



Smithsonian

100 years of science in Panama



Smithsonian Tropical Research Institute, Panamá

STRI news

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August 5, 2011

NEO symposium

Monday, August 8, the STRI/McGill University Neotropical Environment Option Symposium will be held at the Tupper Center Auditorium. See page 5 for the program. Everybody is invited. It will be broadcasted by

webcast at:
<http://bit.ly/n9M4ai>

Tupper seminar

Tuesday, August 9, 4pm seminar speaker will be Manuel Arroyo-Kalin, Durham University

**Slash-burn-and-churn:
Landscape history
and crop husbandry in
Pre-Columbian Amazonia**

Bambi seminar

Thursday, August 11, Bambi seminar speaker will be Elisabeth Kalko, STRI, and Stefan Braendel, University of Ulm, Germany

**Bats: Diversity, disease,
senses, scent and teeth**
Interested in giving a Bambi on BCI? Contact Sara Neihaus at sfln2@cam.ac.uk

**Safety number
212-8211**

NEO TURNS 10!

This year marks the 10th Anniversary of the STRI-McGill Neotropical Environment Option (NEO) Program. The program, which partners two outstanding research communities, was conceived as a way to give graduate students the opportunity to develop a long-term relationship with the tropics. "The only way for students to understand the cycle of life in the tropics and get their head around the complex issues involved in preserving biodiversity is to spend a long time in the tropics. The NEO program gives students the chance to do just that," reflects Catherine Potvin, the McGill professor who helped establish the program.



Catherine Potvin

The cross-cultural, multidisciplinary approach to science is the program's defining characteristic and its greatest strength. There are simply no comparable graduate programs in existence today. By offering a formal graduate program between STRI and McGill, NEO allows graduate students to combine intensive fieldwork in the tropics with academia, and get the best out of the two institutions. "The program is demanding and challenging", muses Oscar Puebla, a recent NEO graduate and current STRI fellow. "However the ability to spend long stretches in Panama meant that I could develop a dissertation that combined extensive behavioral, genetic, and theoretical work."

Over the last 10 years, NEO has welcomed 54 students from many different nationalities and has granted 33 graduate degrees. Research carried out by NEO students reflects the depth and breadth of STRI research. "In my mind, the NEO program represents some of the best aspects of STRI scholarship and science. It is the only program STRI has for directly connecting with graduate students and provides wonderful opportunities for strengthening and broadening our science. I am 100% committed to ensuring that



José Loaiza



Victor Frankel



Dominique Roche

NEO's next 10 years are as productive and dynamic as the previous 10," says Owen McMillan, STRI's academic dean.

Please join us this Monday for a celebration of the NEO program. STRI is hosting the annual NEO Symposium at the Tupper Conference Center. The

Arrivals

Anna Strimaitis and Brendan Biggs, Florida State University, to investigate the influence of skeletal composition on growth, regeneration and reattachment of Caribbean coral reef sponges and its context-dependency, at Bocas del Toro.

Janie Wulf, Florida State University, to study the influence of competition, mutualism and physical environment on patterns of sponge diversity and co-occurrence in Caribbean coral reefs and mangroves, at Bocas del Toro.

Jennifer Hansen, Jonathan Stocking, Daniel Ellis, University of Virginia, to study the influence of climate change on wave dissipation over Panamanian coral reefs and subsequent effects on beach morphology, at Galeta.

Frances Armstrong, College of William and Mary, to study the development of hybrid larvae from two species of *Clypeaster* with differing life history strategies, at Bocas del Toro.

Hannah Schedkenbach and Beate Zimmermann, University of Postdam, to join the Agua Salud Project-Hydrologic Studies.

Rosalien Jezeer and Leonie Wezendonk, University of Utrecht, The Netherlands, to join the Agua Salud-Hydrologic Studies Project.

Anindo Choudhury, Chase Brosseau and Eric Gale, Saint Norbert College, to study freshwater fish parasites in the Chagres River watershed, in Gamboa.

event begins at 9:00am and includes talks by NEO alums, as well as current NEO students. McGill's Dr. Margaret Kalacska will give the keynote address. There will be a barbeque following the symposium. All are welcome.

Este año marca el décimo aniversario del Programa de la Opción Ambiental Neotropical de STRI y la Universidad de McGill (NEO). El programa, para el cual se asociaron dos comunidades de investigación prestigiosas, se creó para ofrecerles a estudiantes graduados la oportunidad de desarrollar una relación a largo plazo con los trópicos. "La única manera que los estudiantes entiendan el ciclo de la vida en los trópicos y se compenetren con los complejos procesos de preservar la biodiversidad es que pasen un período largo en los trópicos. El programa NEO le ofrece a los estudiantes la oportunidad de hacer exactamente eso," reflexiona Catherine Potvin, la profesora de McGill que ayudó a establecer el programa.

Un enfoque interdisciplinario hacia la ciencia es la característica que más define al programa



Kecia Kerr

y representa su mayor fortaleza. Simplemente, en la actualidad no hay ningún programa de posgrado que se le compare. Al ofrecer este programa de posgrado entre STRI y McGill, NEO le permite a los estudiantes combinar trabajo de campo intensivo en los trópicos con academia, y obtener lo mejor de ambas instituciones.

"El programa es exigente y tiene muchos retos" comenta Oscar Puebla, un becario de STRI recientemente graduado de NEO. "Sin embargo, la posibilidad de pasar largos períodos en Panamá significó que pudiera desarrollar una tesis que combina trabajo extensivo en comportamiento, genética y teoría."

Durante los últimos diez años, NEO ha recibido a 54 estudiantes de varias nacionalidades y ha otorgado 33 diplomas de posgrado. Las investigaciones llevadas a cabo por estudiantes

de NEO reflejan la profundidad y amplitud de las investigaciones de STRI. "Para mí, el Programa NEO representa algunos de los mejores aspectos de la erudición y ciencia de STRI. "Es el único programa que STRI posee para conectarse directamente con estudiantes graduados y ofrece magníficas oportunidades para reforzar y ampliar nuestra ciencia. Estoy comprometido ciento por ciento a asegurar que los próximos diez años de NEO sean tan productivos y dinámicos como los diez años previos, aseguró Owen McMillan, decano académico de STRI.

Únanse a nosotros este lunes para la celebración del programa NEO. STRI presentará el Simposio de NEO en el Centro de Conferencias Tupper. El evento empieza a las 9am, e incluye charlas de graduados de NEO así como estudiantes que cursan el programa actualmente. Margaret Kalacska de McGill ofrecerá la conferencia magistral. Ofreceremos una barbacoa después del simposio. Todos están invitados.



Oscar Puebla

More arrivals

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

Whitney Nagel, University of North Carolina, to study ecological impact and parasitism in the invasive lionfish, *Pterois volitans*, in Panamanian coasts, at Bocas del Toro and Galeta.

Alex Pasquini, University of North Carolina, to study molecular evolution of sea urchins, at Bocas del Toro and Naos Island Laboratories.

Maryna Lesoway, McGill University, to study the evolutionary biology of the Calyptraeid gastropods, at Naos Island Laboratories.

STRI in the news

"ScienceShot: A buzz in the dark" by Sara Reardon. 2011. Science NOW (July 26): <http://news.sciencemag.org/sciencenow/2011/07/scienceshot-a-buzz-in-the-dark.html>

New publications

Chisholm, Ryan A. 2011. "Time-dependent solutions of the spatially implicit neutral model of biodiversity." *Theoretical Population Biology* 80(2): 71-79.

Glynn, Peter William, Colley, Susan B., Guzman, Hector M., Enochs, Ian C., Cortes, Jorge, Mate T., Juan L., and Feingold, J.S. 2011. "Reef coral reproduction in the eastern Pacific: Costa Rica, Panama, and the Galapagos Islands (Ecuador). VI. Agariciidae, *Pavona clavus*." *Marine Biology* 158(7): 1601-1617.

Back-packing toucans assist tropical researchers

Nutmeg-loving toucans wearing GPS transmitters recently helped a team of scientists at STRI address an age-old problem in plant ecology: Accurately estimating seed dispersal. The tracking data revealed what scientists have long suspected: toucans are excellent seed dispersers, particularly in the morning.

The researchers collected fresh seeds from a common Panamanian nutmeg tree and fed them to captive toucans at the Rotterdam Zoo. They gulp nutmeg seeds whole, the outer pulp is processed in the bird's crop, and the hard inner seed is then regurgitated. Five zoo toucans fed 100 nutmeg seeds took an average of 25.5 minutes to process and regurgitate the seeds.

In Panama, the scientists netted six wild toucans that were feeding from a large nutmeg tree in Gamboa. They fitted the birds with lightweight backpacks containing GPS tracking devices and accelerometers which can measure a bird's daily activity level. When matched with the seed-regurgitation time of the zoo toucans, the GPS data indicated the wild toucans were probably dropping nutmeg seeds a distance of 472 feet, on average, from the mother tree. Each seed had a 56% probability of being dropped at least 328 feet from its mother tree and an 18% chance of being dropped some 656 feet from the tree.

In addition, the accelerometer revealed that the toucans' peak activity and movement was in the morning followed by a lull at midday, a secondary activity peak in the afternoon, and complete inactivity at night. This is a normal pattern of tropical birds.

"Time of feeding had a strong influence on seed dispersal," the scientists write. "Seeds ingested in morning (breakfast) and afternoon (dinner) were more likely to achieve significant dispersal than seeds ingested

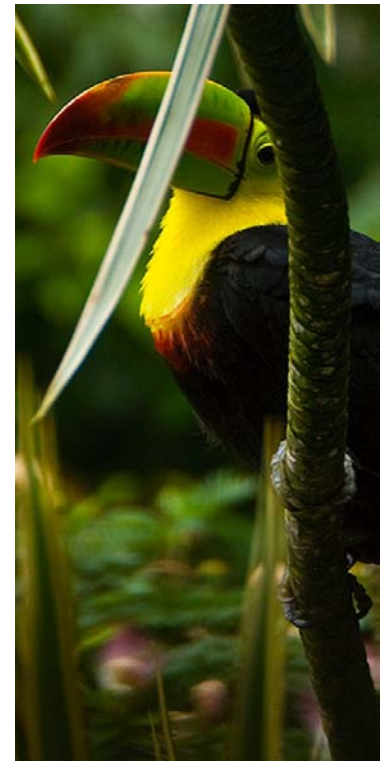
mid-day (lunch)." This observation explains why tropical nutmegs are "early morning specialists" with fruits that typically ripen at early and mid-morning so they are quickly removed by birds. Ideally, the scientists observed, nutmeg trees could increase their seed dispersal distances by producing fruit with gut-processing times of around 60 minutes.

The article produced from this research was published by Kays et al, 2011. See citation under "New publications." The article can be obtained from calderom@si.edu

Tucanes que adoran la nuez moscada y portando transmisores GPS ayudaron a un equipo de científicos de STRI a resolver un antiguo dilema de la ecología vegetal: estimar con exactitud la dispersión de semillas. La información que recogieron reveló lo que los científicos habían sospechado: los tucanes son excelentes dispersadores de semillas, especialmente en la mañana.

Los investigadores colectaron semillas frescas de un árbol de nuez moscada común de Panamá y se las dieron a tucanes en cautiverio en el Zoológico de Rotterdam, los cuales se tragan las semillas enteras, procesan la pulpa exterior en el buche y luego regurgitan la dura semilla interior. Cinco tucanes se comieron 100 semillas de nuez moscada y les tomó en promedio 25.5 minutos procesar y regurgitar las semillas.

En Panamá, los científicos atraparon con redes seis tucanes silvestres que estaban alimentándose de un árbol grande de nueces en Gamboa. Les pusieron unas mochilitas que contenían transmisores GPS de poco peso y acelerómetros que miden el nivel de la actividad diaria del ave. Al comparar el tiempo en que los tucanes del zoológico regurgitan las semillas, la información del GPS indicó que los tucanes silvestres



probablemente dejaban caer las semillas a una distancia de unos 472 pies del árbol. Cada semilla tuvo un 56% de probabilidades de llegar por lo menos a 328 pies de distancia del árbol y 18% de llegar hasta a 656 pies del árbol.

Además, el acelerómetro reveló que la máxima actividad del tucán es en la mañana, seguida de un intervalo al mediodía, una actividad alta secundaria en la tarde, y total inactividad de noche. Este es el patrón normal de las aves tropicales.

"El tiempo de alimentación tiene una fuerte influencia en la dispersión de las semillas," escribieron los investigadores. "Las semillas que se comen en la mañana (desayuno) y en la tarde (cena) tienen mayores posibilidades de dispersarse que las semillas que ingieren a mediodía (almuerzo). Esta observación explica por qué la nuez moscada tropical es un "especialista matutino" con frutas que maduran típicamente temprano y a media mañana para que las aves se las lleven. Lo ideal, observan los científicos, sería que los árboles de nuez moscada produjeran frutas con un tiempo de procesamiento en los intestinos de unos 60 minutos.

New publications

Jaramillo, Carlos A., Rueda, Milton, and Torres, Vladimir. 2011. "A palynological zonation for the Cenozoic of the Llanos and Llanos foothills of Colombia." *Palynology* 35(1): 46-84.

Kays, Roland, Jansen, Patrick A., Knecht, Elise M.H., Vohwinkel, Reinhard, and Wikelski, Martin. 2011. "The effect of feeding time on dispersal of *Virola* seeds by toucans determined from GPS tracking and accelerometers." *Acta Oecologica* doi: 10.1016/j.actao.2011.06.007

Lambert, Thomas D., Halsey, Michaela K., Dittel, Jacob W., Mangan, Scott A., Delfosse, Erika, Adler, Gregory H., and Schnitzer, Stefan A. 2011. "First record of Alston's Woolly Mouse Opossum (*Micoreus alstoni*) from the canal area of Central Panama." *Mammalia* 75(1): 107-109.

Mascaro, Joseph, Asner, Gregory P., Muller-Landau, Helene, Van Breugel, Michiel, Hall, Jefferson S., and Dahlin, K. 2011. "Controls over aboveground forest carbon density on Barro Colorado Island, Panama." *Biogeosciences* 8(6): 1615-1629.

Moreno, Cufemio, Varughese, Titto, Spadafora, Carmenza, Arnold, A. Elizabeth, Coley, Phyllis D., Kursar, Thomas A., Gerwick, William H., and Cubilla-Rios, Luis. 2011. "Chemical constituents of the new endophytic fungus *Mycosphaerella* sp. nov. and their anti-parasitic activity." *Natural Product Communications* 6(6): 835-840.



Nocturnal bees see the light?

Even at night, some bees are still out there, watching you with their dark vision. Three genera of Neotropical bees—*Megalopta*, *Megaloptidia*, and *Megommation*—eschew the sunshine, colorful flora (and predatory birds), and prowl instead for the few flowers that bloom in the moonlight." (Reardon, *ScienceNOW*, 2011)

A group of researchers, led by Simon Tierney (in the photo), published the article "Photic niche invasions: phylogenetic history of the dim-light foraging augochlorine bees (Halictidae)" in the *Proceedings of the Royal Society B* last week. For the study, they collected many of these nocturnal bees to study their DNA, specifically opsin genes which are involved in vision.

Having analysed their DNA and comparing it to close relatives, the group, that includes Oris Sanjur, Gretchen Grajales, Biff Bermingham and Bill Wcislo of STRI, and Leandro Santos from Universidade Federal do Paraná, found that one of them returned to daylight foraging approximately 4 million years ago! "Maybe it was afraid of the dark" concludes Sara Reardon, in "A buzz in the dark". You may obtain the article by Tierney *et al*, from calderom@si.edu

"Aún de noche, algunas abejas todavía

están por allí observándote con su visión nocturna. Tres géneros de abejas neotropicales, *Megalopta*, *Megaloptidia* y *Megommation*, evitan la luz del sol, la flora colorida (y las aves depredadoras), prefiriendo visitar las pocas flores que florecen a la luz de la luna." (Reardon, *ScienceNOW*, 2011).

Un grupo de científicos encabezados por Simon Tierney (foto) publicó "Photic niche invasions: phylogenetic history of the dim-light foraging augochlorine bees" en *Proceedings of the Royal Society B* la semana pasada. Para el estudio, colectaron muchas de estas abejas nocturnas y estudiaron su ADN, en particular los genes opsin que tienen que ver con la visión.

Luego de analizar el ADN y compararlos con parientes, el grupo, que incluye a Oris Sanjur, Gretchen Grajales, Biff Bermingham y Bill Wcislo, de STRI, y Leandro Santos de la Universidad Federal de Paraná, encontraron que hace unos 4 millones de años, una de estas abejas, regresó a forrajear de día "Quizá le temía a la oscuridad" concluyó Reardon en "A buzz in the dark" [Zumbido en la Oscuridad]. Para el artículo de Tierney *et al* de calderom@si.edu

New publications

Powell, Scott. 2011. "How much do army ants eat? On the prey intake of a Neotropical top-predator." *Insectes Sociaux* 58(3): 317-324.

Serrano, Lina, Ferrari, Luca, Martinez, Margarita Lopez, Petrone, Chiara Maria, and Jaramillo, Carlos. 2011. "An integrative geologic, geochronologic and geochemical study of Gorgona Island, Colombia: Implications for the formation of the Caribbean Large Igneous Province." *Earth and Planetary Science Letters* doi.org/10.1016/j.epsl.2011.07.011

Update, 2010

Lambert, Adam M., Dudley, Tom L., and Saltonstall, Kristin. 2010. "Ecology and impacts of the large-statured invasive grasses *Arundo donax* and *Phragmites australis* in North America." *Invasive Plant Science and Management* 3(4): 489-494. doi:10.1614/ipsm-d-10-00031.1

Meyerson, Laura A., Lambert, Adam M., and Saltonstall, Kristin. 2010. "A tale of three lineages: Expansion of common reed (*Phragmites australis*) in the U.S. Southwest and Gulf Coast." *Invasive Plant Science and Management* 3(4): 515-520. doi:10.1614/ipsm-d-09-00052.1

Saltonstall, Kristin, Lambert, Adam, and Meyerson, Laura A. 2010. "Genetics and reproduction of common (*Phragmites australis*) and Giant Reed (*Arundo donax*)." *Invasive Plant Science and Management* 3(4): 495-505. doi:10.1614/ipsm-09-053.1

NEO ANNUAL SYMPOSIUM

Neotropical Environment Option STRI-McGill University

AUGUST 8, 2011

| | | |
|----------------|--|---|
| 9 am | Owen McMillan, STRI | Welcoming words |
| 9:15 am | Oscar Puebla, Postdoc, former NEO student | Life after NEO |
| 9:45 am | Alana Domingo, Biology Ph.D. student | Linking larval and adult fish communities in marine protected areas in the Pacific of Panama |
| 10:15 am | Sophie Picq, Biology Master student | Relationship between genetic distances and communication behaviour in one species of weakly electric fish, <i>Brachyhypopomus occidentalis</i> |
| 10:30-10:45 am | COFFEE BREAK | |
| 10:45 am | Maryna Lesoway, Biology Ph.D. student | MAPK activation and early development in the Calyptraeid gastropods |
| 11:15 am | Victor Frankel, Biology Ph.D. student | Using biological invasions to test ecological and evolutionary drivers of host-parasite interactions |
| 11:45 am | Guillaume Dury, Plant Science Master student | Evolution of larval aggregation in neotropical Chrysomeline leaf beetles |
| 12-2 pm | LUNCH | |
| 2 pm | Luis Fernando De León, former NEO student, McGill Postdoc Redpath Museum | Anthropogenic impacts on evolutionary diversification in Darwin's finches |
| 2:30 pm | Stéphanie Sabbagh Natural Resources Master student | Social Factors Affecting Shark Conservation on the Mesoamerican Barrier Reef |
| 2:45 pm | Guillaume Petersen St. Laurent, Biology Master student | REDD+ and the agricultural frontier: Understanding colonos uses of the territory |
| 3 pm | Gerardo Vergara Asenjo, Biology Ph.D. student | Evaluating forest carbon stocks and stocks changes in Panama: the role of indigenous peoples in forest conservation |
| 3:30-3:45 pm | COFFEE BREAK | |
| 3:45 pm | Margaret Kalacska, McGill Faculty KEYNOTE SPEAKER | Hyperspectral remote sensing in the Neotropics - from ecology to forensics. |

When was the last time you heard that a large group of people leaves such a small beach clean?

Smithsonian Tropical Research Institute, August 5, 2011



Three hundred people showed up on Sunday, July 31, for the second beach cleaning at STRI's Galeta Marine Laboratory, organized by Maya de Vries, Fulbright fellow doing research at Galeta.

The group included US ambassador in Panama Phyllis Powers, groups of Young Ambassadors from Panama and Young Leadership from the US, students from Florida State University in Panama and Eben-Ezer High-School in Colon, HSBC volunteers and youngsters from Coco

Solo, as well as STRI researchers. "With the increase of scientific work at Galeta, the number of visitors is larger and social work and environmental awareness also increases in the community" stated Stanley Heckadon-Moreno, STRI director for Communication and Public Programs. The crowd collected some 150 garbage bags. The next beach cleaning will be held in September.

The inset photo shows, from the left, STRI intern Andrew Sellers, Maya de Vries, Alice Brown from the US Embassy, and ambassador Powers. Trcientas personas aparecieron el domingo 31 de julio para la segunda limpieza de playa llevada a cabo en el Laboratorio Marino de Galeta, organizado por Maya de Vries, becaria Fulbright que realiza investigaciones en Galeta. El grupo incluyó a la embajadora de los Estados Unidos en

Panamá, Phyllis Powers, grupos de los Embajadores Jóvenes de Panama y Young Leadership de Estados Unidos, estudiantes de Florida State University y Colegio Eben-Ezer en Colon, jóvenes de Coco Solo, voluntarios del Banco HSBC, y científicos de STRI. "Con el aumento de trabajo científico en Galeta, el número de visitantes es mayor, y el trabajo social y la conciencia ambiental aumenta entre la comunidad" afirmó

Stanley Heckadon-Moreno, director de Comunicaciones y Programas Públicos de STRI. Los visitantes recogieron unas 150 bolsas de basura. La próxima limpieza de Galeta se llevará a cabo en Septiembre. La foto a la derecha muestra (desde la izquierda) a Andrew Sellers, pasante en STRI, Maya de Vries, Alice Brown de la Embajada de los EU y a la embajadora Powers.

