

Amigos

Newsletter

No. 65, May 2006

Las Cruces Biological Station
Wilson Botanical Garden

Apdo. 73-8257 San Vito, Coto Brus, COSTA RICA



**Organization for
Tropical Studies**



Who We Are

The Organization for Tropical Studies (OTS) acquired the Wilson Botanical Garden in 1973, as part of the Las Cruces Biological Station. It is one of three tropical field stations operated by OTS in Costa Rica. Located in the remote southwestern corner of the country, Las Cruces 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 lies 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 the Wilson Botanical Garden part of the Reserve due to its diverse plant collection and proximity to La Amistad.

The Wilson Botanical Garden, founded in the early 1960's 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 12-hectare (~ 30-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 409 species, or close to half the number of birds found in all of Costa Rica. There are also 43 species of bats, and a number of common mammals including agoutis, white-faced capuchin monkeys, kinkajous, olingos, and tayras. Reptiles and amphibians thrive in this moist, cloud-laden habitat and there is an

impressive diversity of insects, particularly moths and butterflies.

Las Cruces owns a ~200 hectare primary forest fragment (home to over 2,000 native plant species) and smaller adjacent areas that are in various stages of forest recovery. 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.

At approximately 1,100 meters elevation (3,300 feet), the prevailing temperatures at Las Cruces are cooler than an inexperienced traveler 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 December - April, 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 pathways and trails. We can also provide internet access to overnight visitors who bring a portable laptop computer.

The nearest town to Las Cruces is San Vito which is 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 Wilson Botanical Garden.

For more information please visit the Las Cruces website at www.ots.ac.cr/en/lascruces or contact us directly by email: lcruc@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) 773 4004.

Reservations can also be made by contacting the OTS office in San José by email: nat-hist@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) 524 0628.

The North American office of OTS 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.

Director's Keys and Notes

Zak Zahawi / zahawi@ots.ac.cr

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Front Cover: Introducing the Fiery-billed Aracari (*Pteroglossus frantzii*) as the second emblem for Las Cruces. Alongside the *Heliconia*, this common garden visitor will represent the fauna of the station, giving special emphasis to the birds that are one of the major strengths of this beautiful place.

Back Cover: Sunset at Las Cruces.

Editorial Committee: Tatiana Acón, Mariana Mora, Alison Olivieri, Silvia Pérez, Rodolfo Quirós, Emilce Ramírez, Ariadna Sánchez, Zak Zahawi.

Well, it has already been almost two months since I took over at Las Cruces and time has really flown. It has been a fantastic beginning and I feel more invigorated with each day that I spend here – there are simply so many possibilities!

As promised in my last note, I said that I would write about the research that I have been doing around Las Cruces. I collaborate with two other scientists: Karen Holl from the University of California, Santa Cruz, and Catherine Lindell from Michigan State University. Each of them also has a graduate student who will be collecting their dissertation data from this project. So it is a nice sized group that allows for some flexibility in the planning and management of a pretty large project.

The principal idea behind the research is to look at forest recovery, as mediated by various restoration treatments, over a long time span. Currently most studies that have examined restoration techniques in tropical systems have monitored treatments for short time periods (generally 2 years or less, which happens to coincide with the data collection time frame for most doctoral dissertations!). We now know that a number of restoration techniques can accelerate forest recovery, but we also know that in most systems forest actually recovers naturally; it just takes a while. What we don't know is whether natural recovery can catch up with restored systems - say 20 years after two similar sites are abandoned, or whether the pattern of recovery is similar. It's likely that restoration will always help but we do not have the data to back up that generally held belief or assumption.

Accordingly, our project has a 20-year horizon. We started in the summer of 2004 and since then have located and set up 13 field sites that are scattered across a ~100

km² area stretching between Las Cruces and Aguabuena (to the southeast). We plan on setting up a few more sites this coming summer. Each site is roughly 1 hectare (2.2 acres) in size and is divided into three 50 × 50 m treatments. A 'control' where we have not applied a restoration technique, a 'plantation' where we have planted the entire 50 × 50 m area with four native species of trees spaced ~ 4 m apart, and an 'island' treatment where we have used the same four species of trees but planted them in patches (or islands) within the 50 × 50 m area.

Studies have shown that both plantation and island plantings can accelerate forest recovery, but what has not been examined is whether islands and plantations yield a similar forest. This question is interesting because most forest recovery tends to follow a patchwork (or island) trajectory. That is to say that an early successional tree (or pioneer species) colonizes an area, which in turn facilitates the colonization of other species. This is due to a number of reasons including the fact that birds will use the pioneer to perch and deposit more seeds beneath the pioneer than elsewhere; the pioneer will provide shade from the harsh tropical sun for germinating seedlings; and over time the



Director Zak Zahawi conversing with Terry Moss (a longtime garden volunteer) at the French dinner fundraiser. Rodolfo Quirós is in the background.

pioneer could improve soil conditions for other species. So if islands work 'better' as it were, or are even equivalent, it would be a more favorable methodology as it is far less costly to plant and maintain islands than it is an entire plantation.

We have also chosen our sites so that they are surrounded by varying levels of forest cover, ranging from ~1 km from a large forest fragment to adjacent to the large Las Cruces forest (one in Melissa's Meadow, another on the opposite end of the forest). The idea here is that forest recovery is likely affected by the proximity to a seed source so that restoration projects abutting tracts of forest will recover faster than more isolated ones. Again from a management perspective, it is important to understand whether this is really the case, and if so, practitioners will be better able to target certain areas for restoration over others. Most of our sites are on land that is owned by farmers and we have been working closely with the Coopepueblos coffee cooperative. Increasingly, we plan to work with local farmers to help provide scientific input and financial resources to help forward ongoing reforestation efforts in the region.

Lastly, and perhaps most interestingly, is the question of time. As I mentioned above, most studies have been relatively short term. Here we want to see whether our control treatment will, over time, resemble our restoration treatments. That is not to say that as restoration ecologists we are trying to put ourselves out of work! However, it is important to understand what our role is over the long term (we're not very good at thinking over human lifespans!) and as we gain more knowledge and understanding of these processes, how to target our research projects in a more directed manner.

To measure what I have described above, we will be monitoring seed dispersal in each treatment using cloth traps that we will place just above the ground. We will monitor bird visitations to our treatments, paying special attention to frugivorous birds, and of course we will monitor the seedlings that germinate and establish in our plots. We will also look at a number of other abiotic (or environmental) aspects such as nutrient cycling and temperature. Lastly, we have been contacted by other researchers who would like to collaborate with us and study other aspects of our experiment, such as mycorrhizae and litterfall.

Needless to say this project is in its infancy and the most interesting results are yet to emerge. I will, of course, keep you posted periodically on the latest events and results of our project. In the next issue of AMIGOS, I will describe in more detail what I see as the role of Las Cruces in facilitating this type of research (I believe the station is ideally suited for this type of applied research), and what all of you AMIGOS could do to help!

Hope to see you around Las Cruces and the gardens in the near future.

All the best,
Zak

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What's New at Las Cruces?

Zak Zahawi / zahawi@ots.ac.cr

New Faces at Las Cruces

In addition to my new face at Las Cruces, we have also hired a new naturalist guide for the station and botanical garden. Ariadna Sánchez will be in charge of providing tours to natural history visitors to the garden, but she will also help Rodolfo Quirós (resident biologist) with visiting academic groups. Both of them will be working together to bring in school groups from local communities in an effort to increase public awareness of the garden, and provide a framework for environmental education for young students. Lastly our GIS (Geographical Information Systems) specialist Guillermo Durán, who is no longer such a new face (he started working here in October of last year), will now be working fulltime at the station starting in March.

New Buildings and Building Remodeling

A number of building changes have taken place in the last few months. As mentioned in the previous AMIGOS issue, the library has been completely moved to its new home in a remodeled section of the director's house. This is a great change that will make the library more accessible to visitors and researchers alike. The future herbarium will also be housed there, and we are in the final preparation stages of getting that room ready. This addition is a long overdue and much needed tool for researchers and having worked in an herbarium in years past, it is very exciting to be able to take part in the reincarnation of the new Las Cruces herbarium.

At the Wilson house, the area where the library used to be housed has been turned into two new rooms for students. Now we can house an entire student group in the upstairs section of the Wilson house (room for up to 29 students!), and there is still plenty of space for socializing. The classroom on the ground floor, which was always a bit small, was expanded by removing a rear-partitioning wall. Finally, the old director's office was remodeled and has now become my office and next-door is the office of Guillermo (GIS) and Ariadna (naturalist).

The new bodega, or storage shed, was completed next to the back entrance of the station and all of our gardening equipment was moved into the new building. The old wooden bodega that dated back to the early days of the garden has been torn down. In its place will be the future reception and administrative

building for the station. Here we will house all of the administrative offices, an expanded store and reception area, and a large auditorium where we can provide incoming groups with an introductory talk on Las Cruces and its famous botanical garden. Having a second auditorium at Las Cruces will also allow us to manage two student groups more easily as each group can have its own lecture room. We expect to begin construction on the new building in May.

One final important technological feature of note is that we now have wireless internet access throughout the Wilson House, the library and future herbarium, the researcher cabins, and in the laboratory. This is an important addition and should allow researchers, students, and visitors alike much greater freedom of movement and better access to the internet. This will also allow more users to be connected to the web at any given time. So next time you come to Las Cruces, bring your laptop with you!



Cynthia Foiles at work in the garden.

Volunteer Time

We have had a number of volunteers come and help us for short periods in the garden. Needless to say there is never a shortage of work to do here. One remarkable volunteer, however,

is Cynthia Foiles who elected to volunteer at the station for no less than 90 days! Cynthia has helped in general maintenance by clearing brush and litter around the garden, and by cleaning the many plant identification tags around the garden that get covered with growth.

Of course in having a volunteer section, I need to give special thanks to our group of local volunteers who help in so many ways – from providing garden walks to visiting groups, to help in fundraising outreach, to help in editing AMIGOS, and many other duties. So a big thank you goes out to Alison and Michael Olivieri, Julie Girard and David Woolley, and Terrie Moss.

If you are interested in volunteering and learning more about what you can do to help us at the garden, please email us at lcruces@ots.ac.cr.

French Night at the Garden: Bon Appétit II

On February 5, we had our second international cuisine night fundraiser at the garden. This year we had to have the event indoors due to the rain, but nonetheless some 30 guests came to enjoy another night of exquisite French cuisine. The chef for the evening was once again Roberto Ramírez, the brother of Emilce, our station administrator. Roberto is a chef in a French restaurant in New Jersey and has twice now been gracious enough to offer his services for a fundraising dinner at the garden when visiting family in Costa Rica. On the menu for those who were not fortunate enough to come: a Crabmeat strudel with champagne and saffron sauce; a fish roulade with ratatouille and potato pancakes; and a vanilla crème brûlée. Delicious! The roaring ovation given to Roberto and the kitchen staff after the dinner awoke a few sleeping researchers, and is perhaps a good measure of the dinner's success! The evening was also a



Dinner guests enjoying a punch cocktail before the dinner.



Roberto Ramírez doing final plate preparations with help from the Las Cruces kitchen staff.

great social event and brought together neighbors who had a lot to catch up on. It was also a great opportunity for me to meet many of my new neighbors. We hope to see all of you again in what will be an annual and perhaps even bi-annual international cuisine night at the garden.

A New Look for Amigos

You may have noticed some changes in the layout and overall appearance of this edition of AMIGOS. This is to bring the newsletter inline with all other OTS publications. We hope you like the new look!

Almost Paradise!

Ariadna Sánchez. Resident Naturalist/
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How to describe with words the immense satisfaction that it meant for me to come to work at Las Cruces Biological Station?

My name is Ariadna Sánchez, and I am the new naturalist guide at the Wilson Garden. My training has been in Natural Resources Management, and I have worked and collaborated in some conservation, ecotourism, and environmental educational projects. I expect to give my best to develop some projects in this place.

I started working at the Wilson Botanical Garden in December. During these few months, I have had the pleasure of discovering the wonders of this magical place: new colors, shapes, odors, sensations... the weather, the food, the incredible staff... details that make you feel like you are in Paradise!

With this motivation, I have been guiding and showing the visitors all of these things. Also, I have been helping with the revision and translation into Spanish of the self-guided tours and taking pictures to make a new photo gallery for the Las Cruces Biological Station.

What is next? I want to help strengthen the Environmental Education Program and connect the community with the conservation processes in this area. I also hope to help make people aware of the environmental problems that we have here and of ways that we may solve them.

I am deeply thankful for this great opportunity to be part of this wonderful team and family.



Ariadna and friend having dinner at the Station

Research at Las Cruces

Odonates Observed During the "Little Wet Season" - Part Two -

Fred Sibley / fcsibley@empacc.net

Part One of this article was previously published in the Amigos Newsletter No. 64, November 2005. Part Two continues the saga of dragonfly and damselfly hunting in the San Vito area in January 2005.

The pond near San Vito's airstrip had at least 20 species this trip while the pond at Finca Cántaros had only 13, despite much more coverage. Each had several species not present at other ponds. The series of ponds from Agua Buena south were always under partly cloudy skies but even with those limitations it was obvious they had different dominant species than the San Vito ponds. Dennis Paulson had seven genera and 12 species of damselflies at the San Joaquin Wetlands and airport pond, while our January visit (with more time spent there) turned up 10 of those 12 plus six others.

One pond was particularly interesting, although rain and fog ruined any real hope of comparison to 1967. Staff members at Las Cruces were able to figure out what forest pond Dennis Paulson had visited in 1967 at the end of a logging road and 1,000 feet higher than Las Cruces (the editor's note of Gamboa Marsh in the earlier article). It's the pond next to a large radio tower west of the San Vito-Wilson ridge. The tower is clearly visible from the porch of Finca Cántaros.

It's much changed from 1967, but still a unique site with distinctive species not found elsewhere. The still-undescribed – *Micrathyria* close to *laevigata* – didn't turn up on any of the other ponds in the area. *Telebasis* damselflies are small,

red-orange and fairly common in marshy vegetation around ponds (*salva*, *corallina*, and *digiticollis* at San Vito ponds). But Dennis had only *Telebasis aurea* at this higher pond. A slightly larger blue and black species, *Erythrodiplax abjecta*, is dominant and abundant there.

The big excitement at the Finca Cántaros pond was to find three species of red skimmers: the southernmost record of *Orthemis ferruginea*, the northernmost record of *O. aequilibris* and the abundant, widespread *O. discolor*. All three are similar enough that even fairly good dragonfly watchers do not distinguish them in flight and *O. discolor* and *O. ferruginea* were only recently recognized as full species.

A bit of trivia: *O. aequilibris* was a first record for Costa Rica and my friend, the often-cited Dennis Paulson, was collecting on the Pacific side near Rincón at the same time and caught the species two days after I did, thinking he had the first record for the country! Finca Cántaros may be a good place to study the interactions between these incredibly similar species.

When you're walking around the grounds at the Wilson Garden or anywhere nearby, take a look in some of the forest streams. The large damselfly with the red spot at the base of the wings will likely be *Hetaerina capitalis* in the forest and a few feet away, where the stream crosses the lawn, *Hetaerina cruentata*. In like manner, the little blue damselflies in the forest may be *Argia anceps*, *medullaris* or *oculata*, while the identical-looking thing in the open stream areas will be *Argia extranea* or possibly *indicatrix*. I find this abrupt shift

from one species to another where the habitat changes fascinating. They are literally within feet of each other but rarely leave their habitat.

All my Tico friends assure me it doesn't rain all year and delight

in sending me emails about how gorgeous the weather is now that we've left. Wait 'til next year! No matter how good the food is or how friendly the people, there better be sun as well.

Sex, Lies, and Begonias

John Cozza, Biology Department,
University of Miami / johncozza@yahoo.com

Although plants will never star in a porno flick, their sex lives are often bizarre and quite varied—and a secret to most people. For the past three years, I have ventured into the forest at Las Cruces to try to discover the hidden sexual escapades of one of its residents—a native begonia (*begonia del monte*) called *Begonia urophylla*. This begonia is a common (though not abundant) herb in the understory that blooms with beautiful white or pink flowers from December through February. Look for them in the Las Cruces forest, just past Quebrada Wilson, or just before the Rio Jaba.

If you observe some blooms closely, you will see that they are of two different types: males, which the plant produces first, and females, which usually (though not always) follow. Having separate male and female flowers means that the plants might be able to vary the number of flowers of each sex they produce, and thus adjust how male or female they are. I proposed, for my doctoral research at the University of Miami, to find out if the begonias do in fact vary their gender, and if so, why they do it. Is it plant size? Environment? Or coming up with the gender that maximizes the success of each sex? Complicating matters are the 'lies'—bees are only rewarded when they visit the male flowers; the female flowers entice bees to visit but then offer them nothing. Although I don't have all the answers yet, I've found that the plants have an intriguing story to tell.



A female (center) and male *Begonia urophylla* flower on the same inflorescence.

© J. Cozza

But first, the beginning of the story: before I returned to school after years of working as a gardener and teacher, I often wondered how scientists come up with the ideas they pursue for their research. For me, the odyssey started with an OTS field course (OTS 2000-1, Tropical Biology: An Ecological Approach). I had never done research before, so I really appreciated the OTS approach of guided inquiry, which had me doing my own small projects in a couple of weeks—my virginal research experience! One of my independent projects concerned the sex ratio of a different species of begonia (*B. sericoneura*) that grows at La Selva Biological Station, and I became interested in studying them for my dissertation research. But when I re-visited these begonias the following year, they didn't seem to fit into the experimental design I

had carefully worked out on paper. Nature has a way of doing that! Reading about earlier begonia research at Las Cruces, I decided to check out what this forest had to offer. I was not disappointed. The begonias were numerous enough and in full bloom, and seemed well-suited for a study of their sex expression. I fell in love with the station, the people, and of course the garden too. Luis Diego Gómez, then Director of the station, and Rodo, the resident biologist, were enthusiastic and supportive, and before I left, I knew I would return the following year to begin my research at Las Cruces.

I arrived at Las Cruces in January 2003 to study Sex, Lies, and Begonias. The plants were already in bloom, so I had my work cut out for me. I started counting buds and flowers as they appeared. I found that the genders of individual plants



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A female inflorescence (left) and a female one on the right.

ranged from entirely male to more than 50% female, with most plants falling into 2 gender classes: 30-40% female, or entirely male (0% female). Gender was not random or even normally distributed; there was a story out there in the understory.

Finding out why the plants ‘choose’ the genders that they do has proved more daunting. My initial hypothesis concerned moisture, soil nutrients, and light—more of each factor would lead to a more female gender, since being female is generally more difficult than being male. In 2003 I measured the moisture in the soil around each plant. There was no correlation of moisture and gender. I took selected soil samples to the laboratory at CATIE in Turrialba for nutrient analysis. There was no correlation of the soil nutrients phosphorus and nitrogen with gender either. I measured the light environment as percent of open canopy above each plant. Again, no correlation with gender. Size, measured as the total area of the leaves of a plant, didn’t correlate with gender either (though it just barely missed passing the statistical test). So what could be causing these plants to vary in gender, and could I ever hope to find an

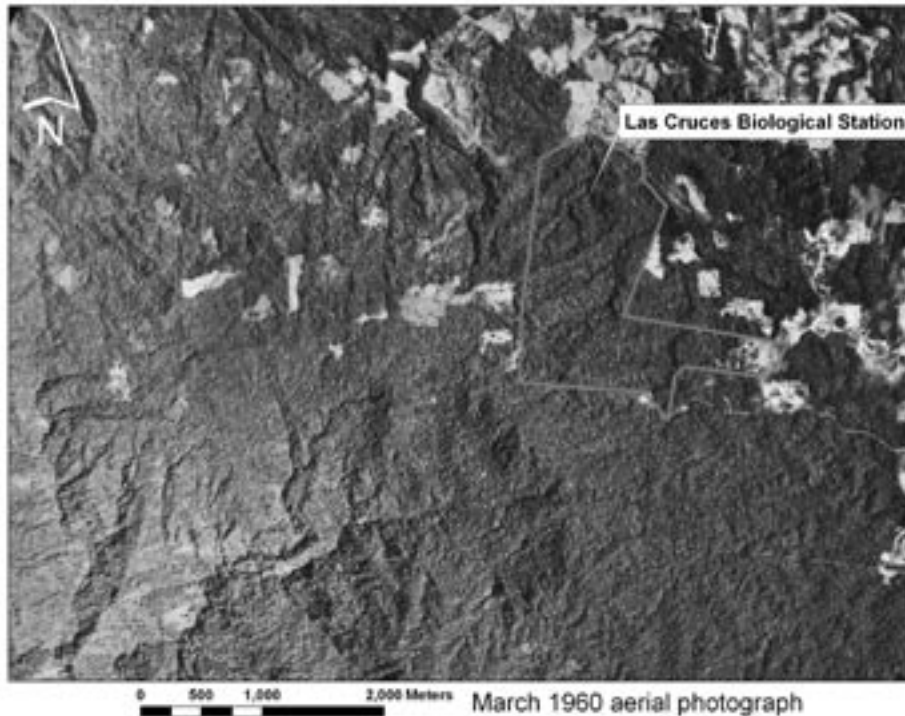
explanation? The plan, of course, was as the hard-headed fans of the old Brooklyn Dodgers used to say, “Just wait ‘til next year!”

And the next year (2004), some tentative answers started to emerge. To my surprise and delight, I found that many of the plants, and in fact whole populations, were more female than they had been the year before. So the plants not only vary in gender from plant-to-plant, but they can change gender from year-to-year. In addition, size did seem to affect gender, but not in a straightforward way. Larger plants tended to be more female, while smaller plants varied in gender. Light the previous year affected gender in 2004, suggesting a cumulative effect of environment on gender over the year. Finally, a lab analysis by CATIE of nutrients in the plants (rather than in the soil around them) showed a possible relationship of nitrogen and phosphorus to gender. Although not definitive, these results were clues that light and nutrients might be affecting gender. Now I just needed stronger evidence.

With the permission of the Station’s director and of the Ministry of the

Environment and Energy (MINAE), I had brought back leaves of *B. urophylla* to the laboratory at University of Miami in 2003. Remarkably, new plants grew easily from just the leaves: I placed them on moist paper towels in baggies, under fluorescent lights, and now I have over 900 plants! With the help of a dedicated crew of undergrads, I am currently using these plants in experiments to test the effects of varying light and nutrients on the genders of the plants.

In February 2005, I returned briefly to Las Cruces to work with the OTS Tropical Biology graduate field course, and to count that year’s crop of flowers on the begonias I had spent so many days with. Then, with some sadness, I removed the tags and labels that had allowed me to keep track of who was who in the forest. Although I would not know the plants as individuals any more, I took comfort that I was not saying goodbye to the wonderful people, forest, and garden of Las Cruces. I plan to return as often as I can in the future, to enjoy the hospitality and beauty of this extraordinary place. And maybe to check up on a begonia or two...



One of the early photographs that we found of the area – circa 1960. Outlined are the current boundaries of Las Cruces.

Advances in GIS for the Coto Brus area

Guillermo Durán / gduran@ots.ac.cr

For the past few months we have been gathering historical information of the watersheds that our GIS lab database has focused on. These are mostly aerial photographs, and it has been a very successful task. In the Instituto Geográfico Nacional we found some very old cloud-free aerial photographs for the area surrounding Las Cruces. Searching in the cabinets of don Luis, Zak and I were pleasantly surprised to find a complete set of aerial photos from 1992 for the whole county of Coto Brus. Lastly, the Centro Nacional de Alta Tecnología gave us digital photos of their 2003 and 2005 missions. So we are well on our way to acquiring a big set of aerial photos for each decade ranging from 1960 to 2005.

We have to thank professor Gretchen Daily from Stanford University for

donating a huge hard drive to store all this digital information. Now my task is to scan and orthorectify the photographs (make them coincide with geographic data). As it is a lot of information and a lot of time, I'll be focused on photos requested by researchers.

Our goal with this is to have a record of changes in land use for the region, and the aerial photographs are key data for the years before the high-resolution satellites era. This is especially important in our case because we will be able to map changes in small areas, which would be too coarse to identify with old Landsat images. We will be able to determine the history of every pasture, farm, and forest patch in the area for the past 50 years, adding a lot of interesting data that will be available to researchers.

Finally we are also updating and making new maps of the station paths and trails. I hope that you will be able to see them on our website shortly.

Flora and Fauna

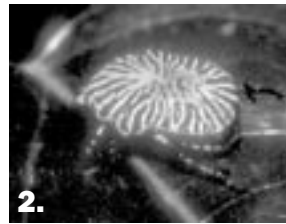
Special Memories and Continuing Adventures at the Wilson Garden

Carrol L. Henderson / carrollhenderson@prodigy.net

My introduction to the Organization for Tropical Studies and Costa Rica came modestly enough one day while attending graduate school at the School of Forest Resources in Athens, Georgia. My professor, James H. Jenkins, stopped me in the hallway one day and asked if I would like to go study in Costa Rica. I said "Sure." Then I went to find a map to see where I was going. It was the beginning of a great adventure, and a life-changing experience.

I was approved to attend the course "Tropical Grassland Agriculture" in February and March of 1969. It was an interesting approach for a forestry and wildlife student, but Dr. Jenkins reassured me that it would be a great experience. Having grown up in the flatlands of Iowa and never traveling much more than 50 miles from home, the OTS course was an overwhelming and stimulating educational opportunity. On one of our trips back the the University of Costa Rica campus, I attended the orientation week "Baile de los Cocos" where I met Ethelle María González Álvarez.

I was so taken by the country, the people, and by Ethelle, that I soon fell in love with all three. I applied to return to Costa Rica for the Tropical Ecology course in July and August of 1969. Dr. Jenkins was a strong advocate for the OTS, and he offered to drive with me in an old blue pickup from Georgia to San José. That alone was a graduate level education in Latin American studies. Anyway, my travels eventually led me to the Wilson Botanical Garden on July



1. Carrol Henderson at Las Cruces in 1969.

2. *Gymnetosoma stellata*, a rare beetle that was found along the Río Jaba trail.

3. The Wilson House in 1969.

23, 1969. We were an eager class of 21 graduate students, which included Pedro León who has now had a distinguished career at the University of Costa Rica and is still associated with the OTS.

In 1969 most of the OTS legends were still teaching: Dr. Dan Janzen, Dr. Mildred Matthias, Roy McDiarmid, Dr. Doug Robinson, and of course Dr. Rafael Lucas Rodríguez Caballero, and Dr. Carl Rettenmeier, among others. Our minds were on overload most of the time, and we all benefited enormously from their sharing of knowledge and inspiration as we explored the grounds.

The Wilson Botanical Garden was indeed a fascinating and great place for our tropical studies. From there we went on to Rincón de Osa on July 27 where I contracted viral pneumonia and had to be flown back to San José for treatment. There Ethelle's family took me in and saw to my safe recovery. I was able to rejoin the OTS class on August 18 so I could experience the famous OTS station at La Selva and at Turrialba. At the end of the course I got engaged to Ethelle.

In December of 1969 I returned to Costa Rica for a third time, this time with my parents, and was married to Ethelle. Pedro León was our best man. We have now been married for 37 years and we have one son, Craig, who is 34. After

returning to the University of Georgia, I applied my extensive field notes from my two classes in Costa Rica

to writing a master's paper on "Fish and Wildlife Resources of Costa Rica, with Notes on Human Influences." The paper was 340 pages long and had an annotated listing of the larger birds, mammals, fish, and reptiles that were being utilized or exploited for their meat, furs, hides, or other purposes. I included a series of recommendations for improving and updating their game laws. Apparently some of the recommendations were subsequently incorporated into Costa Rica's wildlife laws.

The spell of Costa Rica, and the Wilson Garden, has continued throughout my life. In 1987 Ethelle and I began leading annual birding trips to Costa Rica for people, mainly from the Minnesota region. This year we completed our 21st birding tour. We arrange our trips through Preferred Adventures Ltd in St. Paul, Minnesota and use Costa Rica Expeditions as our outfitter. Carlos Gómez is always our birding guide. I have used the opportunity of leading these trips to compile detailed bird lists for all our birding destinations, and I now have a collection of about 18,000 slides of Costa Rican habitats, natural history, birds, mammals, reptiles, amphibians, and other assorted plants and small creatures.

On January 25, 1992, I photographed an unusual beetle along the River Trail at Las Cruces. Later Angel Solís of INBIO told me it was *Gymnetosoma stellata* and that it was only about the fifth or sixth record for the country.

We have been back to the Wilson Garden and Las Cruces in 1992, 1993, 1994, 1995, 1997, 1998, 2001, and 2006. It's wonderful arboretum-like setting and natural beauty is a powerful attraction that always delivers some wonderful observations of bird life, plants, and other sightings. We always enjoyed the warmth and friendly atmosphere shared by Gail Hewson during our visits, and we always enjoyed seeing Luis Diego at the Garden as well. It was great to see Gail and meet Harry at Finca Cántaros during our visit in January of this year. We missed crossing paths with Dr. Ehrlich who had just left several days prior to our arrival.

I think that is one of the special attractions of the Wilson Garden. It is way off the beaten path of Costa Rica's main tourism, birding, and beach destinations. After all these years, the San Vito community still has a beautiful, pastoral charm and great biological diversity to stimulate us northern birders. And yet the opportunity to get acquainted with the researchers and staff at the gardens enriches our travels well beyond the birding experience or casual stops at other research locations.

What can I say, but to keep up the great work in research, and to keep welcoming those birding tourists who can help support the research and conservation endeavors of the Garden. We will be back. Best wishes, Carrol and Ethelle Henderson.

Is This What We Ate?

Rodolfo Quirós, Resident Biologist
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“Is this what we ate?” This is a question heard often during a walk in the Garden. The reason for the question is that the common names of plants are sometimes mixed up between the name given in Spanish and the one in English, because they sound similar.

Following are two examples of this situation, showing the names of the plants in both languages, but representing different species of plants.

Spanish name	English name	Scientific name
Guayaba	Guava	<i>Psidium guajava</i>
Guaba	Inga	<i>Inga</i> spp. (several species)
Itabo	Yucca	<i>Yucca elephantipes</i>
Yuca	Cassava	<i>Manihot esculenta</i>

Guava is the English name for the fruit used to make jam. The edible part of the plant is the fruit, which people also eat unripe, but it tastes best when the skin is yellow, meaning that the fruit is ripe. These are small trees up to 5 meters tall (15 feet), with a peeling bark, and are found in the Garden at the bottom of the Bromeliad Hill. Elsewhere, people use them as living fence posts, for firewood, and as shade trees in pastures.

Guaba is the Spanish name for a group of species of legume trees, whose seeds are covered with a very tasty, soft and sweet white aril eaten by humans and monkeys. The seed pods come in different sizes and shapes depending on each species, which also have different sizes in height, diameter, and canopy of the trees. Several species

of this group are widely used in the coffee plantations as shade, with the advantage that they fix nitrogen in the soil, making it available for the coffee plants. The leaves are also used as mulch, and the timber is used as firewood.

Yucca is the English name of the elephant leg plant found in several countries north of Costa Rica. It was introduced in Costa Rica many years ago, but it has become naturalized in most parts of the country where there is a strong dry season, for it is originally from areas with low rainfall. The edible parts are the sepals and petals of the white flowers. The big inflorescences (bunches of flowers) are sold on the streets or in the market. The plants bloom during the dry season,

thus making it a common dish around Easter time. The species has a tight relationship with its pollinator; in Costa Rica the plants do not produce seeds because the pollinator –the yucca moth - is not native here. Thus, the plants are reproduced by cuttings, making it a good plant for living fencing posts. In the Garden there are two varieties of the species in the dry area.

Yuca is the Spanish name of cassava or manioc, a bush up to 3 meters tall (9 feet), of which the root is edible. This is a staple food item in Costa Rica and other countries, and is cooked in many ways but without the skin because it is poisonous. Pieces of an old stem can be planted in open fields with loose soil, and six to eight months later the big starchy roots can be harvested by pulling the entire plant out of the soil.

The Bird Checklist

It is very exciting to report that in the latest revision of our bird checklist for Las Cruces and surrounding areas, we surpassed 400 species! The grand total now stands at 409—a jump of 14 species from the last check-list. Actually a total of 22 species were added to the list but a further 8 were demoted to ‘hypothetical’ status. The additions were not first time sightings but birds that had been omitted. The additions were made by Jim Zook when he reviewed a draft version of the new checklist. The list has now been updated to include all changes made in the last AOU supplement of 2005, and is available at our store in Las Cruces as well as at the main OTS office in San José.

Do You Have Bird Feeders?

Rodolfo Quirós. Resident Biologist / rquiros@ots.ac.cr

As you may know, the Wilson Botanical Garden was a pasture at the time Robert and Catherine Wilson established it in the early 1960’s. Since then, many changes in the composition of the plant biota have occurred. Consequently, the availability of perching places, food items and shade for birds, bats, insects and many other animals has increased.

The number of bird species in the garden proper has changed through time, from a few species adapted to open and exposed conditions to a large number of species that take advantage of the large diversity of the vegetation. Some of you may have lists of birds you saw here at different times; if we were able to compile these lists chronologically, I am sure we could observe these changes.

Every place you go in the Wilson Garden is a good place to look for birds, plus we have the forest next to the garden. The Garden is like a large natural feeder with many kinds of flowers and fruits available as attraction and reward for the services of pollination and dispersal the birds carry out. But there is only one place

Speckled Tanagers at the feeder.



in the garden that is sort of an artificial feeder. Do you remember it?

For most of the year, we hang a bunch of bananas in one corner of the terrace in front of the dining room. On the railing next to it, we often put pieces of papaya, cantaloupe, watermelon or oranges that are otherwise discarded by the kitchen. The result: an easy bird watching start with many colorful birds and a warm, freshly-brewed cup of local coffee at 6:00 am!

An interesting question that came up one morning when looking at the birds in the feeder was whether this is good or bad for the birds. Certainly we are offering food and they know it is available without much effort. The food items are limited, mostly bananas and sometimes papaya and other fruit in lesser amounts, all of them somewhat juicy. But the interesting thing is that even if the bunch of bananas hangs there for the entire day, the birds only come early morning and late afternoon, indicating that they go elsewhere to look for other kinds of food the rest of the time.

The feeder is a nice attraction for everybody. We are planning some educational activities for a program called Birding 101, and I want to modify some of it to attract school children to come, have breakfast with us at the terrace, and learn about the birds they see at the feeder. Some of the birds are very common

locally, others are only found in places with forest. Still others are migrants and are only seen during the dry season. Many birds are aggressive, others are shy, some have bright colors, and others are not that showy. Many interesting species can be explored in a two-hour outing at this feeder!

As we all make lists of things we see, I have compiled a short (and very much incomplete) list of birds seen at this feeder and eating the fruits. Other birds come nearby but do not eat the fruits.

- Blue-crowned Motmot
- Fiery-billed Aracari
- Chestnut-mandibled Toucan
- Red-crowned Woodpecker
- Clay-colored Robin
- Baltimore Oriole
- Thick-billed Euphonia
- Palm Tanager
- Silver-throated Tanager
- Green Honeycreeper
- Speckled Tanager
- Bay-headed Tanager
- Golden-hooded Tanager
- Blue-gray Tanager
- Cherrie’s Tanager
- Summer Tanager
- Buff-throated Saltator
- Streaked Saltator
- Rose-breasted Grosbeak

De la Comunidad

Coopepueblos: una Cooperativa Agroecológica y de Servicios Múltiples

Victor Méndez. Presidente del Concejo de Administración, Coopepueblos R.L.

Después de haber sufrido los reveses de los precios internacionales del café, un grupo de cincuenta productores cafetaleros de la zona de Agua Buena de Coto Brus, decidieron crear una nueva organización con una visión mucho más amplia que la de recibir y procesar el café. El 7 de mayo de 2005 celebraron la asamblea constitutiva de esta nueva cooperativa, denominada Coopepueblos R.L., una cooperativa con énfasis en la agroecología y la prestación de servicios múltiples.

Coopepueblos nace a partir de la necesidad de diversificar y crear nuevas alternativas de producción, sin depender del monocultivo del café que ha sido característico de la región de Coto Brus, al sur de Costa Rica. En este sentido, aparte de mantener fincas con cultivo de café sostenible, también se apoyará la elaboración y comercialización de otros productos como artesanías y varias líneas de productos comestibles.

Uno de los propósitos de la cooperativa es la adopción de métodos de protección, conservación e incentivos de zonificación y uso planificado del suelo, que minimicen el impacto ambiental del desarrollo de esta región. También se apoyará y fortalecerá los cuerpos de protección y vigilancia de los recursos naturales, así como los grupos pro-ambientalistas de la sociedad civil locales e internacionales.

Con respecto a la comercialización del café, Coopepueblos no está sola; se han establecido relaciones con una organización en California llamada Community

Agroecology Network (CAN), conformada por comunidades agro-ecológicas, con quienes se ha establecido un programa de venta directa de café. Este programa permite que los productores de Agua Buena vendan su producto directamente al consumidor, obteniendo así un mayor aprovechamiento, en armonía con el ambiente. Esto es una gran ayuda para potenciar una forma de producir diferente.

Otras actividades que se están implementando incluyen:

- * Un programa de estudiantes visitantes que tiene varios componentes: se imparten cursos de diferentes materias y en varios niveles y se realizan diversas giras de campo, y los estudiantes se hospedan y comparten con familias locales asociadas a Coopepueblos.
- * Se ha implementado una sala de Internet, en donde nuestros productores de café y sus familias puedan establecer contacto directo con los consumidores en otras partes del mundo.
- * Una rama importante de la cooperativa es el grupo “Damas Unidas de Agua Buena”, que se dedica a la confección de artesanías como pintura en tela y vestidos, bolsos, tarjetas y cuadros hechos con productos naturales secos. Además de realizar la exhibición y venta de dichos artículos, estas señoras elaboran comidas típicas, propias de la zona.
- * También aceptamos las visitas de diferentes personas que quieran conocer y apoyar nuestro esfuerzo.

El cooperativismo es un sistema social y económico que tiene sus propios principios y valores, que busca la realización del ser humano tanto en lo material como en lo espiritual, y donde el lucro ocupa un lugar secundario ya que lo que importa es el ser humano.

Coopepueblos: An Agroecological Coop with Diversified Interests

After the drop in global coffee prices, a group of 50 coffee farmers in the Aguabuena area of Coto Brus decided to form a new cooperative. The new cooperative, Coopepueblos R.L., was formed on the 7th of May 2005 with the idea of diversifying products and not relying solely on the production of coffee. Accordingly, in addition to coffee cultivation, coop members have started cultivating other crops and even producing handicrafts.

One of the objectives of this coop is to develop a more conservation oriented approach to the products they cultivate. In this way they hope to reduce the environmental impacts of agriculture such as soil erosion. Additionally, the idea is to strengthen ties with local environmental groups and help protect the natural resources of this area.

The new cooperative has also formed a relationship with a marketing outreach program based in California. Known as the Community Agroecology Network (CAN), the group helps in direct marketing the coffee that is produced by the cooperative and in that way, most of the profits are returned directly to the producer.

In addition to its sustainable agricultural mission, the coop is also involved in a number of other projects:

- * A student intern program where students are given courses on a number of different subjects. Students stay with families in the community and help in field work.
- * An Internet center has been setup for cooperative members and their families. That way producers can be in direct contact with consumers.
- * A group of women known as “The United Women of Aguabuena” have started producing a number of handicrafts. These include textiles, paintings, and other products made from local materials.

Our Donors

Donations Update

Silvia Pérez-Baires, CR Fundraising Coordinator / sperez@ots.ac.cr

A few months ago, Zak asked me to write a little note on fundraising figures for this issue of the *Amigos* newsletter. However, before I start reporting from this end, I would like to thank each and every one of you for supporting Las Cruces throughout the years. On behalf of the OTS family, “Muchas, muchísimas gracias”.

In the last issue of *Amigos*, you may have read about a fundraiser being planned for the spring at the Costa Rican Embassy in Washington D.C. Well, I am very happy to report that we had a wonderful event on the evening of April 6th to honor “our extraordinary man” Luis Diego Gómez. Not only, were we very successful in terms of attendance –over 70 people joined us- but we also had wonderful weather.

It rained the day before and the day after, and many people asked me what kind of influences we had to be so lucky!

Washington D.C. received us with open arms: cherry blossom trees, wonderful weather, incredible guests, a Costa Rican Ambassador and staff fully committed to helping our event be successful. And we raised nearly \$15,000 on-site! We had it all! The good news is that since the Campaign was launched we have raised \$23,000 that will be added in perpetuity to the Las Cruces Endowment Fund.

As the Campaign continues through December 2006, we are preparing another event for June 22 at the Simons Center here in Costa Rica. If by any chance any of you are in the country and would like to attend please do not hesitate

to contact me at sperez@ots.ac.cr.

I would like to end my note, reporting on the latest numbers for the Las Cruces Annual Fund. As of today, we have raised almost \$31,000. These funds allow the Station to fulfill its mission including receiving students eager to learn about the wonders of the tropics; supporting researchers working on the restoration of pasture lands in Coto Brus County; and of course, protecting the Garden collections displayed to the public. We are only \$15,000 shy of our goal for this fiscal year.

That is why, I ask you to please send today the most generous donation you can to support the Las Cruces Annual Fund. Remember, to donate is to invest in the things that you believe in and in the changes you want to make!

BOOK DONATIONS

Our deepest Gracias to all our friends who help improve our library, and who care about the learning processes that we conduct at the station.

Laura Aldrich-Wolfe
Héctor Castañeda
Ann and Paul Ehrlich
Luis Diego Gómez
Julie Gibson
Maarten Kapelle

Piotr Naskrecki
Alison & Michael Olivieri
Rodolfo Quirós
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Amigos, our thanks to all of you!

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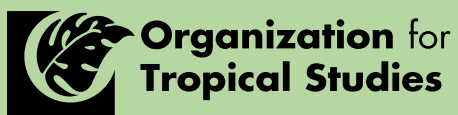
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