Mathematical Biology Newsletter

Society for Mathematical Biology | Volume 8, Number 1 | March, 1995

SMB NEWS

Election Results

Leah Edelstein-Keshet is the newly elected President-Elect. The three newly elected Board members are **Stephen Ellner, Ray Mejia and Robert Miura. Carlos Castillo-Chavez** has been appointed to fill Leah's position on the Board.

An Interesting Proposal

At the joint meeting of SMB and SIAM in San Diego last July, an interesting idea surfaced that needs careful consideration by the leadership and membership of SMB. At the SIAM Council Meeting a suggestion was made that SIAM should become more involved in mathematical biology, and consider creating a "SIAM Activity Group in Mathematical Biology" (SIAG.MB).

For those of you unfamiliar with SIAG's, they function much like SMB, with their own board of elected officers, their own specialized meetings, newsletters, etc. So, if SIAM were to establish an AG in MB independently of SMB, the two groups would be competing for much the same audience.

Rather than acting immediately to establish a SIAG.MB, the SIAM Council requested that Jim Keener and Charlie Peskin first discuss with SMB the possibility of closer cooperation between the two societies. This overture was discussed at great length by the Board of Directors, and a committee was appointed to draft a proposal from SMB to SIAM. Its members are:

John Tyson <tyson@vtvm1.cc.vt.edu>
Simon Levin <simon@eno.princeton.edu>
Leah Edelstein-Keshet <keshet@math.ubc.ca>
Carlos Castillo-Chavez <cc32@cornell.edu>
James Keener <ma.keener@science.utah.edu>
Charles Peskin <peskin@cims.nyu.edu>

The committee favors a scenario with two separate organizations (SMB & SIAG.MB) with separate leadership, membership, goals, meetings, etc. The two societies would maintain a loose affiliation as follows: (a) SMB President participates on SIAG.MB Board of Directors and vice versa, (b) SMB represented on Organizing Committee for SIAG.MB meetings and vice versa, (c) promote joint membership, share mailing lists, single electronic newsletter, etc.

If you have any questions, comments or suggestions, please contact the members of the committee listed above. We will keep you posted of developments.

A Reminder

If you have not yet submitted your entry for the SMB Logo, you should do so. And soon because the deadline is April 1, 1995. Send your entry to

John Tyson
(address below)
FAX: 703-231-9307

(**SMB News** continued on page 5)

LETTER FROM THE PRESIDENT-ELECT

Dear Colleagues,

Last summer, John Tyson asked me to agree to run as candidate for presidency of SMB. I sensed that this was an honour with a double edge: on one hand, it meant that I was running for the highest position in the Society, but on the other hand it portended the possibility of more work. I agreed only because I felt that members who identify with this society (like myself) should be prepared to contribute to its continuity.

It would be premature and presumptuous for me to set out an agenda, or summarize goals for the Society. I feel that I have a lot to learn about its administration. Further, I think that the goals should emerge from a consensus of the membership of this society, not only from the top. I hope to hear from members, and particularly from the young scientists who have recently joined or are about to join SMB. I would like to hear your views and find out more about issues that are relevant to your view of this society.

In many ways, SMB has benefitted greatly from the hard work of previous members and presidents. The Society has grown, its publication, *The Bulletin of Mathematical Biology*, is better and more widely recognized than it was in my earlier days as member, and we hold regular, streamlined, annual meetings, at which interested members are given an opportunity of expressing their views. Thus, in many respects, most of the work has already been done, and it remains simply to continue. I would like to acknowledge the efforts of our past presidents, of members of the board, and of the editorship of the Bulletin for this track record. I would also like to thank all the devoted people who have worked at setting up mailing lists, electronic networks, digests, newsletters, and other forms of communication, for their hard and continuing work.

I have been a member of SMB for over 10 years. During these years, the place of Mathematical Biology has changed considerably. While we have been originally seen as a group on the "fringe of respectable science", the shifting attitudes and recognition of interdisciplinary work has given mathematical and theoretical biology a firmer footing and more opportunities of becoming established. On the other hand, the ecomomic and funding crises in recent years have reversed much of that solid basis and young scientists are faced with an impossible job market, and great difficulties in competing for funding. I feel that it is imperative to support these people and to address their needs as best we can in this difficult period. It is not clear to me how this is to be done, and I ask for input on this important problem. I came to SMB at a time when attitudes about women were just beginning to change and improve. This is an area in which further work and energy is needed.

There have always been conflicting views on what mathematical biology should be. Some of us consider the mathematical aspects more interesting than others, and some of us are primarily concerned with making an impact in biology. We have varying degrees of realism versus abstraction in our theories, and we use a variety of tools and ideas to address questions that interest us. I have always felt that this diversity should be taken as one of our strengths, not as a weakness, and that a tolerance and appreciation of the many distinct approaches of our membership are essential. Recent developments in our field have shown that even pure, abstract theory can eventually become essential as a tool in experimental science. Further, practical and experimental projects also engender mathematical research and progress. Thus, I hope to convince potential SMB members who think that we are "too mathematical" or "too biological" to join our ranks and contribute to our diverse forum.

Sincerely yours,

Leah Edelstein-Keshet

Leah Edelstein-Keshet, President-Elect

Stephen Ellner, Director

Raymond Mejia, Director

Robert Miura, Director

Carlos Castillo-Chavez, Director

A LETTER ABOUT THE BULLETIN

Dear colleagues,

There is lots of good news concerning the Bulletin of Mathematical Biology (BMB). There is also one piece of bad news, but readers can do something about it.

Good news is that citation reports show that BMB is a high quality journal, whose rating is becoming even higher. The time is nearing when LATEX submissions will be fully accepted, so that production time and accuracy should improve. More good news is that during 1992 the number of members receiving the journal increased by 15% to 459.

Bad news is that institional circulation is decreasing by 10% a year, from 440 in December 1992 to 398 a year later, to an estimated 360 at the end of this year.

Here are some figures concerning the impact factor (IF) of BMB, which is the average number of citations per article over two years. These come from SCI Journal Citation Reports, courtesy of Pergamon, publishers of BMB.

The Bulletin's IF rose about 10% from 1991 to 1992, from 0.800 to 0.875. SCI lists BMB under "Biology Miscellaneous", where its standing rose from 13th to 10th out of 25. BMB is also listed under "Mathematics Miscellaneous" where it rose from 3rd to first in the list (out of 6).

Although not listed there by SCI, comparisons with other categories are interesting, and are shown in the following table.

Subject	No. of Titles	IF:max-median	BMB rank
Biology miscellaneous	25	2.0-0.68	10
Biochem and mol. biol.	157	36-1.6	118
Biology	54	18-0.69	27
Mathematic applied	84	2.2-0.38	11
Mechanics	56	4.8-0.44	11

If you get a copy of BMB it is tempting to tell your librarian not to order one for your institution, or to acquiesce in cancellation. But this is biting the hand that feeds you. It weakens your profession, diminishes the audience of BMB papers that you might publish, and lessens the impact of theoretical biology in your institution.

We urge members to encourage their institutions to subscribe to BMB if they have not done so. You can use the above figures to show the relevant librarian or library committee that BMB is one of the more widely read theoretical journals, and that it can even hold its head up among the general class of biology journals. And all of us see clearly that the role of theoretical biology is destined to grow rapidly.

John Tyson (President, SMB)
Lee Segel (Editor, BMB)

SMB Annual Meeting

The 1995 Annual Meeting of the Society for Mathematical Biology will be be hosted by the Institute of Chemistry of the National University of Mexico between May 27-31, 1995, in the resort of Oaxtepec, Morelos, Mexico (40 miles South of Mexico City's airport).

There will be an informal mixer, and registration, Saturday evening (May 27). The formal program will begin Sunday morning.The program is being organized by **Francisco Lara-Ochoa** and **Carlos Castillo-Chavez**.

Areas of focus and invited speakers include:

Immunology, Molecular Biology and Cell Biology (Chair: Alan Perelson; Co-chairs: Francisco Lara-Ochoa and Germinal Cocho)

Carla Wofsy, University of New Mexico,
Biochemical Responses to Receptor Aggregation: Theory and Experiment in a Model System
Marek Kimmel, Rice University,
Probabilistic Models of DNA Repeat Polymorphisms
Catherine Macken, Los Alamos National Lab,
Evolution on Fitness Landscapes: Applications to Immunology

Global Ecological and Environmental Issues (Chair: Simon A. Levin)

Dan Grunbaum, University of British Columbia ,
Scaling from Individuals to Aggregates in Marine Systems
Ben Bolker, *Princeton University,*
Biodiversity and Gobal Change
Simon Levin, Princeton University,
Introduction to Problems of Global Change and Biodiversity

Epidemiology, Ecology, and Evolutionary Biology (Chair: Carlos Castillo-Chavez; Co-chairs: Karl Hadeler and Cristobal Vargas)

Sally Blower, Univ of California, San Francisco,
HIV Vaccines (Tentative).
Lourdes Esteva, Universidad Autonoma de Mexico,
A Mathematical Model for Dengue Disease
Karl Hadeler, Tuebingen University,
Modeling Spatial Spread by Random Walk Systems
Herbert Hethcote, University of Iowa,
Comparison of Vaccination Strategies for Pertussis
Denise Kirschner, Texas A and M University ,
Immunological Insights into the Recent TB Epidemic
Simon Levin, Princeton University,
Evolution of Community Level Poperties
Jaime Mena, Universidad Catolica, Valparaiso,
Effects of Dfferent Rates of Infection in Epidemiological Models with Variable Population Size (tentative)
Jorge Velasco Hernandez, Universidad Metropolitana and Cornell University,
Superinfection Patterns Leading to Coexistence of Competing Species
Gilbert Walter, Univ of Wisconsin at Milwaukee,
Using Wavelets for Scaling in Ecosystem Models
Ying-Hen Hsieh, Nat. Chung-Hsing University,
A Two-Sex Model for Treatment of HIV/AIDS in a Population of Varying Size

Developmental Biology, Physiology, and Neurobiology (Co-chairs: Robert Miura, and Rafael Perez Pascual)

Leah Edelstein-Keshet,Univ of British Columbia,
How The Cell Gets Its Shape
Harold Layton, Duke University,
Renal Modeling and the Tubuloglomerular Feedback Pathway
Nancy Kopell, Boston University,
From Ionic Currents to Geometry: Reduction of Hodgkin Huxley Networks to Poincare Maps

Public Health Policy (Chair: Joan Aron; Co-chairs: Francisco Lara-Ochoa, and Carlos Santos-Burgoa)

Beatriz Munoz, Johns Hopkins University,
Dynamics of Transmission and Progression of Tachoma in Hyperendemicareas
Jim Koopman, University of Michigan,
Assessing Vaccine Effects on Contagiousness
Marco V. Jose, Instituto Nacional de Salud Publica,
Incidence Forecasting of Rotavirus Infection by Serotypes 1,2,3 and 4

As always, contributed papers and posters are welcome in all areas of mathematical biology. You may submit an abstract by e-mail or you may use the abstract form which was sent out last fall. Electronic submission is encouraged, using either TeX or LaTeX. Macros for both TeX and LaTeX are available for ftp in the SMBnet archives. The files are smb/pubs/SMB_TeX_macro and smb/pubs/SMB_LaTeX_macro, respectively. A sample abstract for each is also available in this file. Abstract deadline is April 1st.

For additional information, please contact

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SMB News (continued from page 1)

Job Exchange

A committee was established to foster communication within the Society about job openings and job seekers (postdoctoral,academic, etc.). Members are:

Leah Edelstein <keshet@math.ubc.ca>
Leon Glass <glass@krylov.cnd.mcgill.ca>
Ramit Mehr<ramit@goshawk.lanl.gov>
Ray Mejia <ray@helix.nih.gov>

A database of information on education, employment, sources of support, etc, is being compiled and made available from a single source through the effort and direction of Ramit Mehr. Several files are currently available in the SMBnet ftp archives, and the database is being expanded and updated.

Teaching Materials

The idea is to provide a clearinghouse for information about course materials in math biology: texts, problem sets, student projects, computer software, etc. Two members at the San Diego meeting expressed an interest in getting this project off the ground: Evans Afenya (Elmhurst College) <evansa@elmhcx9.elmhurst.edu> and Sophia Maggelakis (Rochester Institute of Technology) <sxmsma@ritvax.isc.rit.edu>. John Tyson asked them to come up with some plans, along with the advice of Louis Gross (U Tenn, Knoxville) <gross@math.utk.edu>.

Data Bank on Math Biology Programs

This idea, due to Lee Segel, is to make a catalog of geographically identifiable groups that do teaching and research in mathematical biology. These might be large formal groups, like at the University of British Columbia or the University of Utah, or smaller groups, like at Virginia Tech. The data bank would be organized geographically. It would list senior researchers, research interests, programs and degrees offered, courses, representative publications, etc. Two members at the San Diego meeting volunteered their services: Meghan Burke (Emory University) <burke@wolf.sph.emory.edu> and Athan Spiros (UBC) <spiros@math.ubc.ca>.

The Landahl Travel Grants

The Society for Mathematical Biology has funds for partial support of the travel of graduate students who are members of SMB to meetings co-sponsored by SMB. Graduate students who wish support may apply to: John Rinzel, Mathematical Research Branch, NIDDK , National Institutes of Health, 9091 Wisconsin Avenue, Suite 350, Bethesda, MD 20814 (e-mail: rinzel@helix.nih.gov; fax: 301-402-0535). The application, which should be received by April 3, 1995, should include a one-page research summary, a letter from your research advisor stating why attendance at the meeting is valuable and indicating what other support is available, a summary of requested funding and a statement of any past Landahl awards. Preference will be given to those students who are presenting a poster.

Fourth International Conference on Mathematical Population Dynamics

Rice University, Houston, TX
Tuesday, May 23 - Saturday, May 27, 1995

The Fourth International Conference on Mathematical Population Dynamics is an interdisciplinary meeting of biologists and mathematicians concerned with populations of biomolecules, genes and cells, as well as other topics of mathematical population biology and epidemiology. The meeting will be of interest to applied mathematicians, probabilists, statisticians, ecologists, epidemiologists, biologists and medical scientists. It will be focused on mathematical theory, model analysis and modeling of quantitative data pertaining to cell and molecular biology, epidemiology and cancer research.

Sessions (tentative): Mathematical Methods of Population Dynamics; Chaos in Population Dynamics; Cell Population Dynamics; Theory of Epidemics; Mechanisms and Variations in Repeat Sequence Polymorphisms; Resistance Models in Cancer Chemotherapy; Dynamic Models of the Evolutionary Process; Systems of PDE's in Biology; Modern Branching Processes with Biological Applications; Stochastic Models in Epidemiology ; Modeling of Cell Cycle; Spatial Aspects in Fishery Population Dynamics ; Immune System / HIV Modeling; Population Dynamics and Radiobiology; Mathematical Population Genetics; Optimization Methods in Cancer Chemotherapy; Cellular Automata with Biological Applications

Invited Speakers (tentative): Z. Agur (Tel Aviv Univ); O. Arino (Univ of Pau) ; M. Artzrouni (Univ of Pau); S. Bertuzzi (Istituto di Analisi dei Sistemi ed Informatica del CNR); C. Castillo-Chavez (Cornell Univ); R. Chakraborty (Univ of Texas); A. Coldman (Univ of British Columbia); R. Cowan (Univ of Hong Kong); L. Demetrius (Harvard Univ) O. Diekmann (CWI); K. Hadeler (Univ of Tuebingen); A. Lasota (Silesian Univ); C.Mode (Drexel Univ); D. Nelson (Baylor College of Medicine); B. Novak (Budapest Technical Univ); A. Perelson (Los Alamos National Laboratory); R. Sachs (Univ of California-Berkeley); W. Stephan (Univ of Maryland); Z. Taib (Chalmers Univ of Technology); G. Webb (Vanderbilt Univ)

The abstract deadline is April 15. Registration fees before April 15 are $120/$90 students; after April 15, $140/$100 students.

For further information, please contact either:

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The 1994 Gordon Conference in Theoretical Biology

This biannual conference occured in June.There were many good talks but not as many biologists as would have been desirable. A movement to make the conference more focussed was discussed with the particular motive of including more experimentalists. Several suggestions were made varying between keeping it the same (broad) and narrowing it to at most two topics in order to get more biologists involved. Excerpts from the final report are presented below.

Dear Colleague,

Here is the final report from Carla Wofsy and Artie Sherman on the 1994 Gordon Conference on Theoretical Biology and Biomathematics.

We would like to take this opportunity to thank the many members of the Theoretical Biology community who have helped us out over the last two years. This was genuinely a group effort - many contributed suggestions and helped arrange speakers in fields we didn't know well. Many senior speakers and chairs contributed from their grants, enabling us to support a lot of grad students and post-docs. Many individuals helped with logistical arrangements like setting up and transporting equipment and helping with rides. Although organizing this meeting was a lot of work, it did not feel like a sacrifice, but rather like what you would do for family.

The new co-chairs elected for 1996 are:

Lisa Fauci
Department of Mathematics
Tulane University
New Orleans, LA 70118
tel: 504-865-5727
ljf@math.tulane.edu

G. Bard Ermentrout
Department of Mathematics
University of Pittsburgh
Pittsburgh, PA 15260
tel: 412-624-8324
fax: 412-624-8397
bard@mthbard.math.pitt.edu

Zvia Agur was chosen as an alternate should either of the co-chairs be unable to serve. The choice of a male and a female was not mandated, but the result of an unrestricted choice of the attendees from a field that included more than one of each gender.

Congratulations and suggestions for the next meeting may be directed to Lisa and Bard.

Statistics on the 1994 meeting

There were 109 attendees, down from 123 in 1992; 129 applied and were accepted.
About 1/3 of the attendees were repeat customers from 1992. An undetermined, but significant, number of the rest had attended this meeting previous to 1992.
There were 23 speakers and about 45-50 posters, so most of the attendees had an opportunity to present their work.
The upward trend in female participation over the last few meetings continued, including the highest proportion ever of women on the platform for this meeting.

Participation of Women

Year	Speakers	Chairs	Combined	All participants
1984*	4/24	0/9	4/33	
	16%	0%	12%	N/A
1986	2/24	1/9	3/33	11/95
	8%	11%	9%	12%
1988	2/23	1/9	3/32	
	9%	11%	9%	N/A
1990	6/24	0/9	6/33	19/93
	25%	0%	18%	20%
1992*	4/25	3/10	7/35	32-38/123**
	16%	30%	20%	26-31%
1994*	7/23	3/9	10/32	30/109
	30%	33%	31%	28%

* One of the meeting organizers was a woman
** Some names unable to identify

18% traveled to the meeting from outside the US and Canada, mostly, from Europe, including two from Russia. This was similar to '92.
Seniority was roughly uniformly distributed between junior, senior, and intermediate.
There were 3 participants (all speakers) who are primarily experimentalists present, as well as about 5 - 10 who do both experiment and theory. Subjectively, we have the impression that most attendees have a serious attachment to some biological field, as opposed to "free-lancing".
Fields were represented roughly as follows (some people we weren't sure how to classify, and some work in more than one. There is a lot of overlap between population biology and pattern formation; calcium was arbitrarily classified as physiology instead of cell bio):

Field	#
Physiology	36
Cell/Molec Bio	30
Pattern Formation	19
Mathematics	11
Population Biology	7
Behavior	3
Unknown	3
Total	109

Discussion on the Future of the Meeting

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A discussion was held during the Thursday evening business session on the character and future of the meeting, inspired in part by the feeling of some of the senior attendees that many veterans have drifted away. This may reflect in part the positive development that many senior participants have developed deep roots in specialized fields and have other competing commitments. Similarly, many of the experimentalists whom we would like to attract to the meeting are unable to spare a whole week away from their central work. A proposal was made by John Rinzel to aim for more focussed meetings, that would take up a smaller number of topics more deeply. Others expressed concern that this would tend to divide the group. A compromise was proposed by Lee Segel to request from the GRC a couple of additional, focussed format, meetings for the odd-numbered years as an experiment. It was agreed to organize the '96 meeting along the traditional lines (with the usual wide latitude granted to the chairs on specifics), and to carry on the discussion over the next year or so. It would be of particular interest to hear from past attendees who were absent this year. We are looking for a volunteer to set up an electronic bulletin board or listserver for this purpose.

Sincerely,
The Ex-Chairs,
Carla Wofsy and Artie Sherman

Any suggestions about the organization of the GRC now and in the future should be sent to either Lisa Fauci or Bard Ermentrout. Electronic communications can also be sent to smbnet@fconvx.ncifcrf.gov where they are available for public discussion.

Report on Conference to Honor Memory of Stavros Busenberg

An international conference on differential equations and applications to biology and to industry was held in Claremont, California June 1 - 4, 1994 to honor the memory of Stavros Busenberg, professor of mathematics at Harvey Mudd College and active member of the applied mathematics community who succumbed to ALS (Lou Gehrig's disease) on April 3, 1993 at the age of 51. The conference was attended by more than 150 friends of Stavros from at least 24 countries, representing every continent of the world.

A memorial lecture consisting of reminiscences and descriptions of Stavros' contributions in various pure and applied mathematical areas, including remarks by Ken Cooke, Ellis Cumberbatch, Mimmo Ianelli, Mario Martelli, and Horst Thieme, opened the conference. Afterwards, hour long addresses given by Avner Friedman, Karl Hadeler, Jack Hale, Mimmo Ianelli, Simon Levin, John Ockendon, and Pauline van den Driessche were interspersed with 90 half-hour presentations and two poster sessions. The program also included a piano recital by Valeria Profeta Romano and a memorial banquet where friends and family shared reminiscences about a sorely missed colleague, friend, husband, and father.

Conference proceedings will be published within a year, and a memorial issue of the journal Mathematical Biosciences is being prepared. Funds to endow a Stavros Busenberg scholarship to support the travel of young investigators to meetings are being raised. The scholarship will be administered by the Society for Mathematical Biology. Contributions, payable to the Society for Mathematical Biology, may be sent to Carlos Castillo-Chavez, Biometrics Unit, Warren Hall, Cornell University, Ithaca NY 14853 (U.S.A.)

STAVROS BUSENBERG TRAVEL AWARD

- Status Report -

Dear Friends of the Society for Mathematical Biology:

We began a drive early last year to collect funds to endow the Stavros Busenberg Travel Award. This annual award will be awarded to a selected graduate student to help him/her attend a meeting or workshop organized or cosponsored by the SMB. The Stavros Busenberg Travel Award will be administered by the SMB.

We have received many generous contributions and we are grateful to all of you. The endowment fund has now reached approximately $6500. Our goal is $10,000. We hope that those who have not found the time to contribute will be able to pledge their support in the near future. We also welcome the additional support of those who have already contributed. It is very likely that your contributions are tax deductible.

Please send your contribution by check (payable to the Society for Mathematical Biology) to Carlos Castillo-Chavez at the following address:

Carlos Castillo-Chavez
332 Warren Hall
Biometrics Unit
Cornell University
Ithaca, NY 14853-7801
Fax # 607-255-4698
Phone # 607 255-5488

SOFTWARE CORNER

In this section of the newsletter, I generally mention free software packages and where to get them. Next issue, I will describe a number of places where one can get dynamical systems software and what sorts of machines will run it. But this issue, I want to describe a program that costs money but is probably of interest to anyone who models real biological systems complete with quantifiable data.

Many years ago when I was a postdoc at the NIH in the Mathematics Research Branch, if one wanted to solve differential equations, graph them and produce camera ready output for publication, the only game in town was a program called MLAB short for Modeling Laboratory. This program was developed by Garry Knott and Douglas Reece at the NIH and ran on the DEC 10 using the SAIL computer language. At the time, MLAB had one of the most robust integrators of differential equations, had extensive matrix manipulation capabilities and best of all a very good curve fitting algorithm.

Now, there are many mathematics software packages available that run on most common platforms. Among them are MATLAB, MathCAD, XMath as well as the computer algebra systems MAPLE, Mathematica, and MACSYMA. Many of them do what MLAB used to do, but still lack a nice means of finding parameters that will match a given model to data.

I was quite surprised to see that MLAB is still alive and well and is now available for PC compatibles, SGI Irises, NeXT workstations, and SUN workstations. Knott and Barry Bunow and a host of other programmers have added many new features to MLAB. The program is quite stable, runs very quickly, and provides a simple way of developing, evaluating, and displaying mathematical and statistical models of data.

The interface is command driven and consists of an interpreter which reads lines of text. You can save everything you have typed and read it back later or write a standard ASCII text file with a list of commands that are executed in order. The number of features and functions is huge. The program is able to produce beautiful graphs in postscript that can be quite complex with a large variety of fonts, linetypes, and pointtypes. There can be multiple graphs and inserts of graphs all on the same page. As with many matrix based software packages, one works with arrays and can do all the usual matrix manipulations such as adding, subtracting, mutiplying, inverting, and applying functions to the arrays. MLAB also has an astonishing array of statistical and mathematical functions (more than any other of this type of program that I have seen.)

The main reasons to use MLAB as opposed to other integrated numerical and mathematical analysis packages are (1) the curve fitting program which adjusts parameters to a model by minimizing the weighted sums of the pth powers of the absolute errors and (2) its very good and robust differential equation integrator. Most modeling projects involve solving sets of algebraic and differential equations and comparing the computed results to some set of experimental data. There are generally many "free" parameters in the models in that the user has only a ballpark idea of what they are. Optimizing the parameter set is tedious and at best an inexact science using traditional methods of changing the parameter and looking at the soltuions. MLAB eliminates much of this uncertainty by allowing you to define a set of parameters that you want to vary. This is best illustrated by an example.

EXAMPLE OF MLAB

I want to model the postsynaptic potential of a cell to a brief pulse as a third order differential equation of the form:

$$x''' + a3\,x'' + a2\,x' + a1\,x = \text{heaviside}(toff-t)$$

with $x(0)=x'(0)=x''(0)=0$. I have 25 data points at t=0,...,25 milliseconds and want to find values of a1,a2,a3 that best model fit the data. The entire MLAB session and its output is shown below

```
* fct x1't(t)=x2
* fct x2't(t)=x3
* fct x3't(t)=-a3*x3-a2*x2-a1*x1+.5*(1+sign(toff-t))
* initial x1(0)=0
* initial x2(0)=0
* initial x3(0)=0
* toff=.5
* a3=1
* a2=1
* a1=.5
* m=read(synapse.dat,30,5)
* p col 1 = m col 1
* p col 2 = m col 5
* constraints q={a3>0,a2>0,a1>0}
* fit(a3,a2,a1), x1 to p, constraints q
final parameter values
    value            error          dependency    parameter
1.12290855     0.01902977477   0.3592732092        a3
0.4851544432   0.005585560329   .0153916987        a2
0.113493197    0.001667126941  0.3537858909        a1
13 iterations
CONVERGED
best weighted sum of squares = 7.651178e-03
weighted root mean square error = 1.823897e-02
weighted deviation fraction = 2.828779e-02
R squared = 9.963341e-01
no active constraints
*
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One can then integrate the equations with these parameters and graph them against the data to see how well it fit. This is always the acid test to any fitting problem.

MLAB has an enormous variety of statistical and mathematical functions (more statistical analysis than any of the other general mathematics programs that are available, such as Maple, Mathematica, and Matlab.) It is clearly built around modeling rather than exploring mathematics in general. For this reason, I recommend it highly. There is one major caveat and that is the price. For a workstation, the price is $3000 for a single user license. Compared to the programs mentioned above, this is quite high. However, no program that I have seen makes the exploration and fitting of mathematical models to experimental data as easy as MLAB. Thus, if your main interest in mathematical software is to analyze and simulate experimental systems, then you should have MLAB on your computer.

LITERARY EVENTS

* ***Frontiers in Mathematical Biology,*** Simon A. Levin (Ed.). Springer-Verlag, 1995/App. 633 pp., $69.00.
Volume 100 in the *Lecture Notes in Biomathematics* series serves to commemorate the achievements of one of the most influential collection of books in mathematical biology. Springer-Verlag is offering this book at a reduced price to members of the Society (offer good only in North America); please see enclosed flyer.

* ***Understanding Nonlinear Dynamics,*** D.Kaplan and L. Glass . Springer-Verlag, 1995/App. 350 pp., 250 figures. cloth $44.00; paper $29.95.
An introduction to basic concepts of modern dynamical systems, oriented towards students of biology. Requiring only differential calculus as a pre-requisite, the text motivates the dynamical concepts with many examples drawn from diverse areas of biology, ranging from biochemistry to cancer tumor growth.
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Special Issue of *BioSystems*

BioSystems Vol. 34, Nos.1-2, pp.1-276 (1995) is a festschrift for Hans J. Bremermann (U.C.Berkeley) on the occasion of his retirement. The first paper is a biography of Dr. Bremermann (expanded from an interview by Michael Conrad in the Mathematical Biology Newsletter, April 1992). It outlines his accomplishments and influences on a generation of mathematical biologists. Papers were contributed by former students, postdocs, and colleagues. The subjects reflect the wide range of issues Hans has explored over his career. Russell W. Anderson is guest editor of this issue.
The Society has made a special arrangement with Elsevier whereby individual copies of this special issue may be purchased at a reduced rate. Please see enclosed flyer for more details and an order form.

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(LITERARY EVENTS continued on page 10)

LITERARY EVENTS (continued from page 9)

* ***Information, Sensation and Perception,*** Kenneth H. Norwich. Academic Press, 1993/326 pp. $59.00

* ***Nonlinear Dynamics and Chaos,*** Steven Strogatz. Addison-Wesley, 1994/498 pp. $49.50

* ***Neural Modeling and Neural Networks,*** F. Ventriglia, ed. Pergamon Press, 1994/351 pp. $125.00

* ***Fractal Physiology***, James B. Bassingthwaighte, Larry S. Liebovitch, and Bruce J. West. Oxford University Press, 1994/364 pp. $55.00
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* ***Periodic Motions,*** Miklos Farkas. Springer-Verlag, 1994/577pp. $54.50

* ***Thinking in Complexity: The Complex Dynamics of Matter, Mind, and Mankind,*** Klaus Mainzer. Springer-Verlag, 1994/329pp. $34.50

New Editor of the Journal of Theoretical Biology

After 10 years as Co-Chief Editor of the *JOURNAL OF THEORETICAL BIOLOGY*, Stuart Kauffman has decided to step down effective January 1, 1995. He is handing over the reins to John Tyson, Professor of Biology at the Virginia Polytechnic Institute and State University and current President of SMB. Lewis Wolpert will continue as Co-Chief Editor, handling all manuscripts from Europe through his London office. John will be responsible for manuscripts from other parts of the world, through the JTB Office in San Diego (525 B Street, Suite 1900, San Diego CA 92101-4495).

The *JOURNAL OF THEORETICAL BIOLOGY,* founded in 1961 by Jack Danielle, is the largest publication in our field. Presently the *JOURNAL* publishes 24 issues (about 240 papers) per year. The large volume of reviewing and editing is shared by the Co-Chief Editors and an Editorial Board of distinguished scientists.

There will be no changes in purpose or scope of the *JOURNAL* with this change in leadership. The *JOURNAL* will continue to publish high quality papers in all areas of theoretical biology. Some procedural changes are being instituted at the San Diego Office to speed up the review process. Dr. Tyson is committed to manuscript review that is timely, fair and efficient.

Change in Editorship at Mathematical Biosciences

After 20 years as Editor of *Mathematical Biosciences*, John A. Jacquez has decided to step down effective January 1, 1995. John has been the second editor of the journal, having taken over from Richard Bellman, who founded the journal in 1967. During the years of John's leadership the journal has grown in circulation and significance as one of the major journals in the area of mathematical biology. The journal has published papers in all areas of mathematical biology, and has been prominent in compartmental analysis, ecological and epidemiological modeling, and mathematical neurobiology.

The new editor will be Michael A. Savageau, Professor and Chair, Department of Microbiology and Immunology, 5641 Medical Science II, The University of Michigan Medical School, Ann Arbor, MI 48109-0620. Michael has been active on editorial boards of several journals, including many years of association with *Mathematical Biosciences.*

There will be some changes in the processing of reviews and manuscripts as a result of new technology, but no major changes in philosophy are anticipated. Molecular biology and its technology, in Arthur Levine's term, the "new reductionism" in modern biology, has brought about a unification of many previously distinct biological disciplines. This has led to the realization that signal transduction and regulation of gene expression are topics central to many areas in modern biology. A deeper conceptual unification in these areas also is occurring, and mathematical biology has a significant role to play in this process. The journal hopes to expand its coverage of these topics, while maintaining its existing strengths.

* ***Advanced Methods of Physiological Systems Modeling, Vol 3***, Vasilis Z. Marmarelis (Ed.). Plenum Press, 1994/272 pp. $85.00

* ***Circuits of the Mind,*** Leslie Valiant. Oxford University Press, 1994/256 pp. $49.95

* ***Extinction Rates,*** John Lawton and Robert May (Eds.). Oxford University Press, 1995/248 pp. paper $29.95

* ***Data Analysis in Community and Landscape Ecology***, R.H.J. Jongman, C.J.F. ter Braak, and P.O.F.R. van Tongeren (Eds.). Cambridge University Press, 1995/300 pp. paper $24.95

* ***Kinetics for the Life Sciences: Receptors, Transmitters and Catalysts,*** H. Gutfreund. Cambridge University Press, 1995/300 pp. cloth about $64.95; paper about $32.95

In Memoriam

Alexander D. Bazykin (1940-1994)

Aleksandr Dmitrievich Bazykin died on January 23, 1994 after two years of gallant struggle with cancer. He will be remembered for his contributions to theoretical biology. Those who were privileged to know him personally will also never forget his integrity and devotion to colleagues, students, and friends.

Aleksandr Dmitrievich was born in 1940. In 1964 he graduated from the Department of Biophysics (Physical College) of the Moscow State University. He spent the next eight years (1965-1973) in the Institute of Cytology and Genetic in Novosibirsk. During that time, he published several papers on population genetics of spatially structured populations and on the genetics of speciation.

From 1973 Aleksandr Dmitrievich worked in the Research Computer Center (currently known as Institute of Mathematical Problems in Biology) in Pushchino, where he studied primarily problems of theoretical ecology. The Center and Pushchino in general, with its several biological institutes, provided a rare opportunity for close cooperation between mathematically and biologically oriented scientists, and Aleksandr Dmitrievich was instrumental in its development. In particular, he was a leader in application of the theory of bifurcations of dynamical systems to ecology.

In 1976 Aleksandr Dmitrievich spent a year as a visiting scientist in the International Institute of System Analysis (Laxenburg, Austria). This allowed him to establish personal contacts with many colleagues from the West and reinforced his belief in the importance of the analysis of critical regimes in ecosystems and their mathematical models. While at IIASA, he contributed to a collective monography "Adaptive Environmental Assessment and Management", edited by C. S. Holling.

Perhaps, the main contribution of Aleksandr Dmitrievich consists of the application to theoretical ecology of general idea of "dangerous" boundaries in the state space or the parameter space of a model, such that their crossing causes drastic and often irreversible changes. He emphasized the importance of recognizing when system approaches such a boundary, especially in the context of prevention of disastrous consequences of anthropogenic impacts on natural ecosystems, and proposed several criteria that can be used for their detection. A series of papers on the dynamics of various prey-predator systems, ecological processes in space, and coevolution was published by Bazykin and his co-workers. They were summarized in his monograph (Nauka, Moscow, 1985), which will soon appear in English under the title "Nonlinear Dynamics of Interacting Populations".

Aleksandr Dmitrievich invested a lot of effort into translation of English books on theoretical biology into Russian. For many scientists within the USSR the translations provided the sole opportunity to read these books.

In 1990-1991 Aleksandr Dmitrievich was a deputy minister of Environmental Protection in the first and the last non-communist government of the Soviet Union. In the critical days of the putsch in August 1991 he was among the civilian defenders of the Russian Parliament.

Soon after this his fatal illness was diagnosed. Being fully aware that his time is running out, Aleksandr Dmitrievich remained active as long as it was physically feasible. Between two major surgeries in 1992 and 1993 he was actively involved in establishing of a University in Pushchino and pursued, with his colleagues, a study of bursts in the sizes of forest insect populations, along with several other research projects.

May he rest in peace.

Faina S. Berezovskaya
Alexander I. Khibnik
Alexey S. Kondrashov

Graduate and Postdoctoral Opportunities

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Professor Walter Schneider
Program Director
Neural Processes in Cognition
University of Pittsburgh
3939 O'Hara Strret
Pittsburgh, PA 15260

Fellowships in Computational Biology -- The W.M. Keck Center for Advanced Training in Computational Biology. The objective of this program is to train graduate students and postdoctoral fellows from biology and computer science in computational methods (such as molecular dynamics, gene mapping, drug design, molecular medicine). Information can be obtained by writing to

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206 Mineral Industries Bldg.
Pittsburgh, PA 15260

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Carnegie Mellon University
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For Additional Assistance Contact:

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