

Tupper 4pm seminar

Tuesday September 18, 4pm seminar speaker will be Egbert Giles Leigh, Jr., STRI
What we have learned from CTFS plots?

BDG meeting

Tuesday September 18 at 2pm in the Large Meeting Room, the Behavioral Discussion Group will meet with Armando Castillo:
Decision making on *Schistocerca gregaria*

Paleo-Talk

Wednesday September 19 at 4pm, Paleo-Talk speaker will be Humberto Carvajal-Ortiz, CTPA, Ancon
Carbon isotopic composition of plant-derived organic matter as a recorder of changes in the carbon cycle

Charla en Colón

The monthly talk in Colón will be offered by acting director Haris Lessios, STRI, on Thursday September 20, at 7pm, Hotel Meliá, Panama Canal
Erizo de mar: No es siempre obvio, pero a menudo muy importante

Bambi seminar

Thursday, September 20, Bambi seminar speaker will be Jonathan Shik, University of Oklahoma.
The production ecology of a tropical litter ant community
The new Bambi jefe is Simon Ghanem. If you wish to give a Bambi, contact him at simon.ghanem@uni-ulm.de



Smithsonian Tropical Research Institute, Panamá

www.stri.org

September 14, 2007



Eighty specialists from around the world joined local researchers to participate in the 40th American Association of Stratigraphic Palynologists (AASP) Annual Meeting held at STRI from September 9-12. The event was co-sponsored by AASP, STRI, BP, Chevron, ConocoPhillips, Ecopetrol, Exxon and Statoil.

The meeting, presided by STRI stratigrapher Carlos Jaramillo, also president of the AASP, was attended by past president Bob Cushman, president-elect Francine McCarthy, managing editor James B. Riding, secretary-treasurer Thomas D. Demchuk, directors at large Thomas D. Davies, Joyce Lucas-Clarke, Sarah de la Rue, and Sophie Warny.

The meetings included technical sessions, a poster session and symposia: Pollen Morphology and Phylogeny, chaired by David Jarzen; and Tropical

pollen and spores: Tracking vegetation dynamics of the Neotropics during the Cenozoic Symposium, chaired by Patrice Brenacum.

The participants also had the opportunity to visit BCI, Culebra, the CTPA, the Miraflores Locks, and the Canopy Crane Access System.

Ochenta especialistas internacionales se reunieron con investigadores locales para participar en la 40 Reunión de la Asociación de los Estados Unidos de Palinólogos Estratígrafos (AASP, por sus siglas en inglés) llevada a cabo en STRI del 9 al 12 de septiembre. El evento fue copatrocinado por AASP, STRI, BP, Chevron, ConocoPhillips, Ecopetrol, Exxon y Statoil.

La reunión, presidida por el estratígrafo de STRI, Carlos Jaramillo, también presidente de la AASP, contó con la

participación del presidente pasado Bob Cushman, la presidenta electa Francine McCarthy, el editor administrativo James B. Riding, el secretario-tesorero Thomas D. Demchuk, y los directores extraordinarios Thomas D. Davies, Joyce Lucas-Clarke, Sarah de la Rue, y Sophie Warny.

La reunión incluyó sesiones técnicas, una sesión para presentación de afiches y los simposios "Morfología de Polen y Filogenia, dirigido por David Jarzen; y Polen y esporas tropicales: Rastreo de la dinámica vegetal de los Neotrópicos durante el Cenozoico, dirigido por Patrice Brenacum.

Los participantes también tuvieron la oportunidad de visitar BCI, Culebra, el CTPA, las Esclusas de Miraflores, y el Sistema de Acceso al Dosel.

Arrivals

Roberto Alonso Bosch, Cuban Institute of Ecology and Systematics, to study morphological, acoustical and molecular divergence among Cuban species of the *Bufo peltocephalus* group: Phylogeographic patterns in *Bufo peltocephalus*, at Naos.

Grace Chen, Michigan State University, to study the effects of biotic interactions and abiotic stress on plant adaptation in the tropics, in Gamboa.

Departures

Juan L. Mate, to Coiba National Park, on a field trip.

Enith Rojas to Washington DC, to carry out research on fungal taxonomy at the US Department of Agriculture.

Mercedes Denis and Mirna Fernandez to Washington DC to receive awards at the Unsung Heroes Award Ceremony.

Rachel Collin to Bocas del Toro, to attend administrative matters.

Anthony Coates to Belize with SI's Ira Rubinoff and Michael Lang, for site visit of Carrie Bow Cay.

Hector Guzman to Edinburgh, Canada, to attend CMS Conference.

Fernando Caballero to Las Vegas, Nevada, to attend the 53rd seminar and exhibit of the Advance Security International Services (ASIS).

Safety telephone number:
212-8211

Tropical Ecology Course for NEO students

STRI and McGill University Neotropical Environmental Option (NEO) program offered the 2007 Tropical Ecology Course to its students in Panama, coordinated by STRI's Yves Basset, from Monday, August 6, through Friday, August 24. Additional lecturers included researchers José Luis Andrade, Arthur Anker, Luis D'Croz, Andrew Hendry, Carlos Jaramillo, Andy Jones, William F. Laurance, Haris Lessios, Juan Maté, Emma Sayer, Mark Torchin and S. Joseph Wright. The course was also coordinated by Nilka Tejeira, STRI-McGill Programs specialist.

The aims of the course was to provide a survey of strategic topics on the ecology of tropical terrestrial and marine environments, with an emphasis on biogeography, evolution, and conservation biology of the Neotropics. The core of the course included student-led discussions of recent primary literature, and some field research related to edge effects in tropical rainforests.

Field excursions included a fossil hunt in Sabanitas and visits to Gamboa, San Lorenzo, the Metropolitan Natural Park, and Galeta.

The photo above shows from the left Santiago Gonzalez



Arriola from Bioresource Engineering, Jeffrey Barnes, a former PFSS student and Yves Basset, collecting specimens using the Canopy Crane Access System in San Lorenzo.

El programa de la Opción Ambiental en los Neotrópicos de la Universidad de McGill y STRI ofrecieron el Curso de Ecología Tropical 2007 para sus estudiantes en Panamá del lunes 6 al viernes 24 de agosto coordinado por Yves Basset, de STRI. El curso contó con conferencias adicionales de los investigadores José Luis Andrade, Arthur Anker, Luis D'Croz, Andrew Hendry, Carlos Jaramillo, Andy Jones, Bill Laurance, Haris Lessios, Juan Maté, Emma Sayer, Mark Torchin y Joe Wright. La coordinación logística del curso estuvo a cargo de Nilka Tejeira, especialista de los Programas STRI-McGill.

El objetivo del curso fue ofrecer un estudio de tópicos

estratégicos sobre la ecología tropical de ambientes terrestres y marinos, con énfasis en biogeografía, evolución y biología de la conservación en los Neotrópicos. Parte fundamental del curso incluyó discusiones lideradas por los estudiantes sobre literatura reciente relacionada con los efectos de borde en los bosques lluviosos tropicales.

Las excursiones de campo incluyeron una búsqueda de fósiles en Sabanitas, visitas a Gamboa, las grúas del dosel de San Lorenzo y el Parque Natural Metropolitano, y Galeta.

La foto de arriba muestra (desde la izquierda) a Santiago Gonzalez Arriola, Bioresource Engineering, Jeffrey Barnes, antiguo estudiante del Panama Field Semester Program de McGill y STRI, y Basset, colectando especímenes en la Grúa de Acceso al Dosel en San Lorenzo.

Science News highlights Panamanian beetles

Science News (August 18) highlighted an article on color changing beetles studied at STRI and described in the September 11 issue of *Physical Review E*, vol. 76(3), article 031907: 1-10, authored by a group of scientists including Jean Pol Vigneron, Jacques M.

Pasteels, Donald M. Windsor, and colleagues. Following is a shorter version of "Mood Bugs: Beetle changes color in fluid fashion" by Carolyn Barry.

Color-changing animals, such as chameleons and squid, typically alter their hues when nerve



New publications



Aiello, Annette. 2007. "Adelpha erotia erotia form "lerna" (Nymphalidae): Exploring a corner of the puzzle." *Journal of the Lepidopterists' Society* 60(4): 181-188.

Buschhaus, Christopher, Herz, Hubert, and Jetter, Reinhard. 2007. "Chemical composition of the epicuticular and intracuticular wax layers on the adaxial side of *Ligustrum vulgare* leaves." *New Phytologist* Online.

Herz, Hubert, Beyschlag, Wolfram, and Holldobler, Berthold. 2007. "Herbivory rate of leaf-cutting ants in a tropical moist forest in Panama at the population and ecosystem scales." *Biotropica* 39(4): 482-488.

STRI in the news

"The beans of destruction. Detailed maps of deforestation in the Amazon and compile a register of 350,000 farms" by Mark Rowe. 2007. *BBC Wildlife* October: 32-33.

"Glittering discovery: Penn exhibits Panamanian find. The University Museum celebrates an Indiana Jones-like find 67 years ago at a Panamanian burial ground" by Tom Avril. 2007. *The Philadelphia Inquirer*, September 10.

signals or hormones spur pigment cells in their skin to expand or shrink. The Panamanian golden tortoise beetle, *Charidotella egregia* changes color dramatically from metallic gold to matte red by a very different method. It uses its body fluid to structurally alter the reflectivity of its shell—a trick that could one day be built into devices that would optically signal the presence of a liquid.

Using electron microscopy, the authors found that the shell of this beetle has a three-tiered structure, with each tier consisting of a number of closely packed layers. Each of the tiers—the thickest is at the bottom, the thinnest at the

top—reflects a particular wavelength of light, and those wavelengths combine to produce the gold coloration. Beneath the tiers is a layer of red pigment.

The researchers' high-resolution images also revealed randomly placed patches of nanosized grooves or channels in the layers that make up each tier. When the beetle's body fluid fills these channels, the layers become smooth. Only then do the tiers act as "perfect mirrors" that give the beetle its metallic sheen.

Absence of fluid destroys the optical properties of the mirrors because the irregular surfaces don't reflect light cleanly. With

no smoothing fluid, the tiers act not as mirrors but as windows to the red pigment below.

Moreover, diffuse scattering of light by the shell takes away the beetle's metallic shine, giving it a matte appearance.

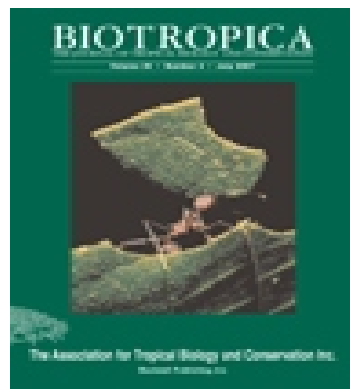
To confirm that liquid is crucial to the color change, the team deep-froze a beetle while it was colored gold. The dead, frozen beetle turned red. Shortly after the beetle was removed from the freezer, its color changed back to metallic gold. Later, when the dead beetle had dried out, it turned permanently red.

Both articles can be obtained from calderom@si.edu

Science editor's choice comments on papers by Herz and collaborators

The Editor's choice section of *Science* highlighted two papers published by STRI's Hubert Herz and collaborators based on field work done at STRI, on July 20, vol 317: 5836.

The papers by Herz, Beyschlag and Holldobler "Assessing herbivory rates of leaf-cutting ant (*Atta colombica*) colonies through short-term refuse deposition counts" and "Herbivory rate of leaf-cutting ants in a tropical moist forest in Panama at the population and ecosystem scales" were published in the July issue of *Biotropica*, pages 476-481 and 482-488, respectively. They were also featured on its cover.



"Smaller harvests than expected" by Andrew M. Sugden, *Science*.

"Leaf-cutting ants of the genus *Atta* are ubiquitous residents of neotropical forests. They construct large subterranean colonies and journey on trails across the forest floor and into the forest canopy, where they harvest leaf fragments that are carried back to the nest. The fragments nourish a mutualistic fungus that in turn provides protein and carbohydrate for the ant colony. Leaf-cutters have been widely assumed to be the dominant herbivores in the forests they inhabit, but supportive quantitative data for this assumption are sparse.

Herz *et al.* first used a rapid and nondestructive method, involving the sampling of refuse deposited by ants outside their nests, as a proxy for measuring the daily harvest of leaves. Then they collected data from nearly 50 nests over 15 months in a Panamanian forest and calculated that the ants were actually responsible for only



Hubert Herz, 2005

about 0.7% of total leaf consumption by all folivores (insects and vertebrates) in the forest. Even though these results indicate that the defoliation by leaf-cutters is more modest than previously thought, Urbas *et al.* found that herbivory by leaf-cutters in a Brazilian forest increased at the margins (versus the interiors) of forests that had been fragmented by human disturbance, thus amplifying environmental change."

The articles may be obtained from: calderom@si.edu

Heliconius: Color patterns for warning and speciation



Story: Richard Merrill
Edited by M Alvarado
and ML Calderon
Photo: MA Guerra

Heliconius butterflies are well known for their bright warning colors and Müllerian mimicry: Unrelated species, in the same geographical region, display identical color patterns to more efficiently advertise their distastefulness to predators. However, a color pattern has also been shown to be important in mate choice between closely related species, such that shifts in a pattern contribute to speciation.

By combining insectary crosses with studies of hybrid zones, where color pattern races meet naturally, STRI fellow Richard Merrill from Cambridge University, UK, and colleagues are beginning to understand the genetics and developmental

pathways involved in the array of color patterns observed in *Heliconius* butterflies.

However, very little is known about the genetic basis of sexual isolation in this or any natural system. Merrill's research at STRI uses a series of mate choice experiments followed by analysis in the lab to uncover the genetic architecture of assortative mating in two closely related species of *Heliconius*.

Las mariposas *Heliconius* son bien conocidas por sus brillantes colores de advertencia y su mimetismo Muleriano. Especies no relacionadas de la misma región exhiben patrones de colores idénticos para advertir sobre su mal sabor a depredadores con más eficiencia. Sin embargo también se ha demostrado que el patrón de colores es importante en la

selección de pareja entre especies estrechamente relacionadas. Por ello, los cambios en un patrón contribuyen a la diversificación de las especies.

Al combinar cruces entre especies en un insectario con estudios de zonas híbridas donde razas de patrones de colores se unen naturalmente, el becario de STRI Richard Merrill, de Cambridge University y sus colegas están empezando a comprender la genética y las rutas de desarrollo que conllevan el abanico de colores que se observan en las mariposas *Heliconius*.

Sin embargo, poco se conoce sobre la base genética del aislamiento sexual en este o cualquier otro sistema natural. Las investigaciones de Merrill en STRI utilizan una serie de experimentos de selección de pareja seguidos por análisis de laboratorio para descubrir la arquitectura genética de apareamientos mixtos en dos especies estrechamente relacionadas de *Heliconius*.