

Amigos

Newsletter

No. 82, November 2014

Wilson Botanical Garden
Las Cruces Biological Station
Apdo. 73-8257 San Vito, Coto Brus, COSTA RICA



**Organization for
Tropical Studies**

Who We Are

The Las Cruces Biological Station is one of three tropical field stations owned and operated by the Organization for Tropical Studies (OTS) in Costa Rica. Along with the Wilson Botanical Garden, Las Cruces was acquired in 1973 and is a hidden jewel that offers natural history visitors and researchers alike an extraordinary place to visit and conduct research.

Far from the noise and bustle of the country's capital city San José, Las Cruces is located in the remote southwestern corner of the country between Corcovado National Park on the Osa Peninsula, and the enormous La Amistad Biosphere Reserve (472,000 hectares) that spans south-central Costa Rica and western Panama. In 1983, UNESCO declared Las Cruces and the Wilson Botanical Garden part of the Reserve due to its incredible diversity and proximity to La Amistad.

The Wilson Botanical Garden, founded in 1962 by Catherine and Robert Wilson, is arguably the most important botanical garden in Central America and a "must see" stop on the itineraries of plant lovers, birders, and other natural history groups. It is famous for its worldwide collection of tropical plants which include palms, aroids, bromeliads, gingers, marantas, heliconias, and ferns. More than 3,000 exotic species of plants can be found in the 10-hectare (~25-acre) garden, including one of the largest collections of palms in the world.

There is an incredible diversity of animals at Las Cruces, and in the immediate area surrounding the station. The most recently updated bird list includes 410 species; close to half the number of birds found in all of Costa Rica. There are also over 100 species of mammals, of which 59 are bats. Some of the more commonly sighted mammals include agoutis, white-faced capuchin monkeys, kinkajous, olingos, and tayras. Reptiles and amphibians also thrive in this moist, cloud-laden habitat and there is an impressive diversity of insects,

and in particular moths and butterflies.

Las Cruces protects over 200 hectares of primary forest (home to over 2,000 native plant species) and several smaller adjacent areas that are in various stages of forest recovery. The forest is surrounded by a mosaic of mixed-use agricultural fields and forest patches, and it is this fragmented setting that makes Las Cruces an ideal place to study the effects of forest fragmentation and isolation on animal and plant communities. The landscape surrounding Las Cruces is also ideally suited for research on biological corridors and restoration ecology; key fields of research that are of ever increasing importance. Part of our mission at Las Cruces is to continue to purchase land for reforestation and, in doing so, expand our protected areas and connect some of the isolated forest fragments around the station. For further information on this campaign please visit our website.

At approximately 1,200 meters elevation (3,900 feet), the prevailing temperatures at Las Cruces are cooler than one might expect. Temperatures range from 21-26 °C (70-80 °F) during the day and 15-21 °C (low 60's) at night. Mean annual rainfall is ~4,000 mm (157 inches)! The dry season runs from January – March, and the rainy season from May – November. Most visitors and researchers come during the dry season.

The station is well known for its visitor-friendly amenities: comfortable private sleeping quarters, delicious meals, knowledgeable and enthusiastic staff, and a well-maintained network of paths and trails.

We also provide internet access to overnight visitors.

The nearest town is San Vito, the capital of Coto Brus County. It was settled in the 1950's by Italian immigrants and to this day there is a strong Italian presence. There is an excellent pizzeria, and the Dante Alighieri Italian-Costa Rican Community Center provides language instruction. Indeed, Coto Brus is the only county in Costa Rica where Italian forms part of the elementary curriculum!

We invite you and your family and friends to come visit us for an afternoon, an overnight stay or a week to see and experience firsthand the splendid tropical diversity of the Las Cruces Biological Station and Wilson Botanical Garden.

For more information please visit the OTS website at <http://www.ots.ac.cr/> or contact us directly by email: lcruces@ots.ac.cr. Postal mail can be sent to: Estación Biológica Las Cruces/Jardín Botánico Wilson, Apdo. 73-8257, San Vito de Coto Brus, Costa Rica. Telephone (from the U.S.): 011 (506) 2773-4004.

Reservations can also be made by contacting the OTS office in San José by email edu.travel@ots.ac.cr, postal mail: ESINTRO/OTS, Apdo. 676-2050, San Pedro de Montes de Oca, Costa Rica, or by telephone (from the U.S.): 011 (506) 2524-0607.

North American OTS office is located at Duke University, telephone: (919) 684-5774 or email: nao@duke.edu.

The Organization for Tropical Studies is a nonprofit consortium of universities and research institutions in the U.S., Costa Rica, Peru, Mexico, South Africa, and Australia.

Founded in 1963, OTS is dedicated to providing leadership in education, research and the responsible use of natural resources in the tropics. To this end, OTS offers graduate, undergraduate and professional education, facilitates research, participates in conservation activities, conducts environmental education programs and maintains three field stations in Costa Rica: La Selva Biological Station in the Atlantic lowland rain forest; Palo Verde Biological Station in the Pacific deciduous dry forest; and Las Cruces Biological Station in the premontane cloud forest near the Panamanian border.

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Front Cover: A young agouti eating a medium-sized artificial fruit. The attached thread and flagging tape do not affect natural agouti seed eating and dispersing behaviors. See agouti article in research section of the newsletter for further details! Photo Erin Kuprewicz.

Back Cover: The Gamboa Annex property before it was purchased in 2008 and what it looks like today. Note the dramatic change in vegetation cover in the central foreground of the image. Photos Zak Zahawi.

Editorial Committee: Alison Olivieri, Rodolfo Quirós, Emilce Ramírez, Ariadna Sánchez, Zak Zahawi.

Zak Zahawi/zak.zahawi@ots.cr

Peanuts! Yes, that might be an odd topical word but it is the theme for this entry. It comes about because a few weeks ago Las Cruces hosted a Restoration Ecology graduate course from the Universidad Nacional of Costa Rica: a small group of students came to Las Cruces for the long Costa Rican Independence Day weekend to visit the Islas Restoration Project and conduct some small, faculty-led projects using the study's experimental framework.

One of the projects was designed to look at seed predation and they used peanuts as the proxy goodie for seed predators (who are also inadvertently seed dispersers – see “Using Artificial Fruits to Decipher Agouti Seed Dispersal Decisions” research article in this issue). In this case the presumed predators would be rodents of various types such as agoutis, squirrels and mice, but also potentially (though less likely) some species of birds.

The use of peanuts took me back to early days as a graduate student in Illinois and some fond memories of simple seed predation studies with peanuts. They are a great natural seed substitute and make for some nifty field experiments. So how does this work? Basically the nuts (in my case I used unshelled peanuts but in the present study they used ‘cocktail’ peanuts) are counted out and then placed in a petri dish or similar container out in a study site of interest. The goodie-gold mine is typically left out for 24-48 hours and then you return to see what (if anything) has transpired. The neat thing with peanuts is that they are widely available (so you don't have to go on a seed collection expedition first), they are consumed by a broad range of potential seed predators, and they are very cheap! One bag is good for a pretty robust little experiment!

So what kinds of predation questions can you ask with peanuts? Well, the answer is almost anything you can ask with real

seeds. For example, you can place them in different habitats to see if there is a greater density of seed predators in one habitat vs another; you can vary the amount of the reward placed in a particular location (for example one vs 10 seeds in a petri dish); you can vary the amount of seed piles available spatially within a given particular area; or you can try burying seeds to see if rodents (‘scatter hoarders’ by nature) will dig them up. You can even evaluate more subtle questions such as whether handling peanuts beforehand can have an impact on predation – in other words, could rodents be deterred by the scent left on the seeds after human handling? Another question could be to look at the size of seeds or whether there is a preference for shelled vs unshelled peanuts as proxies to the degree of effort needed to obtain a food resource.

Results are often quite striking and it is somewhat shocking to return just a day later and see your little stash of peanuts gone... with only a few pieces of shell remaining as evidence of a crime scene! In this study no strong pattern emerged but certainly predation occurred and a number of partially-consumed dishes bore the telltale signs of incisor tooth marks!

The project at Las Cruces led me to thinking about my early days in experimental design and I realized this is one of those simple, yet highly effective, projects that can be used to get young minds interested in research. Certainly such projects can be setup in a backyard or a nearby forest plot (or urban park perhaps) and there is something exciting about returning the next day to see what transpired. Indeed, if one had a camera trap an image of the predator could be obtained by placing it in a strategic location near the site of the peanut stash! So...if you have never tried a little peanut predation study before, you might be surprised by how exciting the experiment can be!

All the best,
Zak

What's New at Las Cruces?

Zak Zahawi / zak.zahawi@ots.cr



Bandera Azul

We are proud to announce Las Cruces was awarded two Bandera Azul (Blue Flag) certifications again this year. The awards are part of a national government drive to recognize efforts that help protect natural resources with particular emphasis on water resources. As in prior years, Las Cruces won awards under the categories of Natural Protected Areas (5 stars) and Mitigation Strategies to Confront Climate Change (4 stars). A big difference from previous years, however, was the number of stars we garnered -- in both cases our status has increased by two, where five stars is the maximum certification obtainable. We have hit the glass ceiling!

Victor Hugo Jiménez Prendas, head of maintenance, holding up one of the two Bandera Azul flags awarded to Las Cruces. Photo Rodolfo Quirós.

Introducing Holly Shimizu

The Las Cruces Advisory Committee (LCAC) has a new member! At our first meeting last year all members duly noted we needed better representation on the horticultural end of things. Accordingly, during the interim year, John Kress, our LCAC chair, signed up Holly Shimizu. She served as the Executive Director of the U.S. Botanic Garden in Washington DC where she is still based and had visited the Wilson Botanic Garden back in the late 1990s when Luis Diego was Director. Holly's experience will bring much-needed botanical garden expertise to our committee and help us move the garden to new heights! ¡Bienvenida Holly!





José Miguel Chaves

Over the last couple of years a number of you may have met and come to know José Miguel – or Migue, he is known by most at the station. Migue worked for Las Cruces under the OTS-herbarium digitization project that was funded by the US National Science Foundation. During that time he helped process several thousand specimens in the Las Cruces herbarium and also took on the task of processing all the specimens housed in the Palo Verde herbarium. The final product, representing the collective effort of several people at both La Selva and Las Cruces, is the OTS Plant Database much-discussed in previous news-



Photos Federico Oviedo-Brenes

letters (www.ots.ac.cr/herbaria). As noted in the photo, Migue is particularly passionate about ferns and during his time here helped expand this collection with several hundred specimens as well as a new hybrid fern to science! With the completion of the project, Migue moved on to the Missouri Botanical Garden where he is doing a 3-month internship! Moving from a small regional herbarium to one of world's largest must be a bit of a shock, but under the best of conditions. Many thanks to Miguel for all the methodical and excellent work he did while at Las Cruces and we all wish him the best in Missouri. ¡Saludos Migue!



Hot Off The Press!!

The Wilson Botanical Garden has (finally!) launched its own Facebook page. You can now follow updates and developments at the garden at the following address:

<https://www.facebook.com/jardin-botanicowilson>



Introducing Dave Janas

As many of you know, we have long noted the need to have a trained horticulturist based at the Wilson Botanical Garden. The position is now being filled in a volunteer capacity from September-December 2014 by Dave Janas. During this time period Dave will become familiarized with the garden and gradually assume various duties as we seek to raise funds from outside sources to secure the position. He is a horticulturist with more than 8 years' experience, mostly focused in tropical regions, and for the past three years he has worked in Hawaii.



Dave Janas taking a pic of *Korthalsella latissima* in the Alaka'i Swamp area of Kauai Island, Hawai'i.

Research at Las Cruces

Hitchhiker's Guide to the Zingiberales: Discovering Interactions Between Insect Herbivores, their Host Plants and Hitchhiking Mites Using DNA Barcodes

Carlos García-Robledo / GarciaC@si.edu / Department of Multi-trophic interactions, Institute of Ecology (INECOL), Xalapa, Mexico. Departments of Botany and Entomology, National Museum of Natural History, Smithsonian Institution, Washington D.C, U.S.A.

At Las Cruces Biological Station, researchers from the Institute of Ecology - INECOL (Mexico), together with the National Museum of Natural History, Smithsonian Institution (USA), are researching the complex interactions between plants from

the order Zingiberales (the ginger and banana-like plants), and specialized group of herbivores, the rolled-leaf beetles (genus *Cephaloleia*, family Chrysomelidae). This might be one of the oldest known plant-herbivore associations.

This group of herbivores is known as the rolled-leaf beetles because their larvae and adults feed on the young rolled leaves of their host plants. When a rolled leaf matures and unfurls, beetles must fly to a young rolled leaf of another host plant. However, rolled-leaf beetles don't fly alone. Several species of mites that also live inside rolled leaves cling on rolled-leaf beetles and hitch a ride to another rolled leaf (Fig.2).



Fig. 1

An ancient plant-insect interaction. For at least the last 40 million years, rolled-leaf beetles have been feeding and mating inside the scroll formed by the young leaves of their ginger and banana-like host plants. When the rolled-leaf matures and unfurls, beetles must fly to another plant with another young leaf. Beetles don't fly alone! Specialized mites hitch rides on the beetles to another plant.

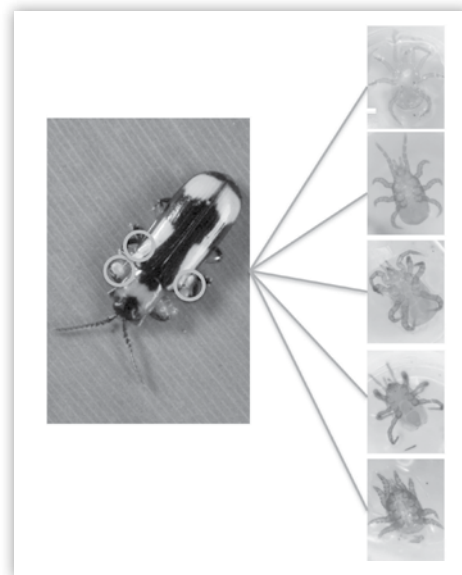


Fig. 2

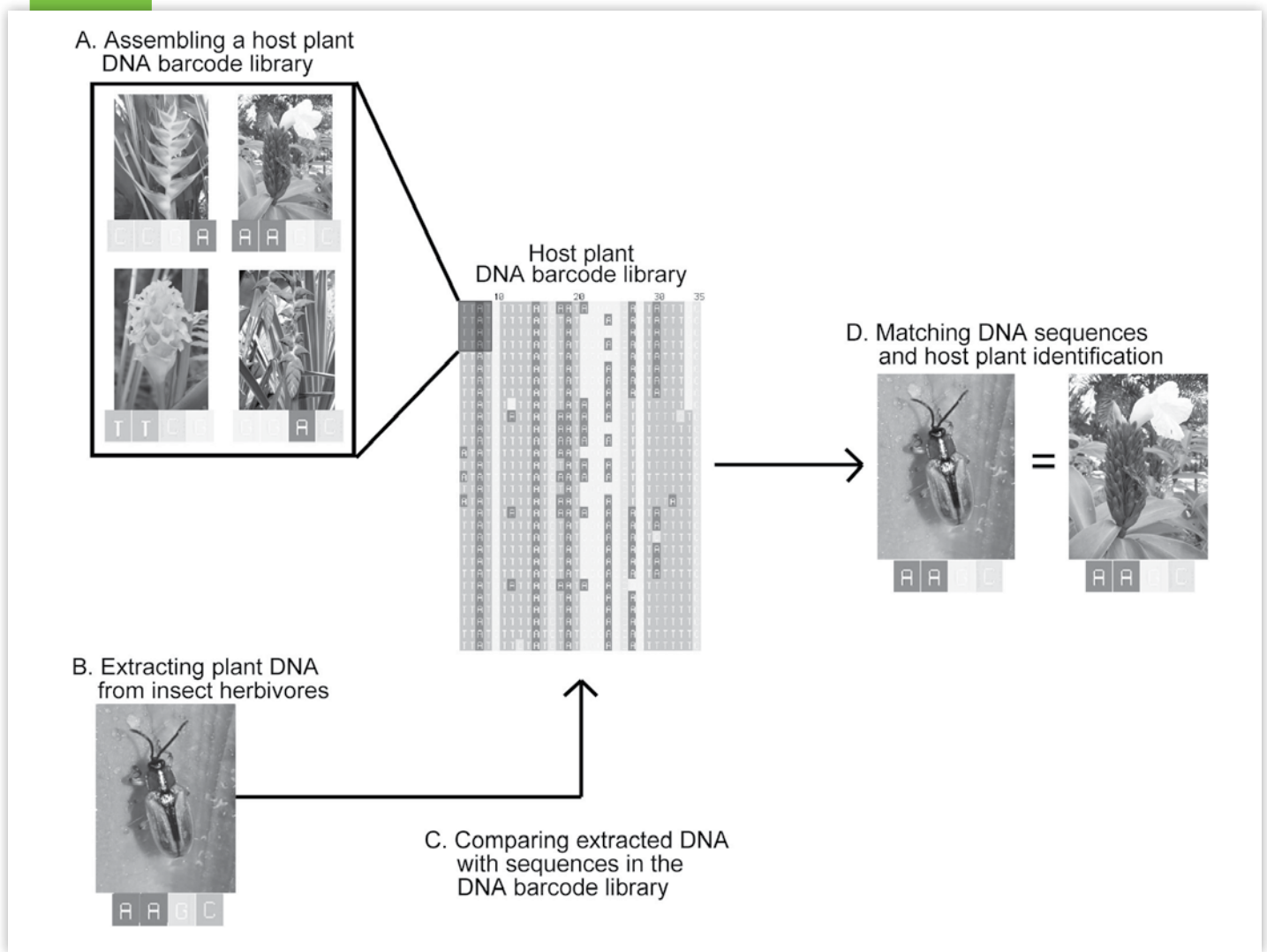
Hitching a ride on rolled-leaf beetles. When rolled-leaf beetles fly to search for host plants, mites that also live inside the young leaf cling to the beetles (blue circles) and hitch a ride to another host plant. This behavior is known as phoresy. Mites left behind by the beetles most likely will desiccate and die.

The first step in understanding this complex tri-trophic network of interactions, is to identify the species of plants, beetles and mites, along with their diets. We are developing novel molecular techniques to identify species and interactions in these complex food webs. Plant, insect and mite species are identified using traditional taxonomy combined with DNA barcodes. These are short DNA sequences that are unique to every species. To identify insect diets, we developed a molecular technique based on plant DNA barcodes. Now we can identify insect diets by amplifying plant DNA extracted from insect

gut contents. We are combining behavioral and molecular studies to determine the roles of the hitchhiking mites in this interaction.

The objective of this project is to determine the interactions between these organisms in multiple tropical forests. Using the resulting networks, we will be able to estimate how extinctions might propagate through food chains under projected climate change. We hope that the tools developed for this project at Las Cruces Biological Station will be useful for other researchers aiming to understand the connections in complex tropical food webs.

Fig. 3



Who eats what? We use plant DNA extracted from insect gut contents to identify insect diets. First, we collect plant tissue from all potential host plants (A). These plant DNA sequences then are assembled in a plant DNA

barcode library. Then, we extract plant DNA from insect gut contents (B). Insect diet identification is performed by comparing DNA extracted from gut contents with the DNA barcode library (C&D).

Using Artificial Fruits to Decipher Agouti Seed Dispersal Decisions

Erin K. Kuprewicz / erinkuprewicz@gmail.com

National Museum of Natural History, Smithsonian Institution, Washington DC, USA



An agouti investigating thread-marked artificial fruits. The fluorescent thread and flagging tape allow me to track where the agouti takes each fruit and if it is eaten or hoarded. Photo Erin Kuprewicz

In tropical forests, seed dispersal by animals is a major mode of reproduction for many plant species (up to 90% of seeds are dispersed by animals in parts of the Neotropics!). In some cases, mammals act as the only dispersers for plants—these plants rely on effective dispersal by mammals to survive, colonize new environments, and reproduce. Interactions between ground-dwelling mammals and plants that produce

large seeds are especially complex and interesting.

One species of mammal that is an important disperser and predator of many seed species in the tropics is the Central American agouti (*Dasyprocta punctata*). Agoutis are large (2-4 kg) mammals that are common in the Wilson Botanical Garden and throughout the forests of Las Cruces Biological Station. Agoutis eat the fruits and seeds of many plants and exhibit a behavior that is important to the dispersal of large seeds: scatter-hoarding. Scatter-hoarding animals (like agoutis in tropical America and gray squirrels in the USA) save some seeds to eat later by burying them singly in many shallow caches underneath the soil. Sometimes, a scatter-hoarding animal forgets where it has buried a seed (or is eaten by a predator) and does not return to dig up and eat the underground seed; if this happens, that seed may germinate and grow into an adult tree, eventually producing seeds of its own to be dispersed by another scatter-hoarder. Despite being effective seed dispersers, an agouti's objective is not to “help” the plant—agoutis bury seeds to save them for later consumption, which kills the seed. Seeds that escape predation by agoutis are incidentally dispersed, but these rare events may be extremely important to plant life cycles and forest community dynamics.

By understanding how scatter hoarders decide whether to bury or eat a seed/fruit, we can determine how plant reproductive and defense strategies may influence seed survival and plant recruitment. However, studying these processes can be very difficult. Scientists studying seed-animal interactions require many seeds to track in space and time; sufficient fruits (of the same size) from one tree species may not be avail-

able in a given habitat because of low plant reproduction or high predation pressure by local seed-eating animals. I was able to bypass these logistic difficulties by creating artificial fruits made of peanuts and baked clay, which mimic natural seeds, can be made in large quantities, and can be modified to be any size and have any level of toxicity—these categories correspond with the hypotheses that the researcher wants to test. In this experiment, I tested how artificial fruits of different sizes (small=4g, medium=14g, large=24g) and with different levels of toxicity (0%, 2%, or 15% tannic acid) were treated by agoutis: what types of seeds do they preferentially eat or disperse? How do seed traits (like size or chemistry) affect agouti behaviors?

In this system, experimentally manipulating fruit functional traits using these artificial fruits worked very well: agoutis treated the artificial fruits as they would natural fruits and I was able to explicitly determine how fruit characteristics affect seed dispersal by agoutis. Overall, agoutis preferred to eat the smallest fruits immediately and hoard the largest ones, taking them far away from their initial locations (in one case 243m from the source!). Toxins had no effect whatsoever on agouti seed predation or dispersal behavior, regardless of tannic acid concentration.

These results are very interesting and even a little unexpected. Chemically-protected seeds can readily be eaten by agoutis despite their apparent toxicity and large seeds have much better chances of being hoarded and surviving to germination than small seeds. These findings have far-reaching implications for the evolution of seed size in plants as well as more local forest processes involving large mammals and seeds.



The first group of students and professors who participated in the Oregon hummingbird project during the closing ceremony at Las Cruces.



Participating professors and outreach coordinators of the hummingbird project for Oregon and Coto Brus at the Linda Vista School in Coto Brus.

The Las Cruces Research Outreach Coordinator – What Does it Mean?

Carla Azofeifa / carla.azofeifa@ots.cr

Greetings to all Amigos Newsletter readers! My name is Carla Azofeifa and I am a new employee at the Las Cruces Biological Station where part of my work is to oversee outreach for Las Cruces based research projects. But... what does that mean exactly? First of all what do we mean by outreach? It's really a combination of social engagement and environmental education, and acts as a bridge to communicate information between the community at large and scientists in order to enhance the understanding of material presented. The outreach that I am talking about here is participatory science, a method that engages the public at large while also providing feedback and developing a dialogue with researchers. Naturally, this line of work is directly linked to the Outreach and Environmental Education Program (PEEA) of Las Cruces, and is, in reality, a branch of the work that has been done by PEEA for a number of years.

The outreach here, however, has a more specific role to what PEEA-LC was doing before. Here we are trying to tie Las Cruces based research projects to a broad variety of community based groups. As such the work necessitates a translation and interpretation of technical scientific information to a more education-based form, and this is done in order to facilitate and augment the understanding of what is studied regionally in scientific projects. The process includes dialogue and the reinforcing of popular knowledge about scientific research, and is a two-way flow of information that moves the process forward.

So how does outreach for scientific projects work? There are a number of methodologies to engage in community work

– what I outline here involves two methods: Participatory Action Research and Knowledge Dialogue. Both methods have a more equitable approach to power, and try to tie the work that a community does to real community needs and issues identified by the group. The methods promote reflection, development of personal skills, and capacity building in community groups, which should result in solid conservation activities.

The most important things to do before searching for outreach funds is to know what we will do, who we will work with, who we are working for, how we will work, and where and how we will work. This diagnostic allows us to have greater clarity before undertaking a project. In other words, before writing a proposal it is important to approach a community to develop an understanding of the culture and outreach needs, as that is fundamental to the development of a successful project. Clearly some degree of uncertainty is always present but undertaking this practice beforehand helps to develop a project that is closer to the reality and needs of the target community. This stage also promotes a dialogue between researchers and participants so that the intentions and objectives of each are defined together, creating a more solid foundation from the outset. In order to accomplish this it is important to engage in workshops, interviews, focal group sessions, and other activities. The clarity and transparency of the objectives put forth by the research group at this stage is really key so that false expectations are not created.

Part of the proposal should take into consideration the creation of communication channels that allow for a constant dialogue with the group. The communication should be

assertive in nature in order to foment relationships, as a lot of community work is based on a highly organized cultural structure. When a project is implemented, strategies exist that are as diverse as groups of people in the world, so there really is no singular or magic formula to working with a given community. Accordingly, each project and each group has its own peculiarities that are constantly being influenced by other factors as the project is carried out. Repeated self-evaluations of the work accomplished is fundamental, as researchers and participants have to be aware that the outreach process requires a degree of flexibility and openness, as things do not always go as planned. Periodic reflections during pauses in the process allow us to rethink the way forward.

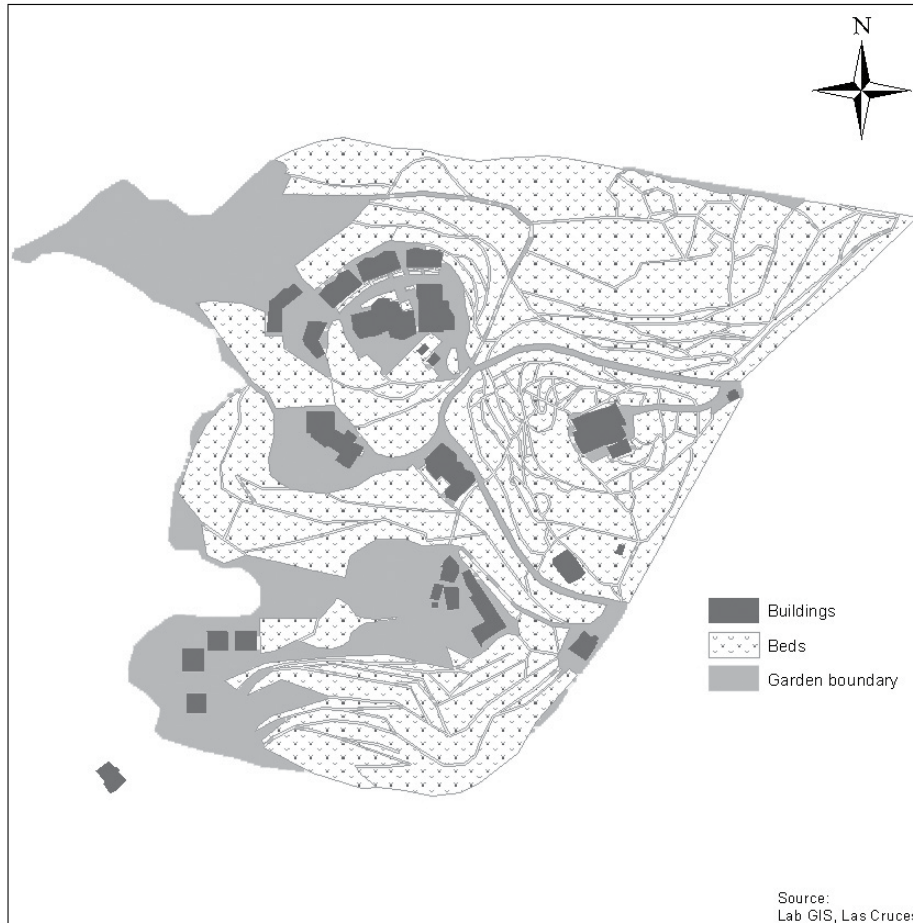
A very important aspect of this line of work with communities is the provision of time for community feedback towards the end of a project. Unfortunately this is often left out due to time or budgetary constraints. However this period is essential for proper closure with the working group, as they may be approached again in the near future, either by the same researcher or by another group who come in to develop a new line of work.

I am running out of space, but to end this entry I would like to inform you that I currently work in two expansion projects: Eco-Maletas and the Hummingbirds and Pollination Project (a research project led by Dr. Matt Betts of Oregon State University). It will be a pleasure to share with you a little more information about both projects in the next newsletter. Should you have any questions suggestions or recommendations please feel free to contact me. Best regards to all.

GIS Corner



Robert and Catherine Wilson Botanical Garden



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Made by:
Yerlyn Blanco V.
OTS, Las Cruces

Projection:
UTM 17 N
Datum:
WGS 84

 Organización para
Estudios Tropicales

August, 2014

The entire garden is divided into planter beds that are grouped in sections, and each planter bed should have an identifying code. However, as the decades have passed, nature has slowly modified this landscape and some of the beds have been transformed – for example, some ‘new’ beds do not have a code whereas others have disappeared because they have fused with other planter beds. Accordingly, the botanical garden map is now being transformed in order to take into account the new planter bed reality on the ground.

This process underscores the importance of having a map such as this, which will allow us to re-label the actual planter beds, while also doing an inventory of all the plants found within each bed. Once complete we will have a database that can serve as a better control for the species found therein and that can hopefully be of use for future projects.

The work will be done in conjunction with the department of taxonomy and with the garden crew. We also hope to work with the new horticulturist Dave Janas who will be working with us as a volunteer in the coming months.

IN OTHER NEWS we are starting a new project to create a map for EBAIS (the national health clinic) that shows the geographic location of all the health clinics in the county of Coto Brus, which does not exist at present. We have started with the process of field trips to take GPS points at clinic locations and will share the map with our readers once it is complete. This map will be of importance not only for OTS and courses based at Las Cruces, such as the Global Health program, but also for the Costa Rican Health Ministry and the county of Coto Brus in general. In total there are 11 EBAIS clinics in the county as well as 42 “houses” that can receive patients; all will be geographically represented in this map.

Yerlyn Blanco / yerlyn.blanco@ots.cr

In the last edition of the Amigos newsletter I presented a new map, which showed all the trails that criss-cross the Wilson Botanical Garden. In this edition I want to show you one of the new products that has emerged as a result of the major cartographical work that was done with these trails. This new map has all the planter beds that form the structural backbone of the garden. These are areas located in between the trails and in general, are also demarcated by them.

Flora and Fauna

Ginger – Beauty and the Beast

David Marsh / david.marsh@skynet.be

Zingiber spectabile, sometimes called the ‘beehive ginger’, is a native of southeast Asia. It occurs in Central America as a garden plant since it is attractive; ‘attractive’ if you like flowers that look a little like something from an alien planet [photo 1]. We first saw it in the hotel garden the morning after we arrived in San Jose for the first time -- bizarre, pale, glistening (the plant, not us) – without knowing at the time it would be what we were in Costa Rica for. In fact the long-lived ‘flower spikes’ are made from leafy bracts, each protecting a small, short-lived flower [photo 2]. The gingers were in full flower for August and we had arrived at the perfect season to discover the beastly side of this alien beauty.

This was our first family visit to Costa Rica, indeed, our first time in Central or South America and we wanted some of the tourist experience of this fabulously different (for us Europeans) country, but also to engage in a way that tourists sometimes are not able to. Our tour company had called Rodolfo Quirós at OTS and organized part of our visit to include 5 nights at Las Cruces, supporting one of his projects as volunteers – though the precise project was to be a surprise.

On Sunday we drove down from San José, rapidly acclimatizing to the gentle pace of travel which gave plenty of time to spot Swallow-tailed Kites and endless vultures (Black and Turkey). ‘Checking in’ to the accommodation at Las Cruces felt like the wrong verb, it felt more like joining a community for the duration: sharing excellent meals at the common table being part of the welcome.

On Monday, Rodolfo introduced us to the garden and to the project. The Wil-

sons brought *Zingiber spectabile* to Las Cruces to sell as a garden plant. But it has a beastly side: away from natural predators it is invasive and has spread into the forest from the garden. Rodolfo had done a survey of its extent in 2007 and now some willing volunteers meant he could revisit the problem to obtain more data on the questions: Was it spreading further? Were the existing control measures working? What was pollinating it? What spreads the seeds?

As a family, we are not horticultural specialists, but my daughters, Holly and Lucy, had both done surveys on environmental science field trips from school and my wife Kate and I are keen gardeners plus I count things (flights rather than plants) for a living. This was enough experience, coupled with a brief training from Rodolfo who equipped us with clipboards, 4-meter bamboo poles, introduced us to some Crested Guans, and sent us to do a linear survey along both sides of the Rio Java trail to a distance of 5 m from the trail – with the Water and Melissa trails to follow.

It took about four hours to work our way down the trail to the river in 50 m sections, counting flowering and non-flowering plants, plus one Spectacled Owl (juvenile). We worked in two teams of two, taking a side each, and developed a little healthy competition for which team could find the most flower-spikes in a single group (the record was around 40, near the Strangler Fig). Unused to the heat, it was quite enough work for one day!

On Tuesday we surveyed the Water Trail, quickly realizing that a 4 m pole was not going to be a useful companion on such a winding path. Gingers stop quite abruptly at the newer part of the forest, so instead we enjoyed the views of the mountains, waterfall and a few invasive bananas. On the way back, we took in the



PHOTO 1 – Ginger plants on the Rio Java Trail at Las Cruces. Photo by David Marsh

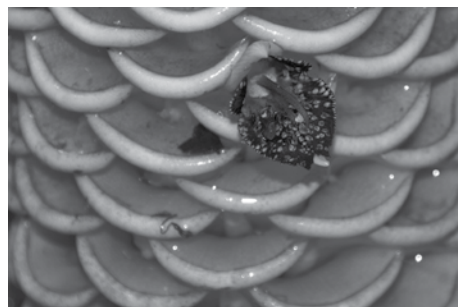


PHOTO 2 – Ginger flower – with a small bee. Photo by David Marsh



PHOTO 3 – Team ‘Right-Hand Side’, Kate and Holly, celebrate another find. Photo by David Marsh

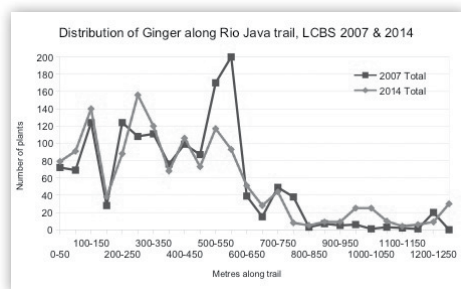


FIGURE 1 – Comparison of survey counts

start of the Melissa Trail, where we only found gingers very near the Rio Java trail.

The next day split the party. While Kate did timed observations for pollinators, David and Lucy explored Melissa, Wilson and part of the Ridge trails, but only the last of these also has gingers. Then finally we reviewed the data with Rodolfo.

In the data were more surprises: a very strong correlation between the previous survey and the new results, showing that the control measures (basically with a machete) were working [Figure 1]. There are clearly places along the path that are welcoming for gingers and others that are not: informally, we found that there were areas of dense undergrowth where the gingers were few – but not enough data to know which was causing which. There was also some suggestion in the data that the gingers are more numerous further down the Rio Java Trail than in 2007, but the extent of the spreading in 7 years was much less than we had expected. For pollinators, we saw bees and wasps, and three visits from hummingbirds (in three hours of observation). The hummingbirds visited several plants in a clump, where there was open space or running water. Who or what is actually causing the spreading? For that we still have no evidence. Next visit, perhaps.

We rounded off our stay in Costa Rica near Manuel Antonio which, apart from daily sloths, was no match in flora or fauna for Las Cruces, but also has gingers along the trails. By the way, once you've started spotting them, you can't stop!



Dipsas tenuissima
(Black-faced Thirst Snake) near a creek at Las Cruces.
Photo by Sylvère Corre.

A New Snake for Las Cruces!

Sylvère Corre / sylvere.corre@hotmail.com

I visited Las Cruces with a French group of naturalists for two nights at the end of March to do some birding and seeing wildlife.

On a night walk searching for glass frogs, among other animals, I found a snake near a small stream bordering the forest. I took some pictures because it was very calm, and I was sure it was a new species for me! When I went back to my room, I checked Solórzano's book "Snakes of Costa Rica" (INBio, 2004). I found only one species similar to the one in my photos: *Dipsas tenuissima*. I later obtained confirmation of the species from Las Cruces staff.

According to Solórzano, the maximum altitude recorded for this species is 950 meters, and it is found only in the Southern

Pacific coast of Costa Rica. Finding it at Las Cruces increases its altitudinal range by 250 meters; plus it represents a new species for the Las Cruces station! The species is not included in the species list for the station, and according to the staff, it is rare as only two sightings have been reported so far.

Las Cruces aims to document information about the species found in the forest and surrounding areas. We, occasional naturalists visiting the place, can contribute to this goal by reporting our sightings, thus, providing data for other researchers to follow and figure out more details of the species. Definitely, an exciting discovery.

Sylvère Corre, is a wildlife guide for Yuhina Tours (www.yuhina.fr)

De la Comunidad

The 2014 Regional Brunca Fair



During the last few days in August Las Cruces participated in the 3rd annual Regional Brunca Fair, organized by different public institutions in the region and held in a different location each year. The goal of the fair is to generate publicity for small and medium-sized regional businesses and provide them with a forum to discuss ideas. The event, held in San Vito this year, was a big success with more than 60 booths, including one for Las Cruces. The festival

was attended by a large number of people and there was something for all family members. Las Cruces was able to promote its ecotourism services along with six other companies from the Tourism Consortium of the Brunca Region (ctrbrunca.wordpress.com). The Las Cruces-based Eco-Maletas project for local schools was also featured and the San Vito Bird Club commandeered a bake sale table to support its activities involving environmental education for students of all ages.

Our Donors

It's Raining Birds!

Alison Olivieri / sanvitobirdclub@gmail.com
www.sanvitobirdclub.org



A male white-tailed Emerald (*Elvira chionura*) on a twig at Las Cruces. Photo Yerlyn Blanco

It's that magical time of year once again when we carry our coffee outside each morning to look for returning warblers, flycatchers, tanagers, vireos and orioles. In San Vito we are deep into the rainy season so we anticipate daily downpours and find our satellite television and internet services frequently interrupted. These are small piques, however, compared to heart-thumping sightings of tiny zebra-like Black-and-white Warblers, flamboyant Summer Tanagers and the pop-out colors of male American Redstarts.

During the day, we bake gingersnaps to sell at local ferias and wait patiently for the slight jiggle of leaves, tiny hops through a gap in the trees – any excuse, really, to rush for binoculars and abandon whatever we're doing in early September when the southward migration begins.

But, by the time you read this article, it will be November -- the rain should be tapering off, the migrant birds will have adjusted into the company of local resident species and we'll be preparing for natural history travelers, groups of college students and an onslaught of researchers.

Speaking of which, Luke Frishkoff of Stanford University published a study in the journal Science this fall, discussing bird species diversity in agricultural areas from an evolutionary perspective. He and his fellow authors (including ornithologists Jim Zook and Chase Mendenhall, longtime Las Cruces researchers) found that species with long evolutionary histories -- like trogons, motmots and toucans -- are less able to adapt to monoculture farming techniques than, say, finches or other family groups at the back of your bird book that are, evolutionarily speaking, younger. According to this study, bird families that have evolved over millions of years inside primary forests decline by 15% from those forest environments to diverse agricultural areas (for example, farms that

As always a big **THANK YOU to you all!**

include multiple crops, trees and shrubs, gardens, etc.) and then even further -- by 40% -- from forests to monocultures like those commonly used for bananas and pineapples.

Thomas Smith, professor of ecology and evolutionary biology at the University of California, Los Angeles, commented on this paper explaining that many biologists may have thought about this but now it has actually been studied adding, “. . . maximizing phylogenetic diversity is critical for conservation efforts. . . . it’s analogous to maintaining a balanced stock portfolio.” He went on to add that the study also points to the need to preserve undisturbed forests.

This should make you, our ‘Amigos’, proud to be part of protecting the Las Cruces forest. When you send in your donation, this helps us protect it by funding salaries and equipment for forest guards who watch for illegal poaching and biologists who study flora changes such as invasive species (please see the ‘Ginger Survey’ article by David Marsh in this issue, describing this very work by Station Biologist Rodolfo Quirós).

Going even further, if you donate to our Land Acquisition Campaign, your tax-deductible contribution will help us increase the size of our forested area as we move forward with efforts to create a biological corridor from Las Cruces to the forested Ngöbe-Bugle Indigenous Reserve.

The total sum game of our research station buildings plus the Wilson Botanical Garden plus the Las Cruces forest add up to a unique spot in the world. We are protecting what we can, increasing our holdings when possible, and providing a safe and comfortable locale for biological research. To continue this mission, we need your support, so please take a moment to donate as generously as you can!

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