TRANSITIONS

Science Board

This group of scientists and educators, drawn from a wide variety of fields, oversees the general direction, integration and quality of the Institute's research. These are the newest members:

With his appointment as co-chair (with Simon Levin) of the Science Board, **David K. Campbell** continues in a new role his long-standing relationship with SFI. Provost at Boston University, Campbell's most recent work focuses on possible observable consequences of chaos and quantum chaos in nanoscale structures and true many-body studies of the effects of electron-electron interactions in novel materials. He is editor-in-chief of the quarterly journal *Chaos.*

Walter Fontana, systems biology professor at Harvard Medical School, views aging as a key problem in systems biology. "The phenomenon of aging touches on every important and as yet ill-defined concept in biology," he says. (See "Toward a Theory of Aging" in this issue for more about this work.) In 2005, he established the Fontana Lab to address fundamental problems in systems biology. Prior to his appointment at Harvard, Fontana was a member of the Resident Faculty at SFI, 1998 to 2004.

The James Tobin Professor of Economics at Yale University **John Geanakoplos's** research interests include various aspects of economic theory. In 1990–1991 and again in 1999–2000 Geanakoplos directed the economics program at the Santa Fe Institute, and he continues active collaborations with the community. Geanakoplos teaches mathematical economics and microeconomic theory at Yale and also directs the Cowles Foundation for Research in Economics there.

Eric Klopfer, Scheller Career Development Professor of Science Education Technology at the Massachusetts Institute of Technology and director of the MIT Teacher Education Program, develops computer games and simulations for learning science and complex systems. For him, SFI science is about fundamental concepts that transcend disciplines. "Most importantly it is about research and education around

DRAWING BY PATRICK McFARLIN

these significant paradigms of modern science," he says. Klopfer works with teachers, enabling them to use technology to enhance science learning in kindergarten through high school.

Science Board Co-Chair **Simon Levin** is Moffett Professor of Biology and director of the Center for BioComplexity at Princeton University. His work involves evolution of diversification and conservation implications of ecological work. Levin is a 2005 Kyoto Prize Laureate, with his award citing his work "for the establishment of the field of spatial ecology and the proposition of the biosphere as a 'complex adaptive system.'"

Professor of Geochemistry in the Department of Earth and Planetary Sciences at Harvard University and Director of the Laboratory for Geochemical Oceanography **Dan Schrag** studies oceans and climate using analytical chemistry and modeling. In particular Schrag uses Pacific corals to study El Niño and modern ocean circulation, deep sea sediments to study the last ice age, and ancient sediments to study Neoproterozoic Snowball Earth. Schrag will deliver SFI's 2007 Ulam Memorial Lectures "Ancient Perspectives on Future Climate" in September.

Science Steering Committee

This group meets on a bi-monthly basis to advise the SFI administration on science issues. SFI welcomes this new member:

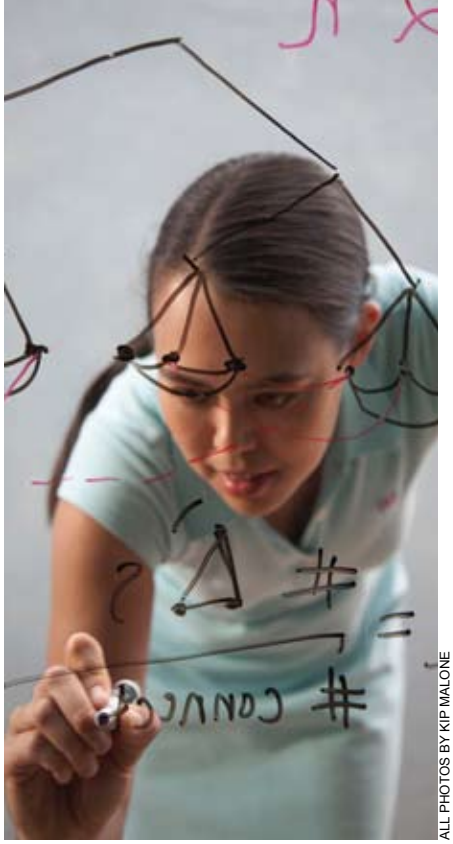
For **Tanmoy Bhattacharya,** SFI science offers a cross-disciplinary approach to research and discovering the laws for emergent systems in terms of the elementary dynamics. As a staff member at Los Alamos National Laboratory and faculty member at SFI, his research includes studying the available genetic history of the HIV virus and testing how the evolution of the virus has been constant in time.

Board of Trustees

SFI's trustees are drawn from leaders in business and finance, the academic world, and the public sector. Here are the newest additions to an accomplished roster:

Elizabeth Hughes Eginton serves as senior vice president and director of corporate strategy for Legg Mason Capital Management. Before joining Legg Mason in 2005, she worked at McKinsey & Company consulting with asset management and financial services clients on strategy and business development.

Private investor **Dan Lynch** promotes internet use and computer networking. His investments include a variety of internet start-up companies. Lynch, founder of CyberCash, Inc. and Interop Company, a division of Key3Media,



ALL PHOTOS BY KIP MALONE

resides in St. Helena, CA, where he tends grapes at his small winery.

Legg Mason's Senior Vice President, Chief Investment Strategist **Michael J. Mauboussin's** work focuses on creating value for both the company and the investor. His multi-disciplinary approach has been featured in many national publications, including his most recent book *More Than You Know: Finding Financial Wisdom in Unconventional Places* (Columbia University Press, 2006).

Garrett Thornburg is chairman, chief executive officer, and founder of Thornburg Investment Management, Thornburg Securities Corporation, and Thornburg Mortgage Corporation. Thornburg has gained recognition as a leader in innovative investment strategies.

External Faculty

The driving force of SFI's scientific life is its network of external researchers, affiliated with universities and research institutions throughout the world. Here are the most recent additions:

As Professor and Chairman of Computer Science at the University of New Mexico, **Stephanie Forrest** studies computer immune systems. "Although there are many differences between living organisms and computer systems, we believe that the similarities are compelling and could point the way to improved computer security," she says. Forrest's other research topics include cancer as an evolutionary system, genetic algorithms, and biologic modeling.

James Hartle's research focuses on relativity and quantum cosmology at the University of California, Santa Barbara, Department of Physics. He sees the central problem in modern cosmology as finding a simple and compelling theory of the initial conditions of the universe that will predict testable correlations among observations today.

Ray Jackendoff, professor emeritus and advisor to the linguistics program at Brandeis University, researches the semantics of natural language. He also has worked extensively with the relationship between conscious awareness and the computational theory of mind, syntactic theory, and musical cognition. Jackendoff's new book, *Language, Consciousness, Culture: Essays on Mental Structure,* is due out in 2007.

Associate Professor at the University of Chicago **John Padgett** continues his work on Renaissance Florence primarily through tracing empirically and through modeling the catalytic co-evolution of multiple, cross-cutting social networks over time. For the past fifteen years, Padgett has been constructing from primary archival sources a massive quantitative data set about social-network evolution over the two hundred years: 1300–1500. Renaissance Florence was the arena for many history-altering organizational and technical inventions in numerous domains.

Postdoctoral Fellows

Several parts of the SFI research program host postdoctoral fellows and researchers. Here are the newest fellows:

Aaron Clauset's research spans several areas of the study of complex systems. His primary research focuses on the development of statistical models of, and data-analysis methods for, complex networks in the social, biological, and technological fields. Much of this work has been methodological, bringing together tools from statistics, learning theory, computer science, and physics. His current research focuses on directly modeling the highly heterogeneous structure of networks, e.g., the hierarchical organization of modular structures, and the development of a mathematically principled framework for testing network hypotheses. In addition to these areas, he is interested in statistical

models of conflict (terrorism) and macroevolution. These foci pose interdisciplinary questions about the origin of certain empirical patterns such as scaling laws that can possibly be best explained using ideas from physics or statistics. Clauset received his Ph.D. in computer science from the University of New Mexico.

Charles Efferson holds a joint postdoctoral fellowship appointment at SFI and the Institute for Empirical Research in Economics at the University of Zurich. His work focuses on human economic behavior including social learning, social preferences, and consideration of humans as an ecologically successful species. A growing evolutionary literature provides many explanations for how and why humans seem to be so successful in this regard. Efferson is working on developing a complementary ecological theory that integrates consumer-resource modeling from both economic growth theory and theoretical ecology.

Miguel Fuentes' interests are wide ranging, but in particular he works on mathematical models of biological systems. He has investigated theoretical and experimental models describing biological and chemical systems under the frame of reaction convection diffusion equations and stochastic processes. As a postdoctoral fellow at the Consortium of the Americas for Interdisciplinary Sciences (University of New Mexico), he studied evolution and formation of patterns in bacterial populations. Fuentes has also conducted research at the Statistical Physics Group at Centro Atómico Bariloche.

Emily Gamber Burkhead's research interests are in ergodic theory and dynamical systems, and in particular, symbolic dynamics and cellular automata. Burkhead completed a master's project that investigated a particular classification of one-dimensional cellular automata, and then developed a topological classification of cellular automata in higher dimensions for her Ph.D. thesis (completed at the University of North Carolina at Chapel Hill).

Daniel Hruschka studies how human institutions arise, persist, and change, by focusing on a particularly small-scale process—the cultivation and maintenance of dyadic social relationships, while focusing on social relationships as simplified models for understanding institutional dynamics. As a doctoral student in anthropology at Emory University, he approached these problems using social network analysis, agent-based modeling, comparative sociology, and ethnographic fieldwork. At SFI, he will extend this work by using behavioral experiments to study how individuals regulate behavior (their own and others') in the context of long-term relationships.

Sander van Doorn, who received his Ph.D. from the University of Groningen in the Netherlands, is interested in the interaction between ecology and evolution. One of his core research interests is sympatric speciation, and he works on various topics that are connected with

this research area, e.g., frequency-dependent selection, the maintenance of genetic variation under disruptive selection, and the evolution of assortative mating. Another favorite research theme is sexual selection. This work has concentrated on the evolution of complex mating preferences and the coevolutionary dynamics of mating preferences and condition-dependent signaling and the evolution of sex chromosomes.

Awards

Kenneth J. Arrow, SFI Science Board member and professor at Stanford University, received the nation's top science honor, the National Medal of Science, for his contributions in the field of economics. President Bush presented the National Medals of Science and Medals of Technology to 10 people and 5 companies, saying the medals were the "highest award a president can bestow for astounding achievement in science and technology." The National Medal of Science Award, established by Congress in 1959, is administered by the National Science Foundation, while the National Medal of Technology, established by Congress in 1980, is administered by the Commerce Department.

Samuel Bowles, SFI research professor, will present a keynote address to the human development and economics staff of the World Bank at their annual Human Development Week, October 31–November 3.

Jim Brown, SFI External Faculty member and Science Steering Committee member and professor at the University of New Mexico, was recently elected Honorary Member of the American Society of Mammalogists, the highest honor conferred by the ASM.

Lisa Curran, SFI external professor and professor at the School of Forestry and Environmental Sciences at Yale University, has been awarded a 2006 MacArthur Foundation Fellowship. The fellowship award describes Curran as a "Tropical Forester combining expertise in ecological processes with insights into the realities of forest communities to address deforestation and its environmental consequences in endangered areas around the world."

Peter Schuster, SFI External Faculty member and professor at the University of Vienna, has been elected president of the Austrian Academy of Sciences.

David Sherrington, SFI External Faculty member, has been chosen to receive the 2007 Dirac Medal and Prize of the Institute of Physics. The prize is awarded annually for "outstanding contributions to theoretical (including mathematical and computational) physics."

SFI President and Distinguished Professor **Geoffrey B. West** was awarded the Weldon Memorial Prize. The prize is given to the person who, in the judgment of the electors, has, "in the 10 years next preceding the date of the award, published the most noteworthy contribution to the development of mathematical methods applied to problems in biology." ◀