



Smithsonian

# 100 years of science in Panama



Smithsonian Tropical Research Institute, Panamá

STRI news

[www.stri.org](http://www.stri.org)

November 26, 2010

## Tupper seminar

Tuesday, December 7, 4pm seminar speaker will be Mauricio Parra, University of Texas at Austin & Colombian Petroleum Institute  
**The competing roles of tectonic inheritance and climatic forcing on the Cenozoic evolution of the eastern Colombian Andes**

## Paleo-Talk

Wednesday, December 8 is Mother's Day in Panama, and a holiday for STRI. No Paleo-Talk is scheduled for this day.

## Bambi seminar

If you wish to become the Bami "jefe" and coordinate Bambi seminars on BCI, please contact Belkys Jimenez at 212-8900 or e-mail [jimenezb@si.edu](mailto:jimenezb@si.edu)

## Arrivals

Kenry Kusumi, Arizona State University, to study the molecular systematics and historical biogeography of *Crocodylia*, in Gamboa.

**Safety number:  
212-8211**

## ARTS moves off island

### *Animal trackers move on from towers to satellites and cameras*

The Automated Radio Telemetry System (ARTS) on STRI's Barro Colorado Island (BCI) is taking down its towers used to track animals with radio-transmitters and switching to GPS and camera trap systems that produce more data with less infrastructure.

Experiences with ARTS over the last eight years on BCI have led to the development of new technologies, including the miniaturization of GPS tracking devices, revolutionary camera trap monitoring techniques, a Smithsonian repository of camera trap images, and a global archive of animal tracking data ([www.Movebank.org](http://www.Movebank.org))

BCI is famous as a training ground for pioneer ecological research systems that allow scientists to ask new questions. In 2003, researchers Roland Kays (New York State Museum) and Martin Wikelski (Princeton University, now at the Max Plank Institute) founded an experimental Automated Radio Telemetry System (ARTS) to track the activity and movement of animals wearing small radio-transmitters. According to Kays, "at that time tracking options were limited because

GPS devices were so large they were carried by surveyors in backpacks and camera traps were limited to rolls of 36-exposure film."

With support from the National Geographic Society and the Levinson and National Science Foundations, Kays and Wikelski brought a team of specialists to BCI to erect a network of seven towers that streamed live data on the location and activity of animals that had been fitted with small, inexpensive radio transmitters. Since then, the ARTS has been used to track 374 individuals from 38 species, including 17 mammal species, 12 birds, seven reptiles or amphibians, and two species of plant seeds. The unique data gathered by ARTS have allowed researchers to tackle previously intractable questions about the ecology and behavior of species ranging from palms and bees to monkeys, by providing a means to "see" cryptic events and track animal movements and activities over large distances and long time periods.

However, ARTS-based tracking is limited to BCI because of its extensive infrastructure requirements, and thus researchers have also been looking past radio transmitters to new, more flexible



technologies. GPS devices have been improved and miniaturized over the past three years, spurred on in part by former ARTS engineer Franz Kuemmeth (founder of E-obs GPS tracking company) and ARTS biologists, who rapidly adopted the new technology to track animals on BCI...and off. New sensors are also being developed to work in concert with GPS tags to provide detailed information about animal behavior and physiology.

ARTS researchers also developed new methods for monitoring animal movement with camera traps. This approach was initially developed to monitor animals moving palm seeds that were being

## More arrivals

Roland Kays, New York State Museum, to attend the ARTS Science Symposium. He will be on BCI.

Daniel Stanton, Princeton University, to work on redefining nutrient limitation in lowland tropical forests, in Gamboa.

## New publications

Brinklov, Signe, Kalko, Elisabeth, and Surlykke, Annemarie. 2010. "Dynamic adjustment of biosonar intensity to habitat clutter in the bat *Macrophyllum macrophyllum* (Phyllostomidae)." *Behavioral Ecology And Sociobiology* 64(11): 1867-1874.

Deichmann, Jessica L., Williamson, G. Bruce, Lima, Albertina P., and Allmon, Warren D. 2010. "A note on amphibian decline in a central Amazonian lowland forest." *Biodiversity and Conservation* 19(12): 3619-3627.

Heckadon Moreno, Stanley. 2010. "Armagedón Hartmann con Alexander Wetmore en Pedasí, 1957." *"Épocas" Tercera Era* (Supplement to *El Panamá América*) 25(11): 10-11.

Hiller, Alexandra, Viviani, Carlos Antonio, and Werding, Bernd. 2010. "Hypercarcinisation: an evolutionary novelty in the commensal porcellanid *Allopetrolisthes spinifrons* (Crustacea: Decapoda: Porcellanidae)." *Nauplius* 18(1): 95-102.

tracked by the ARTS, but is now being implemented at SIGEO sites around the globe. The BCI camera trap data are also being shared with the public through a new 'SI Wild' website that combines the images from ten Smithsonian camera trap studies around the world and will launch in 2011.

Many of the most important moments in an animal's life are hard to study because they are rare or difficult to observe. Due to the shy nature of most species, tracking animals is necessarily a high-tech enterprise. The development of ARTS and related technologies on BCI over the last eight years offers another example of how STRI-supported science can help develop new fields; in this case, one where detailed data on animal movement, physiology, and behavior can be integrated to address the next generation of scientific and conservation questions.

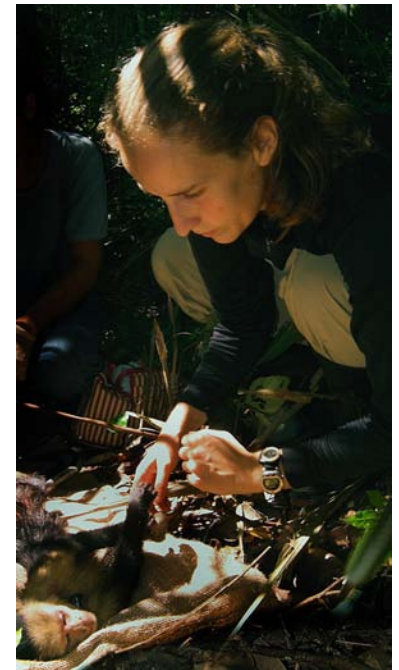
*Meg Crofoot and Rolald Kays, ARTS*

El Sistema de Radio-telemetría Automatizada (ARTS) en la Isla de Barro Colorado (BCI) está eliminando las torres que usaba para rastrear animales con radio-transmisores al cambiar a sistemas que se basan en GPS y cámaras-trampa que ofrecen más datos y usan menos infraestructura.

Las experiencias con ARTS durante los últimos ocho años han llevado al desarrollo de nuevas tecnologías, incluyendo la miniaturización de los rastreadores GPS, la revolucionarias técnicas de cámaras-trampa, el repositorio de imágenes adquiridas con estas trampas, y el archivo global de datos sobre rastreo de animales, [www.Movebank.org](http://www.Movebank.org)

BCI es famosa por suministrar el terreno para entrenamiento en sistemas de estudios ecológicos pioneros que permiten a los científicos hacerse nuevas preguntas. En 2003, los investigadores Roland Kays (del Museo del Estado de Nueva York) y Martin Wikelski (de la Universidad de Princeton, hoy día en el Instituto Max Plank) fundaron el Sistema de Radio Telemetría Automatizada (ARTS, por sus siglas en inglés) para rastrear la actividad y movimientos de animales que portaban pequeños radio-transmisores. De acuerdo a Kays, "para entonces las opciones de rastreo estaban limitadas debido a que los GPS eran tan grandes que los rastreadores debían portarlos en mochilas y las cámaras-trampa estaban restringidas por los rollos de película de 36 exposiciones.

Con el apoyo de la National Geographic Society, la Fundación Levinson y la National Science Foundation, Kays y Wikelski trajeron un equipo de especialistas a BCI para erigir una red de siete torres que transmite información en vivo sobre la localización y actividad de los animales a los que se les ha instalado pequeños radio-transmisores de bajo costo. Desde entonces, ARTS los ha usado para rastrear a 374 individuos de 38 especies, incluyendo 17 mamíferos, 12 aves, siete reptiles o anfibios, y dos especies de semillas de plantas. La información única generada por ARTS ha permitido que los investigadores puedan responder preguntas que antes eran imposibles sobre la ecología y el comportamiento de especies que van desde palmas y abejas hasta monos, al suministrar la manera de "ver" eventos crípticos y rastrear los movimientos de los animales y sus actividades a través de extensas distancias y por largos periodos de tiempo.



*Meg Crofoot, 2005*

Sin embargo, el rastreo que se basa en ARTS está limitado a BCI debido a los extensos requisitos de infraestructura, y los investigadores también han tratado de encontrar algo mejor que los radio-transmisores. Los rastreadores GPS han mejorado y han disminuido en tamaño durante los últimos tres años en parte gracias a Franz Kuemmeth, ingeniero de ARTS (fundador de la compañía E-obs GPS tracking), y los biólogos de ARTS quienes rápidamente adoptaron la nueva tecnología para rastrear animales en BCI... y más allá. También se han desarrollado nuevos sensores para trabajar junto con los rastreadores GPS y así ofrecer información más detallada sobre el comportamiento y fisiología de los animales.

Adicionalmente, los investigadores de ARTS han desarrollado nuevos métodos para monitorear el movimiento de animales por medio de cámaras-trampa. Inicialmente, esta técnica fue desarrollada para monitorear los animales que movían semillas de palmas que estaban siendo rastreadas por ARTS, pero ahora está siendo implementada en sitios



## New publications

Hiller, Alexandra, and Werding, Bernd. 2010. "Redescription of *Petrolisthes militaris* (Heller, 1862), with description of a new species from the Indo-West Pacific (Decapoda, Porcellanidae)." In Fransen, C., de Grace, S., and Ng, P. (Eds.), *Studies on Malacostraca*, Vol. Lipke Holthuis Memorial: 315-331. Leiden, Netherlands: Koninklijke Brill NV.

Leigh, Jr., Egbert Giles. 2010. "The evolution of mutualism." *Journal of Evolutionary Biology* 23(12): 2507-2528.

Mascaro, Joseph, and Schnitzer, Stefan A. 2010. "Dominance by the introduced tree *Rhamnus cathartica* (common buckthorn) may limit aboveground carbon storage in Southern Wisconsin forests." *Forest Ecology and Management* Online.

Nehring, Volker, Evison, Sophie E.F., Santorelli, Lorenzo A., d'Etorre, Patrizia, and Hughes, William O.H. 2010. "Kin-informative recognition cues in ants." *Proceedings of the Royal Society B: Biological Sciences* Online.

Sanchez, Melissa, Realpe, Emilio, and Salazar, Camilo A. 2010. "A Neotropical polymorphic damselfly shows poor congruence between genetic and traditional morphological characters in Odonata." *Molecular Phylogenetics and Evolution* 57(2): 912-917.

Silvera M., Katia, Neubig, K.M., Whitten, W. Mark, Williams, Noris H., Winter, Klaus, and Cushman, John C. 2010. "Evolution along the crassulacean acid metabolism continuum." *Functional Plant Biology* 37(11): 995-1010.

de SIGEO alrededor del mundo. Los datos recolectados por las cámaras-trampa en BCI serán divulgados al público a través del nuevo sitio web "SI Wild", que combina las imágenes de diez estudios del Smithsonian con cámaras-trampa alrededor del mundo y será lanzado en el 2011.

## ARTS Science Symposium

### Where have we been, where are we going?

December 14, 2010: Tupper Center Auditorium

<http://agoutienterprise.wordpress.com/2010/12/06/arts-animal-tracking-science-symposium/>

**When is an animal born?**

**Where does it go when it leaves home?**

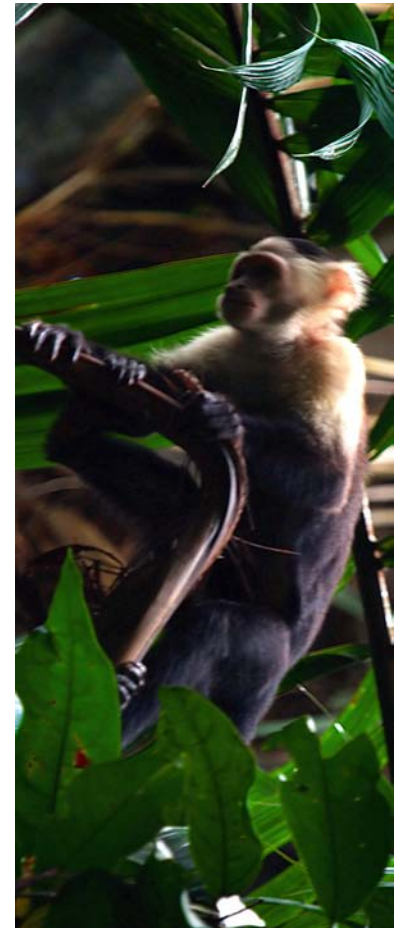
**How does it die?**

**Many of the most important moments in an animal's life are hard to study because they are rare or difficult to observe.**

**Over the past 7 years, the Automated Radio Telemetry System (ARTS) on Barro Colorado Island has helped STRI scientists address many of these important questions by allowing them to "see" cryptic events and track animal movements and activities over large distances and long time-periods. Recent technological advances have now made it possible to collect ARTS-style data using satellite technology, and the ARTS initiative will soon be disassembling the original radio-telemetry based system on BCI and transitioning to GPS based tracking. Please join us December 14th, 2010 in the STRI conference room at Tupper, to hear about how the ARTS system has improved our understanding of the behavior and ecology of tropical vertebrates and learn about the exciting new directions we are taking with our animal tracking research.**

Muchos de los momentos más importantes de la vida animal son difíciles de estudiar debido a lo raro o difícil que es observarlos. Rastrear animales es una empresa de alta tecnología debido a la timidez de la mayoría de las especies. El desarrollo de ARTS y tecnologías relacionadas en BCI durante los últimos ocho años

ofrece otro ejemplo de cómo la ciencia apoyada por STRI puede ayudar a desarrollar nuevos campos, en este caso uno donde información detallada sobre el movimiento, la fisiología y el comportamiento animal puede ser integrada para responder la siguiente generación de cuestionamientos científicos y de conservación.



**12:30-12:55**

**Rodent thieves: multi-stage dispersal leads to long distance seed dispersal.**

**Ben Hirsch, Smithsonian Tropical Research Institute & New York State Museum**

**12:55-13:20**

**From the pond to the forest: a glimpse into the movements and activity of the veined tree frog on BCI.**

**Robert Horan, University of Georgia**

**13:20-13:45**

**How do small groups survive? Intergroup competition and imbalances of power in white-faced capuchins.**

**Meg Crofoot, STRI & MPI-O**

**13:45-14:10**

**Better to be breakfast lunch or dinner: effect of feeding time on seed dispersal by toucans determined from GPS tags and accelerometers.**

**Roland Kays New York State Museum**

**14:10-14:35**

**Intrapopulation niche differences: do they exist for northern tamandua anteaters?**

**Danielle Brown University of California, Davis**

**14:35-15:00**

**Surveying forest mammals using camera traps: From BCI to SIGEO.**

**Patrick Jansen Center for Tropical Forest Science**

**15:00-15:25**

**Sleeping on the limb- atypical sleep patterns in wild sloths.**

**Bryson Voirin, Max Planck Institute for Ornithology**

**15:25-16:00 Break**

**16:00-17:00**

**From ARTS to ICARUS: perspectives on global animal tracking.**

**Martin Wikelski, Roland Kays Meg Crofoot**

*The Smithsonian Tropical  
Research Institute  
Institutional Wellbeing  
Committee*

*El Comité de Bienestar Institucional  
del  
Instituto Smithsonian de  
Investigaciones Tropicales*

*Join Us for the  
2010  
Holiday Party*

*Te invita a la  
Celebración  
de Fin de Año 2010*

*Friday, December 17th, 2010  
4:30 p.m. to 8:30 p.m.*

*Al Dente Restaurant  
(Amador Causeway)*

*Viernes, 17 de Diciembre, 2010  
4:30 p.m. a 8:30 p.m.*

*Restaurante Al Dente  
(Calzada de Amador)*

**RSVP TO [STRICBI@SI.EDU](mailto:STRICBI@SI.EDU)**

*Note: Please RSVP by picking up  
your invitation at your facility  
reception or work area,  
before December, 9<sup>th</sup>.*

*Confirmar su asistencia retirando  
la invitación en la recepción de su lugar  
de trabajo antes del  
9 de diciembre.*

*Non-STRI members=\$45.00 per person.  
We will provide transportation from Tupper Center  
to Al Dente Restaurant, at 4:15pm & 5:15pm.*

*Invitados deben pagar \$45.00 por persona.  
Habrá transporte desde el Centro Tupper al Restaurante Al  
Dente, a las 4:15pm y 5:15pm.*