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where science and nature converge

IN THIS ISSUE:

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Design by **Katherine Hartman**

Large scale gradients in tritrophic interactions

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At the recent ATB meetings in Morelia (July 2007), there were numerous talks that examined phenomena along abiotic or biotic "gradients." Over 60 of the oral presentations and posters dealt explicitly with tropical gradients at all spatial scales. The small-scale studies examined gradients within patches in the tropics; medium-scale studies examined gradients within and between entire tropical ecosystems; and the large-scale studies examined altitudinal and latitudinal gradients. In temperate ecosystems, classical studies of gradients were conducted by Whittaker (e.g., Whittaker 1956), with a focus on obvious abiotic gradients, such as moisture and altitude. Niche theory has been the primary justification for subsequent gradient studies in both tropical and temperate ecosystems (e.g., Austin et al. 1990), including most of the small to medium scale gradient studies. The large scale gradient studies – across elevation and latitude – are perhaps most important to tropical ecology, given their relevance to understanding the high biodiversity that exists in the tropics. In fact, large-scale diversity gradients have provided what some consider to be strong unifying themes for Community Ecology, but these gradient studies have almost exclusively focused on single trophic levels (Scheiner and Willig 2005). These issues are what first attracted me to studies of gradients in tritrophic interactions (Figure 1). To examine large-scale gradients in plant-caterpillar-parasitoid interactions, I have been fortunate to work with a number of collaborators using data from both tropical and temperate sites. We have examined patterns in tritrophic interactions along latitudinal (Dyer et al. 2007, Figure 2) and climatic gradients (Stireman et al. 2005, Figure 3).

For most ecological gradient studies, the term "gradient" is left undefined, even though it has many meanings, depending upon the field of study. Thus, before proceeding, I should provide a definition. The most objective definition, of course, comes from mathematics – the rate of change of a scalar function with respect to a vector variable. For the function, $f(x)$, of the variable, $x = (x_1, \ldots, x_n)$, the gradient is denoted as *del f*, which refers to the vector field composed of the partial derivatives of *f*. The directional derivative is the dot product of

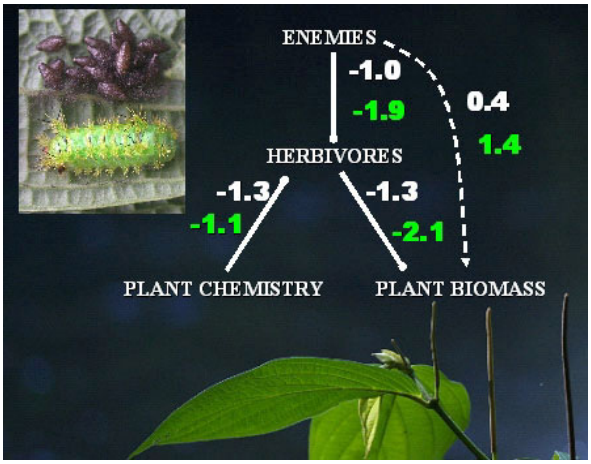

Figure 1. *Tritrophic interactions in tropical versus temperate ecosystems (i.e. a latitudinal "pseudo-gradient"). The inset picture depicts three trophic levels – a host plant (Piperaceae), caterpillar (Limacodidae) and pupae of parasitic wasps (Braconidae) that have killed the caterpillar. The path diagram summarizes a meta analysis conducted by Dyer and Coley (2001). Direct effects are indicated by a solid line between two trophic levels, and the indirect effect (trophic cascade) is indicated by a dashed line. A negative effect of one trophic level on the other is drawn with an bullet-head, and a positive effect is drawn with an arrowhead. The effect is on the trophic level nearest to the arrow- or bullet-head. The numbers closest to the lines refer to effect sizes measured in the meta analysis; green effect sizes are from tropical systems, white effect sizes are temperate. All top-down forces, including the trophic cascade, were stronger in tropical ecosystems. Strong population-level effects of natural enemies can exert selective forces that lead to greater herbivore specialization in the tropics.*

a gradient and a vector, and the largest value among the directional vectors for which you calculate directional derivatives, gives the greatest rate of change. Thus, an elevation gradient can be defined as how fast elevation changes in a certain direction, and as climbers and mathematicians alike know, it is simple to find or compute the steepest altitudinal gradient (utilizing climbing skills and gradient theorems). In the biological sciences, a gradient typically refers to directional changes in abiotic parameters, such as temperature and moisture, or biotic parameters, such as growth rates or physiological activity.

For many tropical biologists, the diversity gradient, which for most areas and most taxa is maximal as one moves north or south towards the equator, is the most interesting gradient to ponder. Fully understanding this gradient is a major goal of ecology (Willig et al. 2003). Indeed, diversity is one of the most important, interesting, and difficult variables to study (biodiversity was included in the top 25 most important research themes in a special issue of *Science* in 2005). More studies examining diversity gradients at all scales are certainly warranted. Unfortunately, many "latitudinal diversity gradient" studies include only two points for comparison – one tropical site and one temperate site; I refer to this as a "pseudo-gradient." This is a common problem in ecological gradient studies, in general, which is apparent if you examine the abstracts from the July ATBC meetings. For linear relationships, two points along a line will suffice to characterize an ecological gradient crudely, assuming that these points do not constitute large residuals in opposite directions. However, you cannot measure the slope to any precision with just two points, and many ecological gradients are not linear. It is clearly inappropriate to try to characterize any gradient from just two points. Figures 2 and 3 depict actual gradients involving tritrophic tropical systems, including an exponential response of caterpillar specialization to a latitudinal gradient reported by Dyer et al. (2007), and a linear response of parasitism to a climatic gradient reported by Stireman et al. (2005). These studies included 8 and 15 points, respectively. Although not really sufficient sample sizes to thoroughly characterize the climatic and latitudinal gradients, they are an improvement over the typical single tropical-temperate comparison. How many points should be included for studies of large-scale gradients? Unfortunately, the answer is "it depends." Sample sizes should probably

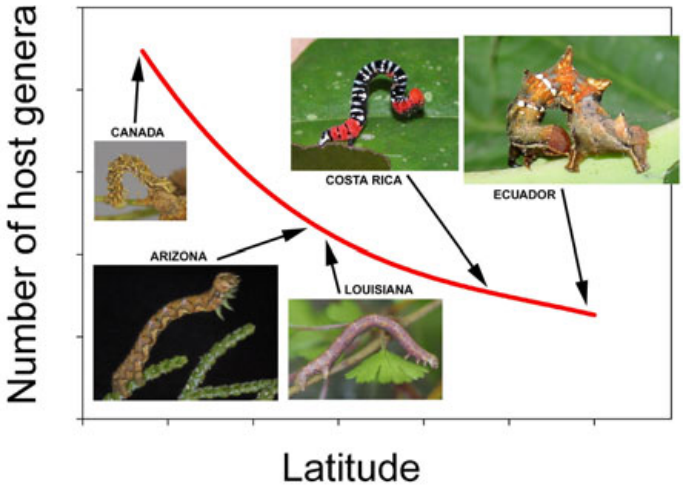

Figure 2. *One potential mechanism contributing to the latitudinal diversity gradient is increased specialization of tropical organisms. Dyer et al. (2007) showed that specialization of herbivorous insects is greater in the tropics. Caterpillar diet breadth (shown here as number of host plant genera per caterpillar species) declined with latitude across a gradient consisting of 8 sites: Canada, Connecticut (USA), Arizona (USA), Louisiana (USA), Costa Rica, Panama, Ecuador, and Brazil. Geometrid caterpillars from 5 of these sites are illustrated (the actual data are not included here). The red curve (with latitude decreasing along the X-axis) depicts the quadratic regression:* Latitude = 1.4 - .007(diet breadth) + .0012(diet breadth)^2; $R^2 = 0.98$ *Similar results were obtained when diet breadth was measured as number of host plant families or species consumed per caterpillar species. We still do not know if parasitoid diet breadth follows a similar gradient.*

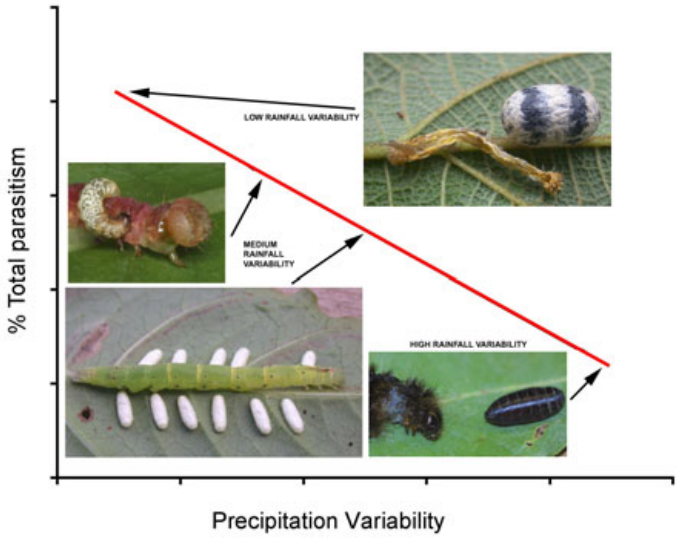

Figure 3. *Stireman et al. (2005) used data from 15 sites in the Americas to compare caterpillar-parasitoid interactions across a broad gradient of climatic variability (year-to-year variation in rainfall). As depicted here (actual data are not included), this study found that parasitism decreases as climatic variability increases. The examples provided are (counterclockwise from upper right hand corner) – Parasitoid pupa (Ichneumonidae) and remains of caterpillar (Sphingidae) from Ecuador, parasitoid larva (Eulophidae) and caterpillar (Noctuidae) from Costa Rica, parasitoid cocoons (Braconidae) and caterpillar (Noctuidae) from Costa Rica, and parasitoid pupa (Tachinidae) and caterpillar (Arctiidae) from Arizona. The red line depicts the linear relationship:* Percent parasitism = -73*(coefficient of variation in rainfall) + 33; $R^2 = 0.33$ *Given the important role of parasitoids in regulating insect herbivore populations in natural and managed systems, there could be an increase in the frequency and intensity of herbivore outbreaks through a disruption of enemy-herbivore dynamics as climates become more variable.*

decrease with the steepness of the gradient and increase with the nonlinearity of function. For most gradients that are studied, steepness and linearity may not be known, so the answer is that as many points as feasible should be utilized. The diversity-productivity hump would be indiscernible if only the extremes of productivity were included for comparison. Similarly, the interesting exponential change in caterpillar diet breadth across a latitudinal gradient (Dyer et al. 2007; Fig. 2) also changes to a linear function when the site furthest to the North (Canada) is deleted.

Of course, there are many other good criticisms of gradient studies. For example, a majority of latitudinal gradient studies suffer from a lack of comparable data across the gradient, and tropical-temperate comparisons will always be comparing apples (Rosaceae) and oranges (Rutaceae) all along the gradient (R. Marquis pers. com.). Both of these criticisms could be applied to the Stireman et al. (2005) and the Dyer et al. (2007) studies. In fact, Stork (2007) has already pointed out the problems with inconsistencies among the sites used for the specialization study (Figure 2) – most notably, the sampling area for the Canada site is considerably larger than all the other sites. However, deleting Canada or any other site from the statistical analyses does not change the tropical-temperate diet-breadth dichotomy of higher specialization in the tropics, nor does it eliminate a pattern across a true latitudinal gradient. For studies that only include one pair of tropical and temperate sites, or similar pseudo-gradients, we do not have the luxury of eliminating sites or otherwise exploring subsets of the gradient.

Clearly there are numerous logistical, methodological, and theoretical problems associated with studying any type of gradient. Nevertheless, gradients in diversity remain a major component of strong unified theories in Community Ecology (Scheiner and Willig 2005). Given that tropical tritrophic interactions encompass a large proportion of global diversity, and most tritrophic interactions are more intense in the tropics (Dyer and Coley 2001), it makes sense to work towards creative research programs designed to uncover patterns of tritrophic interactions across latitudinal gradients. Similarly, research within the tropics should examine similar gradients across altitude, productivity, climate, and other large-scale gradients.

In addition to the simple patterns illustrated in Figures 2 and 3, other tritrophic patterns should be examined. For example, how do connectedness, strengths of interactions, or indirect effects change across latitudinal gradients? Finally, what is really missing in tropical gradient studies of tritrophic interactions is not necessarily a novel way of doing science or testing hypotheses. Rather, there is a glaring lack of good natural history data, taxonomy, and funding for these to address questions. Existing debates about gradients (e.g., Stork 2007) would be far more productive if we were able to conduct thorough censuses of plant-herbivore-enemy associations for forests all over the world, and make these data readily accessible (e.g., see www.caterpillars.org) for anyone to utilize in ecological studies and analyses.

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Women in Tropical Biology and the ATBC

At the annual meeting in Morelia, ATBC hosted its first Women in Tropical Biology forum. Over 50 participants discussed ways to foster participation of women in tropical research and throughout the ranks of different science career tracks at a lunchtime discussion hosted by Meg Lowman (USA), Priya Davidar (India), Patricia Morellato (Brazil), Pierre-Michel Forget (France), and Julie Denslow (USA).The notion of creating a support group for women in tropical biology was first discussed at the Asian Chapter launch in India last March 2007.

At the Morelia meeting, each panel member touched on some relevant data about women in science. Meg Lowman summarized two recent surveys, Profiles in Ecology, and Women and Minorities in Ecology II, conducted by the Ecological Society of America. Both cited disparities in women's salaries and leadership roles, despite the burgeoning number of women PhD graduates in ecology. These surveys indicated that many women and minorities continue to either disappear or fall behind in academic career tracks. Patricia Morellato spoke about similar trends in Brazil, with women presenting an equal ratio as PhD graduates but falling to less than 5% when considering top leadership positions. Priya Davidar spoke from her perspective in India, explaining that — similar to USA — increasing numbers of women were receiving PhDs but it is a relatively recent trend so there has not been enough time to ascertain if they will rise to leadership positions in science. Julie Denslow and Pierre-Michel Forget spoke about the history of women in leadership roles at ATBC, including the lack of parity in the Editorial Board, Program Chairs, Presidents and Fellow awards. The percentage manuscripts accepted for publication in *Biotropica* that are first authored by women (33.8%; 2002-2007) is close to the number submitted for publication (30.5%) and this is the same percentage of women serving on Council and as Managing Editors of *Biotropica* during this time. However between 2003 and 2007 the average percentage of women on the Editorial Board was only 24%. President-elect Forget has pledged to work hard for equity in the leadership of ATBC during his presidency next year.

Julie Denslow (left) and Meg Lowman (standing) were members of the panel discussing women in tropical biology at the Morelia meeeting.

Participants discussed ways to foster the participation of women in tropical biology. Ideas included:

1. Offering childcare at future symposia
2. Working to create parity on the editorial board (but trying not to over-work those relatively fewer women currently in leadership positions.) There is no easy solution, but the notion of engaging junior editors was suggested, perhaps giving younger women biologists more visibility among peers as well as training in the publication process.
3. Short courses at annual meetings on issues such as job negotiation, juggling family and work, and grant-writing for women and minorities who may not have had mentors to offer this information.
4. Encouraging more invited women speakers at symposia. (Note: The Morelia meeting had a very diverse set of symposium speakers!)
5. Women nominating women for prizes and honors
6. Funding technicians for women during child-bearing years to retain a competitive edge in research and publications

Members should send any ideas for further discussion about encouraging women in science to Meg Lowman (canopymeg@aol.com). Julie Denslow will investigate ATBC obtaining an NSF grant to conduct a current profile of tropical biologists as a platform for initiating next-steps to insure equality. The group hopes to convene next year, and offer mentoring, advice and discussion for women in tropical biology. (Men are also welcome to attend!)

THE ATBC GOES CARBON-NEUTRAL

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At its 2007 annual conference in Morelia, Mexico, ATBC members voted overwhelmingly in favor of a proposal to make the society's future annual meetings carbon-neutral. Why have we done this, and how will it work?

The "why" part is fairly obvious. Greenhouse gases are rising rapidly in the atmosphere (Fig. 1), and it would be irresponsible of the ATBC, as a leading scientific and conservation organization, to fail to reduce its emissions as much as possible and to offset its remaining emissions. Many scientific groups, institutes, and businesses are now going carbon-neutral—or are at least talking seriously about doing so. The ATBC Executive Council felt it was important for the society to be at the cutting edge of these efforts.

The "how" part is where things get interesting. The first question is, how much carbon emissions does an ATBC annual meeting produce? To determine this, the society undertook a formal carbon audit, which was assessed by the Edinburgh Centre for Carbon Management (ECCM), U.K., a well-regarded firm that specializes in this field. We used the Morelia meeting as a typical example. ECCM sent the Morelia-meeting organizers, led by Miguel Martinez and Mauricio Quesada, a long series of questions about how delegates would travel to the meeting, and how much energy would be used for hotels and meeting venues. The cost of the carbon audit (nearly $2300) was kindly paid for by the Mexican Secretariat of the Environment and Natural Resources.

Not surprisingly, the audit revealed that most of our carbon emissions are caused by travel to and from the meeting. Air travel accounts for 86% of all emissions, and if one includes automobile travel this figure leaps up to 99.8% of all emissions. On average, each participant in the meeting produces 1.33 tons of emissions (measured in CO_2 equivalents). Overall, with nearly 800 participants, the Morelia meeting was expected to produce about 1070 metric tons of carbon emissions. In future years we should work to reduce these emissions through efficiency savings and the use, wherever possible, of renewable energy sources.

Offsetting Our Emissions

How do we offset our emissions, and how much will it cost? This is the trickiest part. Many options exist for going carbon-neutral, and some have been justifiably criticized. People now talk disparagingly about "carbon cowboys"—dodgy companies that happily take funds from well-meaning organizations attempting to become carbon neutral, and invest them in dubious carbon-offset projects. Aside from such pitfalls, there is also a bewildering variety of options for entering the carbon market. For example, one can invest in the informal carbon market or buy more-expensive certified carbon credits, and funds can be used for myriad different strategies to reduce carbon emissions—such as increasing energy efficiency or promoting wind- or solar-energy production.

But perhaps the most intriguing option for offsetting carbon emissions is in forestry projects, especially in the tropics. This is, of course, where the ATBC has considerable expertise (e.g. Bawa *et al*. 2004; Laurance 2006a, 2006b, 2007). We felt it was important to support innovative projects that promote tropical forest conservation, and we wanted to serve as an example to other organizations that are considering how to offset their emissions.

After much investigation, we reached two conclusions. First, carbon-offset projects in the forestry sector can be risky, especially in developing nations. One needs to ensure, for example, that the emissions reductions are verifiable and long-term in nature, and that "leakage" does not occur (i.e. reducing deforestation or increasing reforestation in one area does not simply result in increasing deforestation somewhere else).

Second, conserving tropical forests—either via afforestation or, even better, by protecting old-growth forests—can have enormous benefits for slowing global warming (Gullison *et al*. 2007, Mitchell *et al*. 2007). Tropical forests store huge amounts of carbon in their biomass, and forest destruction currently accounts for up to a quarter of all human carbon emissions today (Fearnside 2000, Fearnside & Laurance 2005). Moreover, by transpiring huge quantities of water vapor back into the atmosphere (Fig. 2), tropical forests contribute heavily to cloud formation; the clouds in turn reflect solar energy back into space, thereby helping to slow global warming, and they often contribute importantly to regional rainfall (Andreae *et al*. 2004). Finally, tropical forests have far more positive albedo effects than do either temperate or boreal forests. If the latter are cleared they tend to be covered by snow for much of the year, and this reflects much solar energy back into space, whereas tropical forests are replaced by dark land-covers such as pastures and croplands that reflect little heat back into space (Bala *et al*. 2007).

The net effect of these three factors—carbon storage, evapotranspiration, and albedo—is that saving a hectare of tropical forest is likely to have far greater positive benefits for slowing global warming than does saving a hectare of either boreal or temperate forest (Bala *et al*. 2007).

Fig. 1. Tropical deforestation is a major source of greenhouse-gas emissions (photo by W. F. Laurance).

Of course, tropical forests perform other vital ecosystem services, such as protecting soils, reducing destructive flooding, and maintaining reliable stream flows, and they are enormously important for biodiversity conservation (Laurance 1999, Ozanne *et al*. 2003). It is for this reason that several influential studies, such as the widely heralded Stern Report in the U.K. (Stern 2005), have advocated tropical forest conservation as a vital and cost-effective strategy for slowing global warming (Mitchell *et al*. 2007). In any strategy to slow harmful climate change, tropical forests are the low-hanging fruit.

Fig. 2. By transpiring vast amounts of water vapor into the atmosphere, tropical forests help to stimulate cloud formation. Clouds, in turn, reflect much solar radiation back into space and thereby help to reduce global warming (photo by W. F. Laurance).

The ATBC Strategy

Among the available options for tropical carbon-offsets, we have chosen two that we regard as particularly promising. The first, located in the states of Chiapas and Oaxaca in southern Mexico, is a project known as *Scol Te* ('tree that grows'). It invests in forest and agricultural systems in rural communities, in order to increase terrestrial carbon storage. The main goal is to replace monoculture crops with sustainable agroforestry and to promote reforestation and afforestation. A nonprofit group called Bioclimate Research and Development, linked to the ECCM, administers the funds and verifies the practices of the participating communities. Emissions credits are sold at a price of $7.30 per metric ton of CO_2 equivalents.

The other project is Rainforest Concern, whose activities focus on conservation of old-growth forests in Ecuador and elsewhere in South America. Funds administered by Rainforest Concern are used to purchase forested land, which is held and managed in a trust by local communities. Rainforest Concern has a long, successful track record. In Ecuador, for example, they are working to protect cloud forests in the Choco-Andean Corridor, to sustain natural water resources for local communities in the Intag region, and to increase reserve buffers in the Gran Sumaco area. Rainforest Concern and its local partners are responsible for ensuring the permanence of the forested land purchased, and therefore its long-term carbon storage. At $15.00 per metric ton, carbon offsets are more expensive under Rainforest Concern than the *Scol Te* Project, reflecting higher local costs in Ecuador. We believe, however, that the additional cost is warranted, because of Rainforest Concern's strong reputation, and because it is important for the ATBC to promote the key ecological benefits of protecting old-growth forests.

We currently plan to invest half of all ATBC carbon-offsets in the *Scol Te* Project, and half in Rainforest Concern. We may alter this in the future, as new forest-based projects become available, but we will remain strongly focused on the conservation and rehabilitation of tropical ecosystems. ATBC meetings vary from year to year in the meeting locations and number of participants, but we estimate that a contribution of $20 from each individual traveling from outside the host country, and $5 from each person within the host country, will be sufficient to offset our emissions.

At our 2007 annual meeting, contributions to the ATBC Carbon-Neutral Fund were entirely voluntary. Perhaps because of limited familiarity with this new program, only a third of the participants at Morelia contributed to the fund, for which they received a green wrist-band. Fortunately, as voted upon by the ATBC membership, future contributions will be automatic, incorporated into the meeting-registration fee. Beginning next year at our 2008 annual conference in Suriname, the meeting-registration fee will include $20 for foreign participants and $5 for local Suriname residents, with 100% of these funds being used to pay for carbon offsets.

The ATBC is proud to be a leader in the use of carbon offsets to promote the conservation of tropical forests. We hope to serve as a model for other organizations and corporations that wish to offset their emissions while having major positive benefits for tropical ecosystems and biodiversity conservation.

ACKNOWLEDGEMENTS

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The Antisana Volcano behind Yanayacu Biological Station, Napo Province, Ecuador.

FIELD STATION REPORT

THE YANAYACU BIOLOGICAL STATION AND CENTER FOR CREATIVE STUDIES IN ECUADOR

The Yanayacu Biological Station and Center for Creative Studies is a private research facility providing access to the most diverse tropical montane forest in the world. On the eastern slopes of the Ecuadorian Andes, at 0° latitude and 2100 m a.s.l., Yanayacu is 3 hours by road from the capital city, Quito. It is 5 km by dirt road from the small town of Cosanga, the nearest place for snacks and miscellaneous supplies. Twenty kilometers away is Baeza, a larger town with a small night-life and access to food, hardware supplies, and skilled labor such as carpenters, welders, and mechanics. Yanayacu forms part of an over-2500 hectare reserve shared with Cabañas San Isidro and the Napo Andean Forest Foundation. In addition, Yanayacu borders the 188,000 hectare Antisana Reserve and the 205,000 hectare Gran Sumaco National Park. The station lies in the center of a nearly intact gradient from the snow-capped peak of Antisana at 5,000 m down to 350 m, at the edge of the Ecuadorian Amazon. Forest at elevations of 1,900-2,600 m is accessible by foot, while elevations of 900-4,300 m are accessible within 1.5 hours of driving time. Rainfall in the area ranges from 3-4 m a year and is only slightly seasonal. Drier periods are generally September to December (usually less than 15 cm/month). One of the major habitat attractions of Yanayacu is the roughly 500 hectares of nearly flat forest directly in front of the station. A developing trail system provides biologists access to a uniquely flat (at this elevation) area of intact forest from 1,900-2100 m. Major habitats in this area include *Chusquea* bamboo dominated areas of natural disturbance, rolling, hilly, mature cloudforest, and a natural swampy forest dominated by mid-sized trees (mostly *Vismia*, *Miconia*, and *Ocotea*/*Nectandra*). The station runs bilingually in English and Spanish.

Yanayacu was started in 1999 by Harold Greeney, beginning with only an old farm house, 7 chickens, a rooster, and a dog. Now the station provides biologists, students, and artists with a wide range of amenities to promote their work. Facilities include single and bunk-style rooms, with a capacity for up to 60 people. Two kilometers away, Cabañas San Isidro provides additional tourist housing for up to 40. The station is equipped with on-site potable water, has bathrooms with hot-water showers, and a large kitchen facility and outdoor dining area. Researchers and students generally prepare their own meals (in a fully stocked vegetarian kitchen), but arrangements are easily made to hire kitchen staff for groups or special project needs. The station has 24-h power supplied by its own hydro-electric generator. A large office building over the kitchen provides space for individual or group offices, as well as a glass-walled art studio with a view of the Cosanga Valley. The large, growing library facility is equipped with satellite internet, a large selection of tropical biology literature (strongest in birds and butterflies), and onsite access to over 6,000 articles. Additional facilities, currently in use by ongoing projects, include a small greenhouse, a 10 x 15 m covered outdoor laboratory, and a 5 x 10 m aviary.

The staff at Yanayacu includes a local station manager (José Simbaña), a handyman, and two field technicians (trained in avian breeding ecology/nest searching, caterpillar rearing, and insect sampling via malaise and pan trapping). Three additional full-time technicians at the station work for the Caterpillars and Parasitoids of the Eastern Andes (Lee Dyer-Tulane), rearing lepidopteran larvae onsite. The station director, Harold Greeney, is a broadly-trained tropical biologist with research programs covering butterfly and aquatic beetle population ecology, caterpillar behavior and natural history, and avian breeding biology. He has over 15 years of experience working in Ecuador and is available to help potential researchers plan and develop projects at the station.

The largest ongoing projects at Yanayacu are currently: botanical survey and tree-monitoring; caterpillar-hostplant-parasitoid interactions; avian breeding ecology; skipper caterpillar behavior and natural history; Rufous-collared Sparrow population and physiology studies; amphibian monitoring and natural history. Past projects include social spider biology and bat population studies. Recently, multiple species of frogs, lepidopterans, and insect parasitoids have been discovered and described from the area. A potentially new species of owl has recently been discovered, and many rare birds such as Bicolored Antvireo and Peruvian Antpitta have been found to be abundant in the area. However, the station welcomes researchers and students working on any aspect of tropical biology and conservation, with proposals reviewed by the station director and advisory committee. Abundant organisms of particular interest in the area are Spectacled Bears, Antpittas (Formicariidae), Black-and-Chestnut Eagles, Giant Earthworms, Caecelians (*Caecelia orientalis*), Bamboo Butterflies (Nymphalidae: Satyrinae: Pronophilini), Montane Bamboo (*Chusquea scandens*), Parasitoids (Hymenoptera and Diptera), and Glass Frogs. With multiple sightings of Mountain Tapirs, Giant Anteaters, Pumas, Otters, Night Monkeys, Tyras, and other mammals, the station is particularly interested in future projects surveying the poorly known mammals of the area. Also, with hundreds of streams ranging from tiny seeps to large rivers, Yanayacu encourages future research in hydrology and aquatic ecosystems. Several abandoned pastures in the area also provide future investigators with ample opportunity to study regeneration and explore reforestation practices.

Yanayacu is aimed at providing access to its unique Andean habitat for students, researchers, artists, musicians, and others of scientific and creative ilk. Student groups are welcome. In addition, Harold Greeney takes on 5-10 student interns a year, who work on independent and supervised projects covering nearly any aspect of tropical biology. Past student projects include: bat feeding ecology, avian life history, caterpillar life history and behavior, floral surveys, arthropod abundance, aquatic insect distributions, and forest regeneration. Latin American students are particularly welcome. Costs vary from $15 USD to $45 USD per day (food included), depending on group size and length of stay. Discounts are available for Latin Americans. Please see **www.yanayacu.org.**

A New Guide to Costa Rican Plants

Review of: Zuchowski, W. 2007. Tropical Plants of Costa Rica: a Guide to Native and Exotic Flora. A Zona Tropical Publication from Comstock Publishing Associates, a division of Cornell University Press, Ithaca and London. ISBN 0-978-8014-4588-0 (cloth), 0-978-8014-7374-6 (paper). 529 pp.

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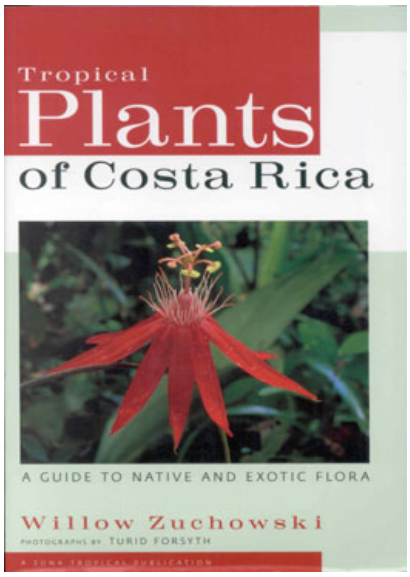
This beautiful book was first published in 2005 by Zona Tropical as *A Guide to Tropical Plants of Costa Rica.* The text and illustrations are by Willow Zuchowski, a botanist living in Monteverde, Costa Rica, and the excellent photographs are by Turid Forsyth. Not having passed through Costa Rica in the past few years, I had not picked up a copy of the 2005 edition, so I am unsure whether there was substantial revision between the two editions. However, at least the taxonomy has been updated, as I noted quite a few post-2005 revisions in names or notes about family placements.

The re-issue through Cornell University this year should bring this guide much-deserved attention from a wider audience, not only visitors to Costa Rica but also visitors to nearby countries. For example, it would be an excellent introduction to tropical plants of Panama, as the majority of the more than 400 plant species featured in the book also occur there, as do probably all of the genera. Comparing photographic guides available when I started work in Panama in the 1970s (e.g. Hargreaves and Hargreaves 1960, 1965) to the current guide is useful. Not only is the number of species treated much greater, and the production quality of the book far superior, but the amount of natural history information presented here has grown enormously, much of it coming from studies in Costa Rica.



The species accounts form the heart of the guide (458 pages). Information for each species includes family, scientific name, English and Spanish (Costa Rican) common names, a short botanical description sufficient to confirm a suspected identification, distribution (including origin), flowering and fruiting times (for some species), related species (sometimes as a separate heading), and comments.

The comment section forms the bulk of each account and contains most of the fascinating tidbits about each species – many new even for seasoned professionals. Through the judicious selection of species, the author covers a wide range of natural history observations for many life forms and habits, from herbs to trees, autotrophs to holoparasites (but surprisingly not a single saprophyte). The pollinators, dispersers and herbivores of many species are routinely noted, but less well-known aspects of these interactions are also discussed, such as the hot inflorescences of many beetle-pollinated aroids, pollination by deceit in dioecious *Begonia*, and sex change in *Ocotea tenera*. Symbioses are not overlooked, such as nitrogen fixing bacteria in *Gunnera*, *Alnus* and *Azolla*; myrchorrhizae in oaks and orchids; and *Azteca* ants on *Acacia* and *Cecropia*. Examples of the economic and cultural value of these plants abound, including the stalwarts of timber, food, fiber, medicine, dyes, and indigenous uses. Even here I've found surprises – how have I missed the drink chan, from the seeds of *Hyptis suaveolens*, all these years? Also noted are new uses for old products, such as the bioweapons potential of ricin (from castor bean, *Ricinus*), and new enterprises such flower culture (especially *Heliconia*) and production of novel health food products, such as the recently much hyped noni juice from *Morinda citrifolia.* Special attention is also given to native species that have potential for reforestation, and introduced species that might or have become invasive in Costa Rica.

Species are neither grouped taxonomically nor by origin (native or introduced) and keys are not provided. Rather species in the first part of the guide are practically grouped together in ways users are most likely to encounter them in Costa Rica, and identification is done by browsing . Sections include Painted Treetops (those with large showy flowers, mostly from dry forests or gardens), Other Common Trees (those with less conspicuous flowers), Roadside and Garden Ornaments, Fruits and Crops, Living Fences and Reforestation, and Special Habitats. The latter, perhaps better called Natural Habitats, includes Wet Atlantic Lowlands, Tropical Dry Forest, Tropical Montane Cloud Forest, and Beach and Mangrove. Of these I especially liked the novel section on Living Fences and Reforestation, as I've been driven past many of these fence species on my way somewhere else for decades without being certain exactly who they were.

Species in the second part of the guide are grouped taxonomically under the heading Typical Tropical Groups or Conspicuous Grasses. The former focuses attention on Araceae, Bromeliaceae, Arecaceae, Heliconiaceae/ Strelitziaceae, Orchidaceae, and Ferns and Lycophytes. The section on Conspicuous Grasses is an especially welcome addition, as most guides skip grasses. Other even more conspicuous grasses are treated elsewhere: the cultivated bamboo (*Bambusa vulgaris*) under Roadside and Garden Ornaments, natives bamboos (*Chusquea* spp). under Tropical Montane Cloud Forests, sugar cane (*Saccharum officinarum*) under Fruits and Crops, and a naturalized pasture grass (*Hyparrhenia rufa*) under Tropical Dry Forest. In general, there are no hard and fast rules about in which section a species appears. For example, the plantation crop African oil palm is treated under Arecaceae (rather than Fruits and Crops), the ornamental butterfly palm under Roadside and Garden Ornaments, and the raffia palm and sea coconut under Tortuguero Canals of the Wet Atlantic Lowlands.

The main text is supplemented with twenty interesting sidebars, each 1-2 pages long. These allow longer discussions of topics such as native cycads, figs and fig wasps, epiphytes, gap specialists, montane oaks, miniature orchids, cacti, cultivars of *Heliconia*, Lauraceae ("little avocados"), and the history of bananas in Costa Rica. The book ends with a short but useful glossary (as the text does not shy away from the occasional technical term), an essential list of species by family (as species are not arranged taxonomically in the text), bibliography and an index (to scientific and common names of plants only). A subject index would have been a good addition, allowing readers to retrieve information (such finding as nitrogen fixing species) gleaned from browsing the accounts.

I would highly recommend this very reasonably priced book to anyone unfamiliar with the plants of Costa Rica or neighboring countries, be they ecotourists, students, or researchers. Those who like to flip through books to identify plants will be happiest using the guide to identify newly encountered species; those who want keys should look elsewhere. Much of the information will be familiar to established botanists and naturalists, although I found many surprises; but most will be new and exciting for those just getting started.

Hargreaves, D. and B. Hargreaves. 1960. Tropical blossoms of the Caribbean. Hargreaves, Kailua, Hawaii.

Hargreaves, D. and B. Hargreaves. 1965. Tropical trees found in the Caribbean, South American, Central America, Mexico. Hargreaves, Kailua, Hawaii.

ATBC 2007 DRAWS ENTHUSIASTIC PARTICIPANTS TO MEXICO

The historic city of Morelia, Michoacán, Mexico was a beautiful venue for the 2007 Annual Meeting of the Association for Tropical Biology and Conservation. Participants from around the world combined with a large cadre of Mexican tropical biologists for a highly successful and productive annual meeting, which took place from July 15-20, 2007. The meeting was held in the old colonial city center of Morelia, and the historic buildings and pleasant sidewalk cafes made absorbing both new data and old tequila a delight.

Conference chair and outgoing ATBC president Miguel Martinez-Ramos, co-chair Mauricio Quesada Avendaño and their many colleagues on the organizing committees put together a program that included a suite of compelling symposia, a world-class series of plenary speakers, and a variety of contributed paper and poster sessions highlighting current issues in tropical biology. Plenary sessions were presented daily at 8:30 in the morning and again in the late afternoon, and the speakers covered topics ranging from protection of Mexican biodiversity, through conservation genetics and land use issues in Amazônia and Indonesia.

A series of cultural performances was one highlight of the meeting. The first evening, a local group performed folkloric dances of the region, and on Tuesday night, there was a rousing concert from Bola Suriana, a talented group of singer-musicians who gave an eclectic performance of traditional and popular music. Wednesday evening featured a performance of the Chamber Symphony Orchestra from the University, enhanced by the acoustics and architecture of the Cathedral where they played. The Thursday banquet was served in the interior courtyards of the Governor's Palace, a spectacular and impressive end to a week of great science, good camaraderie, and excellent discussion. At the banquet, ATBC honored two prominent tropical biologists with election as Honorary Fellows of the society. The awards for 2007, given to persons of long distinguished service to tropical biology, went to Dr. Arturo Gomez-Pompa, a seminal contributor to conservation biology in Mexico, and Dr. Ghilian Prance, noted for his work in plant systematics and biodiversity conservation in the Amazon and world-wide. Both Honorary Fellows were present to receive their awards in person. In addition, President-elect Pierre-Michel Forget made a special presentation to outgoing editor Dr. Robin Chazdon in recognition of her hard work over the past several years in moving Biotropica forward as a world-class journal for tropical biology and conservation. The Presidential address, given by Dr. Miguel Martinez-Ramos, was an inspiring exhortation to the attendees to continue their efforts on behalf of tropical conservation.

The meeting in Morelia was also distinguished by the many efforts of the organizers to be attentive to environmental concerns that arise from such a large gathering of people. The Morelia meeting was the first ATBC conference to have the goal of being "carbon-neutral," (see story on page 4 of this issue). In addition, the conference nametags and folders were made by local artisans of woven fiber, thus being not only functional, but beautiful and ecologically and economically sustainable. In a special effort to reduce waste, coffee and tea at the breaks was served in locally-made clay mugs which were washed and re-used throughout the week. The local host institution, UNAM- Morelia, provided hospitable and very capable support to all the paper and poster sessions, and the organizers and their collaborators deserve a huge round of applause for the care and planning that went into this very successful conference!

ATBC 2008 IN PARAMARIBO, SURINAM

The annual meeting of the ATBC will be held for the first time in the Guiana Shield region of South American when the 2008 meeting convenes in Surinam next June. The meeting will take place 9-13 June, 2008, at the Torarica Conference Hall in Paramaribo. The theme of the meeting, "Past and Recent History of Tropical Ecosystems: Cross-Continental Comparisons and Lessons for the Future" will provide a venue for examining biological and human migrations among tropical habitats, and for considering how our historical understanding of tropical biology can inform future decisions and choices.

Call for Symposia

The organizing committee encourages ATBC members to propose symposia for this conference. Proposals will be accepted until January 15, 2008. The participants need to know that the organizing committee can not offer direct financial support to any symposia. Proposals highlighting the main will be accepted until January 15, 2008. Proposal documents should include:

1. a suggested symposium title
2. a statement of the goal of the symposium
3. names, addresses, phone numbers, and e-mail addresses of the organizers
4. a list of potential speakers and topics

Proposals for symposia should be sent to Dr. Pierre-Michel Forget, Chairman of the ATBC 2008 meeting by e-mail: atbc2008@yahoo.com

The ATBC 2008 web site, at http://www.atbc2008.org/, provides regularly updated information on the meeting program, registration, travel arrangements, and other details. Early-bird registration will open on October 14, 2007. **Plan to join ATBC in Paramaribo in June, 2008!**

ATBC: Asia-Pacific Chapter Meeting 2008

In 2006 the ATBC launched an Asia-Pacific Chapter to help promote tropical biology and conservation in the region. The inaugural conference of the group was in March 2007 at Mahabalipuram, India. The next meeting will be held from the 23rd to the 26th of April, 2008 at Kuching, Sarawak, Malaysia. To encourage young scientists to participate in our activities, the Asia-Pacific chapter offers a limited number of travel bursaries to PhD candidates or those who have graduated within past year. The chapter also awards two prizes for papers for young scientists; the Madav Gadgil Prize for best oral presentation and the Peter S. Ashton Prize for best poster.

The meeting at Kuching, Sarawak, Malaysia will take as its theme, "Towards sustainable land-use in the tropical Asia-Pacific region." Suggested symposia titles include, sustainable forest management, conservation and development, and the consequences of climate change. The meeting will be hosted by the Sarawak Forestry Corporation. Workshops on topics such as, 'Writing scientific papers and proposals' and 'Advanced statistical analyses using R', will be organized in association with the meeting. Registration and submission of proposals for symposia will open in June 2007 with the launch of the conference webpage. Please submit proposals to atbc_asia@yahoo.com.

The chapter is also supporting training activities in the region, such as graduate field courses, and workshops associated with the annual meetings. All ATBC members from the Asian-Pacific region are automatically members of the chapter, and other ATBC members interested in joining can do so without additional dues by writing to atbc_asia@yahoo.com.

Job Opening:
COORDINATOR OF UNDERGRADUATE PROGRAMS, OTS

The Organization for Tropical Studies (OTS) is seeking applicants for the position of Coordinator of Undergraduate Programs with the OTS-Duke University Undergraduate Semester Abroad Program in Costa Rica. This is a field-based program designed to provide undergraduate students with outstanding training in tropical ecology, field research, environmental science and policy, and Spanish language and culture. Successful applicants will work closely with the Education Director, and Resident Professors, and oversee the implementation of all OTS Undergraduate Programs based in Costa Rica, supervise undergraduate program staff, supervise program design, implementation and evaluation, and maintain collaborative relations with partner institutions. This is a full-time position based in Costa Rica. **Qualifications:** Ph.D. in biology, ecology, conservation biology or a related field, experience in teaching and managing field courses, professional experience in the tropics, and a strong interest in team teaching and interdisciplinary collaboration. Experience in hands-on experiential teaching and research a plus. Applicants should have excellent communication skills, be bilingual (Spanish/English), and be able to work a flexible schedule. **Anticipated Start Date:** January or February, 2008. **Application deadline:** December 10, 2008

To apply, submit cover letter, curriculum vitae with list of references, and statement of professional interests and philosophy to Education Director academic@ots.ac.cr. Electronic applications may be submitted online via the OTS website (www.ots.ac.cr). Electronic submissions require that all application materials be in a single word or pdf file. Applications submitted by regular mail may be sent to the Education Director, Organization for Tropical Studies, Box 90630, Durham, NC 27708-0630. OTS is an equal opportunity and affirmative action employer.

Call for Applications:

PASI- **Pan-American Advanced Study Institute**

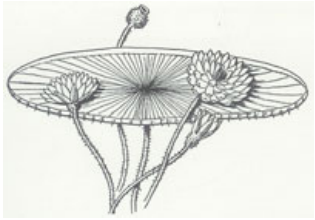
"Interdisciplinary Studies in Tropical Chemical Biology"

Tambopata, Peru - May 26-June 5, 2008

We are accepting applications for an NSF-sponsored PASI workshop on tropical chemical biology to be held in the Amazon rainforest. Who can apply: post-docs and high-level PhDs from North or South America. Workshop lecturers are leaders in the fields of tropical ecology, biology, biochemistry and similar fields; format will include lectures, demonstrations, discussions and field trips to the surrounding rainforest. The workshop will conclude with a poster session. Airfare, lodging, and meals of all participants are paid. To apply, email a current resume, including publications, a list of three references and their contact information, and a 2-3 page letter of interest to Jorge Vivanco, j.vivanco@colostate.edu. Women and minorities are particularly encouraged to apply.

http://crb.colostate.edu/home/PASI.htm

Deadline: October 31, 2007



GENTRY AND BACARDI AWARD WINNERS ANNOUNCED

Three young biologists were recognized for their excellent research presentations during the ATBC annual meeting in Morélia, Mexico, in July of 2007. The Bacardi Award, awarded to a young PhD scientist within 5 years of receiving her/his degree, is given for the best paper presentation on a conservation theme. The Alwyn Gentry awards are given annually to recognize the outstanding student paper and the best student poster presented at the annual meeting. The selection committee, chaired by Dr. Susan Laurance, reviewed papers and presentations by over 100 eligible nominees for these awards at the Morélia meeting.

The Bacardi Award went to Dr. J. Nicolas Urbina-Cardona, from the Instituto de Biologia, UNAM, Mexico, for his paper entitled "Edge effects on tropical herpetofauna: The influence of seasonality and edge orientation," which he co-authored with Hugo Victor Reynoso. The Alwyn Gentry award for the Best Student Paper Presentation was given to Alemayehu Wassie, from Wageningen University in the Netherlands, for a presentation entitled "Species and structural composition of church forests in a fragmented landscape of Northern Ethiopia," which was coauthored with Frank Sterck, Tesfaye Bekele, Demel Teketay and Frans Bongers. Tanya Hawley, of the University of Miami, Florida, USA, won the Gentry Award for Best Student Poster Presentation for 2007 for her poster presentation entitled "Mechanisms underlying adult occupancy patterns: tadpole performance in pasture, edge, and forest sites."

Congratulations to these three winners for the quality of their research, and to all the nominees for these awards, for their ongoing contributions to extending our understanding of tropical biology world-wide.

Association for Tropical Biology and Conservation

The ATBC Conservation Committee produces a number of formal, high-profile resolutions each year focusing on endangered tropical ecosystems and threatening processes. As such, it is one of the ATBC's most important initiatives, for which the society has received considerable press coverage and recognition. If you would like to join the committee, please contact co-chair William Laurance (laurancew@si.edu).

RESOLUTION CONCERNING THE 'HEART OF BORNEO' TRANSBOUNDARY CONSERVATION INITIATIVE

WHEREAS, the forests of Borneo are exceptionally species-rich in both flora and fauna, sustain a large proportion of locally and regionally endemic species, and have new species continually being discovered; and

WHEREAS, these forests store globally significant amounts of carbon in both their vegetation and soils; and

WHEREAS, Bornean forests provide homes, food, and other natural products to a large number of local peoples; and

WHEREAS, these forests are experiencing one of the highest rates of deforestation in the world (recently over 3.9% per annum) via poor timber-harvesting practices, conversion to plantations or agriculture, fires, and other threatening processes; and

WHEREAS, hunting and the international trade in wildlife products, in concert with vastly increased physical accessibility to forests via expanding road and logging networks, is having a devastating impact on many Bornean wildlife species, particularly larger vertebrates such as the Sumatran Rhino, primates such as the Orang Utan and Bornean Gibbon, and many birds including several hornbill species, pheasants, and raptors; and

WHEREAS, many of these declining species have important functional impacts on forest ecosystems as predators, herbivores, seed dispersers, and plant pollinators; and

WHEREAS, many compelling reasons exist for the protection of 'megareserves' in the tropics, including maintaining viable populations of species that are vulnerable to hunting, forest fragmentation, and edge effects; reducing disturbance by fires; and providing the diverse range of habitats required by wildlife species that migrate seasonally along major elevational gradients or that move large distances in response to large, infrequent flowering and fruiting events; and

WHEREAS, the largest surviving tracts of undisturbed forest in South-East Asia occur in the Bornean transborder highlands of Brunei, Indonesia, and Malaysia; and

WHEREAS, the landmark declaration to support the 'Heart of Borneo' initiative by the governments of Brunei, Indonesia and Malaysia, signed on 12 February 2007, will create important mechanisms to establish a network of protected areas and land under sustainable management totalling 240,000 km^2; and

WHEREAS, forests protected by the Heart of Borneo initiative, as presently described, are largely concentrated in upland and montane areas; and

WHEREAS, the biodiversity of plants, invertebrates, vertebrates, and other species in Borneo has a remarkably complex geographical distribution, and is often concentrated in poorly protected lowland forests, in areas with unusual geologies and soil types, and in vulnerable coastal ecosystems;

THEREFORE, BE IT RESOLVED that the Association for Tropical Biology and Conservation, the world's largest scientific organization devoted to the study, protection, and sustainable use of tropical ecosystems:

- APPLAUDS the Governments of Brunei, Indonesia and Malaysia (hereafter the 'transboundary nations') for their pioneering decision to sign and support the Heart of Borneo declaration; and
- RECOGNIZES the leading role that nongovernmental organizations have played in promoting the critical Heart of Borneo initiative and in assisting the transboundary nations in its conceptualization, design, and implementation; and
- URGES the transboundary nations to recognize that the Heart of Borneo initiative, while of enormous importance, will not be sufficient in and of itself to protect Bornean biodiversity; and
- IMPLORES the transboundary nations to establish further protected areas in Borneo, especially in rapidly vanishing lowland forests and coastal ecosystems, either as part of the Heart of Borneo program or as separate initiatives; and
- IMPLORES the transboundary nations to improve biodiversity conservation in Bornean production forests, and to ensure that such forests are not simply converted to agricultural land-uses such as oil-palm plantations after logging.
- URGES the transboundary nations to improve the protection of their existing protected areas, especially for surviving reserves in lowland forests and other imperilled forest types, from illegal hunting, logging, encroachment, and wildlife trade; and
- URGES the international community, private sector, nongovernmental organizations, international aid agencies, scientific organizations, and government partners to provide direly needed financial and technical support for the crucial Heart of Borneo program and for related conservation initiatives to help protect the rapidly vanishing ecosystems and biodiversity of Borneo.

RESOLUTION SUPPORTING CONSERVATION OF CRITICAL ECOSYSTEMS AND RESEARCH SITES IN CENTRAL AMAZONIA

WHEREAS the forests of central Amazonia are of exceptional conservation significance, and sustain among the highest species diversities of trees, birds, mammals, reptiles, amphibians, and invertebrates in the world; and

WHEREAS the Biological Dynamics of Forest Fragments Project (BDFFP) in central Amazonia is one of the world's largest and longest-running ecological experiments, and is internationally renowned for its scientific importance and productivity; and

WHEREAS the BDFFP is a leading center for training Brazilian and international scientists, students, and environmental decision-makers, and has resulted to date in more than 120 M.Sc. and Ph.D. theses by Brazilian graduate students; and

WHEREAS the BDFFP study area, which spans about 1,000 km^2, is now being seriously imperiled by ill-conceived forest-colonization projects sponsored by the Brazilian Superintendancy for the Free Agricultural Area of Amazonas (SUFRAMA); and

WHEREAS, SUFRAMA plans to markedly increase forest-colonization projects in the Free Agricultural Area of Amazonas, including at least six colonization projects within the BDFFP study area; and

WHEREAS, several other important scientific study areas in central Amazonia, including key sites operated by Brazil's National Institute for Amazonian Research (INPA) and other organizations, are also threatened by ongoing or planned SUFRAMA-sponsored colonization projects; and

WHEREAS, the Central Amazonian Conservation Corridor, one of the most important networks of protected and indigenous lands in the Amazon, will also certainly suffer as a direct result of SUFRAMA-sponsored forest-colonization activities; and

WHEREAS the economic benefits of settling small-scale farmers in the central Amazon is extremely limited, given the notoriously poor and acidic soils in the region; and

WHEREAS, given the low agricultural productivity and remoteness of the region, small-scale farmers in central Amazonia are barely able to achieve sustainable, subsistence-livelihoods, and frequently live in disease-ridden areas far from medical facilities, schools, stores, public transportation, and other important services; and

WHEREAS in 2005 SUFRAMA sponsored a detailed Ecological and Economic Zoning (ZEE) plan of the extensive region in central Amazonia under its control, but has failed to release this document for public use and comment, despite the fact that it was paid for using public funds; and

WHEREAS many of the SUFRAMA-sponsored colonization projects are almost certainly in contravention of the unreleased ZEE plan, given that it was designed to rationalize land-use in the central-Amazonian region and to protect key scientific and conservation sites;

THEREFORE BE IT RESOLVED that the Association for Tropical Biology and Conservation, urges SUFRAMA to:

1) declare an immediate moratorium, of at least three years duration, on its ongoing and planned forest-colonization projects; and

2) release the critical ZEE report immediately, for formal public comment and consultation; and

3) consult closely with leading scientific and resource-management organizations in central Amazonia, including INPA, Brazil's national environmental agency (IBAMA), and the environmental-planning department of the Amazonas state government (SDS), regarding its planned forest-colonization activities; and

4) recommence forest-colonization projects only after the Brazilian public, and relevant scientific and resource-management organizations in Amazonia, have had an opportunity to comment fully on its proposed development plans, in light of the ZEE report; and

5) more generally, commit to consult with the Brazilian public and with key scientific and environmental stakeholders in Amazonia before any future land-use decisions are made or implemented within the central-Amazonian lands under its control.

The Association for Tropical Biology and Conservation

THE MORELIA DECLARATION

PROTECTION OF THREATENED TROPICAL DRY-FORESTS IN JALISCO, MEXICO

WHEREAS the Chamela-Cuixmala Biosphere Reserve of coastal Jalisco, Mexico is one of the most important protected areas and best-studied tropical dry forests in the Neotropics, and provides habitat for more than 1200 species of plants, of which 314 are endemic to Mexico; 427 species of vertebrates, of which about 79 are endemic to Mexico; and more than 2000 species of insects; and

WHEREAS the Reserve is part of the World Network of Biosphere Reserves of the UNESCO's Man and the Biosphere Program (MAB), and is part of the RAMSAR network of Wetlands of International Importance; and

WHEREAS several turtle-nesting beaches in this region are protected under the Inter-American Convention for the Protection and Conservation of Sea Turtles, and the islands of the Bahía de Chamela were recently established as a wildlife refuge; and

WHEREAS, the Chamela-Cuixmala Biosphere Reserve is an area of very active biological research and student training, and therefore plays an invaluable role in the education of Mexican and international scientists; and

WHEREAS on November 22, 2006, the Mexican government's Environmental and Natural Resources Secretariat (Secretaria de Medio Ambiente y Recursos Naturales, SEMARNAT) authorized two tourist developments, known as "IEL La Huerta" and "Tambora". These developments were both located on lands adjacent to the Chamela-Cuixmala Biosphere Reserve and within the MAB International Reserve, along the coast in Jalisco state.

WHEREAS a technical panel of scientific researchers from four institutes of the National Autonomous University of Mexico (UNAM), the Instituto de Biología, Instituto de Ecología, Centro de Investigaciones en Ecosistemas, and Instituto de Geografía, conducted a detailed analysis of the Environmental Impact Assessment reports (EIAs) of these two tourist developments, and concluded that they lacked scientific and technical rigor (1) because key information on the biodiversity and conservation status of the flora and fauna was incomplete, and therefore the reports fail to adequate characterize the high biological importance of the region; (2) because both EIAs do not demonstrate that water, which is a very scarce resource in the region, would be used sustainably; and (3) because the EIAs fail to identify the type and extent of potential environmental and social impacts; and (4) because the reports do not establish viable mechanisms for the reduction or mitigation of those impacts.

WHEREAS the UNAM technical panel concluded that both projects, as proposed and approved, will have serious negative impacts on the integrity and ecological functioning of (1) the Chamela-Cuixmala Biosphere Reserve, (2) the International MAB Reserve, (3) nearby protected areas, and (4) the ecosystem of the region as a whole, and because these developments could also threaten the stability and equitable social development of the human populations in the region.

THEREFORE, BE IT RESOLVED that the Association for Tropical Biology and Conservation, during its 2007 annual meeting in Morelia, Mochoacan, Mexico, from 16-19 July, urges the Mexican Secretaria de Medio Ambiente y Recursos Naturales to:

1) assess the authorizations given to these two projects very carefully, to ensure that they were conducted according to current official norms and environmental laws, and taking into account relevant international treaties; and

2) reevaluate the EIAs for each of these projects, explicitly considering the analyses provided by the UNAM technical panel; and
3) suspend both project authorizations unless it can be demonstrated that the above objections to these projects have unquestionably been satisfied.

THE ATBC FURTHER ADVISES the Secretaria de Medio Ambiente y Recursos Naturales to:

1) critically evaluate two additional projects currently under evaluation (Rancho Don Andres and San Carlos), as well as any future development projects that would potentially impact the critical Chamela-Cuixmala Biosphere Reserve, considering not only their individual effects but their synergic impacts on this biologically outstanding region of the world; and

2) carefully consider the views of the relevant scientific community when assessing these impacts and proposed development projects.

Courses, Post-Docs, and Fellowship Opportunities

COURSE IN ENVIRONMENTAL LEADERSHIP

The Smithsonian Institution's Monitoring and Assessment of Biodiversity program is offering a course in "Effective Leadership and Communication Tools for Environmental Management and Conservation from January 6th - 16th, 2008. This course will provide participants with the knowledge and understanding of the communication and leadership capacities of environmental leaders, decision makers, and business executives. In addition, we are excited to offer undergraduate and graduate courses in Conservation Biology through a semester program with George Mason University. For further information visit our website at www.si.edu/simab

AWARDS FOR BOTANICAL STUDY AT THE ACADEMY OF NATURAL SCIENCES IN PHILADELPHIA, PA, USA

The Jessup and McHenry Awards (http://www.ansp.org/research/opportunities/jessup_mchenry.php) are offered by the Academy of Natural Sciences in Philadelphia, PA, USA. The McHenry Fund is available to botanists who wish to study our botanical collection. Please visit the Academy¹s Botany Department website for additional information about our department: http://www.ansp.org/research/biodiv/botany/index.php The deadline is October 1, 2007. For further information on these fellowships, contact: Alina Freire-Fierro, Collection Manager, at freirefierro@ansp.org.

THE CHRISTENSEN FUND GRADUATE FELLOWSHIP PROGRAM IN PLANT CONSERVATION

The Whitney R. Harris World Ecology Center at the University of Missouri-St. Louis offers fully funded fellowships to students from tropical America, Africa, Madagascar, Asia, Malesia and the Pacific Islands with strong leadership and research potential in applied plant conservation. This fellowship is available to individuals with applied plant conservation experience and strong academic credentials for studies leading to a M.S. or Ph.D. degree. This special Graduate program in Plant Conservation, developed in collaboration with The Christensen Fund and the Missouri Botanical Garden, is designed to educate plant conservation scientists from the world's tropical regions. The fellowship will provide recruitment and repatriation airfares, stipend, tuition fee waiver and the opportunity to apply for competitive research funds.

To learn more about The Christensen Fund Graduate Fellowship Program in Plant Conservation visit: http://hwec.umsl.edu/scholarships/plantconservation.html or write to: Executive Director, Whitney R. Harris World Ecology Center, University of Missouri-St. Louis, 1 University Boulevard, St. Louis, MO 63121-4499, USA (email: osbornepl@umsl.edu). Application review, for admission in August 2008, will begin in January 2008 and complete applications received before January 15, 2008 will be considered. Application forms can be obtained from the Harris Center web page at http://hwec.umsl.edu/application.

POSTDOCTORAL FELLOWSHIP IN TROPICAL FOREST ECOLOGY

Center for Tropical Forest Science - Arnold Arboretum Asia Program of The Smithsonian Tropical Research Institute

The Center for Tropical Forest Science-Arnold Arboretum (CTFS-AA) Asia Program coordinates a network of long-term research programs in the tropical forests of eight Asian countries. Postdoctoral Fellows are sought in forest ecology and the evolution and biogeography of forest communities. Strong analytical background preferred; established record of research and scholarly publication in tropical forest ecology and/or evolution required. Positions based at Harvard University. Send curriculum vitae and names of three references to: Stuart Davies, CTFS-AA Asia Program, The Arnold Arboretum, Harvard University, 22 Divinity Avenue, Cambridge, MA 02138, U.S.A. Email: sdavies@oeb.harvard.edu. The Arnold Arboretum of Harvard University and the Smithsonian Tropical Research Institute are Equal Opportunity/ Affirmative Action Employers

EDITOR SOUGHT FOR ORNITOLÓGIA NEOTROPICAL

The Neotropical Ornithological Society is in search of a new editor for its journal Ornitológia Neotropical. The new editor will replace the current editor who plans to retire from his editorial duties in 2009. Potential candidates should be capable of editing manuscripts in both English and Spanish. An ability to read Portuguese is also useful. The journal is published four times a year with approximately 660 pages per volume based on receipt of 4 to 5 manuscripts per week. The editor is responsible for identifying and communicating with reviewers as well as making final decision on manuscripts and providing editorial comments. The editorial board may be enlisted to assist with the review process or suggest appropriate reviewers. The society is presently exploring the possibility of making the journal available online to its membership. Those interested in the position of editor or those who wish to suggest names as candidates for a new editor should contact Joseph M. Wunderle at jmwunderle@gmail.com.

UPCOMING COURSES WITH THE ORGANIZATION FOR TROPICAL STUDIES

The Organization for Tropical Studies (OTS) announces its classic 8-week intensive field course, Tropical Biology: An Ecological Approach, to be offered in Costa Rica January 25 - March 18, 2008. Applications deadline is October 12, 2007. Future offerings of this course are June-August 2009, January-March 2010, alternating odd year summers and even year winters. Information and application forms are available online at www.ots.duke.edu

OTS has also launched an exciting new series of short specialty courses. Applications are still being accepted for Tropical Lichens (Sept 10-23, 2007), Tropical Agroecology (Oct 11-20), Tropical Ferns & Lycophytes (Jan 9-23, 2008), Estuarios Tropicales (Feb 18-23), Tropical Herpetology (May 16-27) and Conservation & Biodiversity Genetics (May 18-31). See http://www.ots.duke.edu/en/education/specialty_courses.shtml for details.

OSA BIODIVERSITY CENTER OFFERS WORLD CLASS FACILITIES FOR TROPICAL ECOLOGY COURSES AND LONG-TERM RESEARCH

The Osa Biodiversity Center, OBC, which opened its doors to scientists and student groups in January of 2007, is a nonprofit research, teaching, and training facility in Costa Rica's Osa Peninsula. The center is run by Friends of the Osa (www.osaconservation.org) and is located in the heart of a 2000 hectare Osa National Wildlife Refuge. The OBC itself includes 1000 hectares owned and managed directly by Friends of the Osa.

Primary and secondary-growth forest habitats as well as freshwater and marine ecosystems are all accessible via a short walk along the OBC's extensive trail network. Wildlife is abundant—four species of monkey, scarlet macaws, and many large keystone mammals including tapir, peccary, and large cats are regularly sighted on the property. The Golfo Dulce, one of the world's four deep tropical fjords, and Corcovado National Park, the crown-jewel of Costa Rica's Park system, are each within an hour's drive of the center.

The OBC can host up to 25 people in its three houses, each of which includes a kitchenette, bathing facilities and 3 bedrooms. There is also a spacious laboratory with a secure storage room and space for meetings, as well as a dining facility where group meals are prepared. A solar panel array provides lighting and power for electronic equipment, and a satellite system affords high-speed access to the internet.

Please contact Jennifer Cruz at jencruz@osaconservation.org for information about bringing course groups to the OBD or conducting research at the facility.

MEETINGS CALENDAR

2007

THE THEORY OF ISLAND BIOGEOGRAPHY AT 40: Impacts and Prospects. 5-6 October, 2007, sponsored by Harvard University's Center for the Environment and Museum of Comparative Zoology. For more information, visit http://www.mcz.harvard.edu/events/island_biogeography/

34th ANNUAL NATURAL AREAS CONFERENCE, 9-12 October, 2007, in Cleveland, Ohio. The theme is "Some Assembly Required: Preserving Nature in a Fragmented Landscape. For information: http://www.naturalarea.org/07conference/

54th ANNUAL SYSTEMATICS SYMPOSIUM, MISSOURI BOTANICAL GARDEN, 12-13 October, 2007. "Biodiversity and Conservation in the Andes." To read more: http://www.mobot.org/MOBOT/research/symposium/welcome.shtml

ECOLOGICAL SOCIETY OF AUSTRALIA 2007 CONFERENCE, 25-30 November, 2007, Perth Convention Centre, Perth, Western Australia. The theme is "Adapting to Change: Society-Environment, Science. Web page at: http://www.ecolsoc.org.au/ESA2007Conference.htm

INTERNATIONAL TROPICAL ECOLOGY CONGRESS, 2-5 December 2007, in Dehra Dun, India. The meeting is jointly sponsored by the International Society for Tropical Ecology and the H.N.B.Garhwal University, India. The meeting is at Garhwal University in Srinagar, Uttarakhand, India. Information at www.tropecol.com

2008

19th WORLD ORCHID CONFERENCE: "Orchids – Nature's Masterpiece," 23-27 January, 2008, in Miami, Florida. More information at http://www.19woc.com/

UNDERUTILIZED PLANT SPECIES FOR FOOD, NUTRITION, INCOME AND SUSTAINABLE DEVELOPMENT, 3-7 March 2008, in Arusha, Tanzania. Web site at http://www.icuc-iwmi.org/Symposium2008/index.htm

3rd CONFERENCE OF CARIBBEAN BOTANIC GARDENS FOR CONSERVATION, 24-28 March, 2008. For information, contact Cuban National Botanic Garden: Dr. Angela Leiva Sánchez, General Director, email: leivajbn@ceniai.inf.cu

ASSOCIATION FOR TROPICAL BIOLOGY AND CONSERVATION, 9-13 June, 2008. The theme is, Past and Recent History of Tropical Ecosystems: Cross-continental Comparisons and Lessons for the Future. The meeting will be held in Paramaraibo, Suriname. For details, visit the web page at http://www.atbc2008.org/

SOCIETY FOR CONSERVATION BIOLOGY, 13-18 July, 2008. The annual meeting will be hosted by the University of Tennessee, Chatanooga, and the theme will be "From the Mountains to the Sea." Information is available at the website, http://www.conbio.org/2008/calls.cfm

BOTANY 2008: 26-30 July, 2008. The Botanical Society of American and the Canadian Botanical Association/L'Association Botanique du Canada will hold a joint meeting on the University of British Columbia campus in Vancouver, Canada. The Botany 2008 Conference website can be found at http://www.2008.botanyconference.org/

.ECOLOGICAL SOCIETY OF AMERICA ANNUAL MEETING, 3-8 August, 2008, in Milwaukee, Wisconsin, USA. The topic is "Enhancing Ecological Thought by Linking Research and Education." The web site is http://www.esa.org/milwaukee/

CAMEROON ETHNOBOTANY NETWORK (CEN) 3rd International Symposium, 11-13 September, 2008, Fidelie Hotel, Kribi, Cameroon. For more information, contact Pr. Bernard-Aloys Nkongmeneck, Président du CEN, e-mail: bnkongme@yahoo.fr or cenrce@yahoo.fr

WORLD BIODIVERSITY CONFERENCE, 20-22 November, 2008, Chiang Mai, Thailand. This converence is organized by the Century Foundation, India. More information at http://www.bgci.org/worldwide/event/0109/

Planning ahead:

5th SYMPOSIUM/WORKSHOP ON FRUGIVORES AND SEED DISPERSAL, 13-17 June 2010 at the Corum Conference Center, Montpellier, France.

BOOK REVIEWERS SOUGHT FOR *TROPINET*

The editor has received the following books for review in *Tropinet*. If you are interested in providing a review for any of these books, please contact Lyn Loveless at mloveless@wooster.edu. Indicate, in your email, which book you feel qualified to review, and an approximate timeline for your review. Reviewers from tropical countries who will then make these books available to local researchers are especially welcome.

Posey, Darrel A. and Michael J. Balick (eds). 2006. *Human Impacts on Amazonia.* Columbia University Press, 366 pages.

McShane, Thomas O. and Michael P. Wells. 2004. *Getting Biodiversity Projects to Work: Towards More Effective Conservation and Development.* Columbia University Press, 442 pp.

Motley, Timothy J., Nyree Zerega, and Hugh Cross (eds). 2006. *Darwin's Harvest: New Approaches to the Origins, Evolution, and Conservation of Crops.* Columbia University Press, 390 pages.

Tsing, Anna Lowenhaupt. 2004. *Friction: An Ethnography of Global Connection.* Princeton University Press. (an account of the destruction of Kalimantan forests in the 1980s and 1990s). 321 pages.

Gannon, Michael R., Allen Kurta, Armando Rodriguez-Durán, and Michael R. Willing. 2005. *Bats of Puerto Rico: An Island Focus and a Caribbean Perspective.* Texas Tech University Press. 235 pages.

Fleming, Theodore H. and Alfonso Valiente-Banuet. 2002. *Columnar Cacti and their Mutualists. Evolution, Ecology, and Conservation.* University of Arizona Press. 371 pages.

Poorter, L., F. Bongers, F.N', Kouamé, and W. D. Hawthorne. 2003. *Biodiversity of West African Forests: An Ecological Atlas of Woody Plant Species.* CABI Publishing, 521 pages.

Francis, Charles M. 2001. *A Photographic Guide to Mammals of South-East Asia*. Ralph Curtis Books. 128 pages.

Withers, Martin B. and David Hosking. *Wildlife of East Africa.* Princeton Pocket Guides. Princeton University Press.

Tebbitt, Mark C. 2005. *Begonias: Cultivation, Identification, and Natural History.* Timber Press.

Tropinet is published quarterly by the Association for Tropical Biology and Conservation (ATBC) and the Organization for Tropical Studies (OTS) and is available at http://www.atbio.org to all interested readers. ATBC is an international society that promotes tropical biology and conservation in its broadest sense. ATBC publishes the quarterly journal BIOTROPICA and sponsors annual meetings and symposia. Information: W. John Kress, ATBC Executive Director, Department of Botany, MRC-166, National Museum of Natural History, Smithsonian Institution, P.O. Box 37012, Washington, DC 20560. OTS is a non-profit consortium of 63 academic and research institutions in the United States, Australia, Latin America, and Asia. Its mission is to provide leadership in education, research and the responsible use of natural resouces in the tropics. Graduate, undergraduate, and professional training and research facilities are provided at three field stations in Costa Rica. Information: http://www.ots.duke.edu, or at OTS, Box 90630, Durham, NC 27708-0630.

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Waldmann, Georg and Michael Stevens. 2001. *Bibliography of the Natural History of the Lesser Antilles.* Acta Biologica Benrodis Supplement 8.

Jones, H. Lee. 2003. *Birds of Belize.* University of Texas Press. 317 pages.

Co, L., J. LaFrankie, D. Lagunzad, K. Pasion, H. Consunji, N. Bartolome, S. Yap, J. Molina, M. Tongco, U. Ferreras, S. Davies, P. Ashton. 2006. *Forest Trees of Palanan, Philippines: A Study in Population Biology.* Center for Integrative and Development Studies (CIDS), University of the Philippines. 313 pages.

Alonso, Leeanne E. and Haydi J. Berrenstein (eds). 2006. *A Rapid Biological Assessment of the Aquatic Ecosystems of the Coppename River Basin, Suriname.* RAP Bulletin of Biological Assessment 39. Conservation International.

Wainwright, Mark. 2007. *The Mammals of Costa Rica: A Natural History and Field Guide.* Cornell University Press.

Clements, James. F. 2007. *The Clements Checklist of Birds of the World.* Cornell University Press.

De Freitas, J. A., B. S. J. Nijhof, A. C. Rojer and A. O Debrot. 2006. *Landscape Ecological Vegetation Map of the Island of Bonaire (Southern Caribbean).* University of Chicago Press.