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Smithsonian Tropical Research Institute, Panamá

STRI news

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August 12, 2011

## Gamboa seminar

Monday, August 15, Gamboa seminar speaker will be Owen Petchey, University of Sheffield

**How to predict food web structure**

## Tupper seminar

Tuesday, August 16, 4pm seminar speaker will be Ingrid Parker, University of California, Santa Cruz

**The evolutionary ecology of domestication in caimito (*Chrysophyllum cainito*).**

## Paleo-Talk

Wednesday, August 17, Paleotalk speaker will be Richard Condit, STRI

**The BCI forest and changes in species composition over 30 years**

## Bambi seminar

Thursday, August 18, Bambi seminar speaker will be Meg Crofoot, STRI

**Cheating monkeys undermine group strength in enemy territory**

**Safety number  
212-8211**



## The ladies and the predators

### *What stops túngara frogs from continually elaborating their calls?*

Males across the animal world have evolved elaborate traits to attract females, from huge peacock trains to complex bird songs and frog calls. But what keeps males from evolving more and more colorful feathers, longer tails, or more melodious songs? Predators, for one. Increased elaboration can draw predators in, placing an enormous cost on males with these sexy traits.

In a new paper published in *Science* (August 5), "Signal perception in frogs and bats and the evolution of mating signals," a group of biologists

led by former STRI fellow Karin Akre from the University of Texas at Austin and colleagues Hamilton Farris and Amanda Lea, STRI's Rachel Page and STRI research associate Mike Ryan from the University of Texas at Austin, showed that females themselves can also limit the evolution of increased elaboration.

Studying Neotropical túngara frogs, they found that females lose their ability to detect differences in male mating calls as the calls become more elaborate. "We have shown that the female túngara frog brains

have evolved to process some kinds of information and not others," says Mike Ryan, "and that this limits the evolution of those signals."

In túngara frogs, males gather to attract female frogs with a call that is made up of a longer "whine" followed by one or more short "chucks." Through a series of experiments conducted in Panama, the researchers found that females prefer male calls with more chucks, but their preference was based on the ratio of the number of chucks, not the absolute number of chucks. As

# Arrivals

Tse-Lynn Loh, University of North Carolina, to study the effect of predation on a sponge-coral association, at Bocas del Toro.

Kasper Reitzel, University of Southern Denmark, to study linking phosphorus biogeochemistry in catchments and water bodies, at Tupper.

Laura Crothers, University of Texas at Austin, and Ricardo Cossio, Panama, to assess the condition-dependence and fitness consequences of male warning color brightness in *Dendrobates pumilio*, the strawberry poison dart frog, at Bocas del Toro.

Friedrich Huebel, Joscha Becker and Aditi Rosegger, Universitat Postdam, Germany, to join the Agua Salud Project-Hydrologic Studies, at Tupper.

Sarah Batterman, Princeton University, to join the Agua Salud Project-Hydrologic Studies, on BCI.

Martijn Slot, University of Florida, to study temperature responses of leaf dark respiration and their implication for tropical forest carbon balance, at Tupper and Gamboa.

Eric Griffin, University of Pittsburgh, to the study the last frontier of biodiversity: On the abundance and impact of bacteria on arboreal species within a tropical forest, on BCI.

Samuel Crickenberger, Clemson University, to study the evolution of life histories in geminate echinoderms: A comparative approach to unscrambling the relationships among environment, egg size, and the energetics of development, at Galeta and Naos.

males elaborate their call by adding more chucks, their relative increase in attractiveness decreases due to a perceptual constraint on the part of females.

Male túngara frog calls also attract a predator: the fringe-lipped bat. To confirm that male call elaboration wasn't limited by these predators, the researchers studied how the bats respond to additional "chucks" in the male call.

They discovered that hunting bats also choose their prey based on chuck number ratio, just as the female frogs do. So, as males elaborate their call by adding chucks, the relative increase in predation risk decreases with each additional chuck.

"We know that predation risk can keep male frogs from calling at all, or keep males from producing calls with chucks," says Rachel Page, "What this new study shows us is that predation risk is unlikely to limit increased call elaboration," concludes Page. "Instead, it is the females' cognition that limits the evolution of increasing chuck number," says Karin Akre.

*Adapted from Karin Akre*

The article was distributed by Neal G. Smith. You may also obtain it from [calderom@si.edu](mailto:calderom@si.edu)

## ¿Qué evita que las ranas túngara desarrollen llamadas cada vez mas elaboradas?

En el mundo animal, los machos han evolucionado con características elaboradas para atraer a las hembras, desde enormes colas de pavo real hasta complejos cantos de aves y llamadas de ranas. Pero, ¿qué es lo que evita que tengan plumas más y más coloridas, colas cada vez más largas o cantos aún más melódicos? La respuesta, por un lado, son los depredadores. Una mayor

elaboración puede llamar la atención de los depredadores, lo que tendría un alto costo para los machos con estas características tan sexy.

En un artículo nuevo publicado por *Science* (5 de agosto), "Signal perception in frogs and bats and the evolution of mating signals" [Percepción de señales en ranas y murciélagos y la evolución de señales de apareamiento], un grupo de biólogos liderados por Karin Akre ex-becario de STRI de la Universidad de Texas en Austin, y sus colegas Hamilton Farris y Amanda Lea, juntos con Rachel Page de STRI, y Mike Ryan, investigador asociado a STRI de la Universidad de Texas en Austin, mostraron que las hembras mismas pueden limitar la evolución de una mayor elaboración.

Estudiando ranas túngara del Neotrópico, los investigadores encontraron que las hembras pierden su habilidad de detectar diferencias en las llamadas de los machos cuando éstos se vuelven muy elaborados. "Hemos demostrado que el cerebro de las hembras túngara ha evolucionado para procesar cierta clase de información y otra no" advierte Mike Ryan, "y esto limita la evolución de dichas señales."

En las ranas túngara, los machos se reúnen para atraer a las hembras con un llamado que se compone de un "gemido" más largo, seguido de uno o más "golpes secos". A través de una serie de experimentos llevados a cabo en Panamá, los investigadores encontraron que las hembras prefieren las llamadas de los machos con más golpes, pero su preferencia se basa en la proporción del número de golpes secos. Cuando los machos elaboran sus llamadas añadiendo más golpes, el aumento relativo de su atractivo decrece debido a la limitación de parte de las hembras.



Las llamadas de los machos túngara también atraen a los murciélagos de labios con flecos que comen a ranas túngara. Para confirmar que la elaboración del canto de los machos no estaba limitada por estos depredadores, los investigadores también estudiaron cómo respondieron estos depredadores a los "golpes secos" adicionales en las llamadas de los machos.

Los científicos descubrieron que los murciélagos escogen a sus presas basados en la proporción del número de golpes, al igual que las hembras túngara. De modo que cuando los machos elaboran sus llamadas añadiendo golpes, el aumento relativo del riesgo de ser comido baja con cada golpe adicional.

"Sabemos que el riesgo de ser comido puede evitar que los machos de la rana túngara canten del todo, o puede evitar también que canten con golpes secos" dice Rachel Page "Lo que este nuevo estudio demuestra es que el riesgo de ser comido no parece limitar la elaboración del llamado," concluye Page.

"Sin embargo" comenta Karin Akre, "la capacidad de reconocimiento de las hembras sí limita el incremento en el número de golpes secos"



## More arrivals

Elise Morrison, California, to study the effects of nitrogen deposition and elevated carbon dioxide on liana and tree growth, in Gamboa.

Andrew Quebbeman, University of Michigan, to study the response of tropical liana and tree seedlings to elevated CO<sub>2</sub> and seasonal precipitation, in Gamboa.

Helmut Elsenbeer, University of Postdam, Germany, to study the surficial processes in undisturbed forests and their controls, on BCI.

Sara Holloway, University of Texas at Austin, to work in the Coral Adaptability, Resilience & Resistance to Anthropogenic Impacts in Biodiverse Caribbean Reef Ecosystems project, at Bocas del Toro.

## Departures

Mark Torchin to Barcelona, Spain, to give a talk at the 7th International Conference on Marine Bioinvasions

Lidia de Vakencia to Washington DC, to participate in the Rainforest Researchers Summer Camp at the Smithsonian Associates with Educators Connecting Research to the Classroom (ECRC), and meet with colleagues from SERC and the NMNH.

Rachel Collin to Ft. Pierce, to conduct field work at the Smithsonian Marine Station to work on an NSF grant on the evolution of development of Calyptroid gastropods.



## Workshop on REDD+ for Panama's Indigenous Leaders

STRI's Packard Project, The Environmental Leadership Training Initiative (ELTI), a joint effort by STRI and Yale University, and the Dobbo Yala Foundation hosted a workshop on REDD+ (Reducing Emissions from Deforestation and Forest Degradation) for Panama's indigenous authorities and members of the National Coordinating Body of Indigenous Peoples (COONAPIP).

The event took place in the Ngäbe-Buglé Comarca on August 6-7. More than half of Panama's remaining mature forests are found in indigenous territories, both formally recognized and under claim. These forests, along with secondary-growth forests, contribute to mitigating climate change through carbon sequestration. As such, they are eligible for the REDD+ mechanism by which industrialized countries will pay developing countries for conserving and sustainably managing their forests to partially offset carbon emissions.

The workshop was designed to prepare Panama's indigenous leaders for the upcoming Climate Change Meeting of the United Nations Framework Convention on Climate Change (UNFCCC) that will take place in Panama from October 1-7. Key topics covered during the workshop included climate change, forest carbon, social safeguards, forest cover and land conflicts in indigenous territories, and carbon property rights.

El Proyecto Packard, la Iniciativa de Liderazgo Ambiental y Capacitación (ELTI) de STRI, un proyecto conjunto entre STRI y la Universidad de Yale, y la Fundación Dobbo Yala celebraron un taller REDD+ (Reducción de Emisiones por Deforestación y Degradación de Bosques) para autoridades indígenas de Panamá y miembros de la Coordinadora Nacional de Pueblos Indígenas de Panamá (COONAPIP). El evento se llevó a cabo en la Comarca Ngäbe-Buglé del 6-7 de agosto.

Más del 50% de los bosques maduros que quedan en

Panamá se encuentran en territorios indígenas, tanto formalmente reconocidos como en disputa. Estos bosques, junto con bosques secundarios, contribuyen a mitigar el cambio climático a través del secuestro de carbono. Como tal, son elegibles para el mecanismo REDD+, por el cual los países industrializados pagarán a los países en vías de desarrollo por conservar y manejar de manera sostenible y así reducir parcialmente las emisiones de carbono.

El taller se diseñó para preparar a los dirigentes indígenas de Panamá para la próxima Convención sobre Cambio Climático dentro del Congreso sobre Cambio Climático de las Naciones Unidas (UNFCCC) que se llevará a cabo en Panamá del 1ro al 7 de octubre.

Los tópicos clave que se cubrieron fueron el cambio climático, carbono del bosque, salvaguardas sociales, cobertura boscos y conflictos de tierras en territorios indígenas, así como los derechos del carbono.



## Departures

Carlos Jaramillo to Ensenada, Mexico, to attend a PhD defense for Monica Zegarra, at Centro de Investigacion Cientifica y de Educacion Superior.

Angel Aguirre and Apolinar Guerrero to Washington DC, on official business and training at SI.

## STRI in the news

Move to the city, save the rainforest, by Greg Lindsay. 2011. Fast Company: August 5, at <http://www.fastcompany.com>

## New publications

Akre, Karin L., Farris, Hamilton E., Lea, Amanda M., Page, Rachel A., and Ryan, Michael J. 2011. "Signal perception in frogs and bats and the evolution of mating signals." *Science* 333(6043): 751-752.

Baeza, J. Antonio, Bolanos, Juan A., Hernandez, Jesus E., Lira, Carlos, and Lopez, Regulo. 2011. "Monogamy does not last long in *Pontonia mexicana*, a symbiotic shrimp of the amber pen-shell *Pinna carnea* from the southeastern Caribbean Sea." *Journal of Experimental Marine Biology and Ecology* 407(1): 41-47.

Farris, Hamilton E., and Ryan, Michael J. 2011. "Relative comparisons of call parameters enable auditory grouping in frogs." *Nature Communications* 2: 410. doi:10.1038/ncomms1417



## Sandra Patiño (1964-2011)

With great sadness, the staff of Barro Colorado Island announced the passing of STRI former fellow Sandra Patiño, after a struggle with cancer, on August 9, in Medellin Colombia. She was 47. She is survived by her mother, Ofelia Gallego.

Her peers at STRI describe her as a person who would never show fear, but curiosity, who invited homeless people for coffee just to hear their stories, who delighted in citing Darwin and answering questions he didn't, and brought together people she loved and who loved her. She turned lives upside-down, and helped them find their footing... understood that rules should be followed if they made sense, but not otherwise... and knew that the answer was always "haz lo que es bueno" concludes an eulogy by Greg Gilbert.

At STRI, Sandra worked with Allen Herre, Greg Gilbert and Melvin Tyree. She also co-authored articles with Gerhard Zotz, and most recently with Oliver Phillips, Joe Wright and Bill Laurance. She was co-author of "Drought sensitivity of the Amazon rainforest", published in 2009 by *Science*.

Con gran pesar, el personal de la Isla de Barro Colorado anunció el fallecimiento de Sandra Patiño, luego de una lucha contra el cáncer, el 9 de agosto, en Medellín, Colombia. Tenía 47 años. Su deudo principal es su madre, Ofelia Gallego.

Sus colegas en STRI la describen como una persona que nunca mostró miedo, sino curiosidad, que invitaba a personas sin hogar a tomar café, solo para escuchar sus historias, que gustaba de citar a Darwin y contestar preguntas que él nunca se hizo, así como unir a las personas que amaba y que la amaban a ella. Ella cambió vidas, y ayudó a que se enderezaran... entendía que las reglas debían seguirse si tenían sentido, pero de lo contrario, no, y que la mejor respuesta era "haz lo que es bueno" concluyó una elegía de Greg Gilbert.

En STRI, Sandra trabajó con Allen Herre, Greg Gilbert y Melvin Tyree. Fue co-autora de artículos con Gerhard Zotz, y más recientemente con Oliver Phillips, Joe Wright y Bill Laurance. Fue co-autora de "Drought sensitivity of the Amazon rainforest", publicado en 2009 por *Science*.

## New publications

Encarnacao, J.A., Tschapka, M., Kalko, Elisabeth K.V., and Becker, N.I. 2011. "Abstract: Energy compensation in males of a temperate insectivorous bat species. In *85th Annual Meeting of the German Society of Mammalogy Luxembourg (L)*, 13th-17th September 2011, Vol. 76: 7. Berlin: German Society of Mammalogy.

Nygaard, Sanne, Zhang, Guojie, Schiott, Morten, Li, Cai, Wurm, Yannick, Hu, Haofu, Zhou, Jiajian, Ji, Lu, Qiu, Feng, Rasmussen, Morten, Pan, Hailin, Hauser, Frank, Krogh, Anders, Grimmeliikhuijzen, Cornelis J.P., Wang, Jun, and Boomsma, Jacobus J. 2011. "The genome of the leaf-cutting ant *Acromyrmex echinator* suggests key adaptations to advanced social life and fungus farming." *Genome Research* 21(8): 1339-1348.

O'Connell, L.A., Matthews, B.J., Ryan, Michael J., and Hofmann, H.A. 2010. "Characterization of the dopamine system in the brain of the túngara frog, *Physalaemus pustulosus*." *Brain, Behavior and Evolution* 76(3-4): 211-225.

Stouffer, Philip C., Johnson, Erik I., Bierregaard, Jr., Richard O., and Lovejoy, Thomas E. 2011. "Understory bird communities in Amazonian rainforest fragments: Species turnover through 25 years post-isolation in recovering landscapes." *PLoS ONE* 6(6): e20543.

van Breugel, Michiel, Ransijn, Johannes, Craven, Dylan, Bongers, Frans, and Hall, Jefferson S. 2011. "Estimating carbon stock in secondary forests: Decisions and uncertainties associated with allometric biomass models." *Forest Ecology and Management* doi: 10.1016/j.foreco.2011.07.018