netherlands), J. Metz (The Netherlands), A. Goldbeter (Belgium), W. Keiding (Denmark), and S. Levin (U.S.A.). For further information contact Vincenzo Capasso, Dipartimento di Matematica, Via G. Fortunato, Campus Universitario, 70125 BARI, ITALY.

Membership Recruitment

Using various mailing lists, the Society has recently sent information about membership to potential members. Our past experience suggests that the best targets for promotional literature are individuals who have been identified by present members of the Society. The Membership Committee is now preparing for another mailing. Members are encouraged to send the names and addresses of potential members to the Chairman of the Membership Committee:

P. E. Rapp
Department of Physiology and Biochemistry
Medical College of Pennsylvania
3300 Henry Avenue
Philadelphia, PA 19129

P.S. For your hands-on convenience we are enclosing an application form and information sheet for potential members who might be in the office next door to yours. You are welcome to make additional copies for someone down the hall.

Literary Events

Computer Simulations of Self-organization in Biological Systems, Narendra S. Goel and Richard L. Thompson, Croom Melm, Australia, 1988, 353 pp. Describes methods of computer modeling, specific models of self-organization and evolution, including in particular models of molecular self-organization.

Alternate Realities: Mathematical Models of Nature and Man, John L. Casti, Wiley-Interscience, 1989, 493 pp. Reviews a variety of new mathematical ideas and techniques pertinent to biological systems.

Dynamic Modeling in Behavioral Ecology, Marc Mangel and Colin W. Clark. Princeton, 1988, 380 pp. Describes techniques for modeling of behavior, based on evolutionary principles and stochastic dynamic programming.

Population Harvesting, Wayne M. Getz and Robert G. Haight, Princeton, 1989, 352 pp. Presents a general framework for modeling age- or stage-structured populations that reproduce seasonally.

Mathematical Biology, J. D. Murray, Springer, 1989, 768 pp. A comprehensive textbook, covering a wide range of topics.

Perspectives in Ecological Theory, Jonathan Roughgarden, Robert May, and Simon Levin, Princeton, 1989, 425 pp. Overviews, accomplishments and new directions in ecological theory.

Applied Mathematical Ecology, Simon Levin, Thomas Hallam, and Louis Gross, Springer, 1989, aprox. 500 pp. A sequel to *Mathematical Ecology*, develops applications to ecotoxicology, resource management, and epidemiology.

Mathematical Evolutionary Theory, Marcus Feldman, Princeton, 1989, 400 pp. An up-to-date survey of current currents in mathematical evolutionary theory.

NSF ANNOUNCEMENT

One of the most notable and highly publicized awards made by the NSF in the area of mathematical biology was the recent five-year, $2 million grant awarded to the University of California at Berkeley. The project, under the direction of Nicholas R. Cozzarelli, a molecular biologist at Berkeley, brings together four biologists and six mathematicians, who will be using knot theory to achieve a better understanding of DNA structure.

As a result of the publicity accompanying the announcement of this award, word spread that a new program in Mathematical Molecular Biology had been established at the NSF. To set the record straight, the NSF issued the following announcement in January, 1989:

JANUARY 9, 1989
NOTICE REGARDING NSF SUPPORT
OF MATHEMATICAL BIOLOGY

It has been reported or at least rumored that a new program on Mathematical Molecular Biology now exists at NSF. This, unfortunately, is not the case.

During the fall of 1988 a large project was funded to undertake a theoretical study of DNA and other large molecules. The U. C. Berkeley-based project is jointly funded by the Division of Mathematical Sciences and the Division of Molecular Biosciences. A more detailed description can be found in NSF news release 88-69 or in an article appearing in the January, 1989 issue of *Notices of the American Mathematical Society*, pp 27-30.

The Division of Mathematical Sciences recognizes that there are opportunities for genuine interactions between mathematicians and biologists which will enrich and further both disciplines. Plans are underway to seek an increase in the funding of this interaction. For a general statement on this issue please see the November, 1988 issue of *Notices of the American Mathematical Society*, pp 1358-1359. At present Mathematical Biology is funded through the various programs in the Directorate of Behavioral and Biological Sciences and Division of Mathematical Sciences.

Toward NSF Funding of Mathematical Biology

Historically, as we are all aware, proposals for funding for interdisciplinary research often fall into the cracks between disciplines. As the research activity in mathematical biology has mushroomed over the past few years, there has become an increased awareness of this problem. In 1987, Andrzej Manitius, who was then the Co-Program Director for Applied Mathematics at the NSF, developed an initiative, *Innovative Interactions Between Mathematics and Biology*, designed as "a joint initiative between the Division of Mathematical Sciences (DMS) and several divisions in the Directorate of Biological, Behavioral and Neural Sciences (BBS) to fund innovative cross-disciplinary research involving mathematicians and biologists." Manitius pointed out that, "The National Science Foundation is in a unique position to foster increased collaboration between mathematicians and biologists because it is the only federal agency that provides broadly based support for both sciences."

At the March 1987 SMB Board of Directors Meeting, Manitius' proposal was discussed and enthusiastically endorsed. Following the meeting, Simon Levin wrote to Manitius to express enthusiasm and support for the initiative and to offer the Society's help. As a follow-up, Levin prepared and sent to the NSF a proposal for a workshop to identify active and emerging areas in mathematical biology, with a view toward identifying areas of greatest promise. The proposal, *Mathematics and Biology: The Interface. Challenges and Opportunities*, has been approved and an initial meeting of the Steering Committee will be held in Washington D.C. in October, to plan a broader workshop for 1990.

HONORS

1989 MacArthur Lecture

Simon Levin, recipient of the Ecological Society of America MacArthur Award for 1988, will give the MacArthur Address at the annual meeting of the Ecological Society at the AIBS Meeting in Toronto on Tuesday, August 8, at 4:30 p.m. (see program for location).

Landahl Travel Awards for Students

The Landahl Scholarship Endowment Committee presented travel awards of $500.00 each to **Fred Adler** (Cornell), **Beate Nuernberger** (Cornell) and **Jorge X. Velasco Hernandez** (Harvey Mudd), to help support their travel to the IMA/SMB Meeting in Oxford. Watch for the call for applications for travel awards for 1990 meetings.

MATHEMATICAL/COMPUTATION/THEORETICAL NEUROSCIENCE RESEARCH AWARDS

The National Institute of Mental Health (NIMH) and the National Institute of Neurological and Communicative Disorders and Stroke (NINCDS) invite research and research training grant applications (individual and institutional) for studies using mathematical, computational, or theoretical approaches to understanding the fundamental mechanisms underlying behavior and for research training in these approaches. The purpose of this program is to place additional emphasis on the use of quantitative tools in solving basic problems in the neurosciences. Applicants may request support for a period of up to 5 years. NIMH will accept applications in response to this announcement under the usual Public Health Service receipt dates for new applications. Potential applicants interested in obtaining further information, please contact one of the following:

Richard Nakamura, Ph.D.
Chief, Behavioral Program
Neurosciences Research Branch
Division of Basic Sciences
National Institute of Mental Health
Parklawn Building, Room 11105
5600 Fishers Lane
Rockville, MD 20857
Telephone: (301) 443-1504, or

Herbert Lansdell, Ph.D.
Head, Neuropsychology
Division of Fundamental Neurosciences
National Institute of Neurological and
Communicative Disorders and Stroke
Federal Building, Room 916
Bethesda, MD 20892
Telephone: (301) 496-5745

Michael Volkenstein, Honorary SMB Member, Tours U.S.

(Interview by Michael Conrad)

Nobel Laureates Ilya Prigogine and Paul Flory both wrote letters supporting Michael Volkenstein's election as an honorary member of the Society for Mathematical Biology. It wasn't too hard for them. Both also nominated Volkenstein for the Nobel award.

I first met Professor Volkenstein in the dining room of the Soviet Academy of Sciences in Moscow on a darkening midwinter afternoon. It was early in 1980, right after the Soviet invasion of Afghanistan. Not a propitious moment for U.S.–Soviet scientific contacts. But without hesitation Volkenstein invited me to visit him. I did so, and soon we were collaborating on the theme of molecular evolution from the point of view of information theory. After about half a year we had completed a joint paper. During that time I came to know not just a perceptive and reflective scientist, but a man of encyclopedic breadth, a master of many languages, and a talented painter.

Volkenstein's remarkable knowledge of the flora and fauna of the world and of its human history was all the more astonishing since one of the main facts about his life is that before *Perestroika* he had never succeeded to travel to any of the nonsocialist countries, despite countless invitations. It was thus with some feeling of mild electric current running through my acupunctural system (if any) that I found myself sitting with him beside a pool in sunny La Jolla. It was of course not a chance meeting. I had been one of a group of scientists working on this invitation for some time. But the whole circumstance defied boundary conditions that had circumscribed our relations for a decade.

First, some facts. Volkenstein finished his studies at the Physical Department of Moscow State University. Until the war he worked at Karpov's Physical–Chemical Institute, in the region of molecular spectroscopy. His most important work at this time concerned the theory of intensities for vibrational spectra, including contributions to Raman spectroscopy. After the war he was invited to the Institute for High Molecular Compounds in Leningrad. Here (from 1948 to 1967) he did his most important and famous work–on the statistical mechanics of macromolecular isomerism, encompassing the explanation of the elastic properties of rubber and the behavior of macromolecular coils. In 1966 he was elected a Corresponding Member of the USSR Academy of Sciences and invited to join the Institute for Molecular Biology in Moscow. Of his many books seven have been translated to English. The first and scientifically most important was *Configurational Statistics of Polymeric Chains*, originally published in Russian in 1959. Flory wrote the foreword to the English edition. But probably better known are the books, *Molecular Biophysics* and *General Biophysics* and the more popular books such as *Physics and Biology*. Volkenstein is arguably the best known and most influential biophysicist in the Soviet Union.

What of the development of theoretical and mathematical biology in the Soviet Union? I had discussed this topic at length with him in Moscow on a number of occasions. But today he was rather concise. Gel'fand and Zetlin were key influences, he thought. Chismadzev's group at the Institute of Electrochemistry developed important models for neural transmission. The monograph, *Mathematical Biophysics*, by Chernavsky, Romanovsky and Stepanova, was an excellent and influential work. It was clearly more awkward for him to assert the significance of his own work and that of his group. But the name of Boris Belintsev, a young coworker in his immediate group that I also knew, inevitably came up. Belintsev did excellent work on the mathematical theory of ontogenesis. It had been a shock to hear that he died last year at the age of thirty-five.

Volkenstein's own work in biophysics and theoretical biology followed a natural progression from chemical physics and statistical mechanics. Electronic-conformational interactions in proteins and other macromolecules has been one major theme. The nature of biological information, in particular how the concept of value of information can be defined and used, is another. The use of Chaitin-Kolmogorov measures of complexity to deal with issues of biological and artistic form is the topic of one paper that I recall. Another concerned the issue of determinism-indeterminism from the point of view of sensitivity to initial conditions. The problems of biological evolution and its molecular basis inevitably became paramount in Volkenstein's mind; in recent years physical approaches to evolution have become his main focus.

Volkenstein, not surprisingly, allowed that the good ideas on evolution from long ago were lost because of Lysenkoism. Names associated with these early ideas were Severtsov, Schmalhausen, the emigre Dobzhansky, Chertverikov, and Timofeev-Resovsky. Now the main problem is to combine evolution with molecular biology, synergetics, and the theory of information. Indeed when I later asked Volkenstein my inevitable question about the main future direction of theoretical biology, the same issues arose again, though somewhat more specifically. The genotype is not a plan for the future organism, but more like a recipe. I was perplexed, but in a moment I understood that "recipe" here corresponded precisely to what I call a "structurally nonprogrammable" mode of development. Volkenstein's English is excellent, but perhaps a native English speaker growing up in the age of digital computers would have suppressed the essential self-organizing character of the term "recipe." Obviously we are here dealing not with the traditional computer science metaphor for an algorithm or program, but with an everyday kitchen usage that specifies how components are mixed. The mixed components then self-organize according to the principles of physics and chemistry.

As Volkenstein also puts it, what evolves in evolution is "ontogenetics." So it is natural that he and his group have been working on problems of morphogenesis, on the one hand, and phenomenological descriptions of the evolution process on the other. The phenomenological descriptions are formulated in terms of bifurcation theory, in analogy to physical descriptions of phase transition phenomena. The phase transition description applies at the phenomenological level of speciation. The problem is to understand the molecular basis of the interrelationship between genotype and phenotype in this process, and the implication is that this interrelationship cannot be properly understood without taking account of the physical principles of self-organization at every stage of development.

The discussion inevitably turned to methodology. Theoretical biology should be approached from two directions, the molecular and the phenomenological. It is not difficult to detect Volkenstein's background in the statistical mechanics of polymers here. Phenomenological descriptions at the level of the organism or species, formulated for example in the style of synergetics, are analogous to the macroscopic descriptions of thermodynamics. These must eventually be combined with the descriptions of molecular biophysics. But Volkenstein has no illusions about the difficulty. One difficulty is that "for many biological problems we don't have sufficient biological information to make mathematical-physical models." Very general conceptual problems, such as the problem of chaos, cannot be approached in a narrow empirical manner, however. Theoretical biology should both be close to empirics and broadly conceptual.

Are there any differences in research trends in the U.S. and USSR? Volkenstein could not yet assess the situation in the U.S. But he felt that with the move to molecular engineering there has been a de-emphasis on physics, despite the fact that physics will be essential for protein engineering. His perception was that the interest in eukaryotes and the applied sciences such as genetic engineering was also concomitant to a lack of interest in evolution. I was surprised, since here was just the bank of molecular and phenomenological data that should be necessary for progress. But his more general judgment was that the individuals making controlling decisions in Soviet science were not interested in biophysics or in mathematical and theoretical biology. The literature may appear to suggest otherwise (as Volkenstein put it, the level of theory is not lower than in the West, as it is not so dependent on scientific instrumentation, except for computers). I had heard similar comments from many Soviet colleagues, who often have the impression that biophysics and theoretical-mathematical biology are firmly established in the U.S. Evidently the interest and initiative among scientists is real and intense enough to have created the illusion of a firm supporting structure on both sides of the looking glass. (One wonders to what extent the ostensibly more pragmatic fields that are supported depend for their vitality on this initiative.)

I decided to probe with a left jab, then to see how Volkenstein could handle a strong right. (I would use the image of chess, but this is too much Volkenstein's strong point.)

"Are you a reductionist then?" The first answer was "Yes," followed by, "I am a physicalist, a materialist." But he was not convinced that reductionism was a particularly meaningful concept. There is, however, no doubt that he is anti- anti-reductionist. Anti-reductionism, he believed, served the purpose of annihilation of science. He was thinking of his experience during the Stalin period: first the attack on biology in '48, on theoretical physics in '49 (as being idealistic and

non-revolutionary), and against theoretical chemistry, physiology and cybernetics in the early 50's. It was easier to annihilate the sciences, he thought, if they could first be divided. "Soviet philosophers supported this annihilation in those years, struggling against 'reductionism'."

I decided to throw my right. If, as Volkenstein puts it, physics is the study of fields and substances and the conditions (space and time) for their existence, and this includes both the living and the nonliving, can we expect science to deal with (nonpublic) mental phenomena in a physicalistic manner?

Some scientists might offer a specific theory: call it an emergent property, for example, or a computational process that could be abstracted from physics and chemistry. Others might say that it is outside of science, perhaps an unanswerable question altogether. It all depends on how the man or the culture chooses to divide the world of experience. But Volkenstein directly said it was a phenomenon in space and time, that modern science was only about four hundred years old, that amazing progress had been made in that time, and that he was confident that in the end there will be found both a chemical and physical basis for mental activity.

My right had landed, and what remained standing, not a bit off balance, was a champion of the scientific method applied in an open way to an undivided universe.

MEMBERS IN THE NEWS

Articles about mathematical biology and written by SMB members appear regularly and frequently in various and numerous scientific journals routinely found on the shelves of academic libraries. But seldom is the man on the street, or for that matter, the man in the supermarket, exposed to articles about mathematical biology. Recently, as I made my way from the yogurt rack to the check-out counter I happened to pass by the magazine racks, and what should leap out at me but the May issue of *Discover, The World of Science*. On the cover, in big bold letters, appeared **Tracking Chaos in the Human Body**. Pulse throbbing, I opened the magazine to page 63; and starting on that page appeared an article entitled, *The Body Chaotic*, by Gary Taubes which included descriptions of individual research projects of **Paul Rapp**, **Walter Freeman** and **Stuart Kauffman**. Articles of this type help make the general public more aware of mathematical biology.

T. Chorbajian

Membership Directory

The current Membership Directory is at the printers and will be on its way to you shortly.

AIBS NEWS

The American Institute of Biological Sciences (AIBS) is an umbrella type organization comprised of 40 affiliated societies (of which SMB is one). As such, AIBS represents more than 70,000 individuals, and through its various activities, has an impact on many more than that. As the SMB Council Representative to AIBS, Torcom Chorbajian asked Nancy Bell, Public Responsibilities Coordinator for AIBS, to write an article for the *Newsletter* describing some of the governmental activities of AIBS. Her article, graciously contributed, appears below. Enclosed with the *Newsletter* is a brochure, which describes the scope and activities of AIBS, and an application form. We encourage those of you who are not already members of AIBS to consider becoming members and thereby help provide support for an organization that is already providing support for us. Members receive the excellent journal, ***Bioscience***.

AIBS PUBLIC AFFAIRS NEWS

by Nancy S. Bell

As the Society for Mathematical Biology is a member society of the American Institute of Biological Sciences (AIBS), we wanted to share some of the governmental activities AIBS has been involved with this year. We hope to encourage new and continued participation by SMB members.

The AIBS Public Responsibilities (PR) program serves as a voice for biology in Washington policy-making. The PR staff participates in many coalition groups with scientific and environmental groups including the American Committee for International Conservation, the Endangered Species Act Reauthorization Coalition, the Intersociety Council for Biology and Medicine, and the Biotech Network. We communicate directly with congressional staff and federal agency representatives.

The PR program prepares programs for our members. At the February 1989 AIBS Council meeting, the Public Responsibilities department arranged a legislative program on global change. We heard talks by Dr. Paul Risser of the University of New Mexico on the status of the International Geosphere-Biosphere Program (IGPB) and US national planning on global change research. Dr. Robert Peters of the World Wildlife Fund discussed his research on the impact of global warming on biological diversity, and how biologists can relate this information to Congress. Mr. Michael Totten, legislative assistant to Congresswoman Claudine Schneider (R-RI), described the legislation Schneider introduced on global warming.

As part of the meeting, the AIBS Council went to Capitol Hill to talk to congressional committee staffers working on global change issues. The Council expressed biologists'

concerns regarding the biological impact of global change. The Council met with the US House of Representatives Committee on Science, Space and Technology, the Committee on Interior and Insular Affairs, the Committee on Merchant Marine and Fisheries, as well as the Committee on Energy and Commerce. In addition, the Council met with the US Senate Committee on Commerce, the Committee on Environment and Public Works, the Committee on Energy and Natural Resources, and Senator Albert Gore (D-TN).

The AIBS PR program does extensive analysis of biology funding allocated in the federal budget. An evaluation by AIBS appears in the American Association for the Advancement of Science publication, *Research and Development in the FY 1990 Budget*. The analysis is also included in the AIBS bimonthly public affairs newsletter, *Forum*, and the Washington Watch column in *Bioscience*.

AIBS has testified on various biological and environmental issues of interest to our member societies. We actively participated in drafting the National Biological Diversity Conservation and Environmental Research Act (HR 1268) and are seeking support for the bill. In mid-May, AIBS past-president Donald Duckworth of the Bishop Museum, Honolulu, testified on behalf of the Institute at a hearing on this legislation.

In addition, the Public Responsibilities Committee is preparing a seminar at the AIBS annual meeting on *Politics and Global Change*. The Committee has invited American and Canadian leaders with a recognized interest in global change issues to participate at the August meeting in Toronto.

[NANCY S. BELL IS SPECIAL ASSISTANT FOR POLICY DEVELOPMENT AT THE AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES.]

OBITUARIES

Yonosuke Kobatake 1927–1988 (Communicated by M. Conrad)

The Newsletter editor was informed by Tetsuo Ueda that Professor Yonosuke Kobatake passed away on October 31, 1988. Kobatake was the leader of the physical chemistry group in the Faculty of Pharmaceutical Sciences at the University of Hokkaido in Sapporo, Japan. He sat on the board of the *Journal of Theoretical Biology* and was a major figure in physical and theoretical biology in Japan. He was internationally known in the area of electrophysiology, in particular for work on bacteriorhodopsin and for studies of the slime mold *Physarum polycephalum*. Much of this work was directed toward coherent dynamics, in particular models of the dissipative structure type. The most recent works addressed the issue of information processing from the point of view of phase wave phenomena in amoeboid cells. Dr. Kobatake was author or coauthor of more than seventy papers on the slime mold system, totally apart from his papers on other topics.

I had the pleasure of meeting Professor Kobatake at a meeting in India concerned with coherent dynamics and the living state, and subsequently visited his laboratory in Sapporo. The mutual interest was in dynamic intracellular mechanisms of information processing involving cyclic nucleotides. My vivid recollection is of an enthusiastic and talented group of scientists using carefully worked up experimental systems to address key issues in the framework of well chosen theoretical models and paradigms. I also recall touring the fabulous Hokkaido countryside with Professor Kobatake and his coworker of twenty years, Tetsuo Ueda. It was not hard to discern in Professor Kobatake a man who loved and appreciated nature.

I. Richard Lapidus 1935–1988 (Communicated by Lee Segel)

His many friends throughout the world were shocked to hear a few months ago of the sudden death of Rick Lapidus. Simultaneously a cause for great sadness and a hint of consolation is the fact that Rick passed away at the height of his physical and intellectual powers.

Rick was a native of Brooklyn. He received respectively AB, BS and MS degrees from the University of Chicago in 1955, 1956, and 1957. His PhD from Columbia in 1963 concerned pion production in proton-proton collisions. He immediately joined the Physics Department at Stephens Institute of Technology, where he continued to serve until his untimely passing.

Elementary particle physics remained a major interest of Rick's throughout his career. I first became aware of his work about fifteen years ago when a series of his papers with his colleague Ralph Schiller advanced a field in which I had become interested, the theory of chemotaxis. These papers marked the beginning of Rick's intense commitment to the study of biology. At first his work was entirely theoretical, but he became more and more drawn to experiments. A year at CalTech with Howard Berg (now at Harvard) resulted in important results concerning the fascinating puzzle of gliding motility in bacteria. Rick took his last sabbatical in Israel. About half of his time was spent at the Hebrew University, where he continued experimental inquiry into gliding motility, this time in cooperation with Moshe Shiloh. At the Weizmann Institute he made major contributions to the experimental analysis, with Michael Eisenbach, of pauses in the flagellar rotation in chemotactic bacteria, an important clue to the nature of the flagellar motor.

Rick was a committed member of SMB. While in Israel he suggested the establishment of a Forum in the Bulletin of Mathematical Biology, and served as its first editor. In all, his career is a model of commitment and achievement in the area stressed by the Bulletin and the Society, the "Interface between Theoretical and Experimental Biology."