Conservation Through Science

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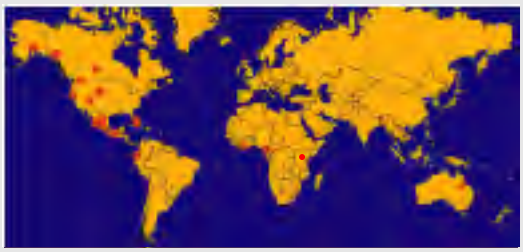
The Seed

Bi-annual newsletter of the Center for Tropical Research



CTR research sites around the world

LETTER FROM THE DIRECTOR

Dear Readers,

While environmental issues in the presidential campaign were eclipsed by the war in Iraq and the economy, the Earth's environment continued to decline. During the past year, we lost another 1% of our forests, and untold species went extinct. The research discussed in this newsletter reflects efforts by the faculty, senior research fellows, and graduate students of the Center for Tropical Research (CTR) to reverse these trends.

Tropical forests comprise only 7% of the Earth's land surface but harbor over half of its biodiversity and sequester 35% of global carbon dioxide emissions annually. By working with conservation groups and government agencies in tropical regions, we are building a bridge between the university community and conservation practitioners in order to bring the best possible science to conservation decision making. This issue covers research in Ecuador, Cameroon, Costa Rica, the Galápagos, the Gulf of Guinea, Mali, Mexico, Oceania (central and south Pacific islands), Trinidad, and Zambia.

Our feature article this month reports on the first stage of field research for CTR's grant from the National Aeronautics and Space Administration (NASA). This study, entitled "Quantifying Patterns of Biodiversity in a Changing Climate," uses environmental variables measured by satellite sensors in a distribution model developed at CTR to map species patterns and diversity in the western Amazon region along the Andean topographical gradient.

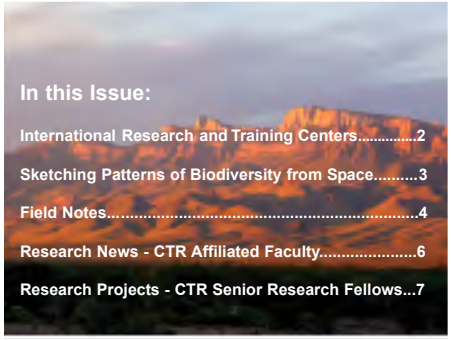
We are pleased to report that CTR has received a number of new grants that will allow us to expand our operations. The National Science Foundation (NSF) funded a $1,741,000 project to enable researchers at the University of California, Los Angeles (UCLA), San Francisco State University, NASA/Jet Propulsion Laboratory, University of California, Davis, and the Institute of Ecology at Vilnius University to examine the ecology of infectious blood-borne pathogens in African rainforest birds in order to assess the impact of deforestation on disease. This project, along with our grant from NASA, will enable us to increase our postdoctoral research team to five members.

During Spring and Summer 2004, I joined CTR graduate students and postdoctoral research fellows at a number of field sites. I traveled to the ecologically unique Sierra del Carmen mountains of Mexico to work with John McCormack researching Mexican jays, to the Bahamas to work with Erin Marnocha and Ryan Calsbeek on *Anolis* lizards, to Ecuador to work with Amy Rogers, Jaime Chavez, and Jordan Karubian on projects examining the processes that produce and maintain rainforest diversity, and to the California High Sierras with Ryan Calsbeek to begin work on a new study of lizard diversity along elevational gradients.

We welcome contributions to our spring 2005 issue of *The Seed*, and hope you will share this issue with your colleagues.

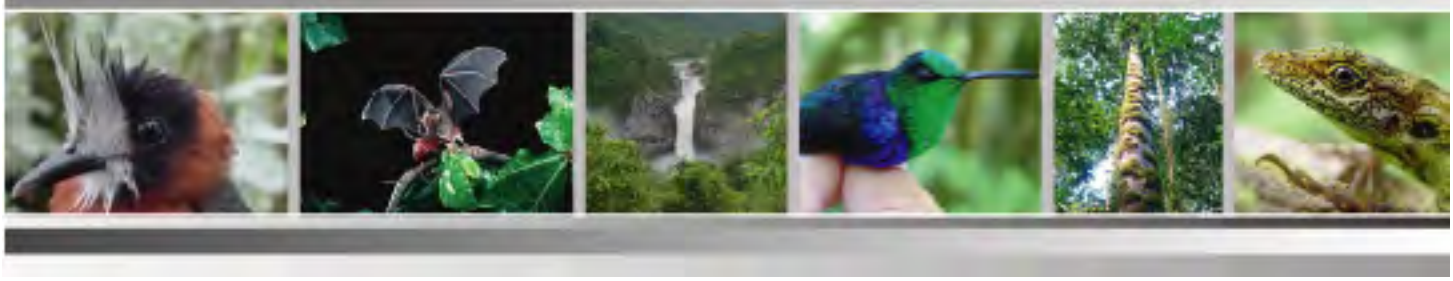
Sincere Regards,

Thomas B. Smith, Ph.D.



Sierra del Carmen, Mexico

http://www.ioe.ucla.edu



International Research and Training Center Reports

ECUADOR UPDATE - Jordan Karubian, CTR Director for Latin America

In Ecuador, CTR has established itself as a bridge between on-the-ground conservation efforts and top-level scientific research. We are currently working on research projects in the Amazon, the Andean foothills and highlands,

Female red-headed barbet, in the Mache-Chindul Reserve, Ecuador

and the humid coastal forests. The topics studied are as diverse as conservation of macaws in the Amazon, elucidating processes that lead to high levels of diversity, and the use of geographic information systems (GIS) and remote sensing to assess impacts of forest loss on animal and plant populations. Further projects in planning stages include a collaborative project with sociologist Thomas Rudell, from Rutgers University, on how different pasture management practices in the Amazon affect diversity, and a collaborative project with BirdLife International that will identify centers of avian diversity in both Colombia and Ecuador.

The focal point of CTR's work in Ecuador is in the Mache-Chindul Reserve in northwestern Ecuador. This reserve encompasses some of the last remnants of Ecuador's Chocó habitat, a humid forest type known for extreme levels of endemism and diversity. Since 2002, CTR has initiated what may be the first long-term scientific research program in Chocó habitat. Research themes include studies of avian diversity, using point counts and mist nets, extensive monitoring of fruiting and flowering patterns, and intensive studies of the endangered long-wattled umbrellabird and the banded ground-cuckoo. Several Ecuadorian students have participated in these projects as a part of their university's undergraduate honor's thesis program. Complementing this scientific research is an extensive community outreach and conservation education program described in an article on Page 7 of this newsletter.

Male long-wattled umbrellabird, an endangered species in Ecuador

CAMEROON UPDATE - Allen Roberts, Director, UCLA James S. Coleman African Studies Center (ASC)

In May 2004, I traveled to Yaoundé, Cameroon, under the auspices of the UCLA International Institute's Global Impact Research grant, a collaboration between CTR and ASC. The purpose of the grant is to create an International Research and Training Center (IRTC) in Yaoundé, Cameroon that will facilitate interdisciplinary environmental, health, and social science research focused on West and Central Africa and to develop a training program for U.S. and African students that promotes sustainable development in the region. Additional funding to open the IRTC is being sought from public and private donors.

While I was in Yaoundé, the cultural affairs staff of the U.S. Embassy arranged for me to give

Allen Roberts lecturing, with inset showing location of Cameroon

two well-attended lectures on Islam in West Africa and the status of African studies in the U.S., the latter at the University of Yaoundé I. I met with a wide variety of officials, academics, and staff of local non-governmental organizations (NGOs) to begin discussions about establishing the IRTC. Meetings with administrators, faculty, and students in the Faculty of Arts, Letters, and Humane Sciences at the University of Yaoundé I, with staff members of the Center for Applied Social Science Research and Training, and with the director of the National Museum explored research and curriculum-development projects of mutual interest on topics ranging from the social, environmental, and strategic impacts of the new pipeline crossing Cameroon from Chad to the ocean to the increased need for visual and performance arts in HIV/AIDS awareness initiatives.

NEWS FROM CTR

CTR Move to La Kretz Hall from Hershey Hall

In Winter 2005, La Kretz Hall will become the official home of the Center for Tropical Research and the UCLA Institute of the Environment (IoE). This new building (currently under construction) is situated along the Science Quadrangle and will house IoE faculty, staff, and researchers as well as a public exhibit of campus environmental projects. We will update CTR affiliates on telephone and address changes at the time of the move.

Three-dimensional rendering of La Kretz Hall

Five CTR Graduate Students Receive Nationally Prestigious Awards in 2004

Allison Alvarado was awarded an NSF Fellowship, Ben Wang received an NSF GK-12 Fellowship for the second year in a row to assist in the training of first-year science teachers in underperforming schools in South Los Angeles, Amy Rogers was awarded a Fulbright Fellowship for studies in Ecuador, Adam Freedman was awarded a Fulbright Fellowship for studies in Cameroon, and Erin Marnocha was awarded an Environmental Protection Agency (EPA) STAR Fellowship for studies in the Bahamas.

Sketching Patterns of Biodiversity from Space

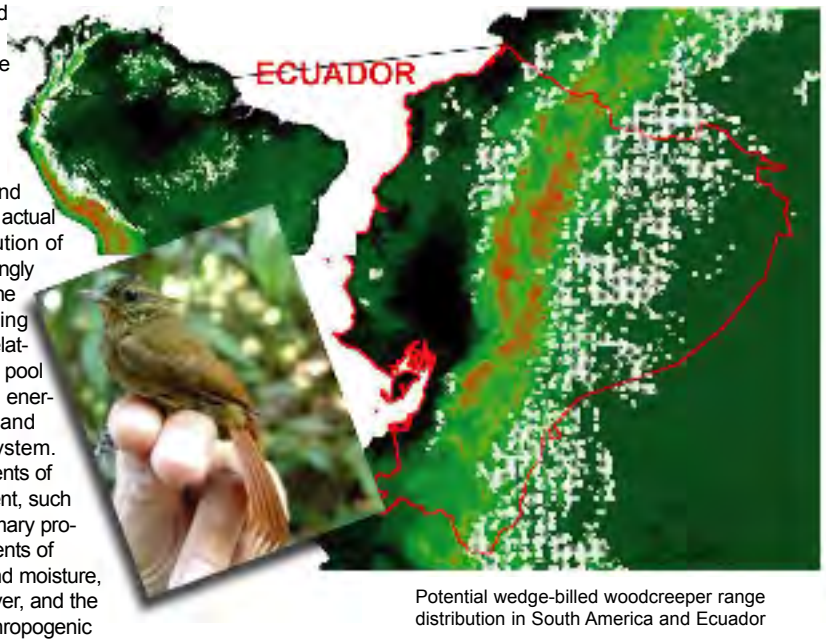
Sassan Saatchi, Ph.D., Senior Scientist, NASA/Jet Propulsion Laboratory, California Institute of Technology

The accelerating loss of biodiversity and extinction of species have serious repercussions for all living organisms. Yet scientists have little baseline information on the patterns of biodiversity and the processes that produce and maintain it. This information is particularly crucial for tropical forests, which cover only 7% of global land surface but contain over half of all surviving species on Earth. About 20% of the original extent of tropical forests has been completely destroyed and another 40% seriously degraded due to logging, land use activities, and other human impacts. What remains is being cut down at an alarming rate of 1-2% per year. In addition, increases in atmospheric trace gases have led to unnatural heating of the planet, adversely affecting the biological and ecological functioning of tropical ecosystems. There are still a large number of undiscovered species in tropical forests, and we lack crucial information on the distribution patterns, abundance, and diversity of those that have been formally described. Quantifying the ever-shrinking fraction of tropical forests and the changes in intactness and stability of species' habitats is perhaps the most urgent task facing scientists. Researchers and students affiliated with CTR are actively engaged in this challenging task and are working towards improving our scientific understanding of tropical biodiversity and contributing actively to its conservation.

Endangered tropical forest, Ecuador

In October of 2003, CTR was awarded a three-year grant for $1.2 million from NASA's Earth Science Enterprise Interdisciplinary Science Program to map habitat distributions, richness, and vulnerability in South American tropical forests along the Amazonian-Andean gradient. The project, entitled "Quantifying Patterns of Biodiversity in a Changing Climate: Integrating Biological Point and Process Data with Remotely Sensed Environmental Variables," includes scientists from NASA's Jet Propulsion Laboratory in Pasadena, University of California, Los Angeles, Boston University, and the State University of New York at Stony Brook. Its main goal is to develop a model that combines three types of measurements: 1) field data on geographical range and richness of selected species, 2) data resulting from the analysis of evolutionary processes defining the species, and 3) satellite measurements of environmental variables describing the species' habitat.

The underlying rationale for this project is based on the hypothesis that the distribution of biodiversity is highly patterned. These patterns are shaped by ecological and evolutionary processes operating over a spatial template created by geological and hydrological features of the landscape. While natural patterns can potentially be understood and predicted, the actual spatial distribution of patterns is strongly influenced by the rapidly changing environment related to the finite pool of mineral and energy resources and the climate system. Certain elements of the environment, such as the net primary production, gradients of topography and moisture, vegetation cover, and the degree of anthropogenic impact, can, when integrated with biological data, predict potential and actual spatial patterns of biodiversity. One of the most innovative parts of the project is the use of images from NASA's Earth-orbiting satellites to predict these patterns.

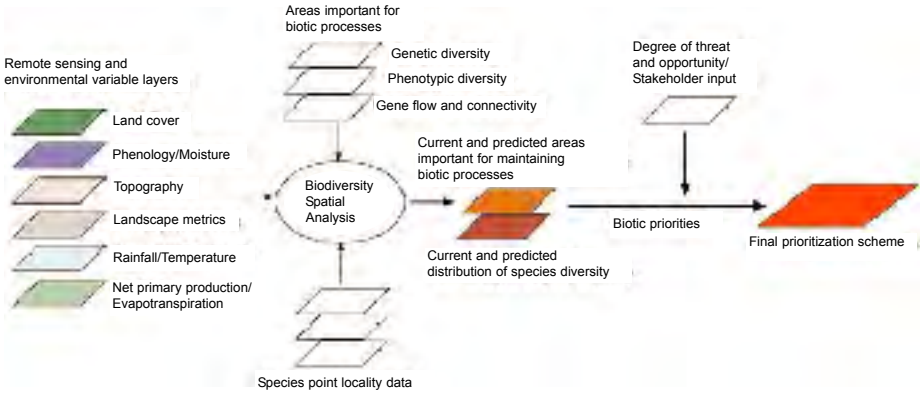


Potential wedge-billed woodcreeper range distribution in South America and Ecuador

The satellite images are obtained regularly at different spatial resolutions by a suite of sensors operating at different frequencies of the electromagnetic spectrum from optical wavelengths to radio frequencies. The sensors measure the energy reflected from the surface of the Earth that carries explicit information about the characteristics of landscape and its climate, such as its vegetation type, structure, seasonality, geological features, moisture condition, intensity and extent of fragmentation, surface temperature, rainfall, etc. These measurements, when combined with biological data, can potentially quantify the ecological niche of species habitat or its richness.

In recent months, we received point locality data from our collaborators and CTR graduate students working in the field. This allowed us to generate model simulations with remote sensing data to predict potential range maps. Although the results are preliminary, they provide spatially explicit information about the habitats that can be further examined and tested on the ground. As an example, the range distribution of the wedge-billed woodcreeper in South America and Ecuador is shown over color-coded digital elevation data acquired by NASA's Space Shuttle Radar Topography Mission (SRTM). The results compare well with field observations, separating the eastern and western lower Andean regions of Ecuador as the potential habitat of the species with reasonable accuracy.

We plan to develop, test, and perform comparative analyses of the model using a wide taxonomic representation of vertebrate species (including species of birds, small mammals, and frogs). Digital maps generated for these species will be used in the field for further validation, for selecting areas for new field surveys, and for developing conservation priorities in the region.



Schematic of our spatial analysis model for incorporating biological patterns and processes for prioritizing conservation planning. The predictive species distribution model is the core of this scheme.

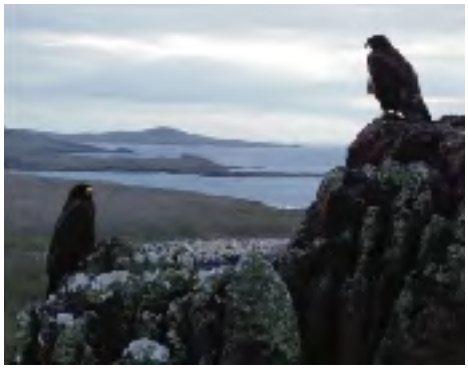
FIELD NOTES - Graduate Students and Research Associates

GALÁPAGOS - Mockingbirds
by Ilonka von Lippke

Ever since Darwin's visit to the Galápagos, the archipelago's fauna and flora have continued to provide the scientific community with a unique natural laboratory in which to understand complex microevolutionary processes. My research investigates the evolution and maintenance of social traits in Galapagos mockingbirds (birds credited by Darwin with providing the first insights into the theory of natural selection) and the impact of global climate change - via the El Niño Southern Oscillation - on the species' reproduction and survival.

Galapagos mockingbird
(*Nesomimus macdonaldi*)

Galapagos mockingbirds are territorial cooperative breeders with a strict male dominance hierarchy, varying group sizes, and varying degrees of within-group relatedness. Cooperative breeding behavior remains an evolutionary paradox because individuals (helpers) forego their own reproduction and assist others with care of the young. A spectrum of social complexity, from solitary (monogamous pair), to singular (one breeding pair and helper/s), to plural cooperative breeding (two or more breeding pairs and helper/s), is seen in these species.



The endemic Galapagos hawk
(*Buteo galapagoensis*)

Understanding the evolution of social traits, including seemingly altruistic behaviors, requires knowledge of how inclusive fitness benefits of natal philopatry (site fidelity), ecological constraints on dispersal, and life history traits interact together. Fitness-related alternative social tactics are quantitatively assessed in the field and lab using a demographic model that incorporates physical (i.e., temperature, precipitation) and biological (i.e., demographic, genetic) parameters. The dynamic interaction of these and related parameters form the basis for developing an integrated theory of social evolution.

MEXICO - Damselflies
by Chris Anderson

Sympatric species of rubyspot damselflies (*Hetaerina spp*.) often differ markedly in male coloration but occupy virtually the same ecological niche, which makes this a promising taxon for studying non-ecologic causes of character divergence and speciation.

Chris Anderson at field site in Mexico

Two categories of secondary sexual characters, coloration and genitalia, were surveyed across multiple populations of multiple *Hetaerina* species in the summer of 2004.

Our field research team, consisting of Dr. Greg Grether (UCLA), myself, and field assistant Erik Adrian Peñaloza Padilla (Guadalajara), collected *Hetaerina* from the Mexican states of Jalisco, Morelos, Veracruz, San Luis Potosí, and Tamaulipas. We obtained Global Positioning System (GPS) locality data for more than 40 sites and collected more than 800 individuals from six *Hetaerina* species. Pilot behavioral observations were also performed. Sample specimens from this trip have recently been delivered to the University of Texas High-Resolution X-ray Computed Tomography (CT) facility. The CT data will allow for three-dimensional characterizations of male clasping structures and the female clasping site attachment points. Genetic analyses of sample specimens are scheduled to begin soon.

Hetaerina cruentata copulating pair
(male on the left and female on the right)

CAMEROON - Skinks
by Adam Freedman

CTR International Research Associate Princewill Tamon and I spent 3.5 months in the spring of 2004 traveling throughout the forest and forest-savanna transition zones of Cameroon, West Africa, conducting research on forest lizards. We collected tissue samples and morphological data from skinks of the genus *Mabuya*. Genetic analyses on *Mabuya affinis* collected in Cameroon, and those from a previous CTR trip to Côte D'Ivoire, will be used to examine the role of geographic barriers, such as mountain ranges, rivers, and savanna corridors, in the promotion of genetic differentiation between skink populations. A barrier of major interest is the Dahomey Gap, a savanna corridor separating West Africa from the Congo Basin.

Mabuya skink © Rick Wallace

African skink captured in pitfall trap in Cameroon

One hypothesis to be tested is whether patterns of genetic variation are consistent with the periodic contraction of tropical forests into isolated forest refugia during periods of glacial activity characterized by cooling, drying periods. Differentiation of populations while they are restricted to these refugia is one hypothesis for why diversity in tropical forests is high. My work will also examine whether analogous genetic and morphological differentiation is occurring between dense rainforest and gallery forest-savanna mosaic habitats in order to shed light on the role of habitat gradients and to better understand the mechanisms involved in animal diversification in the tropics.

ECUADOR - Reforestation
by Amy Rogers

Amy Rogers at Mache-Chindul field site

The Mache-Chindul Ecological Reserve is one of Ecuador's three remaining tracts of Chocó coastal forest, an ecosystem globally renowned for its exceptional levels of diversity, endemism, and deforestation. Efforts are being made to ensure the long-term ecological integrity of this region via protective buffer zones, connective wildlife corridors, and reforestation of degraded habitat to an ecologically functional state. Yet very little is known about how to practically implement reforestation in complex tropical forest systems.

My dissertation research in Mache-Chindul is focused on developing an ecological framework for a reforestation design to accelerate secondary forest recovery - the most time-intensive, least understood successional stage in tropical forests. I am conducting a series of ecological experiments designed to reveal critical limiting factors in the transition from secondary to primary forest by teasing apart stages in the recruitment cycle of primary forest tree species (in secondary forest).

Through a collaboration with Fundación Jatun Sacha, an Ecuadorian NGO, these results will be applied to develop a reforestation strategy to counter the natural limitations of primary forest establishment in recovering areas. Determining which conditions best promote the establishment of primary forest hardwoods in secondary forest will assist Fundación Jatun Sacha and Conservation International's joint efforts to incorporate biodiversity-increasing techniques into current carbon-offsets reforestation protocols.

Amy Rogers conducting reforestation research at the Mache-Chindul Ecological Reserve

MALI - Mosquitoes
by Nick Manoukis

My research centers on the mosquito *Anopheles gambiae*, the principal malaria vector of Sub-Saharan Africa.

Anopheles gambiae collecting team in the village of Banambani in southern Mali

The two projects I work on in Dr. Charles Taylor's lab are conducted in disparate regions of Mali, but both involve extensive use of computer models and regular visits to the field. Along with explosive growth of the human population, Africa has seen a dramatic increase in its total irrigated riziculture (rice growing) area in the last 50 years. A major research focus for me is how irrigation affects the larval and adult ecology of *Anopheles gambiae*. This work contributes to a long-term study in our lab modeling malaria transmission in Mali's largest irrigation project, the "Office du Niger". The

Setting up tubes with silica gel to catch mosquitoes

model should be useful for managing current irrigation projects and guiding future development. The second thread of my research concerns the population structure of *Anopheles gambiae* in a more typical setting, the non-irrigated area around the village of Banambani in southern Mali. I have simulated molecular evolution under disparate demographic scenarios to examine their expected effect on population genetic parameters in this area. We expect these results to apply directly to proposed malaria control through introduction of genetically modified vectors. For more information, visit http://taylor0.biology.ucla.edu.

ECUADOR - Hummingbirds
by Jaime Chaves

In the phylogeographic study of the speckled hummingbird (*Adelomyia melanogenys*) I am conducting in Ecuador, I found that geographical isolation, caused by the uplift of the Andes, resulted in three genetically distinct populations based on mitochondrial DNA sampling. Morphological measurements showed no differences between the two populations of speckled hummingbirds found at the higher elevations. However, hummingbirds from the lowland coastal mountain range had larger bills and were heavier. Future studies will attempt to determine the factors responsible for driving this morphological differentiation.
I also studied the flight performance of the

Speckled hummingbird at feeder

speckled hummingbird at multiple elevations in a natural cline in order to document changes in two flight parameters: stroke amplitude and wing beat frequency. Using a video camera and a microphone to record hum sounds in front of hummingbird feeders, I documented an increase in both amplitude and frequency with an increase in elevation. This is the first field study to document elevational flight variations in a single hummingbird species, confirming that hummingbirds modulate their flight mechanics in high elevation habitats characterized by low air density and oxygen availability. These results point to the need to further examine the effect of elevation on flight-related behaviors such as feeding, courtship, and territorialism in the speckled hummingbird.

Speckled hummingbird (*Adelomyia melanogenys*)

RESEARCH NEWS - CTR Affiliated Faculty

COSTA RICA - Wet Forest Insects, Biodiversity, and Mimicry

My present research focus is on the diversity of insects in a tropical lowland wet forest. I am part of a large insect biodiversity project at the La Selva Biological Station in Costa Rica begun in 1991. After the initial survey of La Selva, the current focus of the Arthropods of La Selva (ALAS) Project is to sample sites along an altitudinal transect to the south on the slopes of Volcan Barva. Preliminary data analyses indicate striking changes in diversity and faunal composition over that transect. Further information on the ALAS Project, sponsored by the National Science Foundation, can be found at http://viceroy.eeb.uconn.edu/ALAS/ALAS.html.

My areas of specialty are two groups of beetles: jewel beetles (Buprestidae) and a subfamily of weevils (Curculionidae, Conoderinae). In addition to trying to estimate the number of species of jewel beetles, I am studying the ecology of leaf-mining beetles (about 80% of the fauna) and certain weevils. My interest in conoderine weevils was sparked by their participation in several mimicry complexes. In fact, a significant fraction of both beetle groups participate in mimicry (perhaps 10-20%), especially the larger species.

Conoderine weevil, *Mnemynurus championi*, a striking putative mimic of flies

Jewel beetle, *Euchroma gigantea*, is the largest species of the family in the Neotropical region

Almost two-thirds of the more than 200 species of jewel beetles known from La Selva are undescribed. The conoderine weevils are even less well known, with more than 80% of the more than 500 species and perhaps 25% of the genera undescribed. Our knowledge of tropical insects - other than a few conspicuous groups like butterflies - is clearly in its infancy, and our knowledge of the tropics is very incomplete.

Henry Hespenheide, Ph.D.
Professor of Ecology and Evolutionary Biology, UCLA

OCEANIA - Endangered Tropical Dry Forests

Tropical dry forests in the Pacific may currently be the world's most endangered forest type and could be ideal for testing a number of remote sensing, biogeographic, and conservation theories associated with fragmented systems. My current research examines the biodiversity of woody plants (trees, shrubs, and lianas) in five regions in Oceania that contain tropical dry forest (Philippines, Micronesia, New Caledonia, Fiji, and Hawaii). The primary objectives of this research are: 1) to test the utility of remote sensing methods for predicting patterns of stand and patch species richness over different spatial scales, 2) to undertake biogeographic comparisons of floristic composition, natural history characteristics, and forest structure, and 3) to determine the conservation status of woody plants and remaining fragments of tropical dry forest in biodiversity hotspots of the Pacific.

Tom Gillespie doing fieldwork

Field data on woody plants is being collected at the stand level using Gentry's transect method and at the patch level using systematic searches at 47 field sites in the largest and highest quality remaining patches of tropical dry forest in each region. Remote sensing, using Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) imagery, will be used to calculate landscape metrics and spectral indices hypothesized to be associated with woody plant species richness.

Tom Gillespie, Ph.D.
Professor of Geography, UCLA

A tropical dry forest fragment in Hawaii

TRINIDAD - Evolution of Coloration and Mate Choice in Fish

Picture pristine rainforest streams punctuated by waterfalls, and you have in mind the natural habitat of guppies (*Poecilia reticulata*) in Trinidad. These small fish have become a model for studies of natural selection, in part because they occur in genetically isolated populations along replicated environmental gradients. Most research has focused on the influence of predation, but I was drawn to work on this system because of another environmental variable: carotenoid availability. Female guppies choose mates based, in part, on the carotenoid content of a male's orange spots.

Female guppy and two males

Animals are unable to synthesize carotenoids, and guppies obtain them primarily from algae. Algae availability depends on forest canopy openness (light availability) which gradually decreases as one moves upstream in a river drainage. By combining field studies with laboratory "common garden" and diet experiments, we are trying to understand how mate preferences and coloration evolve in this system. The emerging story is fascinating but complicated. For example, the female preference for carotenoid coloration appears to be derived from an ancestral sensory bias that may have originally helped guppies find orange fruits but that now also helps females find high quality mates.

Greg Grether, Ph.D.
Professor of Ecology and Evolutionary Biology, UCLA

Waterfall on the Petite Marianne River, Trinidad

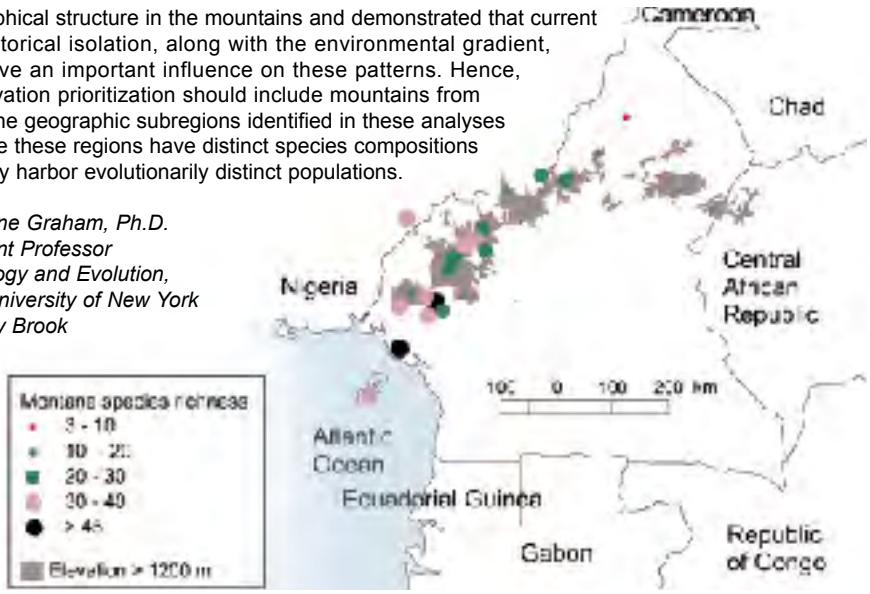
RESEARCH PROJECTS - CTR Senior Research Fellows

GULF OF GUINEA HIGHLANDS - Bird Conservation

The Gulf of Guinea highlands in Central Africa are considered a "hotspot" of biodiversity and endemism on a continental scale, and considerable attention has focused on the conservation of these high elevation forests. However, there has been limited regional conservation assessment of patterns of species distributions and the ecological and evolutionary processes that have created these patterns.

Our study determined that bird species richness (alpha diversity) was greater in areas with high and consistent annual rainfall, most notably in mountains in the southern part of the range. A cluster analysis based on endemic bird species identified three relatively distinct major montane regions and demonstrated that differences in bird species composition (beta diversity) among isolated montane forests were influenced by topographic connectivity among mountains. Our analyses quantified the geographical structure in the mountains and demonstrated that current and historical isolation, along with the environmental gradient, may have an important influence on these patterns. Hence, conservation prioritization should include mountains from within the geographic subregions identified in these analyses because these regions have distinct species compositions and may harbor evolutionarily distinct populations.

Catherine Graham, Ph.D.
Assistant Professor
of Ecology and Evolution,
State University of New York
at Stony Brook



ZAMBIA - Carnivore Research

Night in northeastern Zambia, and a flash of light momentarily illuminates the understory in the dry, evergreen forests of the Muchinga Escarpment. A remotely operated camera trap has "captured" a rare Meller's mongoose (*Rhynchogale melleri*) on film. Remote cameras are one method that I am using to investigate biodiversity, distribution, and abundance of carnivores in Zambia's Luangwa Valley, a little-studied region in south-central Africa.

Meller's mongoose is one of several carnivores roaming these woodlands. Sampling from valley floor to near the top of the escarpment, I have already documented thirteen species of carnivores in the region. Detection is only the beginning. Life histories of many of the smaller species are virtually unknown, as is the ecology of most carnivores in densely vegetated habitats. My research aims to unlock the mysteries of these little-known carnivores, specifically, to examine the ecological separation that allows for coexistence among sympatric species.

Paula White with small carnivore (serval cat)

At the opposite end of the size spectrum is the African lion that, despite its stature and fame, has recently emerged as an issue of international concern. My research program is contributing to a comprehensive conservation plan for African lions by examining population genetics and sustainability of lion hunting in the Luangwa Valley.

Paula A. White, Ph.D.
Director, Carnivore Zambia

ECUADORIAN CHOCÓ - Community-based Conservation Programs

The Ecuadorian Chocó habitat, one of the richest and most diverse on the globe, is an internationally recognized conservation priority. One of the main challenges for conserving the little forest that remains intact (<3% of original extent) is to provide the local population with economically viable alternatives to ecologically harmful practices. Residents in the densely populated Chocó are impoverished, dependent on exploitation of the forest, and without adequate access to education and health care. Since 2002, CTR has been working closely with local communities in the Chocó in three areas: education, training and capacitation, and identification of economically viable alternatives to forest exploitation.

Jorge Olivos, a resident of Dogola, working as a field biologist with CTR

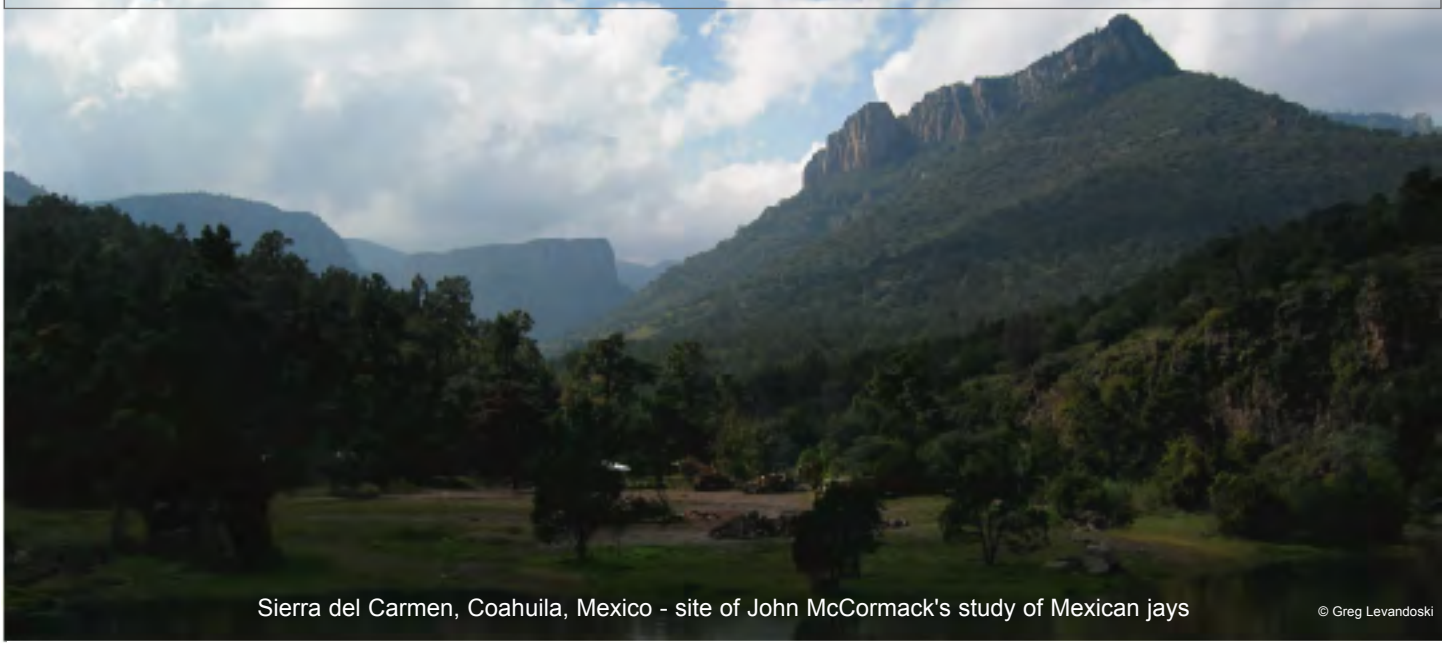
CTR is working with schools in six communities to provide teachers with materials to teach environmental awareness. We have held workshops and presentations in local communities on a range of environmental themes, including public hygiene, the importance of the Chocó for conservation, and results from research on the long-wattled umbrellabird. Since many communities have no access to electricity, CTR staff bring a laptop computer, a digital video projector, and a generator for the presentations.

Working intensively with two communities, Dogola and La Laguna, CTR is helping to design and implement an ecologically and economically viable management plan that would include reforestation for carbon credits, ecotourism, and animal husbandry programs. CTR is also providing training and long-term employment for community members as field biologists.

Jordan Karubian, Ph.D.
CTR Director for Latin America

Dr. Jordan Karubian making a presentation to the community of Dogola, in the Mache-Chindul Reserve

Photos and figures for this issue were contributed by: Chris Anderson, Jaime Chaves, Adam Freedman, Tom Gillespie, Catherine Graham, Greg Grether, Henry Hespenheide, Jordan Karubian, Greg Levandoski, Nick Manoukis, John McCormack, Amy Rogers, Sassan Saatchi, Ilonka von Lippke, Rick Wallace, and Paula White.



Sierra del Carmen, Coahuila, Mexico - site of John McCormack's study of Mexican jays

CTR PEOPLE

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Ecology and Evolutionary Biology (UCLA)
Institute for Bird Populations
Institute of the Environment (UCLA)
Jatun Sacha Foundation, Ecuador
Point Reyes Bird Observatory
Reef Check
Terra Peninsular
The Nature Conservancy
Universidad San Francisco de Quito, Ecuador
Wildlife Conservation Society
World Resources Institute

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