

# UPDATE



March 2006

SANTA FE INSTITUTE

## INSIDE SFI: ON AND OFF THE COWAN CAMPUS

<http://www.santafe.edu/events/update/insidesfi.php>

## INTERNATIONAL SCHOOL ON COMPLEXITY

The Ettore Majorana Foundation and Centre for Scientific Culture, in Erice, Sicily, has opened a section called the International School on Complexity, which is directed by **G. Benedek** (Italy), **M. Gell-Mann** (USA), **L. Pietronero** (Italy), **C. Tsallis** (Brazil and USA), and **A. Zichichi** (Italy). The Directors have the ability to approve courses on this subject, which will be held in Erice. The courses are usually one week long, and are partially sponsored by the Centre. Details can be seen at <http://emcsc.ccsem.infn.it/ccsem2005/Courses2005.html>. Proposals can be sent directly to one of the Directors.

## BOWLES TO LECTURE

In March, SFI Research Professor **Sam Bowles** will lecture at the Juan March Institute in Madrid on the evolutionary dynamics of class structures and at the University of Lausanne on interdemocratic selection models for the evolution of human altruism. He will then go to Japan for a series of lectures on the evolutionary dynamics of social systems, including a keynote address at the Japan Association for Evolutionary Economics in Sapporo and the Kawakami Memorial Lecture in Kyoto.

## SFI IN THE NEWS

A profile of SFI appears in the March 2006 issue of the *Santa Fean* magazine (<http://www.santafean.com/>). "The Science of Synergy" by Elizabeth Wolf presents the Santa Fe Institute within an historical context, describes our interdisciplinary collaborative approach to scientific research, and includes animated

discussions with some of our distinguished scientists including **George Cowan**, **Murray Gell-Mann**, and **Geoffrey West**.

## ERWIN ON EXTINCTION

SFI External Faculty member and Chair of the Science Steering Committee **Doug Erwin's** new book *Extinction: How Life on Earth Nearly Ended 250 Million Years Ago* is now in print (<http://www.pupress.princeton.edu/titles/8011.html>). According to an Amazon.com review, "Erwin blends careful scholarship and graceful prose in this authoritative elucidation of Earth's greatest mass extinction. Although framed in terms of hypotheses and their tests, Erwin's story unfolds as a gripping who-done-it for the ages. Douglas Erwin is the world's leading expert on the end-Permian extinction. This book will be the standard reference on this crucial event in the history of life. It is a wonderful example of science in action."

## WATTS IN SCIENCE

The February 10, 2006, issue of *Science* has a report, coauthored by **Duncan Watts** with Matthew J. Salganik and Peter Sheridan Dodds, in which they conducted a web-based social experiment using an artificial "music market" with over 14,000 participants to look at the impact of social influence on cultural markets. They conjecture that experts fail to predict success not because they are incompetent judges or misinformed about the preferences of others, but because when individual decisions are subject to social influence, markets do not simply aggregate pre-existing individual preferences (<http://www.sciencemag.org/cgi/content/abstract/311/5762/854>).

## ARROW RECEIVES NATION'S TOP SCIENCE HONOR

**Kenneth J. Arrow** (SFI Science Board member and Stanford University) received the nation's top science honor, the National Medal of Science, for his contributions in the field of economics. President Bush

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presented 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 (sic) achievement in science and technology.” The National Medal of Science Award, established by Congress in 1959, is administered by the National Science Foundation; the National Medal of Technology, established by Congress in 1980, is administered by the Commerce Department (<http://www.nsf.gov/od/nms/medal.jsp>).

## APRIL PUBLIC LECTURE

The Santa Fe Institute will present a Public Lecture on **Wednesday, April 5, 2006, at 7:30 pm** at the James A. Little Theater.

The lecture, entitled “The Origin of Life,” will be given by **Christian deDuve** (Nobel Laureate in Medicine, 1974; Founder, International Institute of Cellular and Molecular Pathology; Professor Emeritus, University of Louvain and Rockefeller University) with **D. Eric Smith** (Professor, Santa Fe Institute).

The origin of life is generally taken to be the outcome of progressive chemical complexification. This process presumably led from small organic molecules, such as amino acids, sugars, and nitrogenous bases, now known to be produced on a large scale by cosmic chemistry, to an organism called the LUCA, or last universal common ancestor, from which all known living organisms have been shown to be descendants. In spite of a considerable amount of high-level research, the nature of the chemistry used by the LUCA remains largely unknown. Consideration of the mechanism whereby early small-molecule chemistry may have changed into biochemistry suggests that life may have been launched by processes related to those used by cells today. If this is so, enzyme-like catalysts probably were involved. DeDuve will discuss the possibility that small peptides and other “multimers” may have played catalytic roles in an era before large protein enzymes had formed, a view of the emergence of life that he has pioneered.

For more information, please see <http://www.santafe.edu/events/publicLectures>

## MARCH COLLOQUIA

On March 2, **Rafael Nuñez**, University of California, San Diego, will present a talk entitled “Objectivity, Consistency, Truth, and the Embodied Mind: Lessons from Mathematics and Spatial Construals of Time in Aymara.” On March 23, **Eugene V. Koonin**, National Center for Biotechnology Information, NLM, NIH,

will present a talk entitled “On the Origin of Genomes, Cells, Nuclei, and Viruses.”

## FORMER ADVENTURES IN MODELING STUDENT MEETS PRESIDENT BUSH

President George W. Bush visited Albuquerque on Friday, February 3, 2006, to promote science literacy. A featured speaker on a panel with him was **Nicole Lopez**, a senior at Rio Rancho High School who has been a member of the SFI Adventures in Modeling cohort for the last three years. From articles in *The New Mexican* and *Albuquerque Journal*:

“It seemed an odd pairing—the President of the United States and a senior from Rio Rancho High School—at a roundtable event in Sandoval Country. But 18 year old Nicole Lopez stole the show Friday morning with her candor and eloquence on how science and math had given her purpose.”

Ever articulate, “‘Awesome’ and ‘fantastic’ were two of the words President Bush used to describe what he heard from Lopez.”

## BUSINESS NETWORK NEWS

<http://www.santafe.edu/events/update/businessnetwork.php>

## TWO NEW BUSINESS NETWORK MEMBERS

We are pleased to announce two new members to the Santa Fe Institute Business Network.

**FedEx** is a \$29-billion network of companies, offering a mix of transportation, e-commerce and business solutions. The FedEx worldwide network links customers to more than 220 countries and territories, often within 24 to 48 hours, providing international support services such as customs clearance, freight forwarding, and supply chain services. Put it all together, and it’s easy to see how FedEx is extending its industry leadership and connecting the growth sectors of the global economy. The FedEx common mission is: We promise to do whatever it takes to meet your needs. To learn more about the company please go to: <http://www.fedex.com/us/about/>

**Amena** is a Spanish mobile telecommunications company with over 9 million customers. It is a leader in portable telecommunications and has strategic

collaborations with other pioneering companies both national and international, to offer innovative telecommunication services in all business sectors. To learn more about the company please go to <http://ingles.amena.com>

## NOTES FROM THE INTERNATIONAL PROGRAM

<http://www.santafe.edu/events/update/international.php>

## INTERNATIONAL VISITORS

International Visitor **Paolo Zanotto**, Director of the Laboratory of Molecular Evolution and Bioinformatics [LEMB], University of Sao Paulo, came to SFI to collaborate with Professor David Krakauer.

International Visitor and former SFI Postdoctoral Fellow, **Jung-Kyoo Choi**, of the School of Economics and Trade, Kyungpook National University, returned to SFI to continue his collaboration with Professor **Sam Bowles**.

## PUBLICATIONS

<http://www.santafe.edu/events/update/publications.php>

## WORKING PAPERS

<http://www.santafe.edu/research/publications/working-papers.php>

06-02-006

Social Segregation and the Dynamics of Group Inequality  
*Samuel Bowles and Rajiv Sethi*

06-02-005

Computation of Explicit Preimages in One-Dimensional Cellular Automata Applying the De Bruijn Diagram  
*José Manuel Gomez Soto*

06-02-004

Developmental Origins of Animal Body Plans  
*Douglas H. Erwin*

## REFEREED LITERATURE

<http://www.santafe.edu/events/update/publications.php>

**Arim, M., S. R. Abades, P. E. Neill, M. Lima, and P. A. Marquet.** "Spread Dynamics of Invasive Species." *Proceedings of The National Academy of Sciences of The United States of America* 103(2) (2006): 374-378.

**Atay, F. M., T. Biyikoglu, and J. Jost.** "Synchronization of Networks with Prescribed Degree Distributions." *IEEE Transactions on Circuits and Systems I-Regular Papers* 53(1) (2006): 92-98.

**Attolini, C. S. O., and P. F. Stadler.** "Neutral Networks of Interacting RNA Secondary Structures." *Advances in Complex Systems* 8(2-3) (2005): 275-283.

**Bull, J. J., L. A. Meyers, and M. Lachmann.** "Quasispecies Made Simple." *PLOS Computational Biology* 1(6) (2005): 450-460.

**Davidson, E. H., and D. H. Erwin.** "Gene Regulatory Networks and the Evolution of Animal Body Plans." *Science* 311(5762) (2006): 796-800.

**Dawson, J. F., B. Mihaila, P. Berglund, and F. Cooper.** "Supersymmetric Approximations to the 3D Supersymmetric O(N) Model." *Physical Review D* 7301(1) (2006): 1013-1028.

**Frahm, N., P. Kiepiela, S. Adams, C. H. Linde, H. S. Hewitt, K. Sango, M. E. Feeney, M. M. Addo, M. Lichterfeld, M. P. Lahaie, E. Pae, A. G. Wurcel, T. Roach, M. A. St John, M. Altfeld, F. M. Marincola, C. Moore, S. Mallal, M. Carrington, D. Heckerman, T. M. Allen, J. I. Mullins, B. T. Korber, P. J. R. Goulder, B. D. Walker, et al.** "Control of Human Immunodeficiency virus Replication by Cytotoxic T Lymphocytes Targeting Subdominant Epitopes." *Nature Immunology* 7(2) (2006): 173-178.

**Gastner, M. T., and M. E. J. Newman.** "Shape and Efficiency in Spatial Distribution Networks." *Journal of Statistical Mechanics—Theory and Experiment* (2006): 1-9.

**Henrich, J., R. Boyd, S. Bowles, C. Camerer, E. Fehr, H. Gintis, R. McElreath, M. Alvard, A. Barr, J. Ensminger, N. S. Henrich, K. Hill, F. Gil-White, M. Gurven, F. W. Marlowe, J. Q. Patton, and D. Tracer.** "Economic Man' in Cross-Cultural Perspective: Behavioral Experiments in 15 Small-Scale Societies." *Behavioral and Brain Sciences* 28(6) (2005): 795-815, 849-855.

**Henrich, J., R. Boyd, S. Bowles, C. Camerer, E. Fehr, H. Gintis, R. McElreath, M. Alvard, A. Barr, J. Ensminger, N. S. Henrich, K. Hill, F. Gil-White, M. Gurven, F. W. Marlowe, J. Q. Patton, and D. Tracer.** "Models of Decision-Making and the Coevolution of Social Preferences." *Behavioral and Brain Sciences* 28(6) (2005): 838-855.

**Mihaila, B., K. B. Blagoev, and F. Cooper.** "Phases of a Fermionic Model with Chiral Condensates and Cooper Pairs in 1+1 Dimensions." *Physical Review D*

**Salganik, M. J., P. S. Dodds, and D. J. Watts.** "Experimental Study of Inequality and Unpredictability in an Artificial Cultural Market." *Science* 311(5762) (2006): 854-856.

**White, D. R., N. Kejzar, C. Tsallis, D. Farmer, and S. White.** "Generative Model for Feedback Networks." *Physical Review E* 7301 1(2) (2006): 198-205.

## LIBRARY ACQUISITIONS

For a list of recent purchases by the SFI library, please see <http://www.santafe.edu/events/update/library.php>

## CALENDAR OF EVENTS

<http://www.santafe.edu/events/calendar.php>

**March 17 - 18, 2006**

Workshop — "Roadmap for CAS Science Education," organized by Ginger Richardson (SFI)

**April 3 - 5, 2006**

Workshop — "Degeneracy and Complexity in the Immune System," organized by Eli Sercarz (Torrey Pines Institute) and Alan Perelson (LANL & SFI)

## MARCH VISITORS AND ARRIVALS

<http://www.santafe.edu/events/monthlyvisitors.php>

**Erik Aurell** (3/11-15), Department of Theoretical Physics, KTH - Royal Institute of Technology

**Manuel Eguia** (3/20-4/13), Universidad Nacional de Quilmes

**Doug Erwin** (3/5-12), National Museum of Natural History, Smithsonian Institution

**Miguel Fuentes** (3/14-5/3), Fisica Estadística, Centro Atómico Bariloche

**Jim Hartle** (3/28-4/4), University of California, Santa Barbara

**Stuart Kauffman** (3/8-12), Institute for Biocomplexity and Informatics, University of Calgary

**Rafael Nuñez** (2/28-3/3), University of California, San Diego

**Timothy Reluga** (3/5-8), Epidemiology and Public Health, Yale University

**Martin Shubik** (3/25-4/24), Yale School of Management, Yale University

**Christophe Vignat** (3/28-30), Mathematical Physicist, Laboratoire de Production Microtechnique

Santa Fe Institute  
1399 Hyde Park Road • Santa Fe, New Mexico 87501  
(505) 984-8800 • [email@santafe.edu](mailto:email@santafe.edu)

Editorial Coordinator: Della Ulibarri  
Proofreader/Copy Editor: Laura Ware