

# Amigos

## Newsletter

No. 69, May 2008



**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 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 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 43 are bats. Some of the more commonly sighted species 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 see 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 who bring a laptop computer.

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 Las Cruces website at [www.ots.ac.cr/en/lascruces/](http://www.ots.ac.cr/en/lascruces/) or contact us directly by email: [lcruces@ots.ac.cr](mailto: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: [nat-hist@ots.ac.cr](mailto: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 2524 0628.*

*The North American OTS office is located at Duke University, telephone: (919) 684 5774*

*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.*

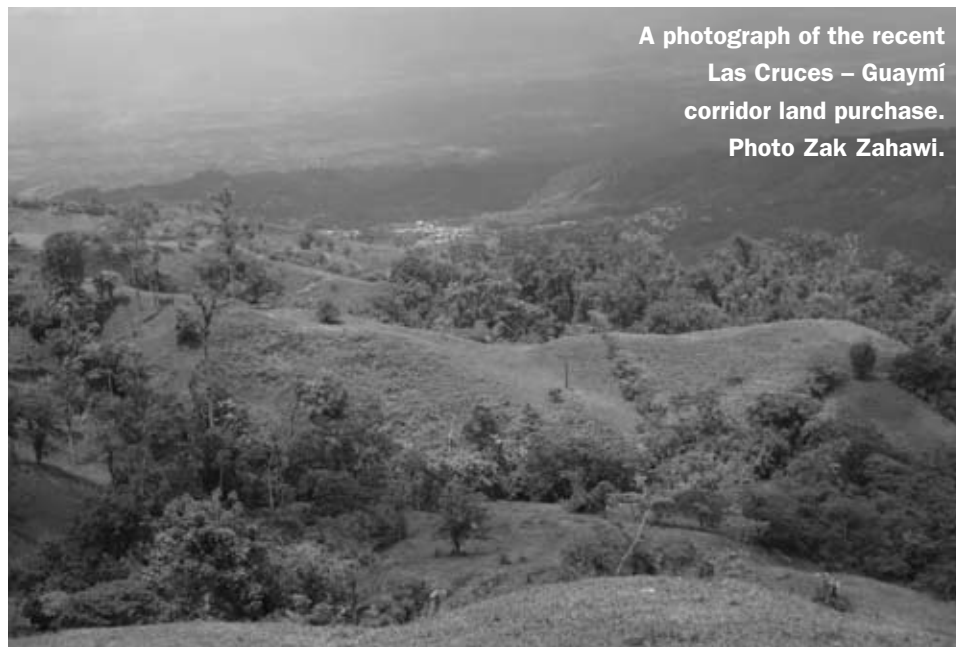
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**Front Cover:** The newly animated mascot of Las Cruces, the Fiery-billed Aracari (*Pteroglossus frantzii*), that will be used for environmental education and in a number of other applications. Artistic rendition Susan Sanders.

**Back Cover:** An insect in the Cerambycidae family evaluating one of the self-guided tour booklets that were being revised for the Wilson Botanical Garden. Photo Ariadna Sánchez.

**Editorial Committee:** Jennifer Loáiciga, Alison Olivieri, Rodolfo Quirós, Emilce Ramírez, Ariadna Sánchez, Zak Zahawi, Alejandra Zúñiga.

# Director's Keys and Notes



A photograph of the recent  
Las Cruces – Guaymí  
corridor land purchase.  
Photo Zak Zahawi.

Zak Zahawi / zahawi@ots.ac.cr

I have to say that I am very 😊 excited to announce that we are on the verge of making the first land addition to the Las Cruces – Guaymí corridor project! Barring any unforeseen issues with legal procedures we will soon add approximately 25 hectares (~61 acres) to the protected area administered by Las Cruces. The land abuts Las Cruces to the west and is made up primarily of pastureland along with scattered remnant trees and small forest patches. The land is bordered on the right by the Las Cruces forest (see photograph above), in the foreground by a riparian corridor, and in the background by the distant ridgeline with San Vito visible in the distance. The riparian corridor in the foreground of the photograph is the upper watershed of the Rio Java, the main river that traverses the Las Cruces forest before continuing on to San Vito. With this additional purchase we will increase the elevational range of our protected area, which will now range from just under 1000 m to over 1500 m!

A management plan will be drawn up for how to best make use of this new land

acquisition. One section will be set aside to recover naturally without human intervention, whereas the remainder will be made available for manipulative research by restoration ecologists. The experimental section should in turn attract more researchers to Las Cruces and further develop research programs at the Station. In the end, however, the objective in both cases will be to return the entire area to a forested state.

Aside from the donor's list in the back of this *Amigos*, I would like to take this opportunity to personally thank all of the many, many donors who have made this initial first step a reality. I know that all the flora and fauna that live in the LCBS forest would also like to thank you so I am passing on their message as well! In all more than 30 donors have given to this cause. Although this represents a fantastic first step, we do have a long way to go in this campaign as this accounts for approximately 10% of the land we would like to incorporate within Las Cruces; please help us with additional outreach and promotion of this important campaign. Information is available at (<http://www.ots.ac.cr/en/lascruces/>)

# What's New at Las Cruces?

Zak Zahawi / zahawi@ots.ac.cr

and I have several files that outline the campaign in more detail that I can send via email, if you are interested in helping out.

A few weeks ago I had the opportunity to see the other end of the biological corridor. I, along with several ornithologists, hiked into the Guaymí indigenous reserve – on the side closest to Las Cruces. The two-hour hike in afforded some spectacular views looking back toward the Station, with several large forest fragments in the foreground and the Talamanca mountain range in the background. Once inside the reserve, partially cleared agricultural fields gave way to immense trees and eventually a magnificent forest that once covered the entire Fila Cruces mountain range. One got lost in thought looking around at the forest and imagining what the entire range must have looked like when it was forested. Much like at Las Cruces, the terrain in the Guaymí reserve is extremely steep and getting into the reserve involved climbing up and down several ridges – and consequently the hike out (which I did on the same day) was not quite as enjoyable as the hike in!

On a related note I am happy to report that the hiring of two part-time park guards at LCBS to try and curtail our hunting problems has been a remarkable success. Word quickly spread that we had hired two people and since then the number of incidents reported has plummeted. We hope that they can eventually work in collaboration with MINAE (Ministry of the Environment) to assist in patrolling some of the adjacent fragments around Las Cruces that also have problems with illegal hunting.

I will close here for now and again thank all the supporters of this project and hope that we will see some of you in the near future at Las Cruces.

Saludos, Zak

## New Buildings

Several improvements have happened over the course of the last few months at Las Cruces. The Wilson student dormitory was remodeled late last year and several rooms currently used as offices were converted into additional dormitories for students. A second story was added to the bathroom building to accommodate the increase in beds and the beautiful wooden floor was entirely redone. The building can now house two courses simultaneously with up to 29 students on the second floor and 18 on the ground level.

With the completion of the Wilson house remodeling we now turn our attention to the final phase in this (seemingly endless!)

building frenzy and have broken ground on the three new researcher cabins near the entrance to the Las Cruces forest. We hope that these cabins will be completed in July, in time for the summer high season at Las Cruces, which is always problematic as there is invariably more demand than there is space available. Accordingly, we will soon be in a far better position to accommodate students, researchers, and natural history visitors at the Station during the high-season without too many scheduling conflicts and total station capacity will increase to almost 100 overnight visitors! All of these improvements in housing are financed by a grant from the National Science Foundation.



The excavation for one of the new researcher cabins under construction. Photo Zak Zahawi.

## Technology Improvements!

Remodeling has not only meant improvements in our building infrastructure but also great strides in information technology at the Station. A few months back we upgraded our bandwidth from 128kbps to 2MB. This upgrade was only possible through a satellite dish as the national internet provider in Costa Rica does not offer high bandwidth in this part of the country. This has revolutionized our communication abilities at the Station and our internet service no longer comes to a grinding halt whenever a large course visits! Aside from improving communication in general, the changes will allow researchers far greater flexibility to carry out projects at Las Cruces because internet bandwidth is becoming more and more of an essential tool for investigation. The change has also allowed us to switch our entire telephone exchange to an IP phone system. The \$30,000 or so transformation (again funded by the National Science Foundation) creates a telephone system that uses the internet to route calls and, as the main office in San José uses the same technology, internal calls between the two offices have no cost.



## Volunteer Time



Eamon relaxing at our annual Las Cruces staff getaway. Photo Zak Zahawi.

Since the last issue of *Amigos*, we had two exceptional volunteers visit us who really advanced two essential projects at the Station. In early October Eamon McNamara came and stayed as a volunteer for two months! Eamon is a horticulturalist from Ireland who volunteered at the Wilson Botanical Garden to expand his horizons to include tropical gardens. He did some work with the bromeliad collections at the Station but his main project was to update the entire Wilson Botanical Garden plant database – a task that took him the entire visit and

one he completed just a few days before heading back to Ireland!

A month or so later Susan Sanders visited Las Cruces as a volunteer from Nashville, Tennessee. Susan is a graphics artist and was keen to help us with our education outreach material. Although she was only able to stay for a short time (10 days or so) she managed to completely renovate the artwork that we needed and because she didn't have time to finish what she had started, took some of the material back to the US to finish it and send to us via email! So a huge THANK YOU to both



The beautiful *Heliconia*, our other station 'mascot', interpreted by the artistic hand of Susan Sanders.

of these exceptional volunteers and I hope you will both come back and visit us at the Station again.

Of course, always a special thanks to our local volunteers who help in so many ways: from providing garden walks to visiting groups, to assisting with fundraising, editing and distributing the *Amigos* newsletter, gardening, weeding and many other tasks. A big *thank you* to all of you as well!

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## New Booklets for Las Cruces

I am excited to report that we have now finished the Wilson Botanical Garden Natural History Tour booklet in English and it is now available for sale in our Gift Shop alongside the Tree Tour booklet. The Spanish version is forthcoming. This booklet took more than a year to revise so when you next visit, please purchase one and let us know what you think of the tour! We are also in the process of revising the Palm Tour booklet (it is in the design-stage of publication) and we should have that ready by June. All of these guides had not been updated in more than 10 years and required considerable revisions.



The new Natural History tour booklet (and the not so new Tree Tour) available for purchase at the Las Cruces gift shop. Photo Zak Zahawi.

# Research at Las Cruces

## Charral Project – The First Decade

Chris Peterson/University of Georgia / chris@plantbio.uga.edu



**Site 3 in March 2005, showing large expanses still dominated by grasses and ferns, with a prominent Guava tree. Note very limited woody plant establishment except along the fencerow in the background. It is unclear why the large Guava tree has not prompted abundant regeneration beneath its branches, because it should be an attractive stop for fruit-dispersing birds. Photo Chris Peterson.**

Consideration of current land-use trends throughout the tropics gives one reason for both pessimism and optimism. One could feel pessimistic because of the continued, and increasing, rate at which tropical forests are being converted to other land uses, invariably with far less diversity and sustainability. However, there is reason for optimism: many areas that were deforested for use as farmland or pasture often are subsequently abandoned, which opens the door to regeneration of forest on these sites. Also, as many tropical countries have a net population flow to urban areas, there may be increasing abandonment of rural agricultural

lands in coming decades. Thus there is potential for tropical forest to reestablish on substantial amounts of land in the near future. With this in mind, I and my collaborator the late Dr. Bruce Haines (d. 2007) both faculty at the University of Georgia, initiated a study of natural forest regeneration in the Las Cruces area in 1996. The short-term goal of the research has been to characterize the rates, patterns and mechanisms of forest regeneration in mid-elevation pastures in the vicinity of Las Cruces. The work is ongoing in five pastures (called Sites 1-5) located on the Fila Cruces a few kilometers from LCBS, which range in size from 0.25 ha to 0.63 ha. All were

active pastures until we fenced them in May of 1996. In these Sites, we have quantified seed rain, the seed bank (seeds stored in the soil), seed germination, seedling recruitment, and sapling growth, survival and spatial location. The most important and ongoing aspect of the study is the almost-annual surveys of woody plant demography. Conducted eight times since 1998, these inventories allow us to know which plants live and die, how fast they grow, where they are in relation to one another and forest edge, etc. The most important findings to date have been as follows:

- Forest regeneration is highly constrained by the availability of seeds of forest trees and shrubs. Our seed rain study documented the input of seeds over a 13-month period early in the study, at varying distances from the forest edge. We found a drastic decline in the input of forest species at a mere 5 m from the forest edge; beyond 5 m, the seed rain declined to <1% of that in the forest, and was extremely limited in seeds of mature forest trees. Large seeds, in particular, were virtually absent from the seed rain beyond 5 m from the forest. This pattern echoes similar findings of other researchers, particularly those of Dr. Karen Holl in her work at Las Alturas. Thus one major hurdle to restoration of forest in abandoned pastures appears to be getting enough seeds of forest species to arrive in the abandoned lands.

- A second major impediment to forest regeneration is the dense grass of pastures. We have examined this mostly indirectly, but preliminary studies confirm that forest species with large seeds (which, as mentioned above, rarely if ever

disperse into open pastures) can germinate and establish beneath a dense grass cover. However, the small-seeded tree and shrub species, which make up most of the actual seed input, have very poor germination and establishment in the dense grasses of pastures. For the small-seeded species, landing on some special “microsite” that is above the grasses may be a huge advantage because it could allow for much greater germination. We have documented that large rotting logs, abundant in one of our study sites (Site 4), have a dramatically higher density of sapling colonists of small-seeded trees compared to the nearby level ground with its dense grass. Thus, elevated microsites such as rotting logs may be extremely beneficial to enhancing the rate of succession in areas with dense grassy vegetation.

- Our study, and several others in regenerating tropical lands, have found that consumption of seeds -- seed predation -- can be substantial, and that

small animals may thereby also impose a hindrance on forest regeneration. In keeping with the themes above relating to seed size, we studied seed predation in ten species in our regenerating pastures, and found that seed predation was most intense on the smallest seeds. So again, if the large-seeded species could get there, they are much less vulnerable to seed predators than small-seeded species.

- Variation in the rate and direction of regeneration in our five sites is surprising. We have yet to determine the actual causes of why our five sites are following different regeneration trajectories, but we suspect that different suites of seeds arriving from nearby forest may be a big part of the story. Near-future efforts will seek to determine the species composition of the forest adjacent to each of our five study sites and to statistically relate that composition to the composition of our regenerating study sites. One thing does stand out, though, from the first decade of

work: the initial group of colonists may remain in a site for quite a while, and the variation in species composition of sites therefore appears to establish itself very early in the regeneration process and be maintained at least throughout the first decade.

- Finally, we note that only in the past few years have we begun to see noticeable colonization of our study sites by seedlings of mature-forest species with large seeds. Species such as *Calophyllum brasiliense* and *Sapium sebiferum* have appeared as small seedlings recently, indicating that animals that disperse large seeds (e.g. toucans, guans) are beginning to utilize the regenerating vegetation of our study sites. This suggests that once sufficient vegetation exists in a particular locale, the large birds that disperse large seeds should indeed bring their valuable “cargo”, presuming it is not too far from a patch of intact forest.

Overall, these findings are encouraging in their demonstration of the potential for substantial unassisted forest regeneration within the first decade in some locations. On the other hand, two of our five sites have lagged behind, with much less forest regrowth, and we have yet to understand why. We do know that seed availability is clearly an important constraint, as is the competitive effect of dense pasture grasses. The work thus far suggests that if the dispersal barrier could be overcome for large-seeded species, reestablishment of mature forest characteristics would be greatly speeded up. This research thus provides several hypotheses that might be tested in active restoration studies in the area. We hope that through study of both natural (unassisted) regeneration and the consequences of various active restoration treatments, a more complete understanding of tropical forest regrowth can be achieved in time to put it to good use.



**Site 4 in March 2005 taken from out in the active pasture. Photo shows the site fence, with the study site on the left and active pasture on the right. In the foreground is a rotting log similar to many that were found within the site at the time the study was initiated in 1996. They have proven to be particularly favorable microsites with abundant regeneration of small-seeded trees and shrubs. Photo Chris Peterson.**



## Neotropical Migrant Birds and the Restoration of Tropical Pastures

Catherine Lindell/Michigan State University / lindellc@msu.edu

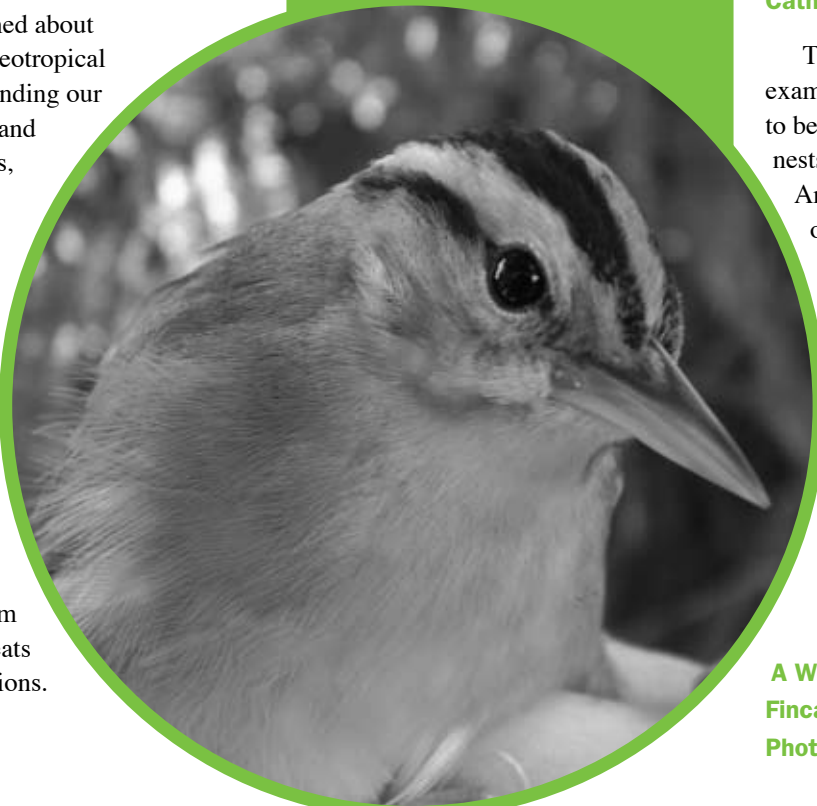
**W**e had seen this little fellow before. The chestnut-sided warbler who appeared on our study site in November 2007 had originally been captured at the same site in November 2006. The number on the band we had placed around his leg allowed us to identify him. Here he was, back in the same 50 x 50 meter plot of land in southern Costa Rica a year, and who knows how many thousands of miles, later.

The chestnut-sided warbler is one of many species of neotropical migrants. Neotropical migrants are birds that nest in North America and then fly to Central or South America, or the Caribbean, where they spend the temperate winter. (In one of those interesting twists that temperate biologists working in Costa Rica must learn the temperate winter--December through March--is considered the "summer" in Costa Rica, because December through March is dry and hot.)

The United States Fish & Wildlife Service is concerned about many species of neotropical migrants and is funding our current project in and around Las Cruces, "Restoration of tropical pastures and their use by neotropical migrants". The concern stems from the fact that neotropical migrants use several parts of the globe during their annual cycle, making them susceptible to threats at numerous locations.



**A Chestnut-sided warbler captured at Finca Heriberto in April 2007. Photo Catherine Lindell.**



The golden-winged warbler, for example, considered by the U.S.F.W.S. to be a species of conservation concern, nests in scrubby habitat in North America, migrates through a variety of habitats, and then prefers wooded areas on its wintering grounds in Central and South America, sometimes ending up in our study sites in Costa Rica. If the habitat needed by golden-winged warblers changes at any of these locations it may affect the survival of individuals and, potentially, the likelihood of population persistence in the future.

**A Worm-eating warbler captured at Finca Loma Linda in February 2008. Photo Catherine Lindell.**



Neotropical migrants as a group use a number of different habitats while residing in Costa Rica. Mourning warblers, for example, like scrubby, young vegetation while worm-eating warblers like forest undergrowth. Almost none of them, however, use active pastures, a common land cover around Las Cruces. In recent years, as local farmers have found it increasingly difficult to make a living growing coffee, some of them have converted their coffee to pasture. On the flip side, others have started to reforest, encouraged by the benefits that tree cover provides in the form of improved water quality, erosion control, and increased levels of biodiversity.

In 2004, several local farmers collaborated with my colleagues Zak Zahawi, the director of Las Cruces, and Karen Holl, a professor at the University of California at Santa Cruz, to implement a restoration experiment on their properties. The experiment has grown to include 16 different properties across the landscape between Las Cruces and Agua Buena, a small town about a 15-minute car ride from Las Cruces. Each experimental site has three different plot types, 1) a control plot where no seedlings were planted, 2) an island plot where tree seedlings were planted in patches of different sizes, and 3) a plantation plot, where seedlings were planted in rows. Drs. Holl and Zahawi are investigating how these different plot types influence the speed and trajectory of the process of forest restoration. I am using the plots to investigate how neotropical migrants respond to these different planting treatments. Do more neotropical migrant individuals and species use the plantation treatments sooner in the restoration process? Does the amount of forest surrounding the plots influence how many and which species use the plots? What

*The experiment has grown to include 16 different properties across the landscape between Las Cruces and Agua Buena, a small town about a 15-minute car ride from Las Cruces.*

resources are the neotropical migrants using in the plots?

To answer these questions I and a number of local Costa Ricans with knowledge about how to work with birds have sampled the numbers of individuals and species of neotropical migrants at the sites six times in the last two years. We sample using fine mesh nets, 12 meters long by 2.5 meters high. We set several of these up in each plot. Birds can't see them and fly into them. We are then able to record the species of each individual, take some measurements, and attach a leg band with a number so that if we recapture this individual, we know when and where we last saw it. Another part of the project involves conducting observations of migrants in the plots to identify how they are using the plots. Juan Abel Rosales, a local farmer who has helped with the project in many different ways, has conducted these observations.

We will be conducting one more

round of sampling in April 2008 and then do final data analyses. Our preliminary results show that more individuals and species of neotropical migrants use the sites as the vegetation grows up, i.e. our 2004 sites are used much more heavily than sites that were planted in 2006. Also, generally, we capture more species and individuals of neotropical migrants in the island and plantation plots than in the control plots.

One interesting result is that the type of pasture grasses in a site appears to influence the use of the site by neotropical migrants. For the first two and one half years after planting seedlings, the grasses in all the plot types were cut, to give the seedlings a chance to establish themselves. After this point the grasses grew up. At sites where a particularly tall and aggressive species of non-native grass grows, the recovery of these sites in terms of their use by neotropical migrants, has slowed. This result suggests that the land-cover history of a site may have long-term consequences for the restoration of a site.

Mr. Rosales' observations indicate that the neotropical migrants collect insects, nectar from flowers, and, interestingly, nectar from the extrafloral nectaries in the sites. Extrafloral nectaries are not associated with flowers but are found on the branches of one of the planted tree species, known locally as guaba. These nectaries appear to be too small to be used by many of the resident bird species but the neotropical migrants commonly drink from them.

The answers to the questions we are investigating will help identify which tree species, planting designs, and landscapes are most favorable to neotropical migrants. Given the importance of restoration in a world with vast areas of degraded lands, it makes sense to design restoration projects based on the type of sound, scientific evidence we are collecting.

## Of Weather Stations and Historical Datasets

Zak Zahawi / zahawi@ots.ac.cr

Weather is, of course, a ‘hot’ topic these days. Naturally, when you start talking about changes in weather you need long-term data, meticulously recorded at one site for many years. In some parts of the world, meteorological data have been collected for hundreds of years and this is of incredible importance to understand long-term patterns and fluctuations in climate, and also to make future predictions.

At Las Cruces, meteorological data were first collected in 1988 and they were collected manually. An impressive meteorological station was established (see photo), and accurate data were taken on all manner of variables, including rainfall, temperature, humidity, barometric pressure, soil temperature and so on. In 1994, the station was upgraded to an automated system, reducing the need to collect data on a daily basis. This was changed again in 1998 and the location was moved to an area adjacent to the Wilson House, deemed safer and closer to computers and such things. In 2005, a new automated system was purchased and this time it was relocated to the roof of the Wilson House – and that station now serves as the main meteorological station for Las Cruces today.

That sounds like a pretty rosy picture, with Las Cruces having more than 20 years of weather data collected in basically the same location – of incredible value, especially when you consider the location of the Field Station. There simply aren’t that many weather stations in Coto Brus County today, never mind 20 or 30 years ago! But, unfortunately, that history is peppered with fiascos. I stumbled on this when I decided to start compiling all the data to put it into one format so it would be available to prospective researchers and other interested parties.



**The old Las Cruces meteorological station that was retired in 1994 in favor of a more high-tech (automated) system. Data is now collected manually at this station as a backup to our automated setup. Photo Zak Zahawi.**

Unfortunately, the story goes more like this: the fantastic data manually collected between 1988 – 1994 appear to have been lost in the fire of 1994. Of that data, I have only managed to find a single photocopied sheet showing the monthly rainfall total for the years 1988 – 1992. This was a terribly disappointing discovery/realization and a painful reminder of all that was lost in that tragic fire. The automated data from 1994 – 1998 are in pretty good shape overall. The only uncertainty appears to be a glitch in the rainfall data and, although the pattern appears correct, the values are roughly three times what they should be! I am hopeful that we will be able to resolve that error and recalibrate the data.

It appears that the weather station died in 1998 and it took a while to obtain a replacement, so there is a year’s worth of missing data. The new station was established in 1999, however, the

data for this period (1999 – 2003) are problematic and it is unclear how much of the data are corrupt – either when they were originally downloaded or while they were stored. Further work on the files are underway to see what, exactly, we can salvage. Then, almost by divine intervention, this problematic station was zapped by lightning (!) and a new station was purchased and put on the roof of the Wilson House, although, once again, we experienced a delay in getting a replacement. Data from this new station (January 2005 – to date) have presented few problems and the data are available on our website if you are interested in downloading the information (<http://www.ots.ac.cr/en/lascruces/metereological.shtml>).

So where do we stand? We still anticipate that much of the corrupted or uncalibrated historical data can be recovered; it is just a process that will take a lot of time. In addition, rainfall and a few other basic parameters have been collected at San Vito since the late 1960s and provide a good alternative source for meteorological data in the region.

Although the data our weather station currently collects are sufficient for most practical applications, they are not precise enough to monitor subtle changes in climatic conditions in the area over short-term periods. Accordingly, OTS decided to upgrade weather stations at all three OTS field stations and incorporate state-of-the-art equipment complying with the World Meteorological Organization (WMO) standards of the United Nations. This involves equipping each station with over \$20,000 of high precision equipment (!) and, thus far, both sister stations, La Selva and Palo Verde, have made this transition. We hope to do likewise, as soon as we raise the funds to make this great leap forward!

# Flora and Fauna

## Book Review: A Guide to Tropical Plants of Costa Rica

By Willow Zuchowski  
Photographs by Turid Forsyth  
Published by Distribuidores  
Zona Tropical, S.A.  
ISBN 0-9705678-4-7

Alison Olivieri / maowao@gmail.com

So, here's a question: when was the last time you found a botany book that was a pleasure to read -- with not only comprehensible scientific information but funny comments about plants? Hah, I thought so.

Well, now you can have this one. Or even two of them because you will find yourself taking it with you wherever you travel in Costa Rica or, if you live here, it will ride in your car or your field pack and, inevitably, it will end up splashed with mud and smeared with juice and cookie crumbs.

I have just identified all the *Cecropia* trees outside my house and those at the Wilson Botanical Garden thanks to the information found on page 48. Of the five species of *Cecropia*, an important light-gap emergent in secondary growth patches, we have three and their fruits are almost always being eaten by some form of wildlife including bats, birds, monkeys and sloths. Additionally, I've just learned that some species are protected vigorously by biting ants, a caution to be taken seriously.

Whether you are on a brief vacation, traveling student, botanical researcher or natural history guide, you'll find an easy logic to the book's divisions. Instead of being an inscrutable list of taxonomic nomenclature, here you will find sections on "Special Habitats" so that if, for example, you find yourself in Tortuguero National Park, you can start on page 247 and have an entirely satisfying experience. Or you might stand somewhere in front of a stunning *Heliconia* and want to

know more. Instinct will tell you to look in "Typical Tropical Groups" where you will discover (among other things) these plants have co-evolved with humming-birds, and indigenous and country people use the leaves as food wrappers and for roof thatching.

The author has managed to include what appears to be all that is known about each species in compact and crisp prose: Scientific and Common Names, Family, Description, Flowering and Fruiting Seasons, Distribution, Related Species and – my favorite – Comments. For example, if you are interested in treating dysentery, skin diseases, malaria, syphilis, lung ailments, baldness, hemorrhoids or burns, you could get yourself a *Guzuma ulmifolia*, also called Bastard cedar and West Indian elm – but you'll need a big yard. Or you will want to think twice about becoming too involved with Yellow oleander, a potent plant described as

both medicine (containing cardiac glycosides) and poison: "Death by oleander," we are told, "is not a pleasant way to go," as it involves burning sensations in the mouth, diarrhea, vomiting, convulsions, heart failure and then death.

You will find Turid Forsyth's photographs to be both vivid and engaging; they are incredibly helpful for identification. Given the rain, wind, fog and glaring sun abounding in Costa Rica, we can imagine her struggles to capture the light, angle and intrinsic beauty of each flower, leaf, shrub or tree.

*A Guide to Tropical Plants of Costa Rica* is now in its second edition and sports a new cover photograph of a red passion flower (the first edition, from 2005, features a closeup of *Heliconia wagneriana*). It is available on Amazon, at book stores in San José, and in most gift shops at hotels and lodges throughout Costa Rica.

### A Walk in Wilson Botanical Garden

Marion Ehrlich / mehrlich@UDel.Edu

I walk in the garden  
The earth carpeted beneath my feet  
With decaying petals and browned soggy leaves  
The stillness is broken by a chorus  
Of singing birds and chirping cicadas  
I walk past bromeliads clothed in burgundy and palest chartreuse  
Their cupped heads holding pools of water  
In which algae, frogs, and myriad insects live their lives  
I pass a ficus whose ancient trunk holds mysteries of the past  
A morpho flits by on luminous wings of aqua and black  
Brown moths chase one another in zigzag patterns like children playing tag  
A single lily is caught in a scarlet-petalled moment of perfection  
Nearby a flycatcher perches on a dead branch  
In a tiny plot surrounded by palms, cycads and a picnic bench  
Lie the Wilsons who fashioned their dream into this reality

# De la Comunidad

## Food and Work Bring Together the People who Colonized Coto Brus

Carolina Murillo Guzmán and Rodolfo Quirós /  
karomurillo@hotmail.com/rquiros@ots.ac.cr

The following account is based on an interview with doña Alcira Bustos, one of the first Costa Rican women who came to live in the Southern section of the Coto Brus Valley.

Doña Alcira was born in Arenal de Santa Cruz, Guanacaste, in 1919. She was very young when she started working: at age 15 she was already cooking for the workers in the rice plantations. She was 18 when she married don Pablo Gutiérrez Velásquez, who was born in Masaya, Nicaragua, and who died in 1993. They came from Guanacaste to the “zona bananera” (the banana zone) in the Southern region of Costa Rica. In the 1940’s they arrived to Campo Tres to work in the construction that the Compañía Bananera (Banana Company) was organizing. Nonetheless, don Pablo did not want to depend on the “Compañía”, nor become anyone’s slave; he looked for a farmland for himself and his family and found a piece of land without limits in Campo Tres.

Pablo arrived with the first Americans who came to the banana plantations, and who were coming to build the road to Fila de Cal. Later on, he was contracted by the engineer Arturo Tinoco, who was looking for a trustable person who would represent Mr. Vito Sansonetti during the colonization work in the Coto Brus Valley.

When the Italian colonizers -led by don Vito- started to inspect and search for the land with the needed requirements to colonize, they set up a camp in Campo Tres, where they established a “rancho”, an adequate roof for the daily chores. It was located in a strategic place for easy access to some places, allowing to open from here a rustic road with a shovel and ax, towards Sabalito, and later on to San Vito.

At that time, don Pablo planted coffee, sugar cane, and vegetables such as chayotes, carrots, beets, and lettuce among other products. He was selling twenty five sacks of chayotes at 9 colones per sack,

and he transported them up to Golfito, “*at such a price, each sack was a real gift*”. Mister Chico Cedeño –a neighbor– had two trucks and facilitated the transportation of these products down to Corredores, from where he would take the train to Golfito. Don Pablo built a trapiche (sugar cane mill) and produced tapa de dulce, a product –as well as others- of very limited access. He had cows and was selling milk to Panama; the collecting truck would pass by around 6:00 am to pick up the milk and transport it to the border.

The first Italians associated with commercial activities who arrived in the area were the Altamura family, who were the owners of a bakery, and the butcher who would buy pigs from doña Alcira to later sell them in San Vito.

There was a large amount of wild animals such as jaguar, tepezcuintles, chachalacas and guams, tapirs, and white face monkeys. Don Pablo did not like to kill wild animals because “*the species would be wiped out*”. If any wild animal was killed, it had to be a male of the species. He planted fields with beans so that food would not be scarce to avoid killing any wild animals. He also tried to plant rice, but this crop was not successful.

All his business was done by a contract; the workers were contracted to do a certain job and were paid right away; the same was true for any trading of commodities or the purchase of an item. “*In this way there were no debts*”.

The relationship with the Panamanian people was very good. At that time there was the phrase “*turning hands*”, this meant that when don Pablo needed help, the Panamanians would come and when they were in need, he would provide help.

Besides the commerce developed among the neighboring communities, an important exchange among social groups happened through the food prepared by the different cultural groups, sharing it among the people who lived close by.

Doña Carmen, one of the nine daughters of Alcira and Pablo, taught

the Italians to eat “gallo pinto”. She would tell them, “*learn to eat gallo pinto because what we eat everyday is rice and beans*”. Sometimes a paca was killed so they would eat something different. Doña Alcira also prepared tortillas, “*and they [the Italians] were delighted*”. The Italians prepared macaroni and invited the family to eat because they did not know about pasta. The afternoons were spent playing cards and domino, enjoying the time with the families living nearby.

Some typical dishes at the time were tamales, tanelas (a kind of tamal stuffed with cheese, sugar, cinnamon and milk) rosquillas (corn flour rings) and marquesote (a mix of egg and sugar). One of the customs that has already been lost in time is the making of tortillas by hand (“*tortillas palmeadas*”). The food in the evenings consisted mostly of corn tortillas, cuajada (a cheese-like derivative of milk), and a cup of agua dulce (hot sugar cane juice).

“*At that time, the clothing was used up and later it was very hard to get new clothes, but the food was never scarce*”, concluded doña Alcira, who will turn 90 soon.

Mass at the church was every Sunday at 10:00 am; they had all day long to go to church. People would travel up to four hours by ox cart to go to church on the road from Campo Tres to Sabalito, where the closest church was located.

The piece of land they owned in Campo Tres was sold for ten thousand colones to be able to move to a place where they had access to education. In Cañas Gordas they purchased a 67 hectare piece of land for three thousand eight hundred colones – a lady was selling the farm for four thousand colones, doña Alcira asked for a lower price and the lady reduced the price to two hundred colones. They moved from Campo Tres to Cañas Gordas in search of education for their 12 children, “*so they would not be raised as ignorant people*” don Pablo used to say.



## The Garbage Corner

Ariadna Sánchez / asanchez@ots.ac.cr

Previously, in a small corner behind the greenhouses of the Wilson Garden, there was a storage shed for gardening tools, junk, and recycling. The place was a 3 × 6-meter area with a dirt floor and a roof. With the construction of the new Visitor's Center building there were some materials that were leftover, including ceramic tiles. These tiles had been used, so they were dirty, broken, and they were going to be sent to the garbage dump.

Having these two situations a crazy idea emerged in my head! Why not do a mosaic floor using these extra ceramic tiles, and then use the area as a collecting center for recycling materials and an attraction for visitors? In other words, have an area to show to people that a garbage (or recycling) place does not necessarily have to be dirty and disorganized, and that almost everything has more than one use. Besides that, if we show this project to visitors and demonstrate that the recycling project is working, we may obtain donations for the Environmental Education Project! And so the idea started to take shape.

The first step was to clean the area and to build a concrete floor. The second step was to think about the color options and availability of materials, and then, outline a design. Once we had a design, we started with the arduous task of breaking the ceramic tiles into smaller pieces with a special mechanical machine. For several weeks a crew of volunteers came to help cement in the small pieces and make them fit together much like the pieces of a big puzzle. Although we had come up with a general design at the beginning, as we continued working more designs kept coming to life!

In this project there were many people involved, from young kids (4 years old) up to an 81-year old lady! There were kids and young people mainly from the surrounding communities, some people from San José, Cartago, and even foreign volunteers from the United States, France and Germany. One of the most important things about this project was that while we were working the conversation topics were about the fact that you can reuse everything you have, and about the animals and plants included in the design.

In this new place we will collect all the recycling material produced by the Station including plastic, aluminum and other metals, paper, and glass. They will be deposited in special containers and then they will be sent to a bigger recycling center that is located in the town of Agua Buena. Other waste produced by the Station such as organic material is already separated and composted. Most of the waste materials are a result of consumption of products by visitors, students, and the daily operation of the Station.

We would also like to take this project a step further, and the idea is to involve staff members and their families. Here we have roughly 30 employees, which means around 30 families that we can be included in the program; we can then include their neighbors. This will require educating people with lectures and workshops and monitoring the development of the program over time. Based on this project some new ideas have come to mind to conserve the environment that will be implemented in elementary and high schools, which will involve an interesting combination of art, creativity, and waste materials.



The recycling center as the puzzle was coming together and in its completed form. Photos Zak Zahawi.



# Our Donors

## Donations Update



*Gloriosa superba* (Liliaceae) living up to its name. Photo Zak Zahawi.

Alison Olivieri / maoawo@gmail.com

We are busier than ever here as you can probably tell from the “What’s New” section on continued construction, student capacity bursting at the seams, the exciting prospect of land acquisition and educational courses and events filling our new, as well as old, buildings! All of that is the good news...

Now we need *your* help! Although our recent facility expansions were funded by several grants from the National Science Foundation, we need general operating donations to keep the infrastructure humming along. Each visitor and researcher – and all those students! – need clean sheets, nutritious food, hot water, electricity, clean pathways and whatever other necessity we can provide to make their experience here a significant lifetime event.

Please take a moment to consider increasing your contribution to our annual fund this year. As you reach for your checkbook, contemplate the diverse world of tropical plants and wildlife supported here for current and future scientists, special interest tour groups, natural history visitors and all the other people who travel, seeking to learn more about the world in which they live.

We are here to help them realize these goals but we need your generous donations to achieve success. Thank you in advance for your continued support of this very special place.

**Annual Fund Goal for 2008**  
\$40,000

**Annual Fund Received to Date**  
\$15,000

**Annual Fund Outstanding**  
\$25,000

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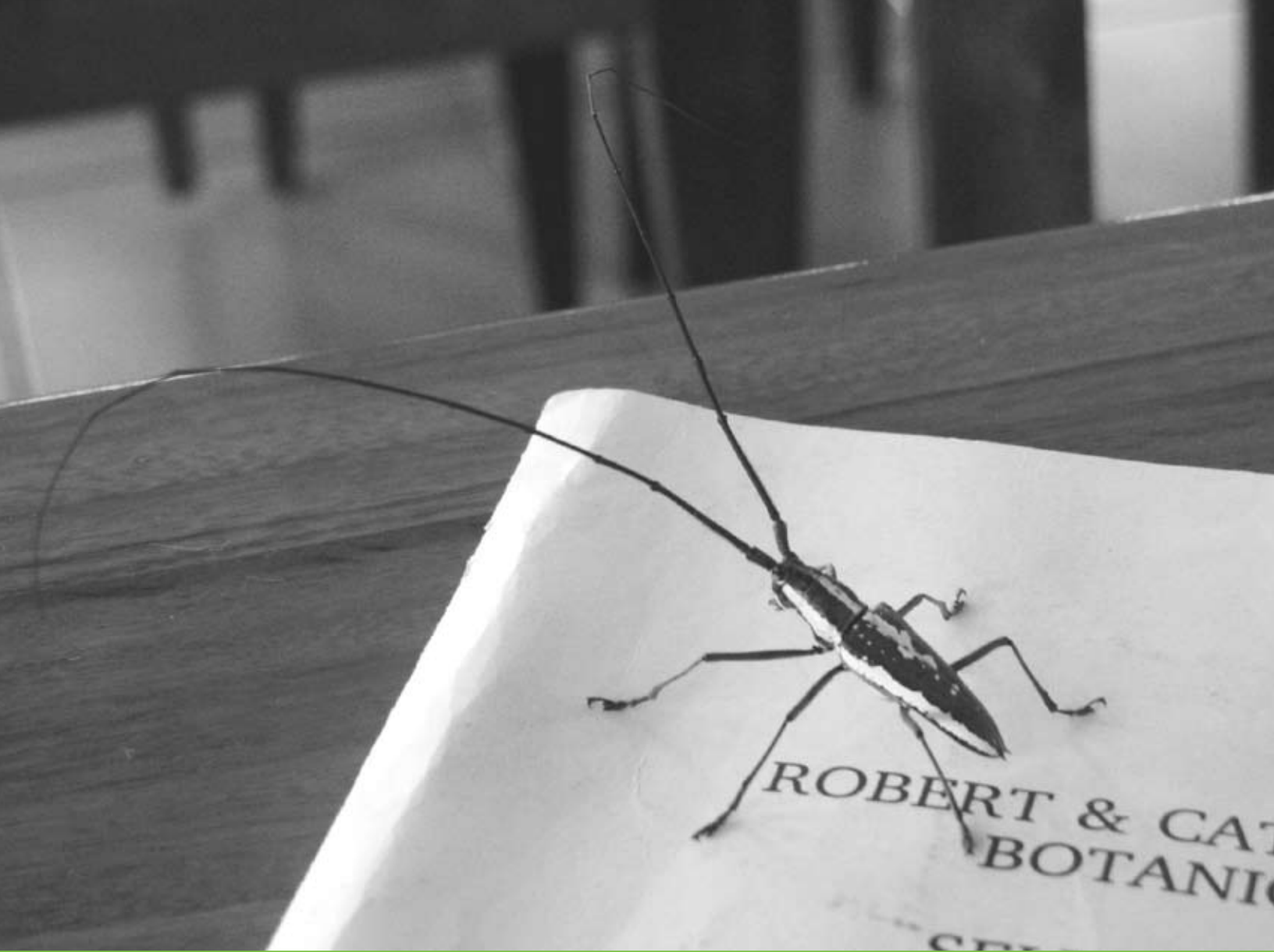
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