



Update

July/August 2009



Jerry Sabloff named new SFI President

SFI's Board of Trustees, with input from the Institute community, has named Jeremy Sabloff to replace Geoffrey West and become the Institute's 7th President.

Sabloff is an eminent archaeologist known for his discoveries in prehistoric settlement patterns, pre-industrial cities, and ancient Maya civilization (see "Jerry Sabloff's background"

on page 3). His contributions to archaeological theory and method provide a strong link to the research at SFI that focuses on uncovering the fundamental scientific principles that govern physical, living, and social systems.

Sabloff will take the reins August 1, 2009. (See "An interview with incoming SFI President Jerry Sabloff" on page 3.)

"We are delighted Jerry has accepted our offer," says Bill Miller, Chairman of SFI's Board of Trustees and Chairman and Chief Investment Officer of Legg Mason Capital Management. "We need a broad and deep intellectual to build SFI's scientific footprint, and Jerry uniquely combines an understanding of our multidisciplinary science with executive-level administrative and fundraising experience."



Jerry Sabloff



Jerry Sabloff during a recent trip to western Mongolia

Geoffrey is stepping down after four years as President and will return to his research full time as an SFI Distinguished Professor. He plans to continue his work in biological scaling and continue to extend these ideas to cities and corporations as a means of exploring a more holistic framework for sustainability.

Says Geoffrey: "I am so pleased to turn the reins over to such a distinguished and accomplished scientist, knowing that Jerry will both build SFI's scientific leadership position and broaden our base of financial support." ■

IN THIS ISSUE

- > Lit Bits 2
- > Computational immunology 2
- > Sustainability school 2
- > Student, teacher awards 2
- > Origins of life for teachers 2
- > Interview with Jerry Sabloff 3
- > SFI heads to China 3
- > SFI In the News 4

INSIDE SFI

Three new Omidyar Fellows to join SFI

Ten current SFI Postdoctoral Fellows were named Omidyar Fellows earlier this year; they will be joined by three new Omidyar Fellows for 2009 in the fall and winter.

The Omidyar Fellows Program was established at SFI in late 2008 with a gift from eBay Founder Pierre Omidyar, an SFI Trustee. The program aims to attract scholars from the social, physical, and natural sciences to spend two to three years as postdoctoral fellows at SFI delving into the major questions facing science and society, using a multidisciplinary, systems-thinking approach.

> more on page 4

Balancing innovation and regulation in financial markets

The massive disruption of the world economy in recent months has many in government and the general public calling for new regulations to control the system's sensitivities to upsets.

Market practitioners are often wary of any new regulatory mechanisms, arguing that with new regulations comes a reduced ability to innovate, or create the new financial instruments that can help distribute capital efficiently.

But in many highly complex adaptive systems – in biology, physics, society, or economics, for example – regulation and innovation coexist and often co-evolve in ways that make separating them difficult.

At a May 15 Business Network meeting at Fidelity Investments headquarters in Boston, some 50 financial experts and scholars spent a day sharing ideas from a variety of fields about the intertwined nature of these two forces. SFI and Fidelity co-sponsored the gathering.

"Financial practitioners will say that regulation stanches innovation," says the meeting's organizer, SFI External Professor and Dartmouth College Professor of Mathematics and Computer Science Dan Rockmore. "We know, in fact, that regulatory mechanisms, whether naturally occurring or intentionally imposed, are not always bad for the system. Regulation and innovation work and evolve together at times to either make the system more stable or destabilize it."

The meeting's participants, he says, spent the day looking at different kinds of regulatory mechanisms and the back and forth between the two actors and, in typical SFI fashion, "tried to find big, central ideas across disciplines."

SFI Faculty Chair and Professor David Krakauer spoke to the group about the co-evolution of innovation and regulation in biological selection and development, and its possible implications for complex social systems such as the economy.

Jeff Madrick, editor of *Challenge* magazine and director of policy research at the Schwartz Center for Economic Policy Analysis, The New School, surveyed lessons from previous economic collapses. He said innovation is almost always considered a healthy characteristic of finance, but waves of innovation often lead to crashes and recessions. A lack of or loosening of regulations also have repeatedly given rise to tidal waves of innovation that create severe instability. These patterns call for a deeper look at regulatory control of economic systems, he said.



In a key afternoon presentation, Sean Belka, senior vice president and director of Fidelity's Center for Applied Technology, said ideas are at the core of innovation. He explored ways to create and manage an "idea ecosystem" in an organization to generate more and better ideas that serve customers and create a competitive advantage.

During the meeting the participants discovered linkages between "what someone in the financial products industry might be thinking about and what the people in biology and ecology and economics are thinking about," says Dan.

He says it became clear during the day that "there are, at some level of abstraction, lessons that can be shared in both directions. The speakers gave the people at the meeting an opening to think about these linkages." ■

PEOPLE

Four Omidyar Fellows accept faculty positions

Four Institute Omidyar Fellows recently have accepted faculty appointments at universities around the world.

"These are extraordinary offers in this economy and job climate, but then these are extraordinary young researchers," says Omidyar Fellows Program Manager Barbara Kimbell.

Dan Hruschka becomes an assistant professor in the School of Human Evolution and Social Change at Arizona State University in August 2009.

Sander van Doorn will join the University of Bern, Switzerland, as an associate professor in the fall of 2009.

Jessika Trancik has accepted a position beginning in January 2010 as an assistant professor in the Engineering Systems Division at MIT.

Aaron Clauset plans to join the University of Colorado, Boulder, in fall 2010 as an assistant professor in the Department of Computer Science. ■

LIT BITS

Culture and epidemiology special issue: Towards an integrated study of culture and population health; Kohrt, B.; Hadley, C.; **Hruschka, Dan [SFI Omidyar Fellow]**; *Annals of Human Biology* 36 (3), 2009, pp. 229-234

Culture as an explanation in population health; **Hruschka, Dan [SFI Omidyar Fellow]**; *Annals of Human Biology* 36 (3), 2009, pp. 235-247

Parkinson's Law quantified: Three investigations on bureaucratic inefficiency; Klimek, P.; Hanel, R.; **Thurner, Stefan [SFI External Professor]**; *Journal of Statistical Mechanics – Theory and Experiment*, March 2009, pp. 184-196

Networks, propinquity, and innovation in knowledge-intensive industries; Bunker Whittington, K.; Owen-Smith, J.; **Powell, Woody [SFI External Professor]**; *Administrative Science Quarterly*, March 2009

Epidemic thresholds in dynamic contact networks; Volz, E.; **Meyers, Lauren [SFI External Professor]**; *Journal of the Royal Society Interface* 6 (32), March 6, 2009, pp. 233-241

Explosive percolation in random networks; Achlioptas, D.; **D'Souza, Raissa [SFI External Professor and Science Steering Committee Member]**; Spencer, J.; *Science* 323 (5920), March 13, 2009, pp. 1453-1555

Partial protection of simian immunodeficiency virus (SIV)-infected rhesus monkeys against superinfection with a heterologous SIV isolate; Yeh, W.W.; Jaru-Ampornpan, P.; Nevidomskyye, D.; Asmal, M.; Rao, S.S.; Buzby, A.P.; Montefiori, D.C.; **Korber, Bette [SFI Research Professor]**; Letvin, N.L.; *Journal of Virology* 83 (6), March 15, 2009, pp. 2686-2696

Random acyclic networks; Karrer, B.; **Newman, Mark [SFI External Professor and Science Board Member]**; *Physical Review Letters* 102 (12), March 27, 2009, pp. 305-308

Sequence assembly; Scheibye-Alsing, K.; Hoffmann, S.; Frankel, A.; Jensen, P.; **Stadler, Peter [SFI External Professor]**; Mang, Y.; Tommerup, N.; Gilchrist, M.J.; Nygard, A.B.; Cirera, S.; Jorgensen, C.B.; Fredholm, M.; Gorodkin, J.; *Computational Biology and Chemistry* 33 (2), April 2009, pp. 121-136

Non-coding RNA annotation of the genome of *Trichoplax adhaerens*; Hertel, J.; de Jong, D.; Marz, M.; Rose, D.; Tafer, H.; Tanzer, A.; Schierwater, B.; **Stadler, Peter [SFI External Professor]**; *Nucleic Acids Research* 37 (5), April 2009, pp. 1602-1615

The adaptive dynamics of turnout; **Collins, Nathan [SFI Omidyar Fellow]**; Kumar, S.; Bendor, J.; *The Journal of Politics*, 71 (2), April 2009, pp. 457-472

On the generative nature of prediction; Loehr, W.; **Ay, Nihat [SFI External Professor]**; *Advances in Complex Systems* 12 (2), April 2009, pp. 169-194

Mathematical modeling of tuberculosis epidemics; Aparicio, J.P.; **Castillo-Chavez, Carlos [SFI External Professor]**; *Mathematical Biosciences and Engineering* 6 (2 SP ISS), April 2009, pp. 209-237

Stability criteria for q-expectation values; Hanel, R.; **Thurner, Stefan [SFI External Professor]**; *Physics Letters A* 373 (16), April 6, 2009, pp. 1415-1420

An integrative framework for stochastic, size-structured community assembly; O'Dwyer, J.P.; Lake, J.K.; Ostling, A.; Savage, V.M.; **Green, Jessica [SFI External**

Professor]; *Proceedings of the National Academy of Sciences* 106 (15), April 14, 2009, pp. 6170-6175

Distributed robustness in cellular networks: Insights from synthetic evolved circuits; Macia, J.; **Solé, Ricard [SFI External Professor]**; *Journal of the Royal Society Interface* 6 (33), April 6, 2009, pp. 393-400

Quantitating the multiplicity of infection with human immunodeficiency virus type 1 subtype C reveals a non-Poisson distribution of transmitted variants; Abrahams, M.R.; Anderson, J.A.; Giorgi, E.E.; Seoighe, C.; Mlisana, K.; Ping, L.H.; Athreya, G.S.; Treurnicht, F.K.; Keele, B.F.; Wood, N.; Salazar-Gonzalez, J.F.; **Bhattacharya, Tanmoy [SFI Professor]**; Chu, H.; Hoffman, I.; Galvin, S.; Mapanje, C.; Kazembe, P.; Thebus, R.; Fiscus, S.; Hide, W.; Cohen, M.S.; Karim, S.A.; Haynes, B.F.; Shaw, G.M.; Hahn, B.H.; et al; *Journal of Virology* 83 (8), April 15, 2009, pp. 3556-3567

The reality game; Cherkashin, D.; **Farmer, Doyne [SFI Professor and Science Steering Committee Member]**; **Lloyd, Seth [SFI External Professor]**; *Journal of Economic Dynamics & Control* 33 (5 SP ISS), May 2009, pp. 1091-1105

INSIDE SFI

Teachers to bring origins of life science to students

This month 20 secondary school science teachers from around the country are attending an SFI workshop to learn the latest on the chemical origins of life and the development of modern genetic code. They then will take the ideas, tools, and inspiration from the workshop back to their students this fall.

The July 5-18 workshop, "Emergence of Life: From Geochemistry to the Genetic Code," is the outreach component of an SFI-led research project of the same name. Both were enabled by a five-year National Science Foundation grant through its Frontiers in Integrative Biological Research (FIBR) program. FIBR supports multidisciplinary research as a way to explore the great unknowns of biological science.

Workshop coordinator Paige Prescott, a secondary school science teacher in Santa Fe, describes another of the workshop's goals. "We're trying to enable them to help their students see science connections across different disciplines," she says.

Teacher-led sessions complement the researchers' lectures. Discussions focus on the project's findings as well as its biochemistry, computer simulation, genetics, geochemistry, microbiology, and physics components.

"Often, science is taught without context," says Paige, who is writing the workshop's curriculum. "We are encouraging teachers to help students understand scientific concepts within a greater scheme."

Paige is no stranger to incorporating multidisciplinary philosophy into her own and others' science classrooms. She also serves as facilitator and regional coordinator of the SFI-hosted Project GUTS (Growing Up Thinking Scientifically), a science, technology, engineering, and math program for middle school students in New Mexico. ■

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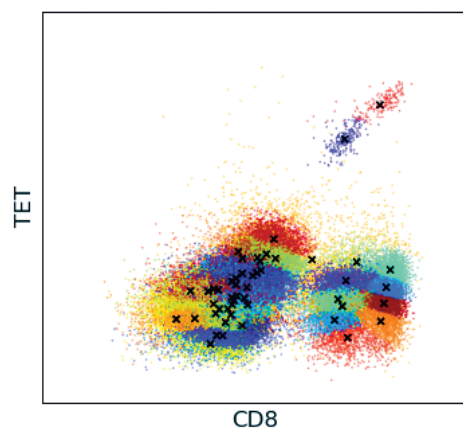
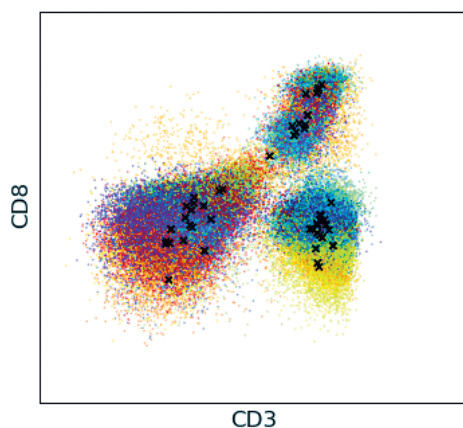
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These two automatically-generated images show different two-dimensional slices of high-dimensional data about human blood cells.

RESEARCH NEWS

Workshop: Engineering new vaccines

Thomas Kepler wants to engineer vaccines just like others have engineered semiconductors.

Doing so requires understanding how vaccines work and why they sometimes fail. And doing that requires quantitative tools like the ones Kepler, a Duke University computational immunologist and former SFI Vice President, is building. In August he is leading a workshop at SFI on "Quantitative and Systems Biology" to introduce graduate students and postdocs to these new techniques.

One of the methods his team has developed provides a kind of X-ray view into the workings of immune cells, including dendritic cells. Dendritic cells are couriers that are activated by the vaccine and then transport it into the lymph node, where the protective immune reaction begins. Some candidate vaccines fail because

too few dendritic cells are activated to play their role. Immunologists use a technique called "flow cytometry" to count the dendritic cells in a lymph node and see if they've carried the vaccine in.

Flow cytometry produces overwhelming volumes of data: millions of points in spaces of as many as 20 dimensions. To make sense of it, researchers have had to pick out dozens of two-dimensional views and make judgments on what they see. Computers, however, can analyze all these points and dimensions at once, picking out patterns people would never catch.

"With these tools, when a vaccine doesn't work, we don't have to just throw it out," Kepler says. "Sometimes we can see that if we changed it a little, maybe we could make it work better." ■

INSIDE SFI

Sustainability school focuses on climate

SFI and the Department of Energy's National Renewable Energy Laboratory (NREL) are hosting an intensive two-week Global Sustainability Summer School July 12-25 to explore global sustainability from many perspectives. The primary focus will be problems posed by climate change and some potential solutions.

The 32 participants represent 10 countries and dozens of disciplines and include graduate students, postdocs, faculty from a variety of colleges and universities, and individuals from government and the private sector.

Topics include population and social development and their effects on energy resource consumption, climate and energy economics, energy technologies and associated paths to a low-carbon energy infrastructure, land use, and innovation and technology.

Co-directors are Doug Arent, Director of NREL's Strategic Energy Analysis group; SFI Professor Doyne Farmer; John Schellnhuber, Professor and Director of the Potsdam Institute; and SFI Omidyar Fellow Jessika Trancik.

"Understanding how to achieve global sustainability will involve interactions between the economy, the environment, and social systems," says Doyne. "It is an ideal arena where complex systems thinking can have a positive impact on humanity."

The program is sponsored by SFI, NREL, and the National Science Foundation. ■

INSIDE SFI

SFI honors 8 students, teacher

At a May 13 awards ceremony at SFI, the Institute honored eight high school seniors and one teacher for outstanding performance in science and mathematics.

Students from area high schools are selected for SFI's annual Prize for Scientific Excellence by a committee of the schools' science and math teachers. The teacher is selected by an SFI committee based on nominations submitted by school administrators.

The 2009 winning students and their schools were:

- Caroline Binkley, Santa Fe Preparatory School
- David Calhoun, Academy for Technology and the Classics
- Emily Estes, SER/SFPS Career Academy
- Joseph Grimley, Santa Fe Indian School
- Dustin Johnson, Santa Fe Waldorf High School
- Daniel Loya-Venzor, Monte del Sol Charter School

- Jake Matthews, St. Michael's High School
- Rose Morris-Wright, Desert Academy

The winning teacher for 2009 was former biomedical engineer and current biology teacher Bob Sorensen of Capital High School in Santa Fe. His nominator, Jim Brookover of Capital, says Sorensen has collaborated with local health institutions to develop a hands-on, career-directed education program that is leading ever-increasing numbers of students into health-related fields.

SFI's Prize for Scientific Excellence was established in 1996 at the suggestion of SFI Distinguished Fellow and Trustee Murray Gell-Mann. The teacher's award was begun in 2005.



Participating in the May 13 ceremony were (standing, left to right) Daniel Loya-Venzor, David Calhoun, Benjamin Migliori, Bob Sorensen, Caroline Binkley, Dustin Johnson, Rose Morris-Wright, Emily Estes, Jake Matthews, Joseph Grimley and (seated) Robert Eisenstein (Santa Fe Alliance for Science President), Murray Gell-Mann (SFI Distinguished Fellow), and Geoffrey West (SFI Distinguished Professor). (Image: Nerissa Escanlar)

For the second consecutive year, the prize was co-sponsored by the Santa Fe Alliance for Science. The program owes much to the Alliance's President, Bob Eisenstein, says Lee Goodwin, SFI Administrative Assistant for Education Programs. ■

LIT BITS (cont.)

A general quantitative theory of forest structure and dynamics; **West, Geoffrey [SFI President and Distinguished Professor]**; **Enquist, Brian [SFI External Professor]**; **Brown, Jim [SFI External Professor and Science Steering Committee Member]**; *Proceedings of the National Academy of Sciences* 106 (17), April 28, 2009, pp. 7040-7045

Extensions and evaluations of a general quantitative theory of forest structure and dynamics; **Enquist, Brian [SFI External Professor]**; **West, Geoffrey [SFI President and Distinguished Professor]**; **Brown, Jim [SFI External Professor and Science Steering Committee Member]**; *Proceedings of the National Academy of Sciences* 106 (17), April 28, 2009, pp. 7046-7051

Eigenbehaviors: Identifying structure in routine; **Eagle, Nathan [SFI Omidyar Fellow]**; **Pentland, A.S.**; *Behavioral Ecology and Sociobiology* 63 (7), May 2009, pp. 1057-1066

Anyonic order parameters for discrete gauge theories on the lattice; **Bais, Sander (F.A.) [SFI External Professor]**; **Romers, J.C.**; *Annals of Physics* 324 (5), May 2009, pp. 1168-1175

The market organism: Long-run survival in markets with heterogeneous traders; **Blume, Lawrence [SFI External Professor]**; **Easley, D.**; *Journal of Economic Dynamics & Control* 33 (5 SP ISS), May 2009, pp. 1023-1035

Scaling relations for a functionally two-dimensional plant: *Chamaejasme setiloba* (Euphorbiaceae); **Koontz, T.L.**; **Petroff, A.**; **West, Geoffrey [SFI President and Distinguished Professor]**; **Brown, Jim [SFI External Professor and Science Steering Committee Member]**; *American Journal of Botany* 96 (5), May 2009, pp. 877-884

Computational applications of nonextensive statistical mechanics; **Tsallis, Constantino [SFI External Professor]**; *Journal of Computational and Applied Mathematics* 227 (1), May 1, 2009, pp. 51-58

Low-dose rectal inoculation of rhesus macaques by SIVsmE660 or SIVmac251 recapitulates human mucosal infection by HIV-1; **Keele, B.F.**; **Li, H.**; **Learn, G.H.**; **Hraber, P.**; **Giorgi, E.E.**; **Grayson, T.**; **Sun, C.X.**; **Chen, Y.L.**; **Yeh, W.W.**; **Letvin, N.L.**; **Mascola, J.R.**; **Nabel, G.J.**; **Haynes, B.F.**; **Bhattacharya, Tanmoy [SFI Professor]**; **Perelson, Alan [SFI External Professor and Science**

Board Member]; **Korber, Bette [SFI Research Professor]**; **Hahn, B.H.**; **Shaw, G.M.**; *Journal of Experimental Medicine* 206 (5), May 11, 2009, pp. 1117-1134

The origin of life: A case is made for the descent of electrons; **Trefil, J.**; **Morowitz, Harold [SFI Science Board Chair Emeritus]**; **Smith, Eric [SFI Professor]**; *American Scientist* 97 (3), May-Jun 2009, pp. 206-213

Mammal reproductive strategies driven by offspring mortality-size relationships; **Sibly, R.M.**; **Brown, Jim [SFI External Professor and Science Steering Committee Member]**; *American Naturalist* 173 (6), June 2009, pp. E185-E199

Taking species abundance distributions beyond individuals; **Morlon, H.**; **White, E.P.**; **Etienne, R.S.**; **Green, Jessica [SFI External Professor]**; **Ostling, A.**; **Alonso, D.**; **Enquist, Brian [SFI External Professor]**; **He, F.L.**; **Hurlbert, A.**; **Magurran, A.E.**; **Maurer, B.A.**; **McGill, B.J.**; **Olf, H.**; **Storch, D.**; **Zillio, T.**; *Ecology Letters* 12 (6), June 2009, pp. 488-501

Human language as a culturally transmitted replicator; **Pagel, Mark [SFI External Professor]**; *Nature Reviews Genetics* 10 (6), June 2009, pp. 405-415

Comment on Coomes et al. 'Scaling of xylem vessels and veins within the leaves of oak species'; **Price, C.A.**; **Enquist, Brian [SFI External Professor]**; *Biology Letters* 5 (3), June 23, 2009, p. 380

Upper-limit mutation rate estimation for a plant RNA virus; **Sanjuan, R.**; **Agudelo-Romero, P.**; **Elena, Santiago [SFI External Professor]**; *Biology Letters* 5 (3), June 23, 2009, pp. 394-396

Food-web structure and ecosystem services: Insights from the Serengeti; **Dobson, Andrew [SFI External Professor]**; *Philosophical Transactions of the Royal Society B-Biological Sciences* 364 (1524), June 27, 2009, pp. 1665-1682

Cascading extinctions and community collapse in model food webs; **Dunne, Jennifer [SFI Research Professor]**; **Williams, R.J.**; *Philosophical Transactions of the Royal Society B-Biological Sciences* 364 (1524), June 27, 2009, pp. 1711-1723

Approximate graph products; **Hellmuth, M.**; **Imrich, W.**; **Klockl, W.**; **Stadler, Peter [SFI External Professor]**; *European Journal of Combinatorics* 30 (5 SP ISS), July 2009, pp. 1119-1133

INSIDE SFI

An interview with incoming SFI President Jerry Sabloff

The *Update* spoke with Jerry Sabloff recently about his selection as SFI's President and his thoughts on the Institute's past and future. He joins SFI August 1.

Update: First, congratulations on your selection. What have your past interactions been with the Institute, and what are your impressions?

Sabloff: Certainly I have known about SFI for many years. I participated in a symposium there two years ago, and last year I gave a lead talk in a Science Board Symposium session on cities, focusing on how an understanding of pre-industrialized cities might shed light on modern cities. I also taught at the University of New Mexico in the late '70s and early '80s, and I served on and chaired the board of the School for Advanced Research in Santa Fe. So I've followed the Institute, and I've always viewed it with a great deal of admiration.

Update: What stood out for you during those interactions?

Sabloff: The people. The people of SFI, both the resident faculty and the external faculty, as well as the people the Institute collaborates with, are tremendous, outstanding scholars. The sense of intellectual excitement when I'm in the building is palpable.



Jerry Sabloff with daughter Lindi and wife Paula

Update: From your perspective, what are the high points of SFI's research portfolio and how might it evolve in the coming years?

Sabloff: I don't envision radical changes. The general trajectory of SFI's research will likely continue. Geoffrey [West] and his staff have made significant strides in a number of areas. Of course, the principal, galvanizing focus at SFI has always been complex phenomena and emergence of new systems. And I have to tell you we don't have all the answers yet. There are still many, many stimulating and important questions in complexity and emergence from a multitude of fields, from physics to the social sciences and the humanities.

Along with SFI's current successes, I think there are a few areas that will see greater concentration in the coming years. Sustainability and the viability of cities are areas that I think will grow. The world has shifted radically in the last 50 years. More than 50 percent of the world's population now lives in an urban environment. Developing an improved understanding of the growth and emergence of cities is an area where theory and practice come close together. And it is critical for the world.

Update: You are an archaeologist, a bit of a departure for SFI leadership. What does this say about the Institute, and what does archaeology bring to the table?

Sabloff: On the surface this might seem like a departure, but for decades archaeologists have been deeply concerned with issues of complexity and emergence through the study of the evolution of human societies.

SFI's research has expanded into a number of fields over the past several years, and that will continue in the future. We've seen scholarly, multidisciplinary thought in the social sciences, humanities, history, and other fields, all tying back to complex systems and emergence, with great success. My own scholarly interest centers around theory and method, as well as in model building, relating to the nature of human society, emergence of major phenomena, and in particular what we can learn from the past that applies to today's big questions. I think this dovetails beautifully with SFI's interests.

Update: What are some of your priorities as SFI's President?

Sabloff: The first thing I need to do is learn more about the overall operation and get to know SFI's faculty and staff. And I need to do it quickly. Clearly my experience [as Director of the University of Pennsylvania Museum of Archaeology and Anthropology] will serve me in good stead. Obviously we need to stabilize SFI's finances for the future so SFI can enhance and strengthen its research endeavors. I must say that Geoffrey and the staff have done a tremendous job not only of fundraising over time but also, in recent months, of managing some difficult financial challenges. Still, we cannot afford to wait very long. One particular priority is to meet the Omidyar Challenge, as soon as that is feasible. I want to further strengthen the administrative side of SFI. And I am a big proponent of outreach. I strongly believe one responsibility of scientists is to make their work understandable and tangible to the public, so that will be a continued focus. That said, I am an optimist by nature, and accomplishing each of these is eminently feasible.

Update: What can you tell us about you and your personal situation during the transition?

Sabloff: Paula, my wife, will also join SFI on August 1 as a resident Research Scientist. We plan to rent a place in the near term until we can find a more permanent arrangement. We know Santa Fe well, and we know a lot of people in Santa Fe, and so the transition

INSIDE SFI

Jerry Sabloff's background

Jerry Sabloff received his PhD from Harvard University in 1969 and has since taught at a number of American universities, including Harvard, the University of New Mexico, the University of Pittsburgh, and the University of Utah.

He is a leading archaeologist known for his discoveries in prehistoric settlement patterns, pre-industrial cities, and ancient Maya civilization. He recently completed a ten-year term as the Williams Director of the University of Pennsylvania Museum of Archeology and Anthropology.

His books include *Excavations at Seibal; Ceramics* (1975), *The Cities of Ancient Mexico* (1989, 1997), *The New Archaeology and the Ancient Maya* (1990), and *Archaeology Matters: Action Archaeology in the Modern World* (2009). He coauthored *A History of American Archaeology* (1974, 1980, 1993), *A Reconnaissance of Cancuen, Peten, Guatemala* (1978), *Ancient Civilizations: The Near East and Mesoamerica* (1979, 1995), *Cozumel: Late Maya Settlement Patterns* (1984), and *The Ancient Maya City of Sayil* (1991). He has written numerous articles and edited or co-edited 11 other books.

He has been a proponent for the advancement of science in his field and beyond. He served as Chairman of the Smithsonian Institution Science Commission and is a Fellow of the American Academy of Arts and Sciences and a member of the National Academy of Sciences and the American Philosophical Society. ■

should not be very difficult for us personally.

[Editor's note: Dr. Paula Sabloff, of the University of Pennsylvania Anthropology Department, pursues research interests in cognitive anthropology, political anthropology, Mongolia, democracy, and public anthropology.]

Update: Anything else you want to mention?

Sabloff: Yes. I am absolutely excited about coming to SFI and it is a privilege to have this opportunity. I am looking forward to August 1. ■

INSIDE SFI

SFI contingent heads to China for collaboration on complexity frontiers

A contingent of SFI Complex Systems Summer School (CSSS) alumni, SFI faculty, and postdocs are heading to China for a new venture in collaboration. They join peers at the Institute for Theoretical Physics (ITP) in Beijing July 13-17 for the ITP-SFI Workshop on Frontiers in Complex Systems.

The goal, explains David Feldman, workshop co-organizer and director of the Beijing CSSS, is for attendees from diverse backgrounds to develop ideas they can expand into research collaborations and grant proposals.

The workshop, titled "Complex Social Networks and Urban Dynamics," will allow student and faculty participants to explore interdisciplinary applications of complex networks, focusing on urban social and technological systems.

"This is not something ordinary for us in Beijing," says co-organizer and SFI Vice President for Administration Chris Wood. The workshop emphasizes research, rather than the CSSS's usual focus on training, and mixes research presentations with discussions and

working sessions to create roadmaps of new collaborative territory.

Among the American participants are two SFI Omidyar Fellows. Nathan Eagle, an MIT PhD, works with massive data sets of human behavior generated by cell phone use. Aaron Clauset, a University of New Mexico PhD, looks at network formation and organization in social, biological, and technological systems.

Also participating is SFI Science Steering Committee Member and External Professor

Henry Wright, a professor of archaeology at the University of Michigan. He is an expert in early state formation in Madagascar and Iran and has considerable experience in computational models of political evolution.

Chris says SFI is exploring the addition of the Frontiers in Complexity workshop as a separate, related week-long event associated with possible future CSSS events in China. ■

> **Three new Omidyar Fellows to join SFI**
continued from page 1

The three new 2009 Omidyar Fellows are:



Simon DeDeo – Simon's education includes post-doctoral fellowships at the Institute for the Physics and Mathematics of the Universe, University of Tokyo, and the Kavli Institute for Cosmological Physics, University of Chicago.

He holds a PhD in astrophysical sciences from Harvard University, a master's in applied mathematics and theoretical physics from Cambridge University, and an AB in astrophysics from Harvard University. He is a past short-term visitor to SFI.

His research examines ways to use astrophysical and cosmological phenomena to test novel ideas in fundamental physics. At Princeton, he demonstrated ways to use neutron stars to test the nature of gravity and new tools for extracting information on how the universe condensed from a primordial state into the galaxies and larger structures we see today. At the Universities of Chicago and Tokyo, he extended this work to show how more radical theories of spacetime structure could be tested with the universe as laboratory, while collaborating with experimenters to develop new techniques optimized for such tests.

His work at SFI extends the "historical reasoning" of cosmology to the biological sciences, where he will bring the philosophies and methods developed for studies of unrepeatable cosmological phenomena to biological systems governed by the unrepeatable accidents of development and evolution.



Laura Fortunato – Laura holds a PhD in anthropology from University College London (including one year of cross-disciplinary training in biology), a masters in anthropology from University College London, and a *dottore* in biological

sciences from the University of Padova. She is a past participant in SFI's Complex Systems Summer School in Beijing.

Laura's research examines the evolution of human social organization, focusing on the social norms regulating kinship and marriage, including the differing norms among societies (monogamy vs. polygyny, for example) and how these variations arose. She combines theoretical and statistical methods used in the study of nonhuman social systems with theory and data from the historical and social sciences, including anthropology, linguistics, and archaeology.

Her future research will investigate how societies' organizations of relatedness and reproduction explain the evolution of unique features of our species' social behavior, such as our predisposition to cooperate in large groups of unrelated individuals.



Jeremy Van Cleve – Jeremy's education includes a PhD in biology from Stanford University and a BA in mathematics and biology from Oberlin College. He participated in SFI's 2001 Research Experiences for Undergraduates

summer program and, as a high school student, received a 1999 SFI prize for scientific excellence.

He is broadly interested in applying analytical and simulation methods to problems in evolutionary and ecological theory. As part of his dissertation research, he has studied the evolution of genomic imprinting, exploring interactions of genetic dynamics with population structure and, through models, the evolution of behaviors that increase the payoff of a social partner.

Jeremy's SFI research will extend his thesis work through exploration of epigenetic phenomena and their role in adaptation, and developing theory that builds on the recent explosion in empirical data from epigenetics. ■

SFI IN THE NEWS

A May 10 *USA Today* article describes a collaboration between computer scientists and art historians to use a statistical technique, dubbed "stylometry," to determine whether a painting purchased by Japanese insurance executive Yasuo Goto is a genuine Van Gogh or a clever forgery. SFI External Professor and Dartmouth College mathematician Dan Rockmore, who has used the technique to study other works of art, is quoted: "There are techniques that allow you to turn an artwork into a point in some geometric space and ask, 'Is there a neighborhood of work of a particular artist?'" www.usatoday.com/tech/science/mathscience/2007-05-10-painting-by-numbers_N.htm

A June 4 article in *The Economist* summarizes two papers in that week's issue of *Science* exploring human morality and culture, including one by SFI Professor Sam Bowles: "[Bowles] fleshes out his paradoxical theory that much of human virtue was forged in the crucible of war. Comrades in arms, he believes, become comrades in other things, too... Dr. Bowles's argument starts in an obscure cranny of evolutionary theory called group selection. This suggests that groups of collaborative individuals will often do better than groups of selfish ones, and thus prosper at their expense. It is therefore no surprise, according to group-selectionists, that individuals might be genetically predisposed to act in self-sacrificial ways." Sam's paper also was covered in *Nature*, *Wired News*, and *The Independent*. www.economist.com/science/displaystory.cfm?story_id=13776964

SFI External Professor Steven Strogatz, in a May 9 guest column in the *New York Times*' "The Wild Side" blog by evolutionary biologist Olivia Judson, writes about recent research into the mathematics of cities and its relation to biological scaling, citing the work of SFI President and Distinguished Professor Geoffrey West and SFI External Professors Jim Brown and Brian Enquist: "[They] have argued that a 3/4-power law is exactly what you'd expect if natural selection has evolved a transport system for conveying energy and nutrients as efficiently and rapidly as possible to all points of a three-dimensional body, using a fractal network built from a series of branching tubes – precisely the architecture seen in the circulatory system and the airways of the lung, and not too different from the roads and cables and pipes that keep a city alive. These numerical coincidences seem to be telling us something profound. It appears that Aristotle's

metaphor of a city as a living thing is more than merely poetic. There may be deep laws of collective organization at work here, the same laws for aggregates of people and cells." <http://judson.blogs.nytimes.com/2009/05/19/math-and-the-city/>

A May 12 article in *US News & World Report* mentions the work of Nigel Franks (University of Bristol) and Tom Seeley (Cornell University) exploring collective decision making in bee and ant colonies, including a multidisciplinary meeting they organized at SFI in January. www.usnews.com/articles/science/2009/05/12/how-bees-ants-and-other-animals-ace-group-decision-making.html

SFI Postdoctoral Fellow Nathan Eagle's launch of "txteagle," which uses cell phones to distribute assignments for simple tasks to people around the world, was covered in *Nature News* on April 22. www.nature.com/news/2009/090422/full/458959a.html

SFI External Professor Stefan Thurner, director of complex systems research group at the Medical University of Vienna, reported in the April 24 issue of *Science* that leverage – the practice by hedge funds and other investors of borrowing money to buy investments – is the root of many troublesome properties of financial markets that classical economics cannot explain, including a propensity to crash. The work, done in collaboration with SFI Professor Dooyne Farmer and SFI External Professor John Geanakoplos, shows that many of the distinctive statistical properties of financial markets emerge together as rates of leverage climb. www.sciencemag.org/index.dtl

In a recent issue of *American Scientist*, James Trefil, SFI Science Board Chair Emeritus Harold Morowitz, and SFI Professor Eric Smith present their research on the chemical origins of life. Using analogies of the complexity of the U.S. Interstate highway system, they illustrate their point that "the current complexity of life should be understood as the result of a multistep process, beginning with the catalytic chemistry of small molecules acting in simple networks...elaborating these reaction sciences through processes of simple chemical selection, and only later taking on the aspects of cellularization and organismal individuality." The continued research and experiments into this "Metabolism First" theory could lead to the ability to re-create life in laboratories. www.americanscientist.org/issues/num2/2009/2/the-origin-of-life/1



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