



Year of the Lizard News

No. 2

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www.YearoftheLizard.org

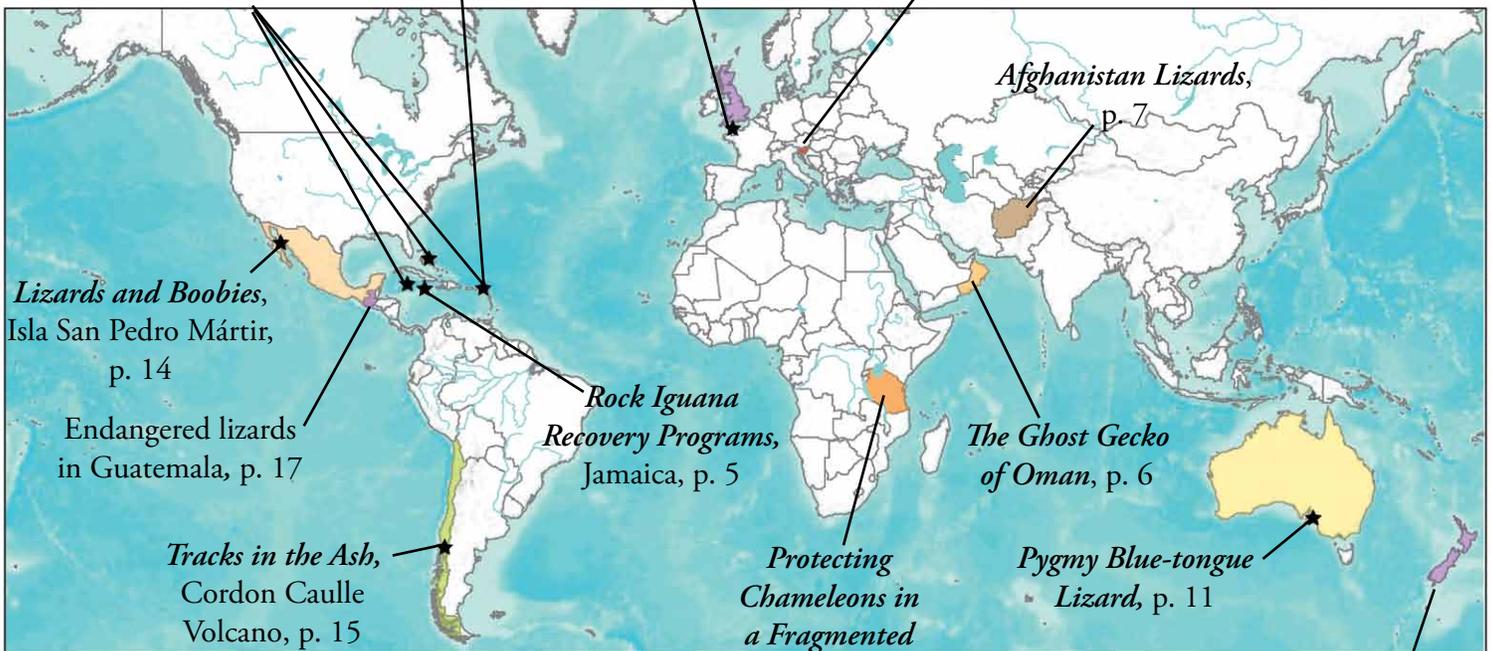
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The genus *Holbrookia* belongs to the *Phrynosomatidae*, one of the Featured Families in this month's newsletter. Female *Holbrookia maculata* (Common Lesser Earless Lizard) like this one photographed by Mike Hill become orange-striped when gravid, a feature that may warn off prowling males.

Look for Issue No. 3 of Year of the Lizard News in May!

"Precisely the least, the softest, lightest, a lizard's rustling, a breath, a flash, a moment - a little makes the way of the best happiness."

Friedrich Nietzsche (German classical scholar, philosopher and critic of culture, 1844-1900)

Get Your March Photo Contest Calendar



The few, the proud, the Lesser Antillean Iguanas! Karl Questel photographed this *Iguana delicatissima*, one of 14 of its species relocated to Fourchue Island. To get a better look at this month's winner and runner-up, download the free **Year of the Lizard Photo Contest Calendar** for March at www.yearofthelizard.org. And don't forget to check back in April for the next monthly calendar.

Call for Photos for the 2012 Year of the Lizard Calendar Photo Contest

We are seeking close-up, digital photos of lizards, preferably in their natural habitats or within an educational or conservation context. One winner will be selected each month to be the featured photo as part of the Year of the Lizard online calendar. Runner-up photos will also be included in the calendar. Additionally, all submitted images will be considered for use in the Year of the Lizard monthly newsletter and website as well as other Year of the Lizard related conservation, outreach, and educational efforts. Give us your best shot! For more information and for entry details, please visit <http://www.parcplace.org/images/stories/YOT/YOLphotocontest.pdf>.



Some of the fantastic photos already submitted include this Plumed Basilisk (*Basiliscus plumifrons*) by Bill Parker (L) and this Black Spinytail Iguana (*Ctenosaura similis*) by Patrick Moldowan (below).



YOU Can Participate!

Submit Your Lizard Art, Stories, and Poetry

Submit photos of your lizard art (jpg, tiff, or pdf files) and copies of your stories and poems via email to yearofthelizard@gmail.com. Please include your name, location, and any comments about the submission in your email message. We will select several submissions to include in upcoming newsletters.

Submit Your Citizen Science Projects

A compilation of lizard citizen science (volunteer) inventory and monitoring projects has begun. These will be featured in our monthly newsletters. Send any information on these types of projects to yearofthelizard@gmail.com.

Ask the Experts!

Submit your lizard questions via email (yearofthelizard@gmail.com) to our panel of lizard experts, and we will select questions to answer in upcoming newsletters. Please include your name and location in your email message.

Are You an Educator or Interpretive Naturalist?

We are working to create resources for teachers and naturalists! If you are willing to share, please send your unit materials, educational program information, or PowerPoint presentations to yearofthelizard@gmail.com. Please include your name, the name of your school, nature center, or organization, and location. If you did not create the materials, please be sure to tell us where you found the materials.

March Year of the Lizard Collaborating Partners

The Year of the Lizard Planning Team is pleased to welcome the following organizations to our growing list of collaborating partners:



The **Horned Lizard Conservation Society** is a 501(c)3 non-profit organization dedicated to protecting horned lizards throughout North America. Our mission is to document and publicize the values and conservation needs of horned lizards, to promote horned lizard conservation projects and to assist with horned lizard management initiatives throughout their ranges. www.hornedlizards.org

The **Connecticut Department of Environmental Protection's Wildlife Division** (CT DEP Wildlife Division) is a state agency that has developed a number of programs to manage wildlife and contribute to diversified and healthy wildlife populations throughout the state. The CT DEP Wildlife Division is engaged in a comprehensive outreach and education effort to make the public more aware of the wildlife that can be found throughout the state. In 2012, the CT DEP Wildlife Division also has made a commitment to inform Connecticut residents about the state's native lizards through monthly press releases, articles and species profiles in issues of the bimonthly magazine, Connecticut Wildlife, a children's art contest, and related events. www.ct.gov/dep/wildlife



The **New York Department of Environmental Conservation's Bureau of Wildlife** is responsible for managing all the wildlife species in the State of New York. The Bureau had its origin in the Fisheries, Game and Forest Commission established by an act of the legislature April 25, 1895, at a time when many wildlife populations were threatened. Today the Bureau of Wildlife is involved in the restoration, recovery, and range expansion of several amphibians and reptiles, including the state threatened Eastern Fence Lizard, in order to stabilize and enhance populations for the enjoyment of future New Yorkers.

www.dec.ny.gov/animals/277.html

The **Amphibian and Reptile Conservation Trust** is the leading UK charity committed to conserving amphibians and reptiles and saving the disappearing habitats on which they depend. Our vision sees amphibians and reptiles thriving in their natural habitats, and a society inspired and committed to their conservation. www.arc-trust.org



Texas Herp Naturalists aims to advance appreciation of herpetofauna and other wildlife and wild places in Texas, understanding of natural history and biological concepts, and support for conservation of plant and animal communities in Texas. Texas Herp Naturalists is a project of Michael Smith and Clint King, consisting of a website and a quarterly e-publication, Texas Field Notes, distributed free to subscribers. www.texasherp.org

The group originally formed in 1993 formerly known as the Agile Frog Group was re-named in 2007 to **Jersey Amphibian and Reptile Group (JARG)**. The group's aims are to: Conserve through study and direct action, the native reptiles and amphibians of Jersey; Collect and collate herpetofauna records; Provide general advice on native reptiles and amphibians and their habitat management; and Raise awareness amongst the general public.



Working to save the Amphibians and Reptiles of Jersey

<http://groups.arguk.org/jarg>

If you are interested in contributing to the Year of the Lizard efforts, please send an email to yearofthelizard@gmail.com with a brief description of your organization and its efforts. Our full list of partners can be found at: www.parcplace.org/news-a-events/year-of-the-lizard/265.html.

The Year of the (Legless) Lizard in Britain!

By Dr. John W. Wilkinson, Amphibian and Reptile Conservation Trust and Nina Cornish, States of Jersey Department of the Environment

<http://www.arc-trust.org>

<http://groups.arguk.org/jarg>



Male Green Lizard (*Lacerta bilineata*) from Jersey (British Channel Islands). Only older individuals develop this much blue on their heads. Twenty years ago the species was declining on the island, but targeted habitat management and conservation focus have helped restore the species' fortunes. See <http://www.greenlizard.org.je>
Photo by John W. Wilkinson/ARC.

The species richness of amphibians and reptiles in the British Isles is poor as compared to continental Europe—many species failed to make it here before we were cut off from our neighbours by the melting ice of the last Ice Age. Eight species of reptile are considered native to different parts of Britain, however, including five species of lizard. Just three of these are found on the Channel Island of Jersey—the most southerly of the British Isles located just off the coast of north-west France. Two of the Jersey species, the Wall Lizard (*Podarcis muralis*) and Western Green Lizard (*Lacerta bilineata*) are not naturally found in mainland Great Britain (though both are introduced). Both have also been the focus of targeted conservation efforts by the States of Jersey Department of the Environment (Jersey is self-governing and takes responsibility for its own conservation action). The Wall Lizard was recently the subject of an MSc research project and the Green Lizard benefits from ongoing conservation (see <http://www.greenlizard.org.je>). Efforts to conserve the latter have been very effective in recent years and the species has shown some recovery.

As part of Jersey's efforts to protect

its native species, the island takes part in the National Amphibian and Reptile Recording Scheme (NARRS). Each year, volunteer surveyors are trained in a series of agreed protocols, compatible with herpetofauna monitoring in other parts of Britain (see www.narrs.org.uk) and given an area which is surveyed several times and its reptiles and/or amphibians recorded. Each year there is a different focus to highlight a species or issue relevant to conservation in the island. For 2012, and to coincide with the Year of the Lizard, the focus will be on the third of Jersey's lizard species, the legless anguid known as the Slow-worm (*Anguis fragilis*). These fascinating but secretive lizards are not slow at all but live mainly fossorially in ants' nests and under rotting wood, etc. The name probably comes from Middle English or Norse origins and translates

A female Slow-worm (*Anguis fragilis*) photographed on a Dorset heathland. The dark sides and vertebral strip identify this animal as a female. Slow-worm females give birth to up to 25 fully-formed young in late summer or early autumn. Photo by Fred Holmes/ARC.



broadly as “lithe dragon” (*wyrm*), though it is sometimes interpreted as meaning “slayer-of-worms”—one of their favourite foods!

The NARRS training this year will emphasize the importance of using refugia (usually corrugated metal sheets, roofing felt or carpet tiles) when conducting Slow-worm surveys in order improve the chances of detecting, and thus recording, their presence in a survey square. We can't be sure of how Slow-worms in Jersey are doing at the moment because they are so under-recorded! To further improve our knowledge of these enigmatic lizards, Jersey Department of the Environment will also be running a “citizen science” Slow-worm survey across the island in 2012. Slow-worm records will be collected from gardens and compost heaps and used to work out what kinds of anthropogenic habitats Slow-worms are using. We hope to collect enough information to establish a baseline of information against which to judge future trends and, where necessary, take action to conserve the species for the future.

This year, for the first time ever, the islanders of Guernsey will also be taking part in NARRS and, of course, we'll be asking them to keep a special eye out for their Slow-worms....

Rock Iguana Recovery Programs: Saving the Caribbean Dragons

By Tandora Grant, San Diego Zoo
Institute for Conservation Research

Rock Iguanas (*Cyclura* species) are the largest native extant vertebrates in northern Caribbean tropical dry forest islands. They are among the world's most endangered lizards primarily because most of their habitat has been severely degraded by human development and invasive alien species. In Jamaica, the introduced Indian Mongoose (*Herpestes javanicus*) eats iguana eggs, nearly all hatchlings, and sub-adults up to 900 grams in size. Several islands are overrun with free-ranging goats, cattle, and pigs that destroy iguana nests and food resources. For almost all populations, the predatory threat from dogs and cats, whether they are feral or semi-domesticated, is an iguana's biggest concern. Above all, mankind's steady pressure to convert forest and scrubland into resorts, houses, roads, plantations, and firewood has created an almost irreversible scenario causing precipitous declines in iguana populations.

But there is hope for these Caribbean dragons! Thought to be extinct since the 1940s, the rediscovery of *Cyclura collei* in Jamaica galvanized an international workshop on the biology of Caribbean iguanas.

Blood draw on wild
Jamaican Iguana
(*Cylura collei*). Photo
by Tandora Grant.



Field biologists, academic researchers, zoo professionals, and government policy-makers from throughout the West Indies and abroad attended the workshop. This represented the first time that so many professionals with a strong interest in the survival of West Indian Iguanas had gathered to share their expertise and concerns. From this workshop, collaborations grew and were formalized in both the IUCN SSC Iguana Specialist Group and an Association of Zoos and Aquarium's *Cyclura* Species Survival Plan program. As a researcher at the San Diego Zoo Institute for Conservation Research, I feel lucky to have been a member of both groups since the early stages and have been involved in diverse components of the conservation programs designed to save these amazing lizards.

Through the collective strength of our collaborations, these two groups have worked in tandem to reverse the extinction trend for *Cyclura*. The phases of our actions could be generalized as: research, strategy, and recovery. A species must be understood at a basic level in order to strategize for

its conservation. What plants and habitats do they need? What are the parameters for reproductive success? What are the reasons for their declines? With this background, we have formalized recovery plans for several of the species that outline action steps and clarify commitments from local government agencies and stakeholders, researchers, educators, and conservation organizations. Strategies have included aggressive predator control, habitat modification, translocation, captive headstarting of hatchlings for several years before release, captive breeding to maximize remnant genetic diversity, and metapopulation management. Molecular DNA analysis has also begun for several of the species and can potentially refine our knowledge of the population's composition and guide future management decisions.

Though our work is far from complete, Rock Iguana species that were once considered functionally extinct in the wild are now documenting milestones toward recovery. Because they are important seed dispersers, iguanas help ensure the persistence of healthy forests and the survival of other animals that share their island home.



Jamaican Iguana (*Cylura collei*) #M4 post-marking release. Photo by Tandora Grant.

The Ghost Gecko of Oman

By Todd Pierson, University of Georgia



Hemidactylus lemurinus, the Dhofar Leaf-toed Gecko

During the summer of 2011, I joined a herpetological expedition to the Arabian Peninsula with Dr. Ted Papenfuss of the Museum of Vertebrate Zoology, University of California, Berkeley. For six weeks, we traveled through the United Arab Emirates and Oman collecting primarily reptiles and some amphibians. The region is home to some interesting snakes, but what really makes the Arabian deserts fascinating is their lizard diversity, particularly in the family Gekkonidae.

Prior to my travels in Arabia, my experience with geckos was almost exclusively limited to the introduced *Hemidactylus* in the United States. I had limited knowledge of this family, and very little appreciation for its biodiversity. During my time in the Middle East, I witnessed the spectacularly beautiful *Teratoscincus*, the salt-flat dwelling *Pseudoceramodactylus*, and the climbing geckos of the genera *Asaccus* and *Ptyodactylus*, but one species in particular—a *Hemidactylus*, in fact—attracted my interest: the Dhofar Leaf-toed Gecko (*Hemidactylus lemurinus*).

The Dhofar—the world's leading producer of frankincense—is an interesting region in southern Oman. It receives heavy seasonal monsoon rains, and due to its close proximity to Africa, it has a distinct herpetological composition including *Naja*, *Bitis*, and *Chameleo*. The Dhofar is also home to quite a few species of geckos, but none are as interesting as *lemurinus*. Described by E. Nicholas Arnold in 1980 from a single canyon, the Dhofar Leaf-toed Gecko was an enigma from the beginning. It is a large, almost solid-white gecko whose specific epithet is derived from the Latin root meaning “ghost.” The type locality—Wadi Ayun—is a large canyon filled with giant, water-smoothed marble boulders, and while other *Hemidactylus* are sympatric, only *lemurinus*

can effectively scale these surfaces. Since its description more than 30 years ago, *lemurinus* has only been found at one additional site; it is essentially endemic to the marble boulders of Wadi Ayun.

After spending a few days in the Dhofar and successfully catching my first *Chameleo*, *Uromastyx*, and other interesting reptiles and amphibians, Ted and I decided to try for *Hemidactylus lemurinus*. We drove to Wadi Ayun, arriving at dusk. From the map, it had appeared that we could descend into the canyon from our parking spot, but upon arriving, we realized that this would be impossible. With the giant white boulders tantalizingly close below us, we were forced to settle for searching the rocky plateau on the top of the canyon. There were plenty of geckos—*Hemidactylus* cf. *yerberri*, *H. homoeolepis*, and *Ptyodactylus*—but we could not find any of our sought-after *lemurinus*. We were in the right place, but the specialized microhabitat was out of reach. This night, the geckos were truly ghosts.

Disappointed by our failure, Ted and I decided to return two nights later. This time, we found a road that dropped into the canyon itself, and we arrived at dusk to the base of the white boulders. Perfect. As soon as darkness fell, we began our search. Again, many other species abounded, including the aforementioned geckos and *Echis khosatzkii*. Just ten minutes into our search, I rounded one big boulder and watched a large gecko scurry vertically over the rockface, and disappear into a deep vertical crevice. A ghost! And shortly thereafter, another! My pathetic climbing abilities were no match for the grace and agility of these geckos, perfectly adapted for escaping clumsy predators in this canyon, and my attempts to catch them were in vain.

However, I quickly had a chance to redeem myself, as I soon spotted another *lemurinus* on a boulder. This one also attempted to scale the rock and escape, but I was able to climb up the edge of the boulder and cut off its path. Carefully balancing the quickness needed to snag the



lizard and the delicacy necessary not to break its tail, I secured it. Staring back at me with those big, gecko eyes was an incredibly beautiful *lemurinus*.

While the Arabian Peninsula is much better surveyed than it was a few decades ago, there are still discoveries to be made. More than just a spectacular gecko, *Hemidactylus lemurinus* serves as a reminder of the endless potential for exploration, and motivates herpetologists to continue searching for more diversity.



Todd Pierson (L) and Ted Papenfuss (R) holding *Uromastyx benti*, Bent's Spiny-tailed Lizard.

Afghanistan Lizards

By Theodore J. Papenfuss, Museum of Vertebrate Zoology, University of California, Berkeley, CA



Afghanistan has high lizard diversity, with 70 species recorded from the country. A species list, published in 1970, is not up to date and it is likely that additional species will be found when the country becomes peaceful and scientific exploration can start again. This is a poorly studied country due to several factors. The topography is very rugged, with huge mountains such as the Hindu Kush (above, left) and impassible deserts like the Registan Desert (above, right). Limited infrastructure makes travel difficult, and due to civil wars during the last 30 years, few biologists have conducted field work there. I was fortunate to spend three weeks collecting amphibians and reptiles in Afghanistan in 2000 as a guest of the Taliban government (below).

The geographic location of the country is the main reason why the lizard fauna is so diverse. There is a mix of West Asia species, East Asia species, and a number of endemic species restricted to the Hindu Kush and Registan Desert.

The Old World family Agamidae is well-represented in Afghanistan, with four genera present. Members of the genus *Phrynocephalus* are commonly called "Toad-headed Agamids." There are about 26 species that occur



Phrynocephalus clarkorum



Phrynocephalus luteoguttatus

from Mongolia west and south across the arid regions of China and the former Soviet Union through Southwest Asia to the Arabian Peninsula. Afghanistan is the center of diversity of this genus, with nine species recorded from the country. All *Phrynocephalus* are ground-dwelling and occur in both sand dunes and gravel flats.

I found five species that are illustrated here. *Phrynocephalus clarkorum*, *P. luteoguttatus* (p. 7), and *P. ornatus* (below, top) live in sand dunes while *P. maculatus* and *P. scutullatus* inhabit flat stony and gravel plains.



Phrynocephalus ornatus



P. maculatus

P. scutullatus



Trapelus agilis (below) is a ground-dwelling agamid that is found in much of arid Asia.



There are nine species of rock agamids in the genus *Laudakia* in the country, including *L. microlepis*, *L. tuberculata*, *L. badakhshana*.



L. microlepis

L. tuberculata



Mohammad with *L. badakhshana*



The Oriental Garden Lizard (*Calotes versicolor*) is an East Asian species that reaches its western limits of distribution in Afghanistan.





The dunes of the Registan Desert are inhabited by a sand-swimming skink, *Ophiomorus tridactylus* (top left). Fourteen *Eremias* species of the family Lacertidae are found throughout the country. One endemic species, *Eremias acutirostris* is restricted to the Registan (below left).



Of the 15 gecko species recorded from Afghanistan, one of the most interesting groups contains the frog-eyed geckos. One species, *Teratoscincus microlepis* (top right) is a dune specialist and another species, *T. bedriagai* (below right) is found in gravel flats.



Lizards in the News

Tiny Chameleon found in Madagascar! The full story available at http://azstarnet.com/news/weird-news/tiny-chameleon-found-in-madagascar/article_20c4c0ba-5805-11e1-9464-001871e3ce6c.html

Brian Vastage of the Washington Post explains the adaptation of anoles on seven Bahamian islands after Hurricane Frances. This work was also featured on ScienceDaily. Read more at www.washingtonpost.com/national/health-science/castaway-lizards-put-evolution-to-the-test/2012/02/02/gIQAjrYJqQ_story.html

In Science Daily: www.sciencedaily.com/releases/2012/02/120202151131.htm

The AP describes Puerto Rico's plan to hopefully eradicate invasive iguanas. Find out more from

www.nytimes.com/aponline/2012/02/03/world/americas/AP-CB-Puerto

[Rico-Killing-Iguanas.html?_r=1&ref=world](http://www.physorg.com/news/2012-02-winter-bit-complicated-youre-lizard.html)

The Science and Technology Facilities Council shares recent studies that have given a new insight into the mysterious 'anti-freeze' capabilities of glycerol. The full story available at www.physorg.com/news/2012-02-winter-bit-complicated-youre-lizard.html

BBC's Wendy Sukerman reports how invasive weeds may save Australia's blue-tongue lizards from cane toad poison. Read more at

www.newscientist.com/blogs/shortsharpscience/2012/01/weeds-save-bluetongue-from-the.html?DCMP=OTCRSS&nsref=online-news

New Scientist's Sujata Gupta showcases research on lizards that may have a competitive edge as the world warms. Find out more from

www.newscientist.com/article/dn21339-lizards-may-be-made-smarter-by-warming-world.html

Robert Sanders, of the UC Berkeley News Center, reports that lizards have a message for robots: get a tail! The full story available at

<http://newscenter.berkeley.edu/2012/01/04/leaping-lizards-show-robots-the-value-of-a-tail/>

The Star's R.S.N. Murali explains that the hunting of Malacca's giant monitor lizards could drive the reptile to extinction. Read more at

<http://thestar.com.my/news/story.asp?file=/2012/1/9/nation/10224627&sec=nation>

At New Scientist, Michael Marshall sheds light on autotomy, the shedding of a lizards' tail. Find out more from

www.newscientist.com/article/dn21375-zoologger-geckos-amputated-tail-has-life-of-its-own.html

Research and Conservation of Slovenian Wall Lizards

By Anamarija Žagar, PhD student at the University of Ljubljana, Ljubljana, Slovenia

“What exactly is so interesting about lizards that made you start working with them?” was a question a friend of mine, an engineer, recently asked. He wanted a practical and applicable reason for it. My answer though, similar to most animal ecologists when talking to their friends and family about work, started at a very broad scale. Why is nature important? How much do we know, and how can we preserve something if we don't first learn about it? What captivates me are the laws of nature that apply the same wherever you go. It doesn't matter if you are in a tropical forest or at the north cap, basic ecological principles apply for all living organisms. A key predator must find its prey, plants need sunlight to photosynthesize, water is circling through the water cycle, and debris needs to be somehow decomposed to nutrients to become available again.

Coming out of this general fascination, lizards are my love. I could say they are “in the middle” of the whole food web. My study species are small lizards from the family Lacertidae. Adults measure only 50 to 60 mm from snout to vent. Being small-sized lizards, they can be eaten by bigger lizards, snakes and other predators, and at the same time they themselves are predators and eat prey that is smaller than them (mostly invertebrates). Their influence is therefore important in both directions, and they have a key role in the ecosystem. In natural communities, interactions between the members of community are diverse and common. In reptile assemblages

as well, lizards of the same size and similar ecological characteristics are more likely to interact in places where they occur together. Doing my bachelor thesis I've come across these two small, brown similar-looking species of lizards, but found



Horvath's Rock Lizard (Iberolacerta horvathi) is the species more abundant at higher elevations of the Northern Dinaric mountains. (Photo: Miha Krofel)



The Common Wall Lizard (Podarcis muralis) occurs in higher densities in the lowlands. (Photo: Miha Krofel)

them in three different combinations: each occurring alone, or occurring together. When conducting transect counts I also found that one species is more abundant in the lower locations and the other in locations higher up. What was fascinating to me was how it's possible that they look almost the same in their outer appearance and prefer very similar microhabitats but

are not occurring evenly throughout their distributional ranges. What are the factors that influence their spatial segregation, and is there some type of interaction going on between them that is not obvious at first observation?

I am working with different people involved in this topic, and we are investigating different parts of the fundamental niches of both species, their thermal preferences, water-loss properties, behavioral thermoregulation, diet, and parasites. Secondly, we are also investigating their habitat use and predator pressure. We would like to know as much as possible to be able to compare the species and infer possible influences of interactions. Since one of the species is confined to higher elevations at the highest tops of mountains in our study area, possible competition interaction with the more abundant lowland species could in the future under climate change (and the associated raising of environmental temperatures) cause the lowland species to spread higher up and outcompete the species now more abundant there. So, in the end most of the work of biologists leads toward trying to answer some sort of nature-conservation question. In my case, I would like to know as much as possible about my two lizard species to be able to more effectively predict what the future holds for them and to keep them “safe”. I don't know if I answered my friend's question as he was expecting from me, but I can only add one more thing—lizards were here before us!

Climate Change and the Pygmy Bluetongue

Field studies by Dr. Michael Bull and his research team at Flinders University, Australia, coupled with population and climate modeling by Dr. Damien Fordham and colleagues at the University of Adelaide, Australia, are highlighting the need to engineer a future for the threatened Pygmy Bluetongue (*Tiliqua adelaidensis*), a lizard found only near Adelaide in South Australia. Although its tongue is actually pink, its name comes from its close relationship with a group of other lizards which have distinctive blue tongues, and which gained the common name “bluetongue lizards” before live specimens of their smallest relative were known. Known also as the Adelaide Pygmy Bluetongue Skink (formerly *Cyclodus adelaidensis*), it is listed as Endangered (category B1+2C) by the IUCN Red List (www.iucnredlist.org; accessed 9 February 2012) due to its restricted distribution and declining numbers. Also, Pygmy Bluetongues are listed under Australia’s Endangered Species Protection Act and South Australia’s National Parks and Wildlife Act. At one time, this species was thought to be extinct, but an individual was found within the stomach of a snake in 1992, prompting renewed efforts to survey for it in South Australia’s mid-north region. “It is very rare for us to get a second chance like this to conserve a species we all thought was extinct,” says Dr. Bull.

The main past threat to the species is agricultural development, which has converted native grassland vegetation to cereal cropping and sheep-grazing pastures. The lizard now occurs in small, unplowed fragments of previously extensive native grassland. Its recovery plan includes a focus on habitat protection, with additional emphasis on public education and research into the lizard’s behavior, reproduction, and ecology led by Bull, with teams from Flinders University, the South Australian Museum and ZoosSA. They have provided extensive conservation advice to landholders. An emerging concern for the lizard is climate change.

Fordham and colleagues are combining habitat and population models to examine the effects of climate change on Pygmy Bluetongues. Their results are showing the interaction of the bluetongue’s restricted distribution with climate change scenarios that further alter habitat conditions—with the result being a pathway of effects that could easily lead to population extinction. Unless, that is, we intervene and engineer a future for this species.

For this species, and several other rare wildlife species worldwide with dire threats to their natural habitats,



Photo by Michael Bull.

managed relocations are being considered as stop-gap measures to ensure their long-term persistence. Importantly, Fordham and colleagues are addressing the question of when and where to move Pygmy Bluetongues based on different habitat criteria (e.g., fragment size, habitat temporal stability) and how these may change under climate change. A compilation of herpetological translocation efforts ongoing in the USA and elsewhere is available online at the Partners in Amphibian and Reptile Conservation website (<http://parcplace.org/resources/relocation-reintroduction-translocation-and-headstarting.html>). For the Pygmy Bluetongue, a comprehensive conservation program of managed relocation in the face of climate change, with continuing habitat protection, education, and research, is under development. Additional engineering advances to combat climate change for various herpetofauna are being compiled now and showcased at: <http://parcplace.org/resources/new-climate-change-and-herps.html>. We encourage submissions of your projects to this online resource (send them to dedeolson@fs.fed.us).

We thank Michael Bull, Flinders University, Australia and Damien Fordham, University of Adelaide, Australia, for sharing information on the fascinating Pygmy Bluetongue!



Image:
Google
Earth

WCS Global Health Program in the Caribbean

By Drs. Paul Calle, Robert Moore and Jean Pare, Global Health Program, Wildlife Conservation Society;
Edited by Valorie Titus, Wildlife Conservation Society

The Wildlife Conservation Society's Global Health Program, based at the Bronx Zoo, has been active in Caribbean lizard conservation for many years. This past year, veterinarians and staff traveled to several islands to participate in studies for three different species of iguanid. All of these programs are coordinated with the IUCN Iguana Specialist Group and their guidelines.

Veterinary Support for the Grand Cayman Iguana (*Cyclura lewisi*) Recovery Program

Dr. Paul Calle, WCS's Chief Veterinarian accompanied by the New York Aquarium's Curator of Aquatic Health Sciences Catherine McClave and Veterinary Technician Patricia Toledo, as well as Veterinary Technician Joan Maurer from the Milwaukee County Zoo, traveled to Grand Cayman Island this past July. The trip continued Global Health Program veterinary support for the National Trust for the Cayman Islands Blue Iguana Recovery Program, led by Mr. Fred Burton. WCS has supported the Program since 2001, in conjunction with the IUCN Iguana Specialist Group. Activities have included pre-release evaluations, health assessments, and annual examinations of Grand Cayman Iguanas (*Cyclura lewisi*) at the Queen Elizabeth II Botanic Park, Grand Cayman, Cayman Islands. Project accomplishments have included determining species baseline hematologic and biochemical parameters, medical care when needed, enteric culture, and parasite screening and treatments.



Grand Cayman Iguana, *Cyclura lewisi*. Photo © Julie Larsen Maher.

The species population once numbered in the thousands, had declined to about 150-200 individuals by the middle 1990s, and by 2002 the free-ranging Grand Cayman Iguanas on Grand Cayman had plummeted to a remnant population of only 15-20 wild iguanas,

with some additional surviving head-started released iguanas. As a result of the recovery effort and this year's releases, there are now nearly 700 free-ranging Grand Cayman Iguanas at three sites on Grand Cayman (the Queen Elizabeth II Botanic Park, the Salina Reserve, and the recently established Colliers Wilderness Reserve). Additionally, there are approximately 230 animals in the captive-breeding colony on Grand Cayman and only about 50 in all other locations worldwide, with a total global population (captive and free-ranging) of less than 1,000. None of the free-ranging animals remain from the original wild population, which now consists entirely of iguanas that were captive-bred, captive-reared, and/or headstarted before release to the wild, or their offspring. There has been excellent survival and successful reproduction of the released animals.

The hope for the species is brighter now than it has been for many years. The 99-year lease for the Colliers Wilderness Reserve creates a third protected area which will allow achievement of the species population goal of 1000 free-living Grand Cayman Island iguanas in self-sustaining populations at three different locations. This can be achieved in the next few years, and once accomplished the breeding program will be drastically curtailed or stopped because there will no longer be a need for this part of the conservation effort, a true conservation success story.

Restoring Allen Cays Iguanas in Allen Cays, Exuma Islands, Bahamas

This past July, just days before the arrival of Hurricane Irene, Global Health Program Associate Veterinarian Dr. Robert Moore and Veterinary Technician Andrea Ablasca joined Dr. John Iverson of Earlham College and a team of USGS biologists, academicians, graduate students, and local conservationists in Nassau, Bahamas, in an ongoing effort to study and help protect a local species of iguana, the Allen Cays Rock Iguana (*Cyclura cyclura inornata*). This native species' survival is threatened by increasing impacts from introduced rodents and predatory owls in a natural environment that is already challenging and unforgiving.

The Commonwealth of the Bahamas is composed of hundreds of islands and cays (small islands), each harboring a unique combination of plant and animal species. The Allen Cays Rock Iguana occurs on only a handful of

these cays in the Exuma island chain of the Bahamas, and pressures on these populations are mounting. The Bahamas National Trust and Dr. Iverson recognized these growing dangers, and proposed to protect the Allen Cays' native fauna by addressing the rodent problem on this island. With financial support in part from the National Fish and Wildlife Foundation's Recovered Oil Fund established after the Deepwater Horizon spill, this latest effort involved capturing iguanas from Allen Cay and relocating them to a nearby island while rodent control measures are underway.



Implanting a radio transmitter in an Allen Cays Rock Iguana. Photo © Dr. Robin Moore.

An important component of this project involved anesthetizing healthy adult iguanas for surgical implantation of a small radiotransmitter before release into their temporary home on nearby Flat Rock Reef Cay. The radiotransmitter will permit further investigation into the habits and behavior of this species, while also facilitating future retrieval of these iguanas for return to Allen Cay once rodent control measures are completed. Transmitters are anticipated to be effective for up to five years, providing useful data to aid in supporting this species through expanded breeding opportunities and habitat enhancement and preservation on their home island. WCS will continue to contribute to this investigation in years to come.

Health Assessment of Translocated Endangered Stout Iguanas in the British Virgin Islands

The Stout Iguana (*Cyclura pinguis*), a critically-endangered lizard once found across the Greater Puerto Rico Bank, survived global extinction on the British Virgin Island (BVI) of Anegada in the Caribbean Sea. Unlike other BVI islands of volcanic origin, Anegada is a flat, limestone and coral island located 20 miles north of the main archipelago. In situ conservation initiatives have been implemented, including a headstarting program, but the iguana population on Anagada is aging and still faces many serious challenges, such as introduced cats, dogs, and other predators, as well as ongoing competition with livestock for the already meager vegetation. In 1983, eight adult iguanas from Anegada were translocated to

Guana, a privately-owned, mountainous, and mostly pristine tropical dry-forest island with a few select, high-end tourist accommodations. Each year in October, Guana Island is closed to tourists for one month and made accessible to scientists.

This past October, WCS Associate Veterinarian Jean Paré and Senior Veterinary Technician Karen Ingerman flew to the BVI to join a team of biologists and conservationists studying the Guana population of Stout Iguanas. In late September through October, hatchling iguanas emerge from nests along the North Beach or White Bay Beach and disperse inland. For unknown reasons, they often immediately seek higher elevations, making their way up the hillsides. For the past several years hatchlings have been captured so that weights and morphometrics could be recorded, and equipped with a transponder or microchip for permanent identification. While hatchlings are often seen and rather easily captured, the same cannot be said of the much more secretive juveniles and subadults. Previously, there were very few juvenile and subadult sightings with some mystery surrounding their whereabouts. Adult Stout Iguanas are large, muscular, stocky, sharp-clawed, cryptic brown lizards with stunning turquoise over the rump and tail. Older, spotted lizards take full advantage of the dense, tangled vegetation and rocky, often steep terrain to quickly escape or disappear in a hole or other form of shelter.

Iguanas on Guana appear to be thriving. This can only be good for the survival of the species. This ex-situ population may now exceed that of Anegada Island in number of individuals, a safety net should the Anegada population suffer an unexpected or sudden decline. Guana Island iguanas have more recently been translocated to several other small BVI islands, and hopefully field work similar to that on Guana will determine if these introductions were as successful. The data contributed by WCS in this and other studies to come will assist in our current understanding of Stout Iguanas, as much remains to be learned about these beautiful lizards.

Measuring Stout Iguanas. Photo © Joel Freisch.



Lizards and Boobies

By Dede Olson



Lizards and Boobies have an alliance, or rather a *reliance*, on San Pedro Mártir Island in the Gulf of California, Mexico. Blue-footed Boobies (*Sula nebouxi*) nest on the rocky surface of this island. With the island being largely devoid of large predators, their eggs and nestlings are safe. They nest on open rock surfaces and along the crags of the rocky outcrops of the island (above). Their breeding colony on San Pedro Mártir is central to a unique ecosystem that includes the endemic *Uta palmeri*, the San Pedro Mártir Side-blotched Lizard. I got hooked on lizards while being a field assistant helping with *U. palmeri* research. Here, I reflect on what I saw during my college Spring Break trip in 1978.

To set the stage, *U. palmeri* is a close relative of the Side-blotched Lizard (*Uta stansburiana*) of the American West. Herpetologists including Dr. Michael Soulé, initiator of the Society of Conservation Biology, studied these island lizards in the 1960s, and found they were genetically distinct from their mainland counterparts, with interesting island traits. *Uta palmeri* is much larger than mainland *Uta*, and the size difference between the sexes is greater (males are much larger than females - Photo, right), with both attributes explained as island adaptations due to relaxed predation pressure. The size difference

of the sexes is tied to sexual selection, where males compete for mates, with larger males being more successful in the mating competition. And so evolution runs its course, with larger males mating and passing on their genetic traits to the young. The counterbalance of larger animals being more vulnerable to predators is absent on the island, so sexual selection has been unconstrained, and the sexual size dimorphism has become magnified. During breeding, males have large territories within which smaller female territories occur. The Blue-footed Boobies set the stage for territory ownership.



Boobies nest in spring. Booby parents eat fish, and regurgitate to feed their hatchlings. Nests are messy with fish scraps, and this attracts flies. Both fish scraps and flies are eaten by *Uta palmeri*. From my observations in 1978 (above), female *U. palmeri* feed on scraps and flies around one or more Booby nests. Males range more broadly and defend the area of several Booby nests, and several female lizards, from interloper males.



Boobies seemed unbothered by the lizards' presence. I wonder—do they benefit from the lizard clean-up service?

Today, San Pedro Mártir Island is part of the Biosphere Reserve “Islas del Golfo de California.” *Uta palmeri* is abundant, but this is the only place it occurs. The species is IUCN-listed as Vulnerable (D2), but is secure due to its continued insularity, for as long as this unique alliance continues undisturbed.

I have many fond memories of this trip, besides getting my lizard fix. I share these memories with a guy I met in college in 1975, who was on the trip with me that Spring Break; we have our 30th wedding anniversary this year. On day 2 at the island, from high on the cliffs, we saw our boat moving backwards out of the cove where it was anchored. “What is Captain Felipe doing?” we said. We later learned that the Humpback Whale that had been cruising the cove had grabbed the anchor line and dragged the boat off. Felipe finally cut the line to stop the shenanigans. We then moored the boat to shore with a rope, but that bad whale then breached on the moorline—at dawn, as we were sleeping on deck. Luckily no one flipped overboard. Then, a sea gull flew into a railing and tossed its breakfast on us. Do all Spring Break trips have the good, the bad, and the ugly? Hey, it's Spring Break time again now!

More information on *Uta palmeri* sexual selection can be found by looking up papers by Dr. Diana Hews, who became intrigued by the system that I described while she was completing her Master's as my academic sister at Oregon State University. Interesting intertwining threads!

Tracks in the Ash: Lizards Survive a Volcanic Eruption in the Chilean Andes

By Dede Olson

The eruption of the Cordon Caulle Volcano that began in June 2011 continues today in Puyehue National Park, Chile. In January 2012, Charlie Crisafulli (Mount St. Helens research coordinator, US Forest Service) traveled to Chile, continuing his endeavors to create an international network of ecosystem research to assess multi-disciplinary ecological responses to volcanic eruptions. At times, ash clouded the air from the ongoing activity, requiring Crisafulli and colleagues to wear respirators. The tephra on the ground was 40 cm deep, creating a moonscape appearance—white and powdery. Trees are now dead, and many of the area's animal life have similarly succumbed. The wetlands that would normally be featuring a cacophony of breeding frogs are silent. But Crisafulli has tracked volcanic ecosystem trajectories for 30 years, and he knows that robust species will be turning up as the active season progresses, followed by a repopulation of the area in the next decades. This is a rare opportunity for researchers to understand how natural disturbance processes occur, and how ecosystems are shaped.

Time and place matter, in matters of volcano ecology. The June blast began in the Southern Hemisphere winter, when snow was on the ground and many life-forms were hibernating. January heralded spring for Cordon Caulle and the surrounding high-elevation region. A few emergent



Bamboo sprouting from the ash of Cordon Caulle. Photo by Charlie Crisafulli.

sprouts began popping through the ash, with bamboo catching Crisafulli's eye as one of the first tenacious survivors. Upon closer inspection, he sees tracks in the ash around the bamboo. More survivors!

Last June's bamboo created an architecture of interstitial spaces that the snow and then tephra blanketed.

Like a children's fort, a tent was formed over the ground surface. Animals were overwintering in this secluded space, or just underground from it. With warmer temperatures finally arriving in January, they are emerging. Ants! And lizards! And lizards following and eating ants! This trifecta of species, bamboo-ants-lizards, is the robust remnant at this site. Are they also critical building blocks of the succession of species to come? The role of lizards in the ecological events that may unfold will be interesting to monitor. Are they the vanguard of other survivors that will seed development of an entire ecosystem? Tracking these pioneers will be part of what Crisafulli and his Chilean counterparts propose. From bamboo-ants-lizards, a complex ecosystem is expected to emerge, but will it differ from the preceding ecosystem, or did that earlier ecosystem have a different reset point? Time will tell.

We thank Charlie Crisafulli, US Forest Service, for his vivid account of finding surviving Chilean lizards.



One of the surviving lizards, Liolaemus sp. Photo by Charlie Crisafulli, US Forest Service.

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Lizard Conservation Efforts in New Zealand

By Heather Peterson, Year of the Lizard student intern, Oregon State University, Corvallis, OR

New Zealand is currently home to approximately 96 known lizard species. It is estimated that 51 of these species are endemic to the country. The two main taxonomic groups of lizards are skinks and geckos. At present, 68 percent of all New Zealand lizard species are at risk or threatened. Lizards are unique in terms of endemism and evolutionary significance, but these unique attributes also put lizards at enhanced risk from introduced predators. Researchers have identified the main conservation concerns to be ecosystem loss and fragmentation, along with introduced pests (particularly mammals). Conservation outreach, management actions, and research are contributing to lizard preservation in New Zealand.



The Robust Skink, Cyclodina alani, a North Island endemic now restricted to five small islands.

Conservation outreach is an important step toward lizard preservation, because once people are aware of the problem they may be eager to help. One project dedicated to conservation outreach is the NZ Lizards Database: Electronic Encyclopedia and Annotated Bibliography of New Zealand Lizards. The goal of the database is to provide information on New Zealand lizards that has been scattered and partially inaccessible, in order to achieve both short- and long-term outcomes. Currently, information is provided on the 96+ known species, most of which have never had species information or photographs available in a single, readily accessible location or format. In the long term, these data will aid improved effectiveness and productivity in lizard research, conservation, and management. Joining the effort for conservation outreach, the New Zealand Department of Conservation has released an article (<http://www.doc.govt.nz/conservation/native-animals/reptiles-and-frogs/lizards/attracting-lizards-to-your-garden/>)

suggesting a method of conservation for anyone with a backyard: attracting lizards to your garden. The idea is to create an ideal habitat for lizards, including cover for hunting, resting, and feeding; protection from extreme heat and cold, and predators; and the right plants to provide an optimum food supply. Conservation outreach is an important part of lizard preservation, because anyone can help.



Whitaker's Skink, Cyclodina whitakeri, also once widespread on the North Island, exists on only three small islands separated by up to 500 km, with an introduced population on a fourth.

Conservationist Dr. David R. Towns has been an avid researcher in New Zealand lizard preservation over the years. When asked about his research, David explained that most of his recent work has been focused on understanding how to eliminate pests (particularly rats) from New Zealand's islands, and how to measure ecosystem change. The project has taken this focus because previous work on NZ lizards demonstrated "the need to think beyond single species on small islands to whole-island ecosystems on large islands," says Towns. This approach achieves gains for as many species as possible, including lizards. Thinking of lizards as a vital cog in the dynamic ecosystem "machine" can help us to manage them in perpetuity.

I thank David R. Towns of New Zealand's Department of Conservation, Auckland, and the School of Biological Sciences, Victoria University, Wellington, for consultation regarding NZ lizard conservation.

The Alliance for the Conservation of Endangered Species of Guatemala: Working to preserve three iconic Guatemalan lizard groups

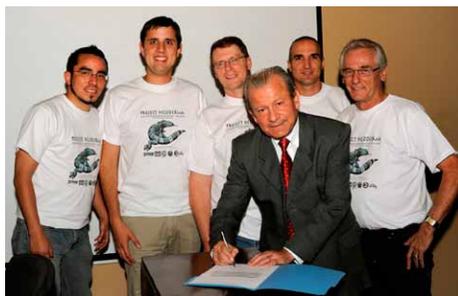
By Daniel Ariano, Brad Lock, Mónica Torres, Antonio Urbina, Thomas Schrei, Gilberto Salazar & Luis Alvarado

The Alliance for the Conservation of Endangered Species of Guatemala is a long-term conservation initiative implemented by Zoo Atlanta, Zootropic (a Guatemalan NGO), and the International Reptile Conservation Foundation. This alliance coordinates three main action projects within Guatemala, each focused on a critically endangered species of reptile. These projects are: Project *Heloderma*, Project *Abronnia* and Project *Ctenosaura*.



Local villagers participating in monitoring of *Heloderma horridum charlesbogerti*. They are seen here after capturing a specimen for the radiotracking study, and showing the diplomas recognizing their participation, 2007.

Project *Heloderma*: This flagship program for endangered Guatemalan lizards was the first conservation project initiated by the alliance. The project began with the Guatemalan Beaded Lizard (*Heloderma horridum charlesbogerti*) and has since expanded to include the Black Beaded Lizard (*H. h. alvarezii*). Guatemalan Beaded Lizards are currently classified as a subspecies of the Mexican Beaded Lizard (*H. h. horridum*), but may actually represent a distinct species,



Signing ceremony for the land purchase of the first 120 acres that were part of the *Heloderma* Natural Reserve, 2007.

and their range is restricted to forest remnants in the Motagua Valley. Only 24,000 ha (50,000 acres) of suitable habitat remain for this endangered lizard, and it is estimated that fewer than 300 individuals exist in the wild. Since the initiation of intensive natural history studies in 2002, conservation efforts have increased, in part because of an increased public awareness regarding the threatened status of this lizard. The main conservation efforts have been led by a local NGO, Zootropic. The overall conservation program consists of four basic elements: (1) educational outreach; (2) applied scientific research; (3) habitat conservation; and (4) development of conservation policies for this species.

Research has focused on determining beaded lizard distribution, the nature



Radiotracking *Heloderma horridum charlesbogerti* in the wild, 2005.

and cause of threats and population declines; the basic biology of the species; movement patterns; shelter use and shelter availability as a limiting resource; and characterization of venom. The educational program has been ongoing since mid-2003 in localities where this species occurs, and in coordination with local authorities and local partners of Zootropic, reaches an average of 5,000 school-age children and 3,000 adults annually.



First formal education talk at San Vicente School, a village within the forest where the last remnant populations of *Heloderma horridum charlesbogerti* still exist in the wild, 2004.

The habitat conservation component has two approaches: (1) conservation of private lands through the commitment of owners to preserve forest remnants and (2) an official declaration of municipal, communal, and private natural reserves as part of the Guatemalan protected areas system. To date, approximately 3,000 ha of land have been committed through these programs. Zootropic, along with Zoo Atlanta and IRCE, owns and manages the *Heloderma* Natural Reserve (HNR), as part of the Alliance for Conservation of Endangered Species of Guatemala. This was the first private reserve in Guatemala specifically for the

conservation of a reptile species. The reserve has a footprint of 128 ha (317 acres), but due to the mountainous terrain, comprises approximately 607 ha (1,500 acres). The home ranges of eight Guatemalan Beaded Lizards lie within the reserve boundaries, as well as many nesting sites of the critically endangered Guatemalan Spiny-tailed Iguana. This area is also inhabited by an as-yet undescribed species of *Oedipina* salamander and is the only monitored nest site for Guatemalan Beaded Lizards in the wild. Finally, Zootropic has promoted and coordinated the planning of a national strategy for Guatemalan Beaded Lizard conservation with the support of The Nature Conservancy. This conservation plan was generated in collaboration with local and international experts representing 16 institutions, including the National Council of Protected Areas (CONAP), which is Guatemala's official institution in charge of maintaining biodiversity within the country. This project has been supported by the Disney Worldwide Conservation Fund, Eli Lilly Corporation, National Reptile Breeders Exposition, International Reptile Conservation Foundation, San Diego Zoo, Oklahoma City Zoo, Toronto Zoo and John Iverson, along with the alliance conformed by Zootropic and Zoo Atlanta.

Project Abronia: This project has a main goal to preserve the endemic arboreal alligator lizards from the genus *Abronia* and their habitat. Effective conservation actions have been a result of strong educational programs along with applied research. The project is focused on assessing the conservation status of the genus in Guatemala. Some of the main results of this project have



Oak tree where the second adult individual of *Abronia campbelli* was rediscovered in 2009.

been the rediscovery of two species (*Abronia campbelli* and *Abronia frosti*) that were considered extinct in the recent past, as well as protection of the critically endangered *Abronia fimbriata* and *Abronia meledona*, by developing *in situ* and *ex situ* conservation actions to diminish the threats on these species. One example of this has been the development of a successful captive breeding program for *Abronia campbelli* and the recent collaboration between the alliance and a private landowner to preserve the last remaining habitat remnant for this species in the world. The lizards of the genus *Abronia* are now used as a flagship group to promote the conservation of the oak forests and cloud forests that remain in the country. This project



First educational talk involving local villagers for conservation of *Abronia campbelli* in 2010.

has been supported by the Humane Society International, Mohamed Bin Zayed Species Conservation Fund, Zoological Society for the Conservation of Species and Populations (ZGAP), and The Microsoft Corporation Fund through Jason Wagner.



Field research on *Ctenosaura palearis* within its seasonally dry tropical forest habitat of the Motagua Valley, Guatemala. 2008.

Project Ctenosaura: This project is focused on the conservation of the endemic Guatemalan Spiny-tailed Iguana *Ctenosaura palearis*. A population assessment has been completed as well as an evaluation of the main threats to the species' continued conservation. Recent meetings with private landowners and government officials have been instrumental in developing a conservation plan for the species. A reassessment and strengthening of the legal framework for the protection of the species has been done, along with the inclusion of this species under CITES appendix II. Educational material has been developed and distributed to assist in increasing public awareness on the need for the conservation of this species. In addition, a private landowner has recently set aside 15 ha (30 acres) of habitat for the protection of the

species, along with a captive breeding program at his farm. This project has been supported by the International Reptile Conservation Foundation, Humane Society International, Disney Worldwide Conservation Fund, and International Iguana Foundation, along with the members of the alliance described here.



Official government commissions from Honduras and Guatemala at CITES meeting in Doha, Qatar, 2010. At this meeting a proposal to include the *Ctenosaura palearis complex* under CITES II was adopted.

Protecting Chameleons in a Fragmented Landscape

Photos and article by Philip Shirk, Virginia Commonwealth University, Richmond, VA

The word ‘chameleon’ means ‘ground lion’, but the analogy doesn’t reach very far. While real lions are apex predators that hide from their prey, chameleons hide from their own predators (things like birds and snakes) and live in trees (although many lesser-known species live on the ground). Chameleons are best known for their ability to change color. Even in rural Tanzania where I did my field work, every time I asked someone what they think of chameleons, they always brought up their ability to change color. While chameleons can change color, they are by no means the kings of color change (that crown goes to squid and octopuses), and they use color change more for communication than for blending into new backgrounds. Regardless of the misconceptions surrounding chameleons, chameleons evoke a strong emotional response in people from many cultures. Some people find them revolting and scary, while others think they’re remarkable and fascinating, which has led to them being kept as pets throughout Europe and North America. Like many rarer pets, much of the supply for the pet trade in chameleons comes from individuals captured from the wild. Combined with habitat loss and small historical population

ranges, many chameleon species are becoming scarcer in the wild.



Kinyongia matschiei – one of the species endemic to the East Usambara Mountains.

I’m working in the East Usambara Mountains of Tanzania: a small plateau (about the size of Rhode Island) home to about as many species as all of Canada (the second largest country in the world)! Of the 8 chameleon species in the area, only two are widespread across East Africa (*Chamaeleo dilepis* and *Rieppeleon brevicaudatus*), two are found nowhere else in the world (*Kinyongia matschiei* and *K. vosseleri*); the rest have very limited ranges outside of the East Usambara Mountains (*K. tenuis*, *Rhampholeon spinosus*, *R. temporalis*, and *Trioceos deremensis*). Six of the eight species (including the two endemic species) can be legally exported for the pet trade (all but *R. spinosus* and *K. tenuis*).

While Tanzania does set export limits in order to prevent too many chameleons from being collected, no one actually knows how many chameleons are still alive in the wild, which makes setting export limits very difficult. That’s where my research work comes in. I’ve estimated population densities of the chameleons in and around the Amani Nature Reserve—the largest remaining block of forest in the East Usambara Mountains—and shown that chameleons generally either live in the continuous forest (*R. spinosus*, *R. temporalis*, *T. deremensis*), or live in more disturbed habitat around the edges of the forest (*C. dilepis*, *K. matschiei*, *K. tenuis*, *K. vosseleri*, *R. brevicaudatus*). Furthermore, the species that live in the forest do not do as well in smaller forest fragments as in larger forest fragments: the number of chameleons in 50 acres of continuous forest is much greater than in a 50 acre fragment, and if the fragment is under about 7 acres, there likely will be no forest-dependent chameleons at all! To make matters more confusing, chameleon populations can change considerably over the course of a year, or just appear to change considerably if it’s a species that aestivates. I saw relatively few of the two endemic species, which is partly because my

surveys were all within forests, rather than in the somewhat disturbed habitat they prefer, but is still a conservation concern. After all, I had to travel through the disturbed habitat to get to many of the forested areas I surveyed, but even after spending nearly a year in the East Usambaras, the total number of either species that I had seen wasn't much above the number of individuals of a very closely-related species (*K. multituberculata*) that I saw in just a few days in the West Usambara Mountains! Some of the next steps in my research will include determining why different species are responding the way they do to the fragmentation of the rainforest and to learn more about the two relatively rare, endemic species.



Rhampholeon spinosus – found only in the East & West Usambara Mountains and not legally exported for the wildlife trade.

Species Spotlight

The Anegada Iguana

By K.A. Bradley

The Anegada Iguana (*Cyclura pinguis*) is the most genetically and morphologically unique species of rock iguana. Not only is this species considered “critically endangered” by the IUCN Red List, it is also among the most endangered in the rock iguana group. Its original range was across the Puerto Rican bank during the last glacial maximum, when the bank was a single landmass. It is believed that rising sea levels and changing climate caused a contraction in the species' range to the remote island of Anegada (39 km²) in the British Virgin Islands (BVI) (Pregrill 1981; Perry & Gerber 2006). Since the mid-1980s, Anegada Iguanas have been introduced to several privately owned islands in BVI as a hedge against extinction (Goodyear & Lazell 1994). Unfortunately, this species has suffered a large decline since the late 1960s (Carrey 1975, Mitchell 1999, Perry & Gerber 2006). Today, we estimate the remaining iguana population on Anegada to be approximately 300 individuals.

Human development and over-browsing by free-ranging livestock are major threats. However, the

large population of feral cats (*Felis catus*) on the island is suspected of killing most hatchling iguanas within months of emerging, drastically reducing recruitment and population growth (Gerber 2000). Few hatchling iguanas are observed outside the emergence period and there appears to be a complete lack of age classes except for older adults.



Hatchling Anegada Iguana

To offset the high rate of juvenile mortality and bolster wild population numbers, the National Parks Trust of the Virgin Islands (NPT VI) and the IUCN Iguana Specialist Group (ISG) initiated a headstart program in 1997. Each year during the summer nesting

season (June and July) the core nesting area (3 km²) is surveyed to locate and protect nests. In October, hatchlings are transferred to the on-island headstart facility operated by the NPT VI. Iguanas are reared in this protective environment and released back to the wild when they reach a larger, less vulnerable size. To date, 157 iguanas have been released back to the wild with a documented survival rate of 79 percent (Bradley & Gerber 2005, 2006).

In 2012, several new projects will be initiated to enhance the ongoing headstart program. First, a camera trapping component will be incorporated into our current population monitoring program. Second, through collaboration with the University of Calgary's Department of Geography, an environmental model will be created using remote sensing and GIS. In fall 2012, a new radio-tracking study will follow newly emerged hatchlings to document their ecology and survival rates.

Now in its 15th year, the Anegada iguana conservation program has benefited tremendously from the



Adult male Anegada Iguana at Windlass Bight.

ongoing partnership between the NPT VI and key zoological institutions. The program has released a total number of 157 iguanas into the wild and has identified key iguana nesting and core habitats for protection. Through the continued monitoring of headstarted animals, researchers have documented their successful integration into the wild breeding population. Ultimately the fate of this species on Anegada will depend on the continuation of work to eradicate introduced species and the establishment of a protected area. While obstacles to having a sustainable population remain, the Anegada Iguana conservation program remains a solid example of how collaborative conservation efforts contribute to species survival.

Acknowledgements

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Featured Lizard Families

By Lawrence L. C. Jones (Larry the Lizard Guy)

Each of the six issues of the Year of the Lizard News will showcase two of the twelve families of lizards native to the United States. The March issue features phrynosomatid lizards and skinks. These two families are dissimilar to one another, but account for many of the species we may see. As an aside for you lizard aficionados, lizards start to become surface active in the spring and are often quite viewable because they may be out for much of the day after it warms up.

Family Phrynosomatidae, Phrynosomatid Lizards, aka Sand, Spiny, Horned, Tree, and Rock Lizards

You figured it out—there is no good common name for the Phrynosomatidae. It is a large family of New World lizards (sometimes lumped with the family Iguanidae) consisting of about 9 genera and 130 species, found throughout many parts of North and Central America. These are among our better known and more viewable species. Although the family is large and diverse, the genera are often rather distinctive, such as the horned



The Long-tailed Brush Lizard (*Urosaurus graciosus*) can be hard to spot when it lines itself up along a branch. Photo © LLC Jones.

lizards. Horned lizards, by the way, belong to the genus *Phrynosoma*, so the family Latin name, Phrynosomatidae, could be deceiving, as no other native species look much like horned lizards. Adam Leaché (2008. In: Jones and Lovich. *Lizards of the American Southwest*) gives a good synthesis of the groups of lizards that make up the Phrynosomatidae in the United States:

- Spiny lizards, genus *Sceloporus*
- Horned lizards, genus *Phrynosoma*
- Side-blotched lizards, genus *Uta*
- California rock lizards, genus *Petrosaurus*
- Tree and brush lizards, genus *Urosaurus*
- Sand lizards, genera *Callisaurus*, *Cophosaurus*, *Holbrookia*, and *Uma*



Yarrow's Spiny Lizard (*Sceloporus jarrovii*). Photo © LLC Jones.

Spiny lizards are a common and well-known group of lizards found over most of North America. In the US, there are about 15 species. The larger species tend to have conspicuous, keeled (spiny), overlapping scales and are called spiny lizards (per se) in their standard English names. Although the scales of the smaller species are also keeled and overlapping, they are not as conspicuously spiny. The smaller species are known by a variety of standard English names, including fence, sagebrush, canyon, prairie, plateau, and bunchgrass lizards. Fence lizards are arguably the most common, widespread, and well-known group of lizards in the US.

The other large group of phrynosomatids in the US is the horned lizards. Almost everyone knows what a horny toad is. Except, of course, they are actually lizards rather than toads, so they should really be called horned lizards (OK, my bad...I call them horny toads when I am being informal among peers). These flattish lizards have wide bodies, short tails, and scales that are modified into spines or horns (long spines on the head are called cranial horns, which are distinctive at the species level). There are 9 species in the US. Although horned lizards are renowned for their horns, some species have horns



Blainville's Horned Lizard, *Phrynosoma blainvillii*, displaying its horns (and some attitude). Photo © LLC Jones.

that are greatly reduced. They are famous for their habit of squirting blood from their eye sinuses (although not all species have such proclivities). They are also known for their habit of eating ants, critters that have highly toxic venoms. Horned lizards are also well known for their cryptic nature—they are very hard to see and survey for. Several species, including the Flat-tailed Horned Lizard (*P. mcallii*), Blainville's Horned Lizard (*P. blainvillii*), and Texas Horned Lizard (*P. cornutum*) are of conservation concern, and PARC has been involved in horned lizard conservation. Southwest PARC organizes workshops to train surveyors to detect Flat-tailed Horned Lizards. Unfortunately, horned lizards are interesting, inoffensive critters, so many a young person has picked them up in the wilds to have a cool pet, only to have them languish in captivity.

The so-called "sand lizards" includes a group of three genera that tend to be associated with loose soils, such as those that are found in washes. The premier species of sand lizards belong to the genus *Uma*. My favorite *Uma*, of course, is *Uma Thurman*, but the lizards are pretty cool, too. *Uma* (the lizards, not the actress) are appropriately called fringe-toed lizards for that distinctive feature. They have quite a few other adaptations for life in stabilized sand dunes. Fringe-toed lizards are among our more threatened species because of their close association with sand dunes in very restricted ranges.



Uma scoparia, the Mohave Fringe-toed Lizard, at Kelso Dunes. Photo © LLC Jones. Zoom in and check out the toes.



A male Greater Earless Lizard (*Cophosaurus texanus*) in breeding color. Photo © LLC Jones.

The Zebra-tailed Lizard (*Callisaurus draconoides*) is a species that can be extremely abundant in areas of loose soils in desert environments, and is arguably the fastest lizard in the US. They will wag the underside of their tail (“zebra”-striped underside) when fleeing a potential predator. The Greater Earless Lizard, *Cophosaurus texanus*, is another species that can be locally common, and it will also wag its similarly colored tail. Breeding males are adorned with a fantastic color pattern of yellows, blues, greens, and reds. The fourth genus, *Holbrookia*, includes several species of “lesser” earless lizards; they are not well understood taxonomically, so hopefully some patient graduate student will figure out what to call them for the rest of us. *Holbrookia propinqua* is a Texas species that is disappearing throughout most of its range; it has been petitioned for federal listing under the Endangered Species Act, with a positive finding.

Banded Rock Lizard, *Petrosaurus mearnsi*. Photo © LLC Jones.



People often ask me what my favorite lizard is, which is hard to answer, but the short list has to include lizards of the genus *Petrosaurus*. Rock lizards are pretty interesting—they are relatively flat and splayed boulder specialists, with an intricate pattern. We have one species native to the US, the Banded Rock Lizard (*P. mearnsi*). I would highly recommend lizard watchers go to Anza-

Borrego Desert State Park in southern California to see these animals clambering over rocks—often scurrying along the underside of a large boulder. If you find yourself in Cabo San Lucas to catch a billfish or take in a round of golf, a side-trip to boulder country to see the larger, vibrant-blue species, San Lucan Rock Lizard (*Petrosaurus thalassinus*), is certainly warranted.

Uta stansburiana, the Common Side-blotched Lizard. Photo © LLC Jones.



The genus *Uta*, side-blotched lizards, are very showy as Baja California’s Sea of Cortez lizards. Our own single species, *U. stansburiana*, is more subtle, but is possibly the most common species of lizard in the American Southwest. There has been a lot of fascinating research done on this species and it has been instrumental for learning about how desert species contend with arid environments in the Southwest. A similar genus of little brown jobs is *Urosaurus*. All species are long and slender. The Long-tailed Brush Lizard (*U. graciosus*) takes this to its extreme. It is a really fascinating animal, because it is not only elongate, but is stick-colored and often lies low on branches, making it very difficult to detect.

To wrap up with Phrynosomatidae, it is a very large and diverse group of lizards, and they are often the most observable lizards, as they are usually seen basking on rocks (horned lizards a notable exception)...which is part of the reason why they are a premier group of watchable wildlife.

Family Scincidae, Skinks

The Scincidae are the second largest lizard family of lizards on earth. They are found worldwide except in areas that are too cold to harbor reptiles. Australia has a particularly diverse skink fauna, with about 250 species, including some rather well-known species such as blue-tongued skinks (genus *Tiliqua*). In the US, we only have 13 species of skink, most of which are found in the eastern US. All but one species belong to the genus *Plestiodon* (formerly *Eumeces*). Skinks can be very attractive animals.

They possess rounded, smooth scales (cycloid), which gives them a glossy appearance. They usually have short legs and may move in a snake-like fashion. Many species have bright colors, especially as juveniles. Young skinks often have bright blue tails, although some have red or pink tails. In some species the brightly colored tail is retained into adulthood. As with most other species of lizards, they can autotomize (lose) their tails at fracture points. This comes in handy if a predator (like the infamous House Cat, *Felis catus*) tries to dine on a lizard. In the case of most skinks, the dropped tail is brightly colored, so the predator is apt to grab the tail, which will then drop off and wriggle about, whilst the skink slinks away to live another day.

Juvenile Western Skink (*Plestiodon skiltonianus*), showing the typical bright blue tail of young skinks. Photo © LLC Jones.



Western skinks¹ are usually cryptic, often living in cool climates (e.g., riparian areas, mountains, humid hillsides) and hiding under cover objects, as do some eastern skinks. As such, they are often difficult to find because they do not tend to bask and have to be actively searched for. The Western Skink (*P. skiltonianus*) is a well-known inhabitant of the Pacific states. It and the Gilbert's Skink (*P. "gilberti"*) are taxonomically a challenge because there is a great deal of variation across their ranges. Each species includes numerous subspecies that are difficult to explain taxonomically. In fact, Crother et al. (2008, *SSAR Herpetological Circular 37*; the authority that PARC recognizes for taxonomy and nomenclature) show the Gilbert's specific epithet (species name) in quotes because it is recognized as a suite of species that are poorly differentiated. No other species in the list has this distinction.

One of the better-known skinks in the US is the Great Plains Skink (*P. obsoletus*). It is indeed found in the Great Plains, but also ranges beyond. Adults have a fishnet stocking pattern on their cycloid scales, whereas



Courting Broad-headed Skinks (*Plestiodon laticeps*), the orange-headed male and the striped female. Photo Laurie © J Vitt.

the juveniles are jet black, with a bright blue tail and white labial (lip) scales. They look so different that they were originally described as separate species. There are other skinks found in the plains, prairies, and plateaus, including Prairie Skink (*P. septentrionalis*) and Many-lined Skink (*P. multivirgatus*).

In the southeastern United States, skinks are fairly well represented (but not nearly as many species as the non-native invaders!). Some of the eastern skinks have more of a tendency to be seen out basking during the day than western skinks, so can be considered "watchable wildlife." The Broad-headed Skink (*P. laticeps*) is a conspicuous lizard because of its large size, broad head, and arboreal tendencies. Like several other species of skinks, adult males have bright reddish orange coloration on the head. In the case of this species (and the western Gilbert's Skink), the entire head may be orange, whereas in other species it is limited to the labial area. By the way, reddish-orange is a color that is often associated with gravid females of many species of lizards in other families, such as many Phrynosomatidae and Crotophytidae (but also in breeding male Green Iguanas, *I. iguana*). Other conspicuous eastern skinks include the Common Five-



The beautiful Great Plains Skink (*Plestiodon obsoletus*), wearing its fishnet scales. Photo © Mike Hill.

¹This is a good example of why the standard English name (i.e., Crother et al. 2008) has initial uppercase letters and names of groups of species or species without standard nomenclature do not. For example, the term "western skink" refers to any of several species of skinks that live in the western United States, whereas there is only one species known as the "Western Skink" (*Plestiodon skiltonianus*).



A pink-tailed subspecies of Mole Skink (*Plestiodon egregius*). Photo © John Jensen.

lined Skink (*P. fasciatus*) and the Southeastern Five-lined Skink (*P. inexpectatus*). These species are more striped as adults than Broad-headed, although the young of all three are quite similar in appearance, with bold dark and light stripes, and bright blue tails (a pattern shared by several western skinks).

Florida has two very interesting, diminutive skinks: the Florida Sand Skink (*P. reynoldsi*) and the Mole Skink (*P. egregius*). Both are not only tiny, but have very small legs and are adept at disappearing under sand to escape detection. The Florida Sand Skink is practically legless—a trajectory that numerous lizard species have taken if they have evolved to adapt to a snake-like lifestyle (e.g., having fossorial tendencies like these two species). This species is listed as threatened under the Endangered Species

Act. The Mole Skink is a particularly variable species, and five subspecies are currently recognized in Florida, Georgia, and Alabama (entire range of the species). Mole Skinks are gems of the lizard world, being small, delicate, and colorful. Another physically similar species is the only member of the genus *Scincella*, the Little Brown (or Ground) Skink, *S. lateralis*. This species is very widespread in the eastern US and may be particularly common, but is usually hiding under cover objects. They are well named since they are little, brown, and found on the ground. Although not as showy as the Mole Skink, they are still fascinating creatures—they remind me of slender salamanders (genus *Batrachoseps*) in California—smooth little brown jobs that are slender and have small legs, and are invariably found under surface objects. Of course salamanders are amphibians, so the resemblance is superficial.



The Little Brown Skink (*Scincella lateralis*). Photo © Bill Parker.

Submit your Articles for Consideration in The Year of the Lizard News

We would like to hear about your research projects (local, national, and abroad), citizen science efforts, school projects, folklore, natural area conservation proposals, lizard luminaries (people or animals that have been shining stars in your life), or other topics related to lizards.

Please include these components:

- 1) Title
- 2) Author name, affiliation, location
- 3) Text: ~400 words will fill one page, a nice size to consider. Shorter and longer articles are fine. It is an electronic newsletter, after all!
- 4) 1-2 photographs or graphics (with captions and photographer recognition; sometimes we can use more than 2) per page: 300+ dpi resolution, jpg or tiff.

Submit your potential articles or any questions pertaining to contributing via email to yearofthelizard@gmail.com. The newsletter will be bi-monthly, with issues coming out in March, May, July, September, and November 2012.

Upcoming Meetings & Events

9th annual **Southeastern Ecology and Evolution Conference (SEEC)**, March 2-4, Clemson University, SC

North Carolina PARC Annual Meeting, March 20, Weymouth Woods Sandhills Nature Preserve, Southern Pines, NC

Northwest PARC Annual Meeting, March 19-20, Portland and Hood River, OR

Association of Zoos and Aquariums (AZA) Mid-Year Meeting, March 24-30, Palm Springs, CA

Southwestern Association of Naturalists Annual Meeting, April 19-22, Valle de Bravo, Mexico

World Congress of Herpetology 7, August 8-14, 2012, Vancouver, British Columbia, Canada.

An Interview with Alfonso Hernández Ríos

By David Wojnowski, University of North Texas



Alfonso Hernández Ríos holding a Mexican Plateau Horned Lizard (*Phrynosoma orbiculare*).

Alfonso is a 27-year-old biologist from the Universidad Nacional Autónoma de México, living in México City. Primarily, his interests focus on the ecology of reptiles and amphibians. He is currently in a Master's degree program at the Instituto de Biología - UNAM under the advice of Dr. Fausto Méndez de la Cruz. His research is centered on the evolution and ecological aspects of horned lizards, including defensive behaviors, habitat, reproduction, thermoregulation, and conservation.

How did you become interested in lizards, and at what age?

As a child I loved dinosaurs, but I became interested in lizards as a teenager when my grandmother gave me my first “camaleón”, specifically, a Mexican Plateau Horned Lizard (*Phrynosoma orbiculare*). I still remember how I thought it looked like a dragon, with its rough skin and horns. I was fascinated by this lizard and although it was hard to

find information about them. I did locate a paper by Dr. Eric R. Pianka and later read Dr. Wade Sherbrooke's *Introduction to Horned Lizards of North America*. Some people in Mexico are afraid of horned lizards because they think they are venomous, but my grandmother was not afraid of horned lizards, as she believed they could benefit sick people by absorbing a person's illness.

What is your current role in lizard research and conservation?

My research is focused on Horned Lizard (*Phrynosoma*) ecology and I have a special interest in conservation issues and solutions concerning this genus and other reptile and amphibian species. My conservation efforts also entail changing the negative perception that some people have of these lizards (e.g., some people believe that horned lizards are venomous). My work could be a first step towards the protection of this group of lizards and their habitat by the people who share the same environments. I have worked with Giant Horned Lizards, Bull-Horned Lizards, and Mexican Plateau Horned Lizards (*Phrynosoma asio*, *P. taurus* and *P. orbiculare*, respectively).

Elementary school student holding a Short-tailed Horned Lizard (Phrynosoma braconnieri) at Ixtlán de Juárez, North of Oaxaca, México. October 2011.



Do you have a favorite lizard or group of lizards?

Yes, Horned Lizards. And my favorite horned lizard is the Giant Horned Lizard (*Phrynosoma asio*).

How would you describe a defining moment or favorite memory of working with lizards?

Having the opportunity to interact with kids and show them the colors, textures, and behaviors of lizards. Children are always open-minded and curious, this motivates me.

What do you believe is the biggest threat facing lizards in the 21st century?

Habitat destruction. Some types of lizards may be able to adapt to degraded environments (around here this usually happens with some *Sceloporus* species) but probably many of them could not. And some species may also be adversely affected by climate change.

What are some of the ways that the public can help in the conservation of lizards?

Sharing information about the benefits of lizards with their family, neighborhood, and people around



Reptile workshop at an elementary school in Ixtlán de Juárez, north of Oaxaca, México. October 2011.

them helps in demystifying these species. Also, the public can help by adding pressure to political representatives to support and approve initiatives about lizard conservation.

What guidance would you give to natural resource managers and policy makers regarding lizard conservation?

Protect the habitat and implement or improve conservation education

programs. The people who live with horned lizards, or any lizards, should be included in the solutions. Alternative economic activities and solutions are needed in many localities that include endangered populations/species but that still rely on habitat modification to provide livelihoods for local people. For example, there must be a balance between people whose livelihoods depend on the cutting of trees to cultivate their crops

(corn, wheat, beans) and the need to protect trees for those lizard species adapted to a forested environment.

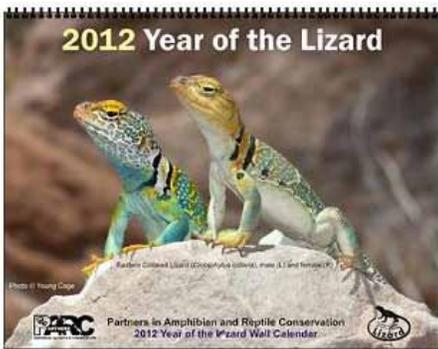
What advice would you give to young people (or adults) who love lizards and want to work with them?

Keep motivated, and go for your dreams. Get to know a herpetologist, and perhaps you could assist with current conservation or research projects.



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Have you already started to acquire your Year of the Lizard loot? As of this issue there are even more products for you to view, purchase, and enjoy. To view and order the merchandise, simply go online to the PARCStore (<http://www.cafepress.com/parcstore>)



Stay tuned and check out the website periodically...more PARC and Year of the Lizard products will be showing up. Proceeds from sales go to the Amphibian and Reptile Conservancy, a not-for-profit organization that helps support PARC activities, such as public education, publications, and research.