

WOMEN IN HERPETOLOGY

On the Iguana Trail

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Photographs by the author except where indicated.

I met my first wild iguana in the spring of 2000. After sailing southeast from Nassau to the Exuma Island chain in the Bahamas, we landed in the midst of the Allen Cays. This was not only my first wild iguana encounter, it was my first time in the Caribbean — and it was breathtaking. I was on a May-term research trip with my undergraduate mentor, John Iverson. Reptiles had always fascinated me, but seeing these iguanas in their natural habitat brought them into a new light. I was immediately enthralled by their behavior and ecstatic about being able to take part in Dr. Iverson's long-term study of the Allen Cays Rock Iguana, *Cyclura cyclura inornata*. Over the course of my undergraduate career, I continued to take part in this iguana study and as many other herpetological projects as possible. These ranged from studying the dynamics of amphibian re-introductions to the dynamics of over-wintering Northern Painted Turtles (*Chrysemys picta*) and the daily activities of the Lesser Antillean endemic *Iguana delicatissima*.

After securing a spot to pursue my doctorate at the University of Tennessee, I took a year off to gain more experience with reptiles around the world. This adventure started with a move to Australia as a visiting fellow at the Australian National University in Canberra. I spent six months there working with Sharon Downes and Scott Keogh on a behavioral study

of retreat-site selection in Velvet Geckos (*Oedura lesueurii*). I then traveled to Costa Rica as a biological consultant on a locally driven sea turtle project in Parismina. It was this latter experience that provided my first encounter with the difficulties of being a young female herpetologist. I immediately was told that the local team was surprised (and, in some cases, disappointed) to find out that a young female had come to share information in an effort to revamp the *in situ* egg incubation project that was underway. Despite the difficulties, I forged on and was able to gain some of the group's trust and support. Finishing my time abroad with a little backpacking from Costa Rica to Mexico, I returned to the U.S. to begin work on my Ph.D. dissertation.

My time in Central America exposed me to a new group of iguanas, the ctenosaurs or Spiny-tailed Iguanas (*Ctenosaura* spp.). Apparently, no matter what I did, something always drew me back to iguanas. Thus, under the mentorship of Sandy Echternacht, I developed and implemented a doctoral project in which I evaluated a variety of conservation issues with regard to the *Ctenosaura palearis* clade of Honduras and Guatemala. This clade includes four of the most threatened species within the genus. I used molecular techniques to better understand the species boundaries within this clade, evaluating the threat of hybridization between the island endemic



Marked adult male *Ctenosaura oedirhina* at the Gumbalimba Park and Reserve, Roatán.



Piebald *Ctenosaura oedirhina* at the Gumbalimba Park and Reserve, Roatán.



Local field assistant, Mikel Belcaries, and the author with the research vehicle.

C. bakeri and its wide-ranging congener, *C. similis*, and defining evolutionarily significant units for the disjunct populations of *C. melanosterna*.

Throughout my time researching these four species of ctenosaurs, I became increasingly aware of the fact that very little was known about them. In particular, nearly nothing had been done to better understand the basic biology of the island endemic, *C. oedirhina*, which was not formally described until 1987. Thus, throughout the last year of my Ph.D. program, I devoted my spare time to grant writing, in hopes of creating a post-doctoral position for myself to return to Roatán, Honduras and focus on this very understudied, threatened species. Upon completion of my Ph.D. and with funding from USFWS Wildlife Without Borders, Mohamed bin Zayed Species Conservation Fund, the International Iguana Foundation,

and the Dutch Iguana Foundation, I moved to Roatán in August 2010 to begin creating a conservation program. This program, in line with my goals as a conservation biologist, was to approach the situation from a holistic perspective, joining research with education and management planning, all the while working closely with the local community.

The Iguanas

Large lizards, such as the iguanas, are among the most endangered species of lizards in the world. This is attributable in part to the fact that many of these species are island endemics. Threats faced by island species often are accentuated, as these forms are restricted to small and often rapidly developing areas, are more prone to extinction from introduced competitors and predators, and are at a higher risk for threats associated with the loss of genetic diversity. Iguanas also are often targets of harvesting for human consumption and the international pet trade.

Among the many reptiles in danger of extinction in Mesoamerica are the Spiny-tailed Iguanas (*Ctenosaura* spp.). Of the 11 genera of iguanid lizards, the genus *Ctenosaura* is the most species-rich, encompassing 18 currently recognized species, or nearly 50% of the known diversity in the family Iguanidae. This understudied genus of iguanas is threatened with extinction primarily due to habitat destruction and over-harvesting, and has not attracted as much publicity or as many conservation efforts as their close relatives, the endangered West Indian Rock Iguanas in the genus *Cyclura*. In most cases, ctenosaurs lack any *active* means of protection at the national and regional levels. Although laws are often in place, enforcement has been sporadic at best. Consequently, illegal poaching usually goes unnoticed. Likewise, in many cases, destruction of prime ctenosaur habitats (e.g., mangrove forests) is prohibited, but proceeds anyway, as habitats are afforded almost no effective protection.

The four species in the *C. palearis* clade (*C. palearis*, *C. oedirhina*, *C. bakeri*, and *C. melanosterna*) are included in the IUCN Red List of Threatened and Endangered Species. They are endemic to the Bay Islands and northern versant of Honduras, and the Valle de Motagua, Guatemala. This clade encompasses the most threatened species within the genus and exemplifies the family-wide decline associated with a particular vulnerability due to their narrow ranges. To combat a more recent threat, in a joint effort between Daniel Ariano of the Guatemalan NGO Zootropic, myself, and the Guatemalan and Honduran governments, we succeeded in the inclusion of all four of these species in CITES Appendix II. This is a great step forward for conservation of these species on the international level, but does not address many of the national and regional issues that must be considered in order to protect these animals. Despite a current lack of information concerning the basic biology of these species, evidence strongly suggests that all four species are in decline and at high risk of extinction. The 2008 IUCN Iguana Specialists Group (ISG) meeting and workshop



Ctenosaura oedirhina in the Red Mangrove forest near Jonesville, Roatán.

on Utila identified research objectives necessary to protect and conserve *C. melanosterna*, *C. bakeri*, and *C. palearis*. Unfortunately, concerns regarding *C. oedirhina* could not be addressed due to a lack of basic information.

Roatán's Spiny-tailed Iguanas (*Ctenosaura oedirhina*) are endemic to the small (156 km²) and rapidly developing island of Roatán, located 48 km north of the Caribbean versant of Honduras. This species is listed as Endangered on the IUCN Red List (www.iucnredlist.org/apps/redlist/details/44191/0) due to its limited and fragmented geographic range, small population size, and imminent threats posed by habitat destruction and the pet trade. More recently, a new threat has become apparent. A wide-ranging congener, *C. similis*, has been introduced to a small island just off Roatán. Since *C. similis* could easily navigate the narrow canal between this satellite island and Roatán itself, this introduction has the potential to devastate the *C. oedirhina* population through competition and/or hybridization with the introduced species. *Ctenosaura similis* is known to hybridize with *C. bakeri*, the sister taxon of *C. oedirhina*. Consequently, the same threat is almost certainly applicable to *C. oedirhina*. To combat the potential extinction of this species, I formulated a multi-faceted approach, focusing on local capacity building, education, habitat protection, and population monitoring.

In a situation such as this, where no active legislation protects the species, no local awareness concerning the status of the species exists, and hunting is the greatest threat, education and grass-roots initiatives are the key to sustainable conservation measures. The situation is made even more difficult by the fact that little is known about the biology of these lizards. Thus, in order to commence an education program, basic biological data need to be collected simultaneously. Although complex, this situation provides an opportunity for me to involve local individuals in all aspects of the project, enhancing the likelihood that they will develop a sense of ownership and pride in the project and any subsequent conservation measures, and that this desire will facilitate the continuation of the project into the future.

I currently am working with local individuals to collect life history data concerning morphometrics, diet, reproduction, population size, and extent of occurrence. Local involvement not only aids in the collection of these data, but also allows the community to feel comfortable asking questions and then sharing the information. Thus far, we have made some exciting discoveries. For example, we have identified what appears to be an ontogenetic shift toward piebaldism and an ability for limb regeneration, neither of which have ever been documented in iguanas. I also am working to create awareness among local tour guides, so that they may disseminate information to tourists who often are offered iguana meat, with property owners in developing grass-roots conservation actions for their respective properties, and with schools interested in adding a conservation component into their curricula. In addition, we have started holding a series of



Ctenosaura oedirhina in a Black Mangrove at a permanent study site, Coco View Resort, Roatán.

workshops, where representatives from local organizations and stakeholders throughout the region get together to discuss conservation issues in general and how they relate to the protection of Roatán's endemic iguanas. These meetings have been hugely beneficial not only to my project goals but in bringing these individuals together to form collaborations for the betterment of the entire biota of the region.

As with any career, one faces difficulties. These challenges, however, cause one to become stronger and more driven. Although herpetology has traditionally been male-biased, I feel that the difficulties for a woman are essentially the same problems women face in the sciences in general. Being taken seriously has been the greatest struggle for me, particularly while in the field catching and handling animals. However, a positive side becomes evident once people observe these field methods a few times; they often are eager to become involved, and are frequently less intimidated when approaching me than they might be with a man. On many occasions, I have been preparing to catch an iguana when a local man steps forward to warn me about the dangers of attempting such a task. However, after seeing me complete the capture without incurring any harm, they are eager to discuss the situation and become engaged. In addition, women and children often feel particularly comfortable approaching me and asking to take part in the studies. I feel that it is important for people to witness women in roles in which they normally see men. The demography of many disciplines is constantly changing, and the most important thing a female herpetologist — or scientist of any kind — can do is support and encourage others. The field of herpetology (like all sciences) and the unique and wonderful creatures that need our protection will benefit from the multiple perspectives of more diverse advocates.



MICHEL BEL-CARRIES

The author (far left) training tour guides about *Ctenosaura oedirhina* at one of her study sites, Gumbalimba Park and Reserve, Roatán.



Juvenile Stout Iguanas (*Cyclura pinguis*) spend much of their time in trees. This individual (marked #12) was taking an afternoon nap in a White Cedar (*Tabebuia heterophylla*). It was not disturbed while this photograph was taken.