# Tupper 4pm seminar

Tuesday, January 19, 4pm seminar speaker will be Robert Srygley, US Department of Agriculture
**Diet, migration, and immunity in Mormon crickets**

# Bambi seminar

Thursday, January 21, Bambi seminar speaker will be Marc Seid, Neurobiology Laboratory, STRI.
**Brain size, behavior and ultrastructure: neuroethology of ants**

# BDG meeting

BDG meeting will be held on January 19, 2pm, at the Conference Room, with Andre J. Riveros

# Arrivals

Joseph Mascaro, University of Wisconsin, to work as volunteer in explaining the distribution of liana and tree species: a test of the dry season growth hypothesis, on BCI.

David King, Oregon State University, to work in the inferring height growth histories from leaf scars in palms, on BCI.

Patricia Jones, University of Texas at Austin, to conduct a comparative study of foraging behavior in the frog-eating bat (*Trachops cirrhosus*) between BCI and La Selva.

Laura Vollset, University of California, Santa Cruz, to study the reproductive behavior and ecology of the fiddler crab *Uca terpsichores* at Naos.

Willem-Jan Emsens, Wageningen University, Netherlands, to study rodents as conditional mutualists of trees: When are agoutis effective seed dispersers?, on BCI.


Smithsonian Tropical Research Institute, Panamá www.stri.org January 15, 2010

# Crime and punishment: Cheaters must pay!


Jandér, BCI, 2005

Figs and the wasps that pollinate them present one of biologists' favorite examples of a beneficial relationship between two different species. In exchange for the pollination service provided by the wasp, the fig fruit provides room and board for the wasp's developing young. However, wasps do not always pollinate the fig. Fig trees "punish" these "cheaters" by dropping unpollinated fruit, killing the wasp's offspring inside, report researchers working at STRI.

Their results, published in the *Proceedings of the Royal Society*, show that sanctions against cheaters may be critical to maintain the relationship.

"Relationships require give and take. We want to know what forces maintain this 80-million-year-old arrangement between figs and their wasp pollinators," said lead author, Charlotte Jandér, Cornell, who conducted the study as a Smithsonian pre-doctoral fellow. "What prevents the wasps from reaping the benefits of the relationship without paying the costs?"

Some wasp species passively carry pollen that sticks to their bodies. Others actively collect pollen in special pouches. Jandér evaluated the ability of six different fig tree-fig wasp species pairs to regulate cheating. She introduced either a single pollen-free wasp, or a wasp carrying pollen, into a mesh bag containing an unpollinated fig. The wasps entered the figs to lay their eggs. Jandér found that trees often dropped unpollinated figs before young wasps could mature.

"This is really about the all-too-human theme of crime and punishment. We found that in actively pollinated fig species—when wasps expend time and energy to collect and deposit pollen--wasps that did not provide the basic service of pollination were sanctioned. However, in passively pollinated species—when the wasps do not need to make an effort to pollinate— sanctions were absent," said Allen Herre, STRI staff scientist. "Although we still need to clearly understand the costs associated with applying sanctions, it seems like sanctions were only present where needed."

"Sanctions seem to be a necessary force in keeping this, and other, mutually-beneficial relationships on track when being part of a mutualism is costly," said Jandér. "In our study, we saw less cheating when sanctions were stronger. Similar results have been found among human societies and in social insects. It is very appealing to think that the same general principles could help maintain cooperation both within and among species."

*By Beth King*

Los higos y las avispas que los polinizan presentan uno de los ejemplos favoritos de los biólogos sobre una relación beneficiosa entre dos especies diferentes. A cambio del servicio de la polinización que ofrece la avispa, la fruta del

# More arrivals

Katherine McCulloh and Steven Voelker, Oregon State University, and Daniel Johnson, US Forest Service, to study plant hydraulic continuum from root to leaf: avoidance of catastrophic xylem failure under dynamic conditions, on BCI.

Sebastian Wolf, ETH Zurich, Switzerland , to study sustainable agroforestry for carbon sequestration to improve small farmers' livelihood, in Gamboa.

Claudia Rosales, Universidad de Los Andes, to study the evolution of mimicry in *Heliconius*, at Naos.

Jenifer Walke and Matthew Becker, Virginia Polytech Institute & State University, to work on mitigating amphibian disease with innate skin defenses, at Tupper.

Katherine Wright, Griffith University, Australia, to work as volunteer with STRI's Center for Tropical Forest Science arthropod initiative, at Tupper.

Melida Ruiz, University of Michigan, to study population genetic structure and phylogeography of widespread tropical forest trees, in Gamboa.

Adrian Villalobos, Universidad Nacional de Costa Rica, to study population genetics and gene expression studies in tree-hole breeding damselfly *Megaloprepus caerulatus* (Pseudostimatidae; Odonata) as an environmental monitor, on BCI.

# Departures

Eldredge Bermingham to Washington DC, to attend the SI Regents Dinner and meet with colleagues.

higuerón suministra hospedaje y alimentación a las crías en desarroyo de la avispa. Sin embargo, éstas no siempre polinizan al higo. Los higuerones entonces castigan a las tramposas dejando caer las frutas que no han sido polinizadas, matando así a las crías de las avispas que están dentro de la fruta, informan científicos de STRI.

Sus resultados, publicados en *Proceedings of the Royal Society*, muestran que las sanciones contra tramposos pueden ser críticas para mantener la relación.

"Las relaciones necesitan reciprocidad. Queremos saber qué fuerzas mantienen este arreglo de 80 millones de años entre los higuerones y sus avispas polinizadoras" comentó Charlotte Jandér, la autora principal del artículo, quien llevó a cabo el estudio como becaria pre-doctoral en STRI. "Qué hace que las avispas renuncien a obtener los beneficios de la relación al no pagar los costos?"

Algunas especies de avispas portan polen pasivamente, el cual se les pega al cuerpo. Otras coletan el polen activamente en bolsas especiales. Jandér evalúa la habilidad de seis diferentes pares de especies de higuerón-avispa de higuerón para regular las trampas. Charlotte introduce ya sea una sola avispa sin polen, o una avispa que porta polen dentro de una bolsa de redecilla que contiene un higo sin polinizar. Las avispas entran en los higos y dejan sus huevos. Jandér encontró que los árboles con frecuencia dejan caer los higos no polinizados antes de que las jóvenes avispas puedan madurar.

"Esto se trata realmente sobre un tema muy humano de crimen y castigo. Encontramos que en las especies que son


polinizadas activamente —cuando las avispas gastan tiempo y energía para colectar y depositar el polen— las avispas que no proporcionaron el servicio básico de la polinización fueron sancionadas. Sin embargo, en las especies que son polinizadas de forma pasiva—cuando las avispas no tienen la necesidad de esforzarse para polinizar— no hubo sanciones" aseguró Allen Herre, científico del cuerpo de investigadores de STRI. "Aunque aún debemos entender claramente los costos asociados con la aplicación de las sanciones, pareciera que las sanciones están presentes solo cuando se necesitan."

"Las sanciones parecen ser una fuerza necesaria para mantener en regla esta, y otras relaciones de mutuo beneficio, cuando el ser parte de un mutualismo es costoso" agrega Jandér. "En nuestro estudio, vimos menos trampas cuando las sanciones eran más fuertes. Los mismos resultados se han encontrado tanto para las asociaciones entre los seres humanos que entre los insectos sociales. Es muy atractivo el pensar que los mismos principios generales pueden ayudar a mantener la cooperación tanto dentro como entre especies."

# New publications


Cernusak, Lucas A., Winter, Klaus, and Turner, Benjamin L. 2010. "Leaf nitrogen to phosphorus ratios of tropical trees: Experimental assessment of physiological and environmental controls." *New Phytologist* 185(3): 770-779.

Curletti, Gianfranco. 2010. "New species of the genus *Agrilus* Curtis, 1825, from Nicaragua and Panamá (Coleoptera: Buprestidae: Agrilinae." *Zootaxa* 2333: 59-68.

Hughes, William O.H., Bot, Adriane N.M., and Boomsma, Jacobus J. 2010. "Caste-specific expression of genetic variation in the size of antibiotic-producing glands of leaf-cutting ants." *Proceedings of the Royal Society B: Biological Sciences* 277(1681): 609-615.

Jander, K. Charlotte and Herre, Edward Allen. 2010. "Host sanctions and pollinator cheating in the fig tree-fig wasp mutualism." *Proceedings of the Royal Society B: Biological Sciences* Online.

Lasky, Jesse R. and Keitt, Timothy H. 2010. "Abundance of Panamanian dry-forest birds along gradients of forest cover at multiple scales." *Journal of Tropical Ecology* 26(01): 67-78.

Leigh, Jr., Egbert Giles. 2010. "The group selection controversy." *Journal of Evolutionary Biology* 23(1): 6-19.

Peretti, Alfredo V. and Eberhard, William G. 2010. "Cryptic female choice via sperm dumping favours male copulatory courtship in a spider." *Journal of Evolutionary Biology* Online(Online).

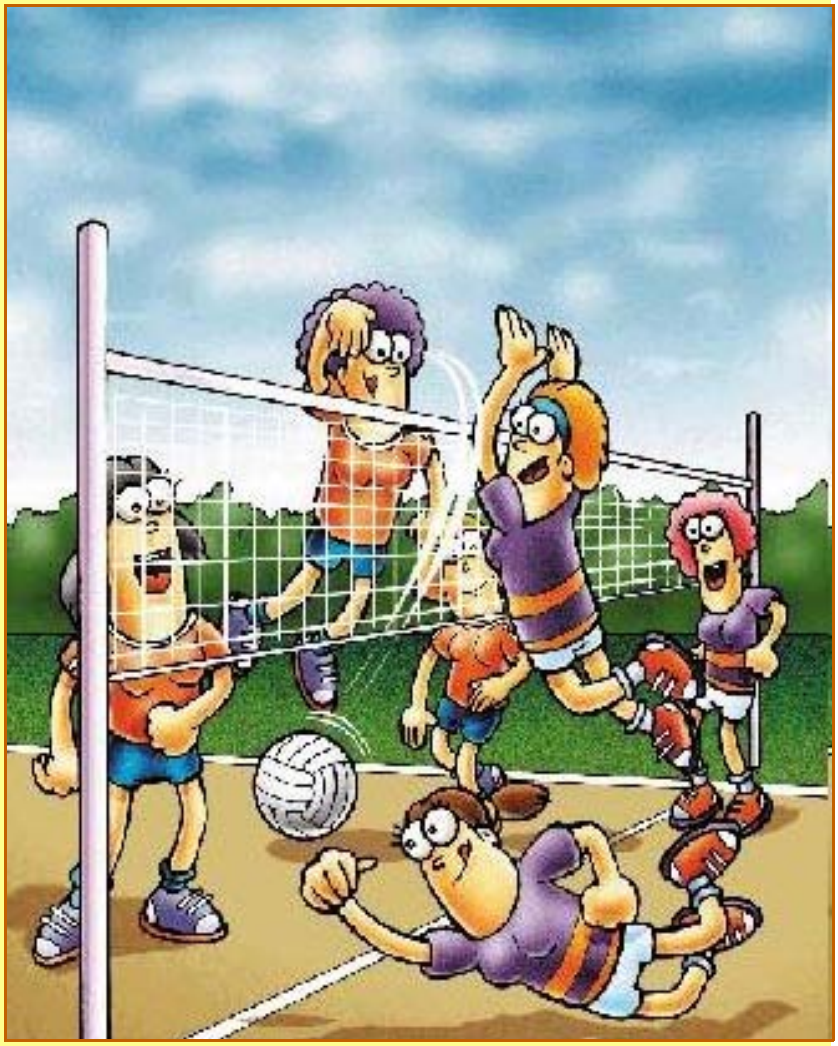
Wester, Stefan and Zotz, Gerhard. 2010. "Growth and survival of *Tillandsia flexuosa* on electrical cables in Panama." *Journal of Tropical Ecology* 26(01): 123-126.

# *Liga de volleyball* *Volleyball Season*

***Inicio: hoy, viernes 15 de enero, 5:30pm***
***Estacionamientos del Centro Tupper***
***Starting today, Friday, January 15, 2010, at 5:30pm***
***at the Tupper Center Parking Lot***

***El Comité de Bienestar Institucional invita a la inauguración de nuestra Liga de volleyball interno 2010. Este año la copa se llamará "Copa Centenario" dando inicio a las actividades internas que el Instituto desarrollará para celebrar los 100 años del Smithsonian en Panamá.***

***STRI´s Institutional Well-Being Committee invites to the inauguration of our internal Volleyball Season 2010. This year the trophy will be named "Centennial Volleyball 2010 Cup" to start the internal activities the Institute will carry out to celebrate the 100 years of the Smithsonian in Panama.***



# *"Copa Centenario 2010"*
## *"Centennial volleyball 2010 Cup"*