Berkeley
Mathematics
Newsletter

A newsletter of the Department of Mathematics and Center for Pure and Applied Mathematics at the University of California, Berkeley

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MESSAGE FROM THE CHAIR

Chair Alan Weinstein

ALUMNI NEWS

Alan Weinstein (PhD 1967) has been appointed chair of the UC Berkeley Math Department for a three-year term, beginning July 1, 2006.

I look forward to hearing from our readers about what you have been doing, both to renew old ties and to inspire our current students. Please write to me at alanw@math.berkeley.edu. Your news will appear in the next newsletter, along with that from former staff and faculty who would like to keep in touch.

While on the subject of alumni news, I am very pleased to congratulate Andrew Z. Fire (BA 1978), who, along with Craig C. Mello, was awarded the 2006 Nobel Prize in Physiology or Medicine. You can read more about Fire, and about the interaction between math and biology, in this issue's feature article by Lior Pachter.

Another alumnus, Martin Olsson (PhD 2001) has joined us as Assistant Professor (and chair in 2040?). You can read more about him, as well as about our new Professors Ian Agol and Constantin Teleman, elsewhere in this Newsletter. We cordially welcome them all to our faculty.

FIELDS MEDALS

Although none of the 2006 Fields Medalists are currently on our faculty, all of them have Berkeley connections. Andrei Okounkov was a Professor in our Department from 1998 to 2002, during which time he did part of the work for which the Medal was awarded. Terence Tao was a Chern Professor in 2005. Grigori Perelman, who was awarded the Medal

(continued on page 3)

A NOBEL PRIZE IN *MATHEMATICAL* BIOLOGY?

Lior Pachter

by Lior Pachter

This year both the Nobel Prizes in chemistry and medicine were awarded for advances in molecular biology. The Prize in medicine was awarded to Andrew Fire and Craig C. Mello for discovering a mechanism called "RNA interference" (RNAi) by which plants and animals selectively turn off the expression of genes [4]. The discovery is remarkable in many ways. It has opened up completely new approaches to gene therapy, and has transformed biologists understanding of the molecular biology of the cell. The pervasive view of RNA as an unimportant bit player in the drama of molecular biology has been erased forever. Recognizing the impact of RNAi on medicine and biology, the Nobel committee took the unprecedented step of awarding the Prize to Fire and Mello only eight years after they published their work. Award committee member Erna Moller expressed the nature of the work in language usually reserved for mathematical discoveries: "It was like opening the blinds in the morning. Suddenly you can see everything clearly."

Perhaps it comes as no surprise then that Andrew Fire was indeed a student of mathematics in our Department (BS 1978, age 19). He also studied biology, and upon graduation de-

(continued on page 9)

Highlights

What's inside:

Message from the Chair 1
A Nobel Prize in Mathematical Biology? 1
Faculty Honors and Awards 2
California Teach 3
Postdoctoral Faculty and Fellows 4
New & Visiting Faculty 5
Student Awards 6
In Memoriam 7
CPAM News 7
Grateful Thanks to Our Friends 7
Manager's Report 8
Your Gift is Welcome 10
Alumni/ae News & Update Form 11
Serge Lange Lecture Series 12

FACULTY HONORS AND AWARDS
2005/2006 Academic Year

Elwyn Berlekamp (Emeritus Professor)
Selected to give the first annual Richard N. Guy Lectures at the University of Calgary, Alberta, Canada, on September 15, 2006.

David Eisenbud
Elected to the American Academy of Arts and Sciences.

Tom Graber, **Mark Haiman**, **Thomas Scanlon**, and Miller postdoc **Ovidiu Savin**
Invited section lecturers at the ICM in Madrid this summer.

Ole Hald and **Kenneth Ribet**
Received a campus "unsung hero" award. A student team reviewed 4000 nominations and chose 200 to be awarded.

Olga Holtz (Morrey Assistant Professor)
Granted the Sofja Kovalevskaja Award (Euro 1M) in July 2006 by Alexander von Humboldt Foundation. These awards are funded by the German Ministry of Education and Research. They are made every 2 years to approximately 10-12 young scientists across all countries and all disciplines to carry out research projects in Germany.

Jerrold Marsden (Emeritus Professor)
Received the John von Neumann Award from SIAM (regarded as their highest honor) in July 2005.
Elected to the Royal Society (of the UK) July 2006

Calvin Moore (Emeritus Professor)
Elected as a Berkeley Fellow.

Beresford Parlett (Emeritus Professor)
Parlett and his PhD student, Inderjit Dhillon, received the SIAM-LA Prize for best paper 2004-2006 in the field of Applied Linear Algebra. The prize was awarded at the 2006 ALA meeting in Dusseldorf, Germany, on July 25.

Kenneth Ribet
Elected to the Board of Directors of the Faculty Club on campus; elected secretary of the club by the board.

Donald Sarason
Received the MUSA distinguished undergraduate teaching award.

Ichiro Satake (Emeritus Professor)
Received the 2006 Publication Prize of the Mathematical Society of Japan.

John Steel
Invited to be a fellow at the Wissenschaftskolleg zu Berlin, from October 2005 through July 2006.

Bernd Sturmfels
Received the Polya Lecturership awarded by the Mathematics Association of American (MAA).

Constantin Teleman
Awarded by the Royal Society, the Leverhulme Research Fellowship. By joining the Berkeley faculty, Teleman withdrew his name from this award.

Dan-Virgil Voiculescu
Elected to the National Academy of Sciences. ◆

Mathematics at Berkeley

Calvin Moore

We are very pleased to announce the release of a new book by former Department Chair, Calvin C. Moore, *Mathematics at Berkeley*, published by A. K. Peters, Ltd. The book chronicles the lively history of the Berkeley Mathematics Department from the founding of the University to the present.

A book signing reception will be held on Tuesday, February 27th, from 3:00 PM to 5:00 PM, (location TBA on the Departmental website). Books will not be available for purchase at the reception, but may be acquired in advance through the publisher's secure website, (www.akpeters.com), for a 15% discount with discount code, "BerkMath."

All royalties from the sale of this book will go directly to the UC Berkeley Foundation and are dedicated to support graduate fellowships in the Mathematics Department.

CALIFORNIA TEACH

HUNG-HSI WU

by Hung-Hsi Wu

In May of 2005, Governor Arnold Schwarzenneger and the University of California jointly launched the California Teach program to quadruple UC's annual production of science and mathematics teachers, from 250 per year to 1,000 per year by 2010.
(http://www.universityofcalifornia.edu/academics/1000teachers/)

This program did not come out of a vacuum. It has been known since the mid-nineties, through international comparisons, that the achievement of our students in math and science in grades 8 and 12 lag behind those of most developed nations. In addition, the high tech industry has been experiencing difficulties trying to assemble a competent work force from our own graduates, on both the K-12 and college levels. A sobering account of the dismal economic future facing our nation if these trends are not reversed has just been given in the National Research Council volume, "Rising Above the Gathering Storm" (2006, http://www.nap.edu/books/0309100399/html). A main recommendation of this volume is the improvement of math and science instruction in K-12. It is in this context that the California Teach program emerges as a direct response to this incipient national crisis.

UC Berkeley has responded vigorously to this call for action. With details yet to be put firmly in place, we envision a four-year program that will put our math, science, and engineering majors directly into school classrooms as intern teachers after they graduate (http://calteach.berkeley.edu/). Of course, Berkeley also does what it usually does best, which is to call on its faculty to contribute on an intellectual level. The Mathematics Department has created a Teaching Mathematics concentration as well as a new three-semester sequence designed for prospective high school teachers entitled, "The Mathematics of the Secondary School Curriculum." These are upper-division courses which would partly fulfill the requirements for this Teaching Mathematics concentration.

The need for such a course-sequence becomes all too apparent as soon as one realizes that the regular courses required of our math majors have almost no direct bearing on the school mathematics curriculum. To give an example, consider fractions. Fractions are the backbone of school mathematics. School students' generic conception of a fraction is "parts of a whole". High school teachers must therefore speak this (mathematical) language if they are to reach out to their students. Yet the formal concept of a fraction, such as 3/5, that we teach to our math majors is that it is the equivalence class of ordered pairs of integers containing (3,5). Such abstraction is not helpful in the school setting, and the new course-sequence is designed to bridge the obvious gap by offering future teachers the needed

(continued on page 10)

(Chair's Message, continued from page 1)

but refused to accept it, was a Miller Fellow here from 1993 to 1995. Finally (here I'm stretching it---I know) Wendelin Werner is the most recent recipient (2005) of the Line and Michel Loève International Prize in Probability, awarded by Berkeley's Department of Statistics in memory of our late colleague Michel Loève.

INFORMATION

Getting information in and out of our Department is an ongoing concern. The main issue concerning incoming information is the escalating price of journals, both paper and electronic. We will be working with the Mathematics-Statistics Librarian, Brian Quigley (recently hired full-time after serving as a part-time Acting Librarian), and the University Library to maintain our collections as effectively as possible.

On the outgoing side, our complementary strategy is to encourage publication in journals which are reasonably priced, or even free, and to expand the use of preprint servers so that our Department members' publications are disseminated as widely as possible. Rob Kirby of our Department is heading (and I am on the advisory board of) Mathematical Sciences Publishers, a nonprofit organization dedicated to low cost publication with the widest and freest distribution possible.

Rob is also the chair of our Information Committee, created by merging the old Library and Web Committees. We would especially welcome comments as to how we can make the Department's website as useful as possible to the community at large. What would you like to see there? Please write to us at webcomments@math.berkeley.edu.

EVANS HALL

Although the long-range prospects for Evans Hall are uncertain, the immediate future is looking brighter. In the fall we completed The Big Clean, a (literally, since it started on the 10th floor) top-to-bottom scrub of our office windows, floors and ceilings. Thanks are due especially to our manager, Mary Pepple, and Letters and Science Executive Dean, Mark Richards, for the efforts to make this happen.

But this is just the beginning. More substantial benefits are due from a series of infrastructure projects initiated last year by Chair Ted Slaman. Over this winter break, our best seminar room, 939 Evans, will get a paint job, new floor and furniture, and the installation of a permanent computer projector. On top of this, Ted and Hugh Woodin have dedicated their discretionary funds, obtained from World Scientific, to purchase teleconferencing equipment. This equipment will be used for an e-seminar in Mathematical Logic in cooperation with the National University of Singapore and the Institute of Mathematics of the Chinese Academy of Sciences. Of course it will be available to anyone else in our Department for similar ventures.

(continued on page 5)

POSTDOCTORAL FACULTY AND FELLOWS

Sophie Chen is a Miller Research Fellow. She received her PhD in 2006 from Princeton University. Her fields of interest include partial differential equations, and geometric analysis.

Shamgar Gurevich is a Visiting Assistant Professor. He received his PhD in 2006 from Tel-Aviv University, Israel. His fields of interest are applications of representation theory, algebraic geometry to quantum mechanics, and harmonic analysis.

Reimundo Heluani is a Miller Research Fellow. He received his PhD in 2006 from MIT. His fields of interest lie in the areas of geometric representation and mathematical physics.

Joel Kamnitzer is an American Institute of Mathematics Fellow. He received his PhD in 2005 from UC Berkeley. His fields of interest are geometric and combinatorial representation theory.

John Krueger is a Visiting Assistant Professor who received his PhD in 2003 from Carnegie Mellon University. His field of interest is set theory.

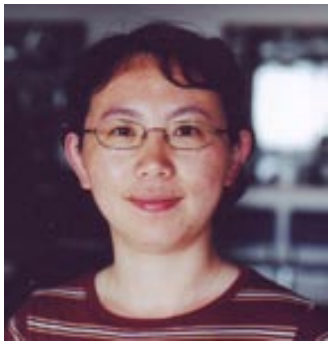
Stania Kuchkova is a Fulbright Fellow. She received her Master's degree in 2004 from Charles University at Prague. Her fields of interest include computational mathematics, numerical methods for differential equations, and mathematical modeling in radiobiology.

Sarah Mason, an NSF Fellow, received her PhD in 2006 from the University of Pennsylvania. Her fields of interest are algebraic and enumerative combinatorics.

Jesse Peterson an NSF Fellow received his PhD in 2006 from UCLA. His field of interest is von Neumann algebras.

Karel Pravda-Starov, a postdoctoral research fellow, received his PhD in 2006 from the University of Rennes 1. His fields of interest lie in the area of pseudo-spectrum of nonself-adjoint differential and pseudo-differential operators.

Jan Reimann is a Humboldt Fellow. He received his PhD in 2004 from the University of Heidelberg. His fields of interest lie in the areas of recursion theory, algorithmic information theory, and descriptive set theory.



Xuemin Tu is a Visiting Assistant Professor who received her PhD in 2006 from the Courant Institute of Mathematical Sciences. Her fields of interest lie in the area of numerical analysis (domain decomposition methods and multilevel methods).

New Faculty

Ian Agol is a new Associate Professor of Mathematics. He comes to Berkeley from the University of Illinois at Chicago, (2001-2006). Before that he was a Visiting Research Assistant Professor at UC Davis, (1998-2000), and a Postdoctoral fellow at the University of Melbourne, Australia, (2000-2001). His PhD was completed in 1998 at UC San Diego.

Martin Olsson is a new Assistant Professor of Mathematics. He has been an Assistant Professor, (2004-2005), at the University of Texas, Austin. Previous to that, he was an NSF Postdoctoral fellow, (2001-2004), at MIT. His PhD, from 2001, is from UC Berkeley.

Constantin Teleman is a new Full Professor of Mathematics. After earning his PhD from Harvard University in 1994, he served as a Research Fellow at St. John's College, Cambridge, from 1995-1997. He was also an NSF Postdoctoral Fellow at Stanford University from 1994-1998. From 1999 to 2001, he was an Assistant Professor at the University of Texas at Austin, after which he returned to Cambridge University. ◆

Visiting Faculty

Alice Guionnet is visiting from Ecole Normale Superieure de Lyon as a Miller Visiting Research Professor. Her fields of interest include probability theory, large Random matrices, statistical mechanics, and free probability. ◆

(Chair's Message, continued from page 3)

But 939 will soon be outdone by a newcomer. The space in the middle of the 7th floor, which has been occupied by a computer lab, a storage room, and a graduate student lounge that never really "made it," will be completely renovated. The first step, due to begin soon, is the construction of a North-South corridor down the middle (like the one on the 8th floor). The old 708 will be broken into 6 spaces: two seminar rooms, the new Laboratory for Mathematics and Computation in Biology, a new computer lab with modern workstations and ergonomic furniture, and a couple of small spaces which will initially serve as storerooms, freeing up a couple of storerooms on the outer corridors for much-needed office space.

At present, our funding, consisting of accumulated savings from the last few years, is only enough to finish the computer lab and one of the seminar rooms, which will accommodate larger groups than 939. We will have to wait for more such savings, or perhaps a gift from a generous reader or readers of this newsletter (hint!), to make further progress. Eventually, we'd also like to make one of the small rooms into an interactive space where people can gather for discussion before and after seminars.

WHAT'S NEXT?

In addition to our expanding program in Mathematical Biology, we are initiating an undergraduate concentration in Teaching Mathematics. (See the article by Hung-Hsi Wu.) Also under consideration is an activity in Financial Mathematics.

Two activities this academic year will play a large role in our planning for the future.

The National Research Council is conducting its Assessment of Research Doctoral Programs, collecting information from departments around the country. This review, conducted every ten years, will rank departments according to various measures. The rankings

(continued on page 10)

GRADUATE STUDENT AWARDS

The following awards were announced at the Mathematics Department Commencement Ceremony held on May 22, 2006.

The Herb Alexander Prize was established by family and friends in the memory of Herbert Alexander, a distinguished complex analyst who received his PhD from Berkeley in 1968. The following students received a cash prize for an outstanding dissertation in pure mathematics: **Pinhas Grossman**, **Manjunath Krishnapur**, and **Rajan Mehta.**

The Bernard Friedman Memorial Prize in Applied Mathematics was established in 1966 as a memorial to Bernard Friedman, a distinguished applied mathematician and the ninth Chairman of the Department of Mathematics. Cash prizes were awarded to graduate students who demonstrated exceptional ability to do research in applied mathematics. The recipients were **Aaron David Ames**, Department of Electrical Engineering & Computer Science and **Nicholas Eriksson**, Department of Mathematics.

The Nikki Kose Memorial Teaching Prize was established in 1981 as a memorial to Nariaki (Nikki) Kose, a graduate student from Japan who died in a mountaineering accident in the summer of 1980. The prize is awarded to a Graduate Student Instructor for truly exceptional teaching performance. The recipient was **Alexander James Diesl**.

2005-2006 Outstanding Graduate Student Instructors:

Patrick Barrow, **Santiago Canez**, **Alexander Dugas**, **Joseph Farjoun**, **Fei Han**, **Yonatan Harel**, **Zachary Judson**, **Ari Nieh**, **Lindsay Stovall**, **Jiangang Yao**

UNDERGRADUATE STUDENT AWARDS

The following undergraduate students were honored at the May, 2006 Mathematics Commencement Ceremony.

The Departmental Citation, in recognition of being the top mathematics scholar in the 2004-2005 graduating class, was awarded to **Vedran Sohinger**. Vedran came to Berkeley from Croatia where he completed a year of college at the University of Zagreb. In addition to his 4.0 GPA in Math, he had a 4.0 in overall coursework. He was a member of the Berkeley team that earned Honorable Mention in the 2004 Putnam Competition, and he was awarded individual honorable mention honors in the 2005 competition. This fall, he began the Mathematics PhD program at MIT.

The Dorothea Klumpke Roberts Prize in Mathematics, a cash prize for seniors who have demonstrated truly exceptional scholarship in mathematics, was also awarded to **Adam C. Cabrera, Jun Andrew Kitagawa, Haijian Kevin Lin, Dominic C. A. McCarty, Andre James Minor, Paul Rene Monasterio** and **Vedran Sohinger**.

The Percy Lionel Davis Award for Excellence in Scholarship in Mathematics was established in honor of Percy Lionel Davis, who graduated in Engineering in 1913. The award acknowledges seniors who have demonstrated excellent scholarship in mathematics. The 2005-2006 recipients were **Enghin Atalay, Konstantinos Alexander Beros** and **Cinna Julie Wu**.

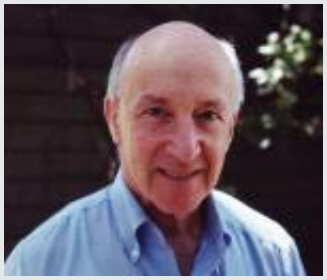
William Lowell Putnam Mathematical Competition:

A total of 3,545 students from 500 colleges and universities in Canada and the United States participated in the sixty-sixth annual competition held in December 2005. There were teams from 395 institutions.

In this competition, two graduating seniors, **Vedran Sohinger** and **Paul Rene Monasterio**, finished in the top 100. Vedran Sohinger received Honorable Mention in the Individual Category (as well as receiving Honorable Mention as a member of UC Berkeley's team at the December 2004 competition). Other scoring seniors in the 2005 exam include **Haijian Kevin Lin** and **Eugene Pyatigorsky**.

IN MEMORIAM

Leon Henkin 1921-2006



With great sorrow we announce the death of noted logician, colleague and friend, Leon Henkin.

Dr. Henkin served as Chair of the Department from 1984-85. Among his many accomplishments he worked to increase the number of underrepresented students in the mathematical sciences. In honor of these efforts, the Leon Henkin Citation for Distinguished Service was established by the University.

Irving Kaplansky 1917-2006

Also with regret, we announce the death of Irving "Kap" Kaplanksy, the second Director of the Mathematical Sciences Research Institute and former President of the American Mathematical Society.

Dr. Kaplansky's contributions to mathematics spanned over six decades. After receiving his PhD from Harvard in 1941, he taught mathematics at the University of Chicago for nearly forty years. His term as Director of MSRI lasted from 1985 to 1992. He was awarded the AMS Steele Prize for Lifetime Achievement in 1989.

CRAIG EVANS

CPAM NEWS

by Lawrence C. Evans

The Center for Pure and Applied Mathematics Lecture Series continues for the spring and fall of the academic year 2006-2007.

Our meetings are 11:30-1:00 on alternate Thursdays in the various rooms of the UC Faculty Club. The continuing format is that participants buy their own lunch and then meet to eat together and to hear a half-hour expository research talk given by a UC faculty member from the mathematical sciences.

This fall we heard the following very interesting talks by:
Martin Olsson - "The fundamental groupoid and arithmetic"
Vaughan Jones - "Linear algebra, multilinear algebra and planar algebra"
Elwyn Berlekamp - "Mathematics applied to the game of Go, and some of its history"
Claire Tomlin - " Mathematical modeling of protein regulatory networks"
Hugh Woodin - "The generic multiverse"
Grigory Barenblatt - "Fracture as a mathematical problem". ◆

GRATEFUL THANKS TO OUR FRIENDS

The Department of Mathematics extends heartfelt thanks to all our donors over the past years for their generous support. Our donors have contributed to the strength and vitality of our students and the Department. The list of our donors from 1996-2006 can be found on the departmental website at http://math.berkeley.edu/aboutus_gifts_donors.html.

We apologize if we have omitted anyone. Please do let us know if that is the case. A special thanks to all our donors who wish to remain anonymous. ◆

MANAGER'S REPORT

Mary Pepple, Manager

by Mary Pepple

Changing Places and New Faces

A fond farewell to Jeanne Coffee and Lynn Ly:

The spring 2006 semester began with the retirement of Jeanne Coffee from the Center for Pure and Applied Mathematics. She began working at the University in August 1985, and was hired to work for the Center for Pure and Applied Mathematics in 1990. Jeanne contributed 21 years of service to UC and will be missed by all of us.

In June 2006 Lynn Ly passed her Certified Public Accounting exam in California and was recruited by Clorox Corporation in Oakland to work in their accounting department. Lynn began working in the Math Department as a work-study student on February 3, 2000. She graduated from UC Berkeley, with a BA in Economics, in December 2003. She was hired full-time in December 2003 as an Administrative Assistant III to oversee Payroll and Travel for the Center for Pure and Applied Mathematics. We are very pleased that Lynn has received this terrific opportunity.

On January 18, 2006, Henrietta Williams joined our Student Services staff, replacing Alison Thompson as an Undergraduate Advisor. Henrietta previously worked for the Department of Economics for 4 1/2 years as the Administrator for the Robert D. Burch Center for Tax Policy and Public Finance. She has a Bachelor of Arts in Human Resources from Odessa State University, Ukraine. She speaks fluent Russian and Ukrainian and completed an advising internship with Catherine Pauling. We are extremely fortunate to have Henrietta join our staff.

On March 30, 2006, Thomas Brown was promoted to Student Affairs Officer III replacing Catherine Pauling. Thomas began working in the Graduate Office as a Student Affairs Officer I on July 18, 2000. In August 2002 Catalina Cordoba retired; Thomas was promoted to Student Affairs Officer II. During the 6 years that Thomas has worked in the Department, he has demonstrated excellent skills in student advising, administration, and communication. Thomas has a Master of Divinity from Fuller Theological Seminary in Pasadena, California. He has a strong commitment to students, staff, faculty, the Mathematics Department, and UC Berkeley. We are extremely fortunate to have Thomas assume the programmatic responsibility for Undergraduate Affairs.

Eva Wong was hired on June 13, 2006. She replaces Lynn Ly and is responsible for Contract and Grants Payroll and Travel. Eva has worked on Campus for 4 years, for the Institute for the Study of Social Change, the Berkeley Art Museum, and the Academic Achievement Program. Her work experience includes Contract and Grants Payroll, Travel Entertainment, and Purchasing. We are pleased to have Eva join our staff.

Barbara Fujisaka Waller was hired on June 19, 2006, and is our new Graduate Advisor & Program Coordinator replacing Thomas Brown. Barb graduated from UC Berkeley in 1978, with a Bachelor of Arts in English and has worked for the UC System for 27 years, starting with Loans and Collections at UCLA in 1979. In 1985, Barb transferred to Loans and Receivables at UC Berkeley, moving on to the Graduate Division in 1990. Barb has been advising graduate students and departments for the last 10 years. We are very fortunate to have her join our staff.

Dave Mina returned to work full-time on July 3, 2006. He is Jeanne Coffee's replacement and is responsible for Contract and Grants Accounting and Purchasing. Dave first came to the Math Department in 1989 as the Administrative Assistant Supervisor for the Math Diagnostic Testing Project. From July 2004 until March 2005 he worked for the Math Department as a Student Affairs Officer. With over 20 years of UC experience, we are very pleased that Dave returned to work for our research unit.

Judie Welch Receives Chancellor's 2006 Outstanding Staff Award

Judie Welch

Congratulations to Judie Welch who was selected to receive a Chancellor's 2006 Outstanding Staff Award. Judie is the Program Assistant for the Math Diagnostic Testing Project. She has done an outstanding job in her position since she arrived 2 years ago. We are extremely grateful for the commitment, dedication, teamwork, and flexibility she demonstrates every day in the work place. ◆

(Nobel Prize, continued from page 1)

cided to pursue a PhD in molecular biology at MIT. His choice of biology after mathematics was not an unusual one; in fact, he is not the first graduate of our Department to leave mathematics and subsequently receive a Nobel Prize in medicine. Hamilton O. Smith received a BA in mathematics from our Department in 1952, and went on to receive the Nobel Prize for his discovery of restriction enzymes. He also played a key role in sequencing the first bacterial genome: Haemophilus influenza. In his autobiography, Smith recalls that his interest in biology started when his brother showed him a book on mathematical modeling of central nervous system circuits.

Among our faculty, complex analyst Hans Bremermann developed an interest in mathematical biology in the 1960's and eventually moved to the Department of Molecular and Cell Biology where he did pioneering work on mathematical aspects of host-parasite interactions, mechanisms of HIV persistence, and the theory of dreams [1]. There are also many students who received PhD degrees in our Department who subsequently distinguished themselves in mathematical and computational biology after leaving mathematics. A prominent example is Phil Green (PhD 1976 with Marc Rieffel) who worked on operator algebras, assuming the position of Assistant Professor in Mathematics at Columbia University upon his graduation from Berkeley. After becoming interested in statistical genetics and attending an intensive summer course on molecular biology, he transferred to the Department of Pathology at the University of North Carolina on a postdoctoral research grant. He is now Professor of Genome Sciences at the University of Washington where he develops mathematical, statistical, and computer methods for analyzing the genomes of humans and other organisms. He is a member of the National Academy of Sciences [2]. David Jaffe (PhD 1987 with Robin Hartshorne) is a leader in developing methods for assembling genomes from data obtained using the sequencing technologies developed, in part, by Hamilton Smith.

The pattern of mathematical training followed by a complete transition to biology was a matter of choice in many of the cases mentioned above and was justified because the advances in molecular biology required only elementary mathematics or none at all. For example, Andrew Fire's discovery was based on careful experiments in roundworms, and the ingenuity of the discovery was not mathematical, but in the use of double-stranded RNA to selectively target genes. Nevertheless, as our understanding of biological systems becomes more detailed, mathematics is increasingly playing a central role in biology. In the case of RNAi, mathematics is required in order to design effective therapies, as is demonstrated in the work of Joshua Leonard, a PhD student in chemical engineering at UC Berkeley whom I taught in our course Math 127 (mathematical and computational methods in molecular biology) in 2004. To quote from the abstract in [6]: "The [mathematical] model provides quantitative predictions on how targeting multiple locations in the HIV genome, while keeping the overall RNAi strength constant, significantly improves efficacy." In related work, Christine Heitsch (PhD 2000 with John Rhodes) is using combinatorial methods to study RNA secondary structure [5]. She is now an Assistant Professor of Mathematics at Georgia Tech.

Heitsch is one of a growing number of PhD graduates from our Department who work on biology but have chosen to stay in mathematics. Other examples include Sebastian Schreiber (PhD 1995 with Charles Pugh) who is an Associate Professor of Mathematics at the College of William and Mary, and Julie Mitchell (PhD 1998 with Morris Hirsch) who is an Assistant Professor of Mathematics at the University of Wisconsin.

Indeed, mathematics students now no longer have to leave mathematics behind in order to contribute to molecular biology. While the connections between mathematics and biology were sporadic in the past, students now benefit from a program that is systematic and exciting. Many members of our faculty actively work on biological problems ranging from population genetics and genomics to carcinogenesis. A group focused on mathematics and computation in biology includes faculty members Steven Evans, Richard Karp, Lior Pachter, John Neu, Rainer Sachs, and Bernd Sturmfels [8]. Last year, Nicholas Eriksson was the first student from our Department to graduate with a PhD in mathematics together with a designated emphasis in computational biology. The rigorous requirements of the designated emphasis - candidates must complete the standard requirements of their PhD program in addition to taking extra courses and writing an interdisciplinary thesis - is resulting in exciting work in which new biology results are complemented by new contributions to mathematics inspired by biology [7].

In a recent article [3], Joel Cohen argues that "mathematics is biology's new microscope, only better" and that "biology is mathematics' next physics, only better." Despite this optimism, it is too early to predict a Nobel Prize in mathematical biology. However, what is certain is that our undergraduate and PhD students no longer have to choose between mathematics and biology and can fully embrace the new potent mix of the two sciences. The track record of our former students suggests that we can expect great discoveries from students who are now engaged in both the mathematical and biological sciences.

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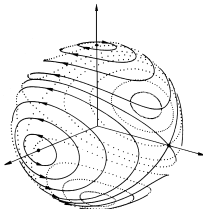
[8] Mathematical and Computational Biology in the Department of Mathematics, UC Berkeley. http://bio.math.berkeley.edu/. ◆

THE DEPARTMENT OF MATHEMATICS



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(California Teach, continued from page 3)

knowledge of mathematics that is, at once, correct and relevant to schools. It is hoped that, for the first time, our majors can look forward to entering the school classroom with the confidence that they have the knowledge needed for their teaching.

JAMES SIMONS

California Teach is not the first program to address the present inadequacy in K-12 math and science education. One other such program that deserves mention is Math for America (http://www.mathforamerica.org/), founded in 2004 by James Simons, President of the hedge fund giant Renaissance Technologies. Simons was a Berkeley math PhD (1962) and was also a distinguished mathematician ("Chern-Simons invariants"). The goal of Math for America is to encourage excellence in high school mathematics teaching by offering financial incentives to master math teachers. He is currently trying to get congress to pass a similar legislation. ◆

(Chair's Message, continued from page 5)

will be based on questionnaires sent to departments about their own activities, and peer reviews by other departments. The latter will make extensive use of department websites, so your comments on ours are especially welcome.

Second, we will be undergoing an Academic Program Review by the Berkeley Campus. Again, the procedure has changed since the last review in 1995. Early in 2007, we will be preparing an extensive self-study, which will be followed by a visit in the spring by a small panel of distinguished mathematicians from around the country.

Watch this space next year to find out how we did. ◆

EMMA LEHMER

November 6th was the 100th birthday of Emma Lehmer, a noted mathematician, alumna, and the wife of former faculty, Derrick Lehmer. She has published over 60 papers in the field of number theory. The Department wishes her a very happy birthday!

Alumni/ae News & Update Form (please type or print, using a separate sheet if necessary)

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Thank you for taking the time to help us plan for our next issue.
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CAL DAY will be on
Saturday,
April 21, 2007
Open from
9 am - 4 pm.
Come join the fun!

Serge Lange Lecture Series Begins

by Kenneth Ribet

In August, the Mathematics Department inaugurated The Serge Lang Undergraduate Lecture series with a lecture by William Stein of the University of Washington. For many years, noted mathematician Serge Lang spent his summer months on our campus. He often organized summer seminars to discuss current work in number theory and geometry. Beginning in the late 1990's, Serge began finishing off each summer with a lecture aimed at undergraduates, graduate students, and professional mathematicians. He lectured on such topics as the "abc Conjecture," "The Bateman–Horn Conjecture," and "Heat Kernels," usually to an overflowing lecture hall on the first day of classes of the fall semester. The impetus for the new lecture series came from the Mathematics Undergraduate Student Organization, which asked the simple question: "What do we do now that Serge has left us?" The new lecture series is a response to their query. The department hopes to raise enough funds to sustain the series; contributions are needed! The Lang Lectures will join the Bowen Lectures, the DiPerna Lectures, and the Chern Lectures, which have been the Department's flagship lecture series. The Lang Lectures are unique in that they are aimed specifically at undergraduates. For more information about the Department's annual events, see http://math.berkeley.edu/events.html. ◆

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