

Spring 2000

The Adolph C. and Mary Sprague Miller Institute for Basic Research in Science
University of California, Berkeley

Volume 2, Issue 2

Miller Institute News



Important Dates To Note

Monday, May 1:

Call for Miller Fellowship Nominations for 2001-2004.

Tuesday, August 22:

Call for Visiting Miller Professor nominations for 2001-2002. Call for applications for Miller Professorship program, 2001-2002.

Monday, September 25

Fall Reception at the Alumni House. Invitation only.

Monday, October 2

Deadline for Miller Professor applications.

Thursday, October 5:

Deadline for Miller Fellowship Nominations for 2001-2004.

Monday, October 9:

Deadline for Visiting Miller Professor nominations for 2001-2002

Wed., October 25:

Deadline for Miller Fellowship applications and letters of support.

All materials are due in the Institute office by 4:00 pm on deadline.

Farewell and Thanks to Professor Mildred Dresselhaus

Professor Mildred Dresselhaus completes her second and final term on the Miller Institute's Advisory Board as of June 30, 2000. She began her service in 1994, and over the past six years has provided wise advice that has been critical in guiding the Institute and its programs. Her engagement and influence will be missed.

Professor Dresselhaus is Institute Professor at the Massachusetts Institute of Technology. She is a National Medal of Science winner whose research has helped unveil the mysteries of carbon, the most fundamental of organic elements. Her research focus is on various carbon-based systems, including low dimensional thermoelectricity, magnetism, fullerenes

and nanotubes, and high temperature superconductivity.

Dresselhaus has served as chairman of the Board of Directors of AAAS, chairman of the National Academy of Sciences Planning Committee, and president of the American Physical Society. She is a member of the Council of National Academy of Engineering, NAS, and Materials Research Society. She has also chaired several national studies on education for the Department of Energy and the National Research Council.

President Clinton recently nominated Dr. Dresselhaus as the next Director of the Office of Science in the Department of Energy. Senate confirmation is pending.

Three -Year Miller Fellowship Term Announced

The goal of the Miller Research Fellowship program is to discover scientists of great talent or promise. In order to remain competitive and continue attracting brilliant young scientists to the program, the Miller Institute has extended the traditional two-year Miller Research Fellowship term to three years, beginning 2001. The next call for nominations will note the new term length. The Institute understands that not all candidates may wish to stay for the full term and will encourage those individuals to pursue their

career options as they arise.

Nominations must include the candidate's name, date of Ph.D., complete mailing and email addresses, phone and fax numbers, and letter of recommendation. The deadline for nominations is Thursday, October 5, 2000. Early nominations are encouraged.

The annual stipend for the Fellows will be increased from \$43,000 to \$45,000 per year effective August 2000.

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Introducing the Advisory Board Members

The Miller Institute is guided by a seven member Advisory Board. The President of the University is the official President of the Advisory Board according to the "Statement Establishing the Institute," however, that role has been delegated to the Chancellor of the Berkeley campus. Three of the seven members are Berkeley faculty and three are selected from outside the University. The term is three years and members typically serve two terms. The Advisory Board meets once a year to review and advise the Miller Institute on its programs.

Professor Jacqueline Barton is the Arthur and Marian Hanisch Memorial Professor of Chemistry at the California Institute of Technology. She was appointed to the Advisory Board on July 1, 1999 and is serving her first term. Professor Barton and her group's research is focused on the construction and application of transition metal complexes which recognize and carry out reactions on nucleic acids. The lab contains a mixture of inorganic, physical and biochemical perspectives aimed at the design of small transition metal complexes which recognize specific sites along nucleic acid polymers and through which specific chemistry may be targeted. An overall goal of this research program is to develop and exploit inorganic coordination chemistry to design new tools and techniques for molecular biology.

Professor Barton has received numerous awards, including the Alan T. Waterman Award of the National Science Foundation (1985), awarded to the outstanding young scientist in the United States, and the American Chemical Society Award in Pure Chemistry (1988). She received a MacArthur Fellowship and was elected to AAAS in 1991.

Professor Anthony Mahowald of the Department of Molecular Genetics and Cell Biology at the University of Chicago has been on the Advisory Board since July 1, 1995 and is serving his second term. Professor Mahowald's research focuses on the genetic control of oogenesis, using *Drosophila melanogaster* as a model system and in those genes required for the proper formation and differentiation of ovarian follicles.

One set of studies focuses on the formation of ovarian follicles in the germarium. Mahowald has shown that the ovarian tumor phenotype is usually due to a failure to properly establish female germline sex identity during differentiation of the adult ovary. He has recently become interested in a special subset of ovarian tumors which appear to be true germline "stem cell" tumors in as much as the cells retain their female character, and thus are not defective in sex determination, but fail to progress along the pathway to differentiation. Currently, Mahowald's laboratory is using these "stem cell tumor cells" as potential candidates for achieving targeted mutation in flies. He has succeeded in demonstrating that these tumor cells will grow in vitro and that they are capable of repopulating the adult ovary. Conditions for DNA transfection, drug selection and targeted mutagenesis are being worked out.

Professor Mahowald is a Fellow in the American Association for Advancement of Science and the American Academy of Arts and Science. He is a member of the National Academy of Sciences.

We would like to extend our welcome to **Dean Venkatesh Narayanamurti** of the Department of Engineering and Applied Sciences at Harvard University, who will be joining the Advisory Board on July 1, 2000. Before joining Harvard, Narayanamurti was the Dean of the College of Engineering at the University of California, Santa Barbara. Dean Narayanamurti has published widely in the areas of low temperature physics, superconductivity, semiconductor electronics and photonics. He is credited with developing the field of phonon optics-the manipulation of monoenergetic acoustic beams at terahertz frequencies. Narayanamurti's current research focuses on the physics of electron and hole transport in novel semiconductor electronic materials and devices.

Narayanamurti is a member of the National Academy of Engineering. He is also a Fellow of the American Physical Society; the American Association for the Advancement of Science; the IEEE; the Royal Swedish Academy of Engineering Sciences; the Indian Academy of Sciences; and Sigma Xi.





Recent Miller Institute Awards

Miller Research Fellowships

The Advisory Board of the Miller Institute has granted ten new Miller Fellowships for a two-year term, beginning August 1, 2000. Candidates are nominated by UC faculty, past Institute members, and a worldwide panel of scientists.

Astronomy	Ray Jayawardhana, Ph.D. Harvard University
Chemistry	Ilya Bezel, Ph.D. University of Southern California Garnet Chan, Ph.D. Cambridge University
Earth & Planetary Science	Yann Capdeville, Ph.D. University Paris 7 Davy Lheureux, Ph.D. Université Pierre et Marie Curie
Integrative Biology	Steven Poe, Ph.D. University of Texas at Austin
Mathematics	Bojko Bakalov, Ph.D. Massachusetts Institute of Technology
Molecular & Cell Biology	Rachel Winston, Ph.D. The Scripps Research Institute
Physics	Hyoung Joon Choi, Ph.D. Seoul National University Yasunori Nomura, Ph.D. University of Tokyo

Visiting Miller Professorships

The Advisory Board of the Miller Institute has granted awards to the following Visiting Miller Professors for terms ranging from one month to a full semester during the 2000-2001 academic year. Visiting Miller Professors are nominated by Berkeley faculty. Two competitions take place each year.

Astronomy	Prof. Bohdan Paczynski, Princeton University Prof. Ewine van Dishoeck, Leiden Observatory
Chemistry/ Chemical Engineering	Prof. Susannah Scott, University of Ottawa
ESPM	Prof. David DeRoiser, Brandeis University
Mathematics	Prof. Mark Haiman, University of California, San Diego
Molecular & Cell Biology	Prof. Marc Kirschner, Harvard Medical School
Physics	Prof. Christos Flytzanis, Ecole Polytechnique Prof. Gerd Schön, Universität Karlsruhe
Plant & Microbial Biology	Prof. James Barber, Imperial College
Statistics	Prof. Russell Lyons, Indiana University

Awards & Honors

Former Miller Professor (1982-1983) **Alexander Chorin** of the Department of Mathematics won the 2000 AMS-SIAM Norbert Wiener Prize in Applied Mathematics in recognition of his seminal work in computational fluid dynamics, statistical mechanics and turbulence. The Weiner Prize, presented by the American Mathematical Society and the Society for Industrial and Applied Mathematics, is one of the highest distinctions given in applied mathematics.

Former Miller Professor (1997-1998) **Donald DePaolo** of the Department of Geology & Geophysics was awarded the Guggenheim Fellowship for his research on the geochemical effects of magma generation and transport.

Former Miller Professor (1995-1996) **Alex Filippenko** of the Department of Astronomy was awarded the Guggenheim Fellowship for his research on the expansion of the universe.

Former Miller Professor (Spring '97) **Daniel Rokhsar** of the Department of Physics was awarded the Guggenheim Fellowship for his studies in computational and theoretical biology.

Former Miller Professor (Fall '96) **Stuart Russell** of the Department of Electrical Engineering and Computer Sciences, was named one of "15 people reinventing how we live" in the San Francisco Magazine, January 2000 issue. Russell was named for his "Batmobile", a car that could help solve traffic problems and make driving safer and easier.

Former Miller Professor (1967-1968) **Chang-Lin Tien** of the Department of Mechanical Engineering, was awarded the Madison Medal from Princeton University. The medal honors a graduate alumnus who has had a distinguished career, advanced the cause of education, or achieved an outstanding record of public service.

Members' Recent Publications

Miller Professor Costas Grigoropoulos completed a paper during his Fall 1999 term with the Miller Institute: "Excimer Laser-Induced Temperature Field in Melting and Resolidification of Silicon Thin Film," with Hatano, M., Moon, S., Lee, M., and Suzuki, K. It appeared in the Journal of Applied Physics, Vol. 87, pp. 36-43.

Visiting Miller Professor Stephen Hedrick published: "Commitment to the CD4 Lineage Mediated by Erk MAP Kinase and Lck Signaling," with L. L. Sharp. J Immunol. 1999 Dec. 15; 163(12):6598-6605., completed during his fall 1999 Miller term.

Former Visiting Miller Professor Lu Sham published an additional four papers as a result of research conducted during his Fall 1998 term with the Miller Institute. They include: "Collective Oscillations Driven by Correlation in the Number Optical Regime," with Th. Ostreich. Physical Review Letters. 25 October 1999; 83(17):3510-3513, "Polariton-Biexciton Transitions in a Semiconductor Micocavity," with U. Neukirch, S. R. Bolton, N. A. Fromer and D. S. Chemla. Physical Review Letters. 6 March 2000; 84(10): 2215-2218, "Electronic four-particle correlations in semiconductors: Renormalization of coherent pump-probe oscillations," with U. Neukirch, S. R. Bolton and D. S. Chemla. Physical Review B. 15 March 2000; 61(12): 7835-7837, and "Theory of spin coherence in semiconductor heterostructures," Journal of Magnetism and Magnetic Materials 200. January 1999; 219-230.

Former Visiting Miller Professor John Spence published two papers as a result of his Fall 1997 term with the Miller Institute: "The Future of Atomic Resolution Electron Microscopy for Materials Science," Materials Science & Engineering. 29 October 1999; R26(1-2): 1-49, and "Dynamic inversion by the method of generalized projections," with B. Calef and J. M. Zuo. Acta Crystallographica. 15 May 1998; A55: 112-118.

Visiting Miller Professor Éva Tardos completed a paper during her Fall 1999 term with the Miller Institute: "A Constant Factor Approximation Algorithm for a Class of Classification Problems," with Anupam Gupta. It will be presented at the annual ACM Symposium on the Theory of Computing, Portland, in May 2000.

Miller Fellow Focus: Deborah Croteau

Longer life spans may be one of the many benefits of the research being conducted by second year Miller Fellow Dr. Deborah Croteau. Under the guidance of Professor Stuart Linn in the Biochemistry and Cell Biology Division of the Department of Molecular and Cellular Biology, Dr. Croteau characterizes mitochondrial DNA repair enzymes. Specifically, her research focuses on defining what types of DNA repair mechanisms exist in human mitochondria.

Mutations in the mammalian mitochondrial genome, a closed circular DNA molecule of about 16.5 kilobases in size, may contribute to more diseases than any other double-stranded fragment of DNA of equal size. Dr. Croteau hypothesizes that defective mitochondrial genome which contributes to the rate at which we age. One of the first challenges Dr. Croteau faced after becoming a Miller Fellow was obtaining the raw material she needed to extract mitochondria from: fresh calf liver. Two less than glamorous expeditions to Rancho Meat, in Petaluma, yielded sufficient fresh cut liver for the necessary experiments. Dr. Croteau used traditional column chromatography methodology to purify an 8-oxoguanine DNA N-glycosylase/AP lyase and an AP endonuclease from bovine

mitochondria. She believes that the 8-oxoguanine DNA N-glycosylase/AP lyase protein is expressed from the nuclear human Oxoguanine glycosylase gene (Ogg1). Dr. Croteau's current work is to clone the gene responsible for the mitochondrial AP endonuclease since it is not derived from the gene which codes for the nuclear AP endonuclease (APE).

When Dr. Croteau is not in the lab, she can usually be found playing with her two kids: Casey, who will celebrate her third birthday in August, and Jacob, who was born on July 4, 1999.



In the fall, Dr. Croteau is planning to join the laboratory of Professor Aziz Sancar, at the University of North Carolina-Chapel Hill, where she will study the DNA damage and replication checkpoint pathway in mammalian cells. This research will increase our knowledge of the DNA damage response pathways in mammalian cells and potentially has implications for the etiology of certain types of cancer.

Christmas in April: Miller Institute Team Volunteers



L to R: MF Adam Summers, Nathan Lovejoy, Rene Tipton, Mitch Hammond, Kathy Day-Huh, Chris Smith, MF Michiel Hogerheijde, Suzanne Smith, Jennifer Francis, MF Matt Francis, Sharalyn Lehman, MF Qun Shan.

On Saturday, April 8, 2000, Miller Fellows joined in the nation-wide Christmas in April campaign. Christmas in April is a volunteer effort, which rehabilitates the houses of low-income elderly or disabled homeowners.

The Miller Institute team helped at the home of Chris and Suzanne Smith in Berkeley to make the home wheelchair accessible. Furniture was moved, walls were primed for later painting, bushes and trees were trimmed, and a wheelchair ramp was constructed. Work continued on the home with other volunteer teams throughout the month of April.

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Please send address corrections to the Miller Institute



Miller's Stork Club

The Miller Institute would like to congratulate Executive Director Raymond Jeanloz and his wife Jennifer Romero on the birth of their daughter, Ana Louise Jeanloz. Ana was born on March 10 and weighed in at a petite 5 pounds. Former Miller Fellow, Professor Kevin Buzzard also became a proud father with the arrival of his son, Joel Buzzard.



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