

STRI newsletter

May 1, 1992

SMITHSONIAN TROPICAL RESEARCH INSTITUTE - Apartado 2072, Balboa, Panamá

No. 18

TUPPER CENTER SEMINARS

Tuesday, May 1, noon seminar speaker will be Steve Palumbi, Hopkins Marine Station.

World-wide genetic diversity in endangered humpback whales

Abstract

Population structure for some species is strongly affected by social interaction and complex behavior. Genetic studies of humpback whales show how these factors affect population subdivision. Overall genetic diversity is surprisingly high in this endangered species, and mitochondrial DNA lineages have persisted for millions of years.

Next Week

Noon seminar speaker for Tuesday, May 12, will be Roy Caldwell, University of California, Berkeley.

Stomatopod Crustacea: a smashing success

PEOPLE

Arrivals

- Henk Wolda, May 4-15, to continue research and analyze data collected by his technicians.
- Thomas Kursar, Univ. of Utah, May 3-15, to continue studies on photosynthesis in shade tolerant species in relation to leaf lifetime at BCI.

Departures

- Alan Smith, staff scientist, Apr 29-May 31, to Washington, D.C. on official business at SI, then to Nairobi, Kenya on business pertaining the Mpala Wildlife Research Trust.
- Ira Rubinoff, STRI director, and Eldredge Bermingham and Joseph Wright, staff scientists, May 2-16 on official visit to Moscow, Russia.
- Jeremy Jackson, staff scientist, May 6-15, on official business at the National Museum of Natural History and to Chicago to present seminar at the Spring Systematics Symposium at the Field Museum of Natural History.

On Leave

Fernando Pascal, May 1-29
Maritza Perurena, May 4-15



University of Panama officials visited Barro Colorado Island on Sunday, April 26, as part of collaborative activities with STRI ••• El domingo, 26 de abril, altos funcionarios de la Universidad de Panamá visitaron BCI, como parte de actividades de colaboración con el STRI. De izquierda a derecha: Mireya Correa, Deyanira Barnett, Dir. de Posgrado, Sidia Candanedo de Zúñiga, Nodier Araúz, Vicerrector Administrativo, Adela Abad, Dir. de Asistencia Técnica, Ira Rubinoff, Celestino Araúz, Vicerrector de Investigación, (ensombrerado) Dimas Lidio Pittí, Dir. de Extensión Cultural, Alfredo Figueroa, Dir. de Investigación, Carlos Iván Zúñiga, Rector de la Universidad, Adela de Arosemena y Gustavo Arosemena, Dir. Inst. de Análisis Especializado, y Noris Salazar.

(Foto: M.A. Guerra)

Olga F. Linares Elected to the National Academy of Sciences

STRI anthropologist Olga F. Linares was elected to the prestigious National Academy of Sciences in Washington, D.C., on April 28. She is one of 59 new members elected to the Academy in recognition of distinguished and continuing research achievements.

Election to membership in the Academy—one of the highest honors that can be bestowed to a U.S. scientist or engineer—recognizes Dr. Linares' nearly 30 years of original research in anthropology and archaeology.

Born in David, Chiriquí, Linares began her scientific career as an instructor in anthropology at Harvard University, where she was awarded her doctoral degree in 1964. She has held a variety of teaching, research and curatorial positions in the United States and Europe, and has been a member of the STRI staff since 1973. Her most recent book *Power, Prayer and Production: The Jola People of Casamance, Senegal* was published in 1992 by Cambridge University Press.



A father and his children observe the STRI photographic exhibit at the very successful Metropolitan Nature Park Earth Day Fair held last weekend ••• Un padre con sus hijos observan la exhibición fotográfica de STRI en la muy exitosa feria del Día de la Tierra, que tuvo lugar en el Parque Natural Metropolitano el fin de semana pasado.

(Foto: M.A. Guerra)

THINGS YOU SHOULD KNOW

Changes at the Tivoli Building

The cashier, America Staff, will move to Office No. 530, two floors above ground level, in the Tupper Building, beginning Monday, May 4, until further notice. Cashier hours are from 8 am-4 pm.

The Facilities Management Office and the Office of Design and Construction have moved permanently to the Pastor's House. Some temporary moves have also occurred due to renovations. The Office of Human Resources moved to Dora Justo's old office; Leonor Motta, STRI Executive Officer, moved to Mr. Tejada's old office and her secretary, Nereida Hernandez, is sharing an office with Celideth Mendoza.

At Tupper

Tues, 5 May	Administrative Staff Meeting, Large Meeting Room, 9:30 am
Wed, 6 May	Amigos de la Biblioteca Meeting, Small Meeting Room, 9-11 am UICN/INRENARE Seminario Taller sobre Legislación Ambiental, Exhibit Hall, 8 am-5 pm
Thurs, 7 May	UICN/INRENARE Seminario Taller sobre Legislación Ambiental, Exhibit Hall, 8 am-5 pm
Fri, 8 May	UICN/INRENARE Seminario Taller sobre Legislación Ambiental, Exhibit Hall, 8 am-5 pm

Charla sobre Ecuador

El personal administrativo y científico de STRI está cordialmente invitado el jueves, 7 de mayo, a las 4 pm a una charla titulada *Visita a Ecuador: estaciones biológicas en los trópicos*, que dictarán Elena Lombardo y Nélida Gómez en el Salón de Reuniones del Centro Tupper.

Curso de Campo en Gigante

La Oficina de Educación del Instituto Smithsonian y la Vicerrectoría de Investigación y Postgrado de la Universidad de Panamá llevarán a cabo el curso "Introducción a las Investigaciones de Biología de Campo" del 3 al 10 de mayo de 1992 en la Península de Gigante. Los objetivos del curso persiguen desarrollar la capacidad de los participantes de observar el mundo natural, elaborar preguntas e ideas, utilizar métodos científicos para entender procesos biológicos, y probar hipótesis en el campo.

Con la guía de los instructores Don Windsor, Stanley Rand, David Roubik, John Tobin, Kevin Hogan, Héctor Barrios, Milton García, Manuel Guariguata y Anabel Tatis, 16 estudiantes de II, III, IV y Tesis de la Universidad de Panamá realizarán pequeños proyectos de investigación en diferentes áreas de la biología. Además de los proyectos de campo habrá algunas charlas científicas por los investigadores David Roubik, Robert Dudley, John Tobin y Noris Salazar.

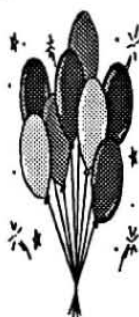
ANNOUNCEMENTS

Charla sobre el Año 2000

En la próxima reunión-cena de la Asociación de Becarios Fulbright, Deane Hinton, Embajador de los Estados Unidos en Panamá, disertará sobre *Las Relaciones de Panamá y los Estados Unidos hacia el Año 2000*. La misma se llevará a cabo el martes 5 de mayo en la Suite Miraflores, piso 19, del Hotel Plaza Paitilla Inn a las 6 pm, a un costo de \$13 por persona. Aquellas personas de STRI interesadas en asistir, favor comunicarse con Ritter Diaz (27-4393/27-2085 ext 367) e indicar que son invitados de Nélida Gómez.

May Birthdays at STRI

John Christy	4
Angel Aguirre	5
Steven Paton	5
Osmila Sánchez	13
Juan Barria	13
Gabriel Jácome	13
Ubaldo Pimentel	17
Alejandro Arze	17
Anthony Coates	20
Roland Gough	20
Abel Gómez	22
Félix Sánchez	26
Oscar Jiménez	29
Nancy Knowlton	30

**Ganadores del Parque Metropolitano**

Los siguientes son los números de los boletos ganadores de la tómbola de la Feria del Día de la Tierra en el Parque Metropolitano:

- 1499•domingo•calendario del parque
- 1309•domingo•colección de afiches de parques nacionales
- 0610•sábado•lámina de tucanes
- 0733•domingo•gira a Río Cabuya
- 1433•sábado•gira a Río Cabuya
- 0281•domingo•gira a Río Cabuya
- 0711•domingo•gira a Río Cabuya
- 1156•gira a finca de Río Cabuya
- 1004•sábado•camiseta del parque
- 1524•sábado•camiseta del parque
- 1151•2 pasajes ida y vuelta a Miami

STRI PROFILE**Paul Ewald, STRI Burch Fellow**

by Gretchen Sotomayor

It was the work of a pesky pathogen in 1977 that changed Dr. Paul Ewald's life. The scientist was working alone in the field gathering data on a sparrow in Kansas when he developed a case of intestinal diarrhea. With time to think, preferably of anything other than his own physical state, Ewald focused his thoughts on the illness from the pathogen's point-of-view.

"Why is this organism doing this to me?" he recalled asking himself. Well, it was a question that he went to extremes to answer. Nearly 15 years later, Ewald has not only shifted the focus of his research

from vertebrate ecology to evolutionary theory of pathogens, but he has also uncovered some powerful and controversial explanations of pathogen conduct.

Ewald, an evolutionary ecologist and the first recipient of the Smithsonian Institution's Burch Fellowship, believes that some common-sense solutions for taming disease may free the world from its deadliest pathogens. Those include diarrheal disease, which, despite the advances of modern medicine, remains the largest cause of death worldwide. It claims 5 to 20 million lives each year. Scientists searching for cures of more complicated diseases, such as AIDS, are also looking for alternatives to treatments no longer considered absolute cures - vaccines and antibiotics included.

With research and statistical data supporting his arguments, Ewald believes pathogens can be reduced in virulence to a level of benignness that could still infect, but wouldn't kill, humans. "Instead of fighting pathogens, we should be able to domesticate them," Ewald said, whose current research focuses on host-parasite co-evolution and virulence in human disease organisms. Such "domestication," which would involve preventive, practical and often less traditional measures, could reduce the virulence of disease by forcing AIDS and other deadly diseases into a state of benignness.

Domestication of pathogens occurs by manipulating "cultural vectors," defined by Ewald as characteristics of human culture that allow the transmission of pathogens from immobile infectious hosts, such as a person confined to a bed, to a susceptible host, perhaps a nurse. In this case, if the nurse changes the dirty bed sheets, it's possible that he or she could contract the patient's germs that were clinging to the sheets.

When pathogens are transmitted between hosts in rapid succession, the more virulent, rapidly reproducing strains tend to gain a competitive advantage over the milder strains, Ewald said. The key of evolutionarily sophisticated health policy is to tip this competitive balance in favor of the milder strains.

Intervention policies can reduce the potential for rapid rates of transmission either by enhancing efforts at curing particularly virulent infections or by reducing the frequency of transmission. Such interventions should favor the loss of the most virulent strains over the short-term, while over the longer term, the milder strains further inhibit the virulent strains by fostering immunological resistance, a kind of natural vaccination.

Such intervention policies would vary with each disease. In the case of AIDS, Ewald believes that using clean needles and condoms, coupled with educational campaigns, will reduce the frequency of disease transmission. And in countries where dysentery is rampant, sufficient quantities of uncontaminated drinking water are needed to block ingestion of water-borne pathogens. Placing screens on windows where mosquito-transmitted malaria and yellow fever exists is yet another way to slow pathogens, Ewald said.

Within hospitals, pathogens are frequently passed from hospital staff and equipment to patients, including babies, via hands. To curb disease, Ewald favors frequent hand washing and decentralization of mothers and babies to reduce the chance of infection. If babies stay with their mothers, they will have less contact with the nurse than if all babies shared one large room. Ewald also encourages breastfeeding to allow the child more exposure to

the mother's benign, protective organisms and less exposure to the more virulent organisms on the nurse's hands.

"The application of evolutionary ideas will lead to a better quality of life," he said.

But Ewald's theory has met resistance with conventional medicine's view concerning the pathogen's selection of its evolutionary path. Textbooks state that a pathogen will evolve toward a state of peaceful coexistence with the host. Ewald disagrees, arguing that pathogen survival and reproduction is the name of the evolutionary game. If increased virulence increases the contribution of pathogen genes into future generations, then pathogens will not evolve toward a state of peaceful coexistence with their hosts, even if the host sometimes dies as a result of the association, he said.

To realize the fallacy in the conventional view, imagine applying it to large consumers, such as lions. One might conclude that lions and zebras should evolve to a state of peaceful coexistence, because in the long run the lions would be better off if they didn't run the risk of destroying their food source.

Also, Ewald pointed out that scientific literature dating back to the 1950s demonstrates that people were not wholly convinced by the conventional view of pathogen evolution.

"They didn't have a theoretical framework for explaining why some disease organisms are so severe while others are so mild," he said. "In spite of the inadequacies of the conventional viewpoint, acceptance of the new viewpoint is going to take a while because few people in the health sciences have been adequately educated about evolutionary principles."

Recognized by many peers as a "pioneer and leader" in the field of evolutionary ecology, Ewald is the first recipient of the Smithsonian Institution's George Burch Fellowship in Theoretic Medicine and Affiliated Theoretic Sciences.

The fellowship, named in honor of one of the world's foremost cardiologists, Dr. George E. Burch, Jr., allows Ewald to study the theory and role of medicine and other scientific disciplines in modern society over a two-year period. The fellowship's recipient is encouraged to use the time to think with freedom and creativity. Without the fellowship, which has temporarily relieved Ewald of his teaching duties at Amherst College in Massachusetts, it would be impossible to conduct research at a productive rate, Ewald said.

"This time is essential," he said, adding that he peruses 50 articles each week just to stay abreast of new information. In studying such diseases as the common cold, malaria, cholera, dysentery and AIDS, Ewald spends much of his time tracing the evolution of pathogens through medical literature.

"Ten years offers about as much potential for pathogen evolution as one million years offers for human evolution," he said. "A million years ago our species didn't even exist."

Dr. Ewald's STRI Visit

During a recent visit to STRI in January and February 1992, evolutionary ecologist Dr. Paul Ewald presented seminars concerning pathogen evolution and its association with communicable diseases.

In STRI lectures, Ewald referred to Human Immunodeficiency Virus (HIV), a retrovirus that can lead to AIDS and the destruction of the immune system, as an example of how pathogen evolution can be affected by changes in human culture.

With HIV, the virus evolves so quickly into new strains that medications lose their effectiveness, usually within two years for most HIV patients, Ewald said. Rapid evolution of virulent HIV strains may be due to the high rate of sexual contact and shared needles, the latter being common among illegal intravenous drug users. But if the virus did not transfer rapidly from new host to new host, the less frequent transmission would eventually force the pathogen into a benign state.

"The key is to make it appear to the virus as though people were staying monogamous. If you have rigorous programs with condoms and clean needles, the virus should evolve to benignness," Ewald said.

To support this theory, Ewald pointed to increasingly milder strains of HIV among homosexuals, the first significant group affected by AIDS. Because of a heightened respect for the destructiveness of AIDS, the sexual rate among homosexuals dramatically decreased in the mid-1980s. By the end of the 1980s, HIV infected homosexual men had a longer AIDS-free period of infection. This reduced severity of infection can be explained only partially by improved treatment. The HIV, therefore, may have already begun evolving toward a less virulent state in response to lower frequency of sexual contact, Ewald said.

A different strain of HIV, HIV-2, exists in Senegal in a fairly non-threatening form, Ewald said. Many prostitutes in Senegal carry the HIV strain but show no sign of AIDS. Ewald believes that the low rates of sexual contact in this largely Muslim society keep the disease at a relatively benign level. The existing genetic variation among HIV strains indicates that the HIV lineages diverged from each other about 1,000 years ago. Strains of HIV have been present in humans for at least 50 years, Ewald said.

"(HIV) appears to have been benign before and is now relatively benign in Senegal," he said.

But in other areas of the world where AIDS is present, it is still claiming many victims. As the search for an AIDS vaccine continues, Ewald believes that the controversial campaign of safe sex practices, condoms and clean needles is the best protection against contracting and spreading HIV - and the best method for rendering the pathogens into benignness.

"To me, if you're saving lives," Ewald said, "that is much more important than whether you are adhering to some medieval, fundamentalist view of morality."