Human health on a worldwide scale may hinge on whether poultry workers in West India get treated for flu symptoms.

Chicken coops are breeding grounds for new varieties of influenza, which can sometimes jump from birds to humans. When this does occur, poultry workers will be the first to get sick.

As part of a grant from the National Science Foundation, SFI Postdoctoral Fellow Dan Huishchka and collaborators at Emory University will study how and when poultry workers in the West Indian city of Surat go to doctors or healers for treatment of flu-like symptoms.

So far, the avian flu can’t efficiently pass from human to human. But many scientists believe the virus is bound to evolve that capability eventually. Preventing a pandemic could depend on how early scientists realize a flu strain has developed the ability to travel from human to human.

Dan’s role in the Surat study will be to gather and analyze social network data showing how people refer one another to health care providers. That data could help the researchers suggest ways to recognize human-to-human spread of a flu strain at the earliest possible moment.


Nearly two-dozen participants brought a variety of perspectives to the table, together they represented computer security software developers, Internet service providers, domain name registrants, electronic commerce, federal law enforcement, and other players in the online community. Society’s dependence on electronic communication and commerce makes the Internet an attractive medium for bad actors, says Institute Vice President Chris Wood, and workshop participants noted that the victims of malware are not necessarily rewarded for combating it.

“The relationship between an individual’s or organization’s ability to do something about malware and their incentive to do so is absolutely out of whack,” he says.

Nearly two-dozen participants brought a variety of perspectives to the table, together they represented computer security software developers, Internet service providers, domain name registrants, electronic commerce.
A September 10 Nature article about the future of evolutionary theory and the synthesis of thought from genetics and developmental biology quoted SFI Professor David Krakauer: “It’s a matter of finally unifying two areas that haven’t spoken to one another,” he says. “To tackle any modern problem in evolutionary biology, you’ll have to use development and the dynamics of the genus that underlie it. He’s quite enthusiastic about the possibility of bringing together mathematical theories of pattern formation and the large body of theory on genetic change between generations used by population geneticists.” But at the same time, he can see forces beyond the content of the theories that may keep them apart: “It’s not about totally incomparable world views, it’s about who holds the torch – who are the legitimized heirs to the Darwinian intellectual estate.”

SFI in the News
Past work by SFI External Professor Mark Newman and SFI Postdoctoral Fellow Michael Gastner was referred to in a September 18 Nature article about national science indicators. Nature created a series of cartograms to illustrate disparities among states in federal science funding per capita and other indicators. The maps were made using 2008 data from the NSF. “Perhaps the best-known use of cartograms is the 2004 analysis of U.S. presidential election results by [Mark and Michael] of the Santa Fe Institute in New Mexico, who are experts in social and information networks. Whereas standard maps showed the United States as a homogenous country, their maladies move too – realistic patterns among zip codes as they go from work to school to home. As they move from place to place, their maladies move too – infecting new people. The researchers also have used a global version of the model to study how travel restrictions affect a flu’s spread. As they expected, restricting air travel between large cities tended to delay its spread from country to country.

Surprisingly, though, the researchers found that in some situations such restrictions could make a flu epidemic worse in particular areas. For instance, delaying the spread of a new flu virus that originated in Asia could cause it to hit the U.S. during winter instead of summer, greatly increasing its wallop.

One way to protect people from emerging flu viruses is to develop techniques to quickly create new vaccines.

> “That’s a laudable and important goal,” he says, “but the assumption is that if you produce a vaccine, people will take it. I think that’s very questionable.”

He points to a study that showed that more than half the surveyed residents of Washington, D.C., and New York wouldn’t accept a smallpox vaccine even during a confirmed smallpox attack. These and other examples convince Josh that “behavior is a central frontier in epidemic modeling.”

RESEARCH NEWS

Model citizens: Preventing flu by understanding behavior

Influenza spreads as people travel. Vaccines can work only if people choose to take them. Sexually transmitted diseases can be stopped only if people adopt safe sex practices.

In the model, people are represented as needing to find their schoolmates in a city. Dots show people with active cases. Blue dots show those who have had it.

Simulations show how a flu virus can spread across the U.S. Black dots indicate people who are healthy and susceptible. Red dots show people with active cases. Blue dots show those who have had it.

> Arthur wins Lagrange Prize

SFI External Professor W. Brian Arthur is one of two inaugural recipients of the Lagrange Prize for research in the science of complexity. Princeton mathematics Yakov Sinai also received the inaugural prize.

Awarded by the Institute for Scientific Interchange Foundation (http://www.isi.it) and CRT Foundation (http://www.fondazionecrt.it) of Turin, Italy, the 75,000 Euro prize is given for “outstanding scientific contributions to the field of complexity and complex systems in all disciplines.”

In addition to his SFI External Professorship, Brian is a past member of SFI’s Board of Trustees and Science Board. He is currently a visiting researcher at the Paolo Alto Research Center’s Intelligent Systems Lab.

His research interests include technological evolution, nonequilibrium models of economics, and theoretical frameworks for economic allocation. He has authored three books and is a noted speaker.

PEOPLE

Ladau leaves SFI for UCSF

SFI Postdoctoral Fellow Josh Ladau’s last day at the Institute was October 10. He is now a Postdoctoral Fellow with the Gladstone Institutes at the University of California, San Francisco, where he is working on iSEEM, a metagenomics project funded by the Moore Foundation.

AWARDS

Hartle wins APS Einstein Prize

James Hartle, SFI External Professor and Professor of Physics Emeritus at UC Santa Barbara, has been awarded the 2009 Einstein Prize by the American Physical Society.

The biennial award recognizes outstanding achievement in the field of gravitation and mathematical physics. It is open to scientists worldwide.

James’s award citation reads: “For a broad range of fundamental contributions to relativistic stars, quantum fields in curved spacetime, and especially quantum cosmology.”

His scientific work is concerned with the application of Einstein’s theory of general relativity to realistic astrophysical situations, especially cosmology. He is currently focusing on the earliest moments of the big bang where quantum mechanics, quantum gravity, and cosmology overlap.

PERSPECTIVES

What the candidates say about science

The U.S. presidential candidates’ positions on climate change and 13 other issues in science are detailed at Science Debate 2008 (www.sciencedebate2008.com), an online compilation of the candidates’ answers to questions posed by the nation’s science community.

Leading researchers initially submitted more than 3,400 questions they wanted the candidates to answer. The questions were pared down to the top 14 by groups representing the AAAS, the National Academies, and other organizations. The final list of questions covers issues from energy and health care to scientific integrity and government interference.

More than 38,000 leading scientists and engineers have signed on in support of Science Debate 2008, including several researchers affiliated with SFI.

Another site sponsored by Science & Engineers for America tallies congressional delegates’ voting history on, and candidates’ responses to, key scientific issues (http://sharp.sourceforge.org/).

Modern malware continued from page 1

An individual PC user, for example, could keep his or her system up to date with the latest security software but has little incentive to do so. For one thing, the software is frequently expan- sive and requires effort, and the damage the malware causes to the individual – perhaps a small performance setback – is relatively minor compared to the potential system-wide or soci- ety-wide damage of unknowingly participating in organized malware such as “botnets.”

Likewise, internet service providers are technically capable of identifying and blocking suspicious activity but typically view their role as providing the paying user connectivity and bandwidth – not malware protection.

Each player in the online world faces a similar tradeoff; such that no player views fighting the problem as a worthwhile endeavor. Participants hope to bring attention to these tradeoffs and generate a discussion of the need to revise the incentive structure for fight- ing malware.

> “It’s a multifaceted problem,” says Chris, “involving software engineering, economics, social networks, the law, and criminal justice systems – exactly the kind of problem to which SFI can productively contribute.”
Russian-built Soyuz spacecraft. She’ll serve as a backup crew member to American software developer Charles Simonyi.

She estimates her chances of making it into orbit this spring at about 1 in 20. “If, for some reason, he doesn’t go, I get to go instead,” she wrote in her Flight School blog. "In the next several months, I’ll be training in how to fly a spacecraft powered by nuclear pulse propulsion."

A Soyuz spacecraft approaches the International Space Station during a November 2005 mission. (Image: NASA)

SFI Professor Sam Bowles was quoted in an October 14 segment of PBS NewsHour with Jim Lehrer focused on inequality in New Mexico. The piece, which was framed as a political battleground, explored the implications of sharply contracting levels of prosperity in Northern New Mexico, between nearby cities Los Alamos and Española, for example. Sam discussed the effects, and failures, of trickle-down economic policies. “America is distinct in the extent to which inequality is inherited from generation to generation,” he said. “The kids of rich parents have a strong tendency to be rich. And the kids of poor parents are very, very likely to be poor, to a far greater extent than is true of any other country, except for Egypt. That’s a huge discrepancy from what we think of as the land of opportunity.”

www.pbs.org/newshour/bb/politics/july-08/mexicanam_10-14.html

People

SFI Trustee Esther Dyson begins training for spring 2009 launch

Institute Trustee Esther Dyson is heading for space...maybe.

Esther, a long-time tech pundit and investor, announced October 7 she will begin cosmonaut training this winter in hopes of a March 2009 trip to the International Space Station aboard a Russian’s Star City training facility near Moscow. By the end of her training she will be certified as a trained cosmonaut and assigned to the space crew as Simonyi’s backup.

An author, prognosticator of IT advances, and investor in emerging technologies and companies, Esther founded the Flight School conference in 2007 for entrepreneurs engaged in air and space ventures.

Her father, physicist Freeman Dyson, participated in Project Orion in the late 1950s, an effort to develop a spacecraft powered by nuclear pulse propulsion.

She says once she is trained, her chances of making it into space improve greatly — if not this spring, eventually.

“I have always assumed I will go into space myself,” she says.

SFI Professor Sam Bowles was quoted in an Octob-

An October 10 Scientific American article mentioned the work of political scientist and SFI Postdoctoral Fellow Nathan Collins describing the tendency of people to misestimate or misinterpret a politician’s stance or record based on how the person making the judgment categorizes that candidate as Republican or Democrat, for example. “The categorizing process, which has been shown to help explain how we learn and remember things, has now been modeled for political beliefs by Nathan Collins, a political scientist at the Santa Fe Institute in New Mexico. In a paper being consid-

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Inside SFI

Institute Postdoctoral Fellow search closes November 14

The Institute is wrapping up its annual search for SFI Postdoctoral Fellows. Appointed for up to three years, SFI postdocs explore independent projects that lie at the boundaries of traditional scientific fields, often pursuing research questions of their own design.

Fellows are encouraged to invite speakers, organize workshops and working groups, engage in research outside their fields, and collaborate with SFI faculty, other postdocs, and researchers from around the world. Funds are available to support their activities.

“We hope everyone in the SFI community will help by bringing this opportunity to the attention of talented students in their fields,” says SFI Professor Jon Wilkins, who is heading up this year’s search.

Applications are being accepted through November 14. Appointments begin in fall 2009.

Information about the application process can be found at www.santafe.edu/postdoc.

Economics Nobel goes to Krugman

Princeton economist and New York Times columnist Paul Krugman has won the 2008 Nobel Prize in economics for his analysis of how economies of scale work in concert with population levels and transportation costs to affect global trade.


Annual symposium

that the events of our silver anniversary be focused on the future — where is the world going and how will SFI’s multidisciplinary approach help us understand and shape the next 25 years?”

Other selected speakers and topics:
• “The challenge of complexity from the perspective of a mathematician,” Donald Saari, SFI Science Board Member, UC Irvine
• “Science diplomacy,” Nina Fedoroff, SFI External Professor and Science and Technology Advisor to the U.S. Secretary of State
• “Why we must all be scientists at heart,” Laurence Gonzales, author, Deep Survival and Everyday Survival
• “Individualized medicine for the sick and the healthy,” Avidan Neumann, SFI External Professor, Bar Ilan University
• “The future of archeology: Why the past matters now,” Henry Wright, SFI External Professor, University of Michigan

Outstanding achievements in science are celebrated at the annual Santa Fe Institute symposium.

Smithsonian acquires portraits of SFI icons

The Smithsonian National Portrait Gallery has acquired the portraits of two Institute icons – SFI Distinguished Fellow, SFI Trustee, and Nobel laureate Murray Gell-Mann and Pulitzer Prize-winning author Cormac McCarthy – to add to its permanent collection of famous Americans.

The Smithsonian acquired the paintings, by acclaimed artist Andrew Tift, from Andreeva Portrait Commissions of Santa Fe (www.luxuryportraits.com).

The images are part of a series of 23 commissioned in 2003 by gallerist/owner Tatiana Andreeva as a millennial portrait record of Northern New Mexicans. The eclectic collection, “New Mexico Faces,” includes portraits of scientists, activists, artists, musicians, flea market sellers, a Vietnam veteran, and a waitress, among others.

Tift, winner of the prestigious BP Portrait Award Best of Show 2006 at London’s National Portrait Gallery, visited the Institute to meet both men before painting them.

Annual symposium continued from page 1