

# Iguana Times

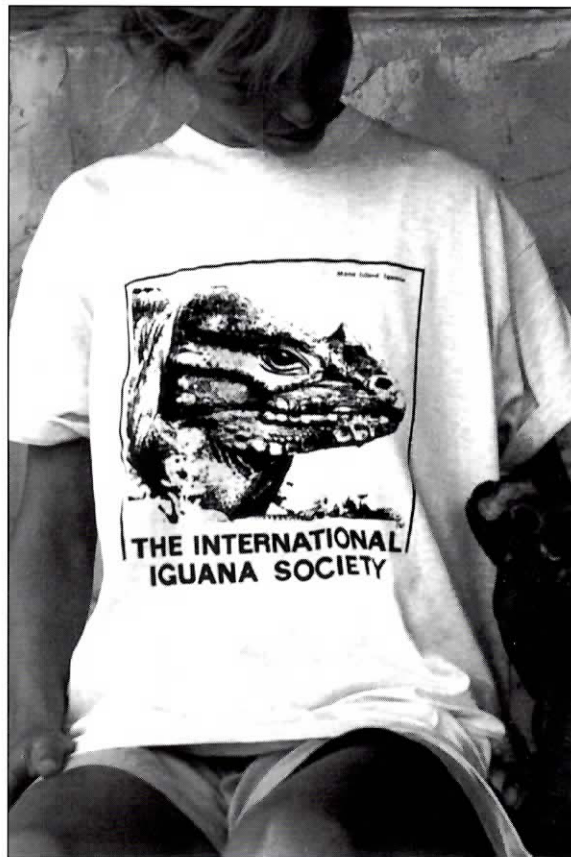
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Galapagos land iguana,  
*Conolophus subcristatus*.  
Photograph: William Hayes

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# LIZARDS LOST IN TIME: GALAPAGOS LAND IGUANAS

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**A**t the edge of an inland patch of thornbrush (*Lycium minimum*), on the great volcanic island of Fernandina, Galapagos, a large Galapagos land iguana stood tall in the direct rays of the afternoon sun. His body turned broadside to me to demonstrate his intimidating size. He puffed up his body to become even larger. A comb of stout, round, horny spines stood out on the nape of his neck. The spines became laterally flat as they continued along his back, topping a lateral fold of fatty flesh. His throat puffed out. His dewlap turned pink. His beautiful reddish coat faded into sulphur yellow on the lower body.

All this flashed before me in seconds. I was entering his territory. He did not like it. What I did not know was why he was so feisty toward me. His mate was motionless behind him, invisible in the thornbush. He appeared to be protecting her. His orange-red unblinking eyes, surrounded by heavy lids, stared at me. I approached to within a few meters of the big lizard. Slowly lifting his head until his nose pointed to the sky, he raised up as high as possible. Then he nodded up and down with a rapid jerking motion. His dewlap flapped from side to side. He hissed long and vigorously. His tail snapped sideways in my direction as if to say, "Come no closer."

The lighting on this magnificent reptile was perfect. I had to get a slide-filling closeup. I got down on my hands and knees and crept forward closer and closer. The big iguana had enough. He suddenly charged straight at me with blood red mouth wide open. I snapped the shutter an instant before he hit the lens, nose first, driving the camera back into my face. He did no great harm beyond giving me a good scare. I retreated, properly intimidated, leaving him in charge of his domain.

## Size

The Galapagos land iguana, *Conolophus subcristatus*, is an endemic lizard frequently more than a meter in length. It has a fat belly that always looks full in spite of its living in arid regions of sparse vegetation. Males average 8 kg in weight; females average 3.5 kg.

Charles Darwin's description of the land iguana is not too flattering. "Like their brothers the sea kind [marine iguanas], they are ugly animals, of a yellow-orange beneath, and of a brownish red colour above: from their low facial angle they have a singularly stupid appearance."



Galapagos land iguana, *Conolophus subcristatus*.

### Distribution

Two species were recognized by Van Denburgh in his 1913 revision of the genus. *Conolophus subcristatus* occupies the central group of islands, Fernandina, Isabela, Santiago, North Seymour, Plazas, and Santa Cruz. *Conolophus pallidus* is restricted to Santa Fe island. This distinction remains to this day.



Galapagos land iguana, *Conolophus pallidus*. Of the two species recognized, this one is confined to Santa Fe Island. Photograph: Lester E. Harris, Jr.

The land iguanas of two islands are now extinct. Iguanas from Baltra were introduced into North Seymour in 1932 and 1934. During the early 1940s, American soldiers were based on Baltra. It is commonly believed that they were responsible for exterminating the iguana population there. Recently (April 1992) some of the North Seymour iguanas were repatriated back to Baltra. The Santiago island iguanas were abundant at the time of Darwin's visit there in 1839. He spoke of iguana holes being so numerous that they could not find an area large enough to put up their tent. By 1905, members of the California Academy of Sciences Expedition could find only bones on the island. A huge population of feral goats on Santiago probably caused the land iguana's extinction.

### Ecotourist Attractions

Land iguanas are gentle creatures. Though wary, they are unafraid of man. The coming of many thousands of tourists since 1970 has made the land iguana more wary and shy. Only the Fernandina population is relatively undisturbed by man. In the early seventies, before the National Park Service was able to monitor the South Plaza

population, the land iguanas there climbed all over tourists for tidbits of sandwiches or other food. They became dependent on tourists for food and ignored their natural foods, which on Plaza are mostly the pads and fruits of the *Opuntia* (prickly-pear) cactus. Snell (1984) says that as the goats eat off the vegetation the soil becomes drier and drier. There is not enough moisture left in the soil for normal development of the iguana egg embryos,

which dehydrate and die. In 1971, after goats were eradicated from Santa Fe, the land iguana population immediately increased in numbers to the healthy level we find today.

National Park law now forbids feeding the land iguanas. As a result, the iguanas have reverted back to their natural ecology. Oblivious to the snap-shooting tourists around them, they go about the business of living their lives. Thornton, in Darwin's Islands (1971), refers to an interesting feeding behavior of the land iguana. He says, "Pinchot (1931) seems to be the only person to have seen a land iguana 'preparing' a fallen cactus apple for eating by brushing off the spines with its front feet." Throughout a Galapagos field trip in 1972, I watched land iguanas from one island to the next hoping to see this odd behavior. Then on South Plazas island I saw and photographed a land igua-

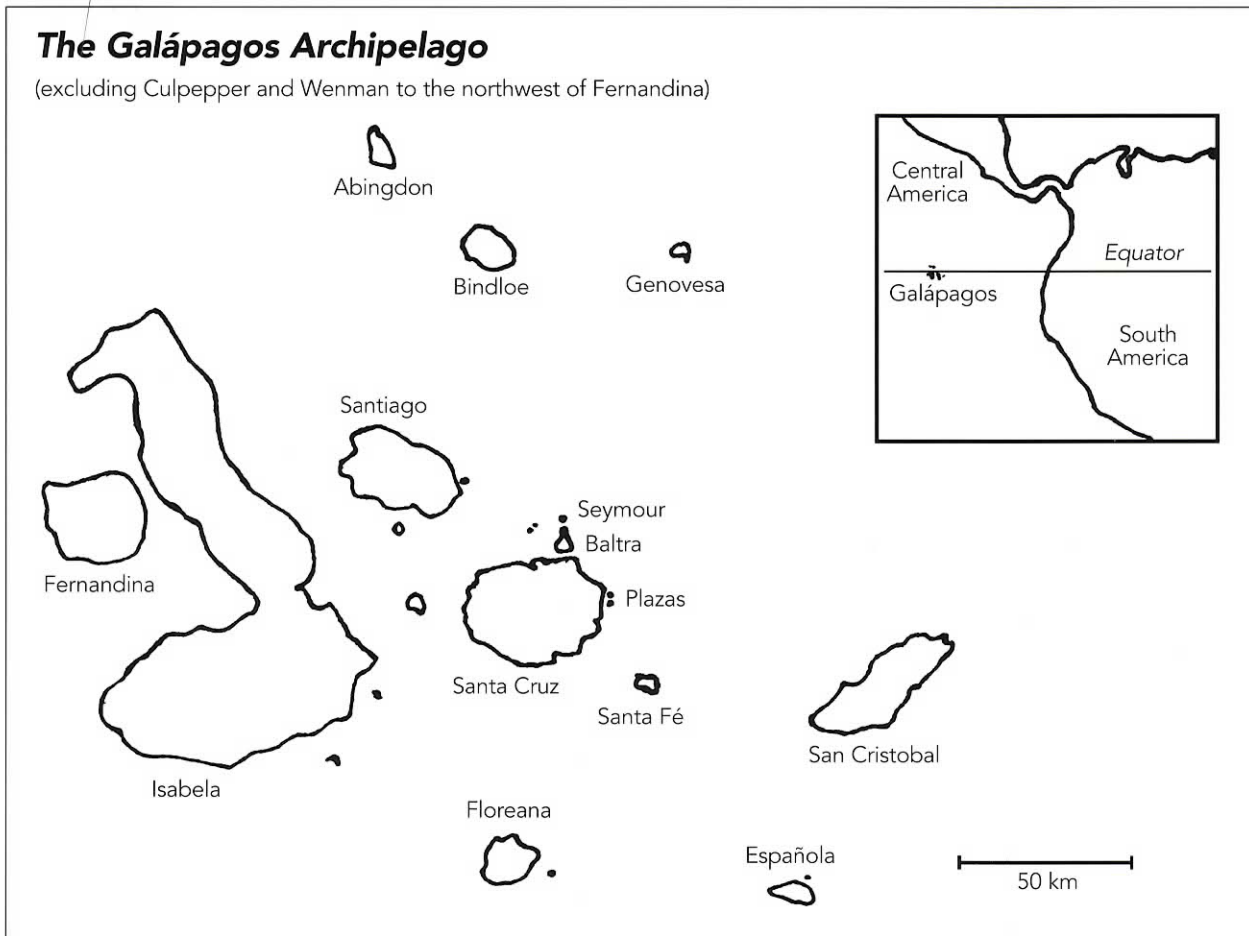
na that picked up a cactus fruit in its mouth and carried it to the surface of a flat, embedded rock. The lizard carefully placed the fruit on the rock, then rolled it back and forth with its outstretched front leg until all of the spines were broken off; then it ate the fruit. Over the next eleven years I visited this and other land iguana populations without ever seeing this behavior repeated. Then, in 1983, upon returning to South Plazas island, I discovered that virtually the entire population of land iguanas were despinning their cactus fruits before swallowing by rolling them on the rocks.

**Social Behavior**

Galapagos land iguanas have formed a complex social structure in their colonies. Dagmar Werner (1983), observing the entire yearly cycle, studied several populations on Fernandina from 1976 through 1979. Three sites, often many miles

apart, are occupied by the lizards through the year. The first site is “home base;” here, the males and females establish territories. Usually this is an area in which holes are easily dug and there is a food source nearby. This is the first part of the reproductive phase. The second part of the reproductive phase occurs at the nesting site and involves the females almost entirely. Both of these phases occur during the warm part of the year. The nonreproductive females are dispersed over a large habitat area wherever their food plants are available. Close proximity of lizards is avoided. In fact, individuals chase each other away. Here the only limiting factor to area occupied is food availability.

When food is sparse over a sizeable home base region, this area becomes the lizard’s home range. Burrows are dug, maintained, and defended the year round. Males defend a small area





Galapagos land iguana, *Conolophus subcristatus*, charging the author on Fernandina Island. Photo taken just before the lizard crashed into the camera. Photograph: Lester E. Harris, Jr.

around their burrows. Females defend only their burrow. In home base areas where food is more abundant there may be sixteen to twenty-one individual territories. These territories average 625 square meters in size—the smallest territory 250 square meters and the largest territory 1600 square meters. Throughout the breeding season, territories are dynamic areas subject to constant change in borders as aggression of neighboring males waxes and wanes. An ideal territory is one in which the soil is soft for burrow construction, the territory is dotted with shrubs for shade, and there is an abundance of nearby food. The more ideal the territory area the higher mating success will be. The central part of any one male's territory is the place where he digs and maintains from one to eight burrows. The more active a male is the more burrows he digs.

The male Galapagos land iguana society is divided into two basic types during the breeding season. There are the territorial males (Werner calls these T-males) who establish, defend, mate with females, and rarely leave their territories, and the non-territorial males (Werner calls these N-males) who concentrate on the periphery of the T-male's territory and try to rape his females

when he is not looking. N-males may be old males no longer capable of holding a territory for themselves, or young males not yet bold or strong enough to hold their own territory. Perhaps they simply do not choose to establish a territory.

An N-male may run into a T-male's territory, grab a female by the neck and run out of the territory with her, whereupon he rapes her. After mating, she runs back into her territory. T-males may do the same thing to a

neighbor's female. Males generally go back to the same territory each year. A male may have as many as seven females in his harem, but, Werner reports, he will not mate with more than four in any one season.

Territorial defense by males starts three months before actual mating begins. Males dig new burrows, clean out old burrows, and patrol the central area of their territories unless challenged by an adjacent T-male or an N-male getting too close to the owner's area. Males will perform aggressive displays toward one another by inflating their bodies, standing up tall, and sidling toward each other. Displays may turn into fights, which last only a few minutes to several hours with little damage to either combatant. Occasionally a fight may end in serious injury to the loser. Werner observed one combative pair who fought up to eight hours a day during a two month period.

### **Courtship and Mating**

As males fuss around their burrows and construct new ones, females inspect the burrows. Males and females retire into the burrows at night. As they emerge in the morning, they hang around

the burrow entrance for a time. Once a female has chosen a specific burrow, the male approaches her and performs the "shudder bob" which is common among many iguanid lizards. He pauses in his advance toward the female and rapidly vibrates his head up and down. The female assents to his demonstration and mating takes place. Males mate no more than twice a day with each of the females in his harem. Usually a female will mate with no more than two males in a season. After mating the female hangs around her chosen burrow. Then various females leave the mating area to go to the nesting grounds. Courtship behavior of the male ceases. During courtship females regularly eat while the males eat nothing. Now the males begin to forage for food.

In the population Werner studied in detail, the females ascended to the summit of Fernandina volcano, taking from three to ten days to travel over six kilometers distance to a height of one hundred meters above the mating grounds. Some females travelled from as far as fifteen kilometers away and climbed to a height of 1400 meters from their mating grounds. Werner observed several thousand females circling the rim while hunting for a way down the vertical walls of the 900 meter deep caldera. Some females laid their eggs in crevices in the crater wall, some nested on a shelf inside the crater, but most headed for an area where fumarole activity from a crevice several meters long heated the surrounding earth. Nest temperatures here measured 32-35°C, while nest temperatures away from the fumarole measured from 26-30°C. The land iguanas are definitely taking advantage of the volcanic heat for incubating their eggs.

### Egg Laying, Hatching and Longevity

On Fernandina, the egg laying peak is in the first two weeks of July. Nest sites are guarded by the females for a short time after laying. Nests are one to two meters apart over the nesting area. A clutch will contain from eight to twenty-two eggs. With such large clutches it is no wonder that it takes a female up to three hours to fill in the burrow after she lays the eggs. Her energy expenditure from mating to egg deposition has been

enormous. She has been drawing on body fat deposits for sustenance.

Hatching in Fernandina occurs in October about three and one-half months after laying. The times of egg laying and egg hatching vary greatly from population to population throughout the Galapagos islands. Incubation time is relatively constant. The young hatchlings are easy prey for the Galapagos hawk and the Galapagos snake, but at maturity the iguanas are too large and tough for these predators to bother them. Juvenile mortality is very high. Sexual maturity is reached in seven to ten years for females and eleven to sixteen years for males. The land iguana life span is judged to be about twenty to forty years.

### Diet

Like all large iguanas, the land iguana's diet is primarily vegetable matter. More than fifty different plants are found in this iguana's diet. Favorite food items vary with the available vegetation from island to island. Among the plants eaten are *Opuntia cactus*, *Scalesia* (the tree sunflower), *Ipomea* (the morning glory), *Sonchus* (the sow thistle), and various sedges and grasses. Land iguanas have also been seen in trees eating




Galapagos land iguana rolling a cactus fruit on a flat rock to remove the spines. Photograph: Lester E. Harris, Jr.



Galapagos land iguana eating cactus fruit after removal of spines. Photograph: Lester E. Harris, Jr.

the berries of the palo santo, bursera, and the muyuyu, cordia. If animal matter is easily available, the land iguana will eat it. Caterpillars and grasshoppers are commonly eaten. Young land iguanas will jump into the air to catch grasshoppers on the wing. Females have been reported eating dry fecal matter which suggests the recycling of incompletely digested material. Ingested along with green vegetation is a sizable amount of dirt, presumably a source of minerals and a supply of cellulose digesting enzymes for the lizards.

### Conclusion

The Galapagos land iguana in its native habitat is like a small dinosaur—a creature lost in time but still with us. 

### Literature Cited

- Snell, H.L., H.M. Snell and C.R. Tracy 1984. Variation among populations of Galapagos land iguanas (*Conolophus*): contrasts of physiology and ecology. Pp. 185-207 in R.J. Berry (Ed.), *Evolution in the Galapagos Islands*. Academic Press, London.
- Thornton, I. 1971. *Darwin's Islands: A Natural History of the Galapagos*. Natural History Press, New York.
- Werner, D.I. 1983. Social organization and ecology of land iguanas, *Conolophus subcristatus*, on Isla Fernandina, Galapagos. Pp. 342-365 in Burghardt, G. M. and A. S. Rand (Eds.), *Iguanas of the World: Their Behavior, Ecology, and Conservation*. Noyes Publ., Park Ridge, New Jersey.



## NORTHERN EXPOSURE

BY MARK MALFATTI

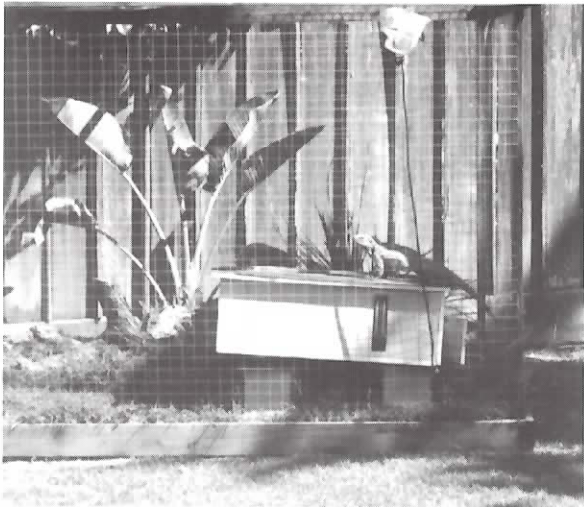
**M**ost of the people I know who keep rock iguanas outdoors all year in the United States live between the 24th and the 33rd northern parallel. This year there's been an exception—the pair of *Cycluras* (*Cyclura c. cornuta*) that I keep are in Belmont, California. Belmont is 11 miles south of San Francisco and falls in between the 37th and the 38th northern parallel. The average summer high is about 86-90 degrees and the average summer low is about 60-70 degrees at night.

After three years and six months of being kept indoors, July, in the summer of '95 was the season the iguanas would see the outdoors for the first time. Their new enclosure was an 8' x 10' outdoor cage with 2" x 2" galvanized wire on all five sides. The hide box, a 2' x 3' x 1' box made of 2" x 12" redwood (sealed inside and out with a non-

toxic sealer) with a hinged lid, was placed in the southwest corner of the cage. At this time, there was no additional heating.

The iguanas obviously enjoyed their new home. They ate like pigs and were putting on size. In mid-October we had a few nights that dropped down to 55 degrees. I decided to plug in the pig blanket. I monitored the outside temperature every day and had an indoor-outdoor thermometer on the hide box to closely monitor the temperature inside. In mid-November I noticed that the food wasn't being eaten. Since I was gone from 7:30 a.m. to 5:00 p.m., 5 days a week, I hadn't noticed that the low swinging sun now left the hide box and its door in the shade most of the day. I moved the hide box to the northwest corner of the cage which was in an area that received the most sun. After this adjustment, the *Cycluras* were out again and feeding as normal.

In November I had set up their indoor winter cage. I was waiting for their feeding to slow or show some other sign of cold intolerance so I could bring them back indoors. I hesitated bringing them back in because they seemed content outside and the few hours of natural sunlight they




*Cyclura cornuta* in northern California.  
Photographs: Mark Malfatti



absorbed were better than eight to ten hours of artificial light. The days averaged about 60 to 70 degrees and the nights averaged 39 to 50 degrees. I would feed the *Cycluras* between 7 and 7:30 in the morning, and crack their door open slightly. When I returned home from work, the food was eaten. At night, I would go out with a flashlight and make sure both iguanas were in the hide box and then shut their door. Only on the weekends could I enjoy seeing them if the day was sunny, basking on top of their hide box that had black composite roofing on it. On rainy or cloudy days, I would only see them come outside to eat and then hustle back to the hide box.

I must note that this past winter was warmer than most in the Bay Area and I am unsure whether I will be able to keep the *Cycluras* outdoors next winter. I must also note that my *Cycluras* look larger and more robust now in March than they did in October.

As I am finishing this short report, it is the end of April and we are now experiencing some temperatures in the 90's. *Cycluras* might hold over a cold temperature adaptation from the Ice Age.

I do not recommend northern keepers of *Cycluras* to adopt my practice unless they are willing to closely monitor their animals. 

Editor's note: Mark's iguanas are probably near the limit of temperatures that they will endure and remain healthy longterm. Natural UV light, even in Northern California, is the critical factor responsible for his success. In a cooler year, these animals would have to spend the winter indoors. We also suggest keeping them indoors during the coolest part of the winter.



*Cyclura cornuta* in Northern California.  
Photograph: Mark Malfatti



Rhinoceros iguanas in a more benign climate in Florida at 24.6°N. Photograph: R.W. Ehrig

## GREASY LIZARD STUFF

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**M**any species of lizards communicate using visual signals. Stereotyped head-bobs, in which dominant males face-off and nod vigorously at one another in defense of their territories, are familiar to anyone who has watched lizards at the zoo or in their natural habitat. Although visual communication is an important feature of lizard social life, lizards may have problems using only headbobs to advertise their presence. Visual signals can sometimes be blocked from view by leafy vegetation, and they do not persist beyond the time they are transmitted. Recent evidence suggests that lizards also communicate using smell. In collaboration with Drs. John Phillips and Nancy Pratt of the Comparative Physiology Division at CRES, I have been investigating the importance of pheromones in the social interactions and mating behavior of green iguanas.

Green iguanas are large, herbivorous lizards that live in trees along rivers and lakes in lowland tropical forests from southern Mexico to South America. Despite their widespread geographical distribution, green iguanas are endangered in every country in which they occur as a result of over-hunting and habitat destruction. In recent years, however, efforts devoted to their conservation have been initiated in Costa Rica, Panama, and Belize, through the hatching and release programs of the Pro Iguana Verde Foundation, the Belize Zoo, and the Zoological Society of San Diego. At CRES, we have been studying several aspects of behavior and physiology in captive breeding groups of green iguanas. For the past two years, one area of our research has focused on the role that chemical communication plays in green iguana reproduction.

Like many other lizards, green iguanas are well-equipped to release and detect chemical signals. In addition to a nasal olfactory apparatus somewhat like our own, they also possess

vomer nasal organs. The vomeronasal organ lies below the nasal cavity, opens into the roof of the mouth, and is designed to sample odors from the environment that are brought in on the tongue. Although humans and many other primates do not have vomeronasal organs, most other terrestrial vertebrates do. A variety of lizards and snakes are noted for their tongue-flicking behavior, which probably serves to deliver molecules to the vomeronasal organ for chemical investigation.

Many lizards possess scent glands that are specialized for releasing pheromones. These glands, referred to as femoral glands because of their position on the underside of the hindlegs, open to the exterior through a series of pores. Each pore contains a small amount of white secretion with a greasy, paste-like consistency, called a secretion plug. In green iguanas, femoral glands are substantially larger and more active in males than in females. In the wild, male green iguanas rub secretions from their femoral glands onto twigs and branches as they move through their home ranges. Research in our laboratory has shown that the secretions of individual males differ slightly in their chemical composition, suggesting that these secretions may act as chemical "signatures" allowing green iguanas to recognize one other.

Green iguanas in the wild exhibit a highly developed, complex social structure. During the mating season, the largest dominant adult males hold territories in and around which several females and subordinate males reside. Medium sized males may attempt to court resident females by remaining on the periphery of mating territories, whereas small males are often so similar in appearance to females that they sneak into the territories of dominant males undetected and may attempt to mate there. At CRES, we have discovered that social relationships among male green iguanas are established at an early age.




Researchers at CRES collect a blood sample from the tail vein of a male green iguana to determine how hormone levels correlate with scent gland activity. *Photograph: Michael Worley/On The Brink*

Almost immediately after they hatch, certain hatchlings, because they are more successful at aggressively competing for resources, become socially dominant. These dominant hatchlings grow faster and mature earlier than their subordinate counterparts.

Over the course of a year, we studied the hormonal and behavioral correlates of femoral gland productivity in the male green iguanas inhabiting the outdoor iguana exhibit on reptile mesa. We found that the socially dominant males produced far more secretions than the socially subordinate males, and that the amount of secretion produced by a given male was positively associated with the level of testosterone in his blood. The secretions of dominant males contained a higher percentage of greasy lipids than those of subordinates, making them easier to detect in the environment. Presumably, males that produce more secretions can scent mark their territories more effectively, and as a result may be more successful at attracting females and defending them from potential rivals. Among juveniles, dominant males have femoral glands that develop sooner and to a greater degree than subordinate males,

indicating that chemical signals may begin to influence social status very early in life.

Now that we better understand the importance of pheromone signals in green iguana social behavior, we are beginning to examine several aspects of communication in this species in more detail. Specifically, we are interested in unraveling how chemical and visual signals may work together to advertise social status, and how both types of signals may affect the physiology and behavior of receiving animals over the long term. Stay tuned, and remember, next time you meet up with a green iguana, all you see isn't necessarily all you get. 

### References

- Alberts, A.C. 1989. Ultraviolet visual sensitivity in desert iguanas: implications for pheromone detection. *Animal Behaviour* 38: 129-137.
- Burghardt, G.M. and A.S. Rand. 1982. *Iguanas of the World*. Noyes Publications, Park Ridge, New Jersey.
- Cole, C.J. 1966. Femoral glands in lizards: a review. *Herpetologica* 22: 199-206.

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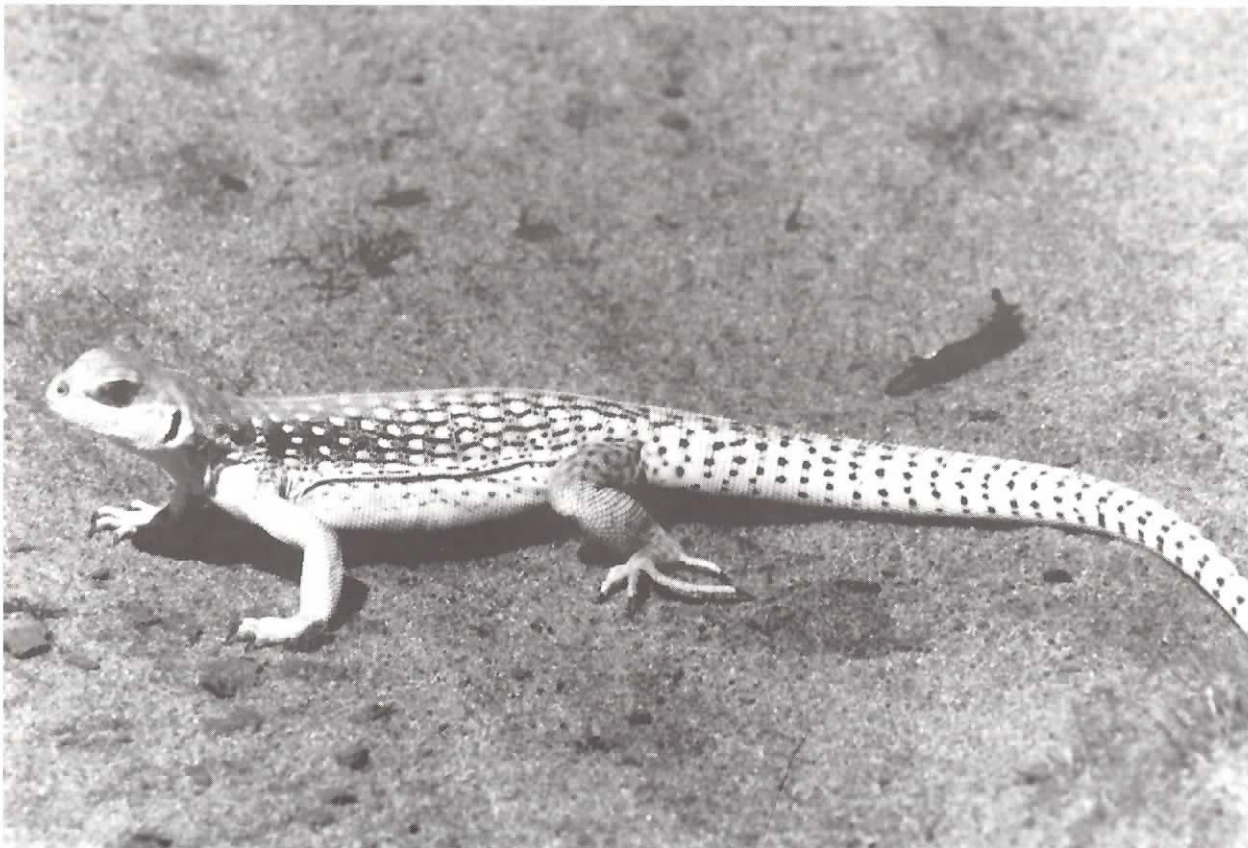
The environment in which a lizard lives may determine how easily its scent marks can be located by other lizards. Both desert iguanas and green iguanas possess femoral glands on the underside of the hindlegs (Cole, 1966). They use pheromone secretions from these glands to mark their territories. Desert iguanas live in extremely hot and arid habitats, whereas green iguanas live in humid tropical forests (Burghardt and Rand, 1982). Because these two species of lizards live under such different environmental conditions, it is not surprising that the way their pheromone signals are transmitted differs.

Desert iguanas have scent marks that are non-volatile, meaning that they evaporate very slowly into the atmosphere. These marks are also very resistant to chemical breakdown at high temperatures. The low volatility and thermal stability of desert iguana scent marks ensure that they persist under harsh desert conditions, a necessary quality if they are to be used effectively for territory marking. Although these characteristics make scent marks more durable in desert environments, they pose a problem for desert iguanas attempting to detect them: if the marks are not very volatile, then they may be difficult or impossible to locate using smell. Desert iguanas avoid this problem by combining a unique type of visual signal with their scent marks.

One striking property of desert iguana scent marks is that they strongly absorb longwave ultraviolet light. Although these

wavelengths are invisible to human eyes, they probably appear dark to animals able to see ultraviolet light, much as ultraviolet absorbing honey-guides on flowers look black when UV sensitive camera film is used to view them. Recent studies have shown that desert iguanas are able to see longwave ultraviolet light, and may use this adaptation to detect scent marks from a distance (Alberts, 1989). After scent marks are localized using visual cues, desert iguanas can approach and investigate them in more detail through tongue-flicking. Although it is not known to occur in mammals, visual sensitivity to ultraviolet light has been shown in certain insects, spiders, fish, frogs, and birds. The ability of desert iguanas to detect ultraviolet light may help them solve some of the problems associated with finding scent marks in a desert environment.

In contrast to those of desert iguanas, the scent marks of green iguanas contain a variety of volatile chemical compounds, and they do not absorb ultraviolet light. Behavioral studies indicate that green iguanas, unlike desert iguanas, can detect these scent marks by smell alone. Because the chemical components of green iguana scent marks remain active and transmit well under the humid conditions of tropical forests, green iguanas do not appear to need a visual cue in order to locate scent marks. Research on both iguana species demonstrates how the environment in which animals live can influence the nature of the communication signals they employ.



Male desert iguana, *Dipsosaurus dorsalis*. Photograph: David Blair

# IGUANAS, SALMONELLA AND HERPETOCULTURE: A CONFLICT OF INTEREST...AND CONSCIENCE?

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**A**s editor of *Iguana Times*, they seem to come across my desk with increasing and alarming frequency. I see them in professional journals, popular magazines, memos from herpetoculturists. They've infested the internet as well as my e-mail. There's little doubt about it, they've gotten my attention.

Of what am I speaking? Reports of humans becoming infected by salmonella from their iguanas and other reptilian pets. Reports of children, pregnant women, and immunocompromised individuals becoming deathly ill—and some even dying. Letters from parents concerned about their children. Newsbriefs from herpetoculturists panicked about potential legislation.

*Iguana iguana*, the popular but overexploited exotic pet of the 1990's, is on everyone's mind these days. And so is *Salmonella*, a minuscule little gram-negative bacterium that can be seen only with the aid of a microscope. With the increasing popularity and availability of hatchling green iguanas in the United States, more people are purchasing iguanas and other pet reptiles today than at any time in history.

I can certainly understand the concerns of health officials and the public at large. True, salmonella infection from iguanas and other reptiles may be of trivial significance compared to other sources of salmonella infection. Outbreaks of salmonellosis from bad hamburger meat has made news in recent years. Salmonella can also infest raw eggs, chicken parts and other foods cooked improperly or left out at warm temperatures too long. Other types of bacterial infection from popular pets, including cats (toxoplasmosis and cat scratch fever) and parrots (histoplasmosis and psittacosis), may be more common than salmonella infection from reptiles. Nevertheless, the fact remains: some people are getting ill (see, for

example, the article from Centers for Disease Control in *Iguana Times*, Vol. 4, September 1995).

What I fail to understand is the totally misplaced concern of a segment of the herpetocultural community. Whereas some breeders and sellers take on the appropriate responsibility of informing would-be pet owners about the risks, I see many that are whining and fussing about how "overreaction" to the rare, isolated incidents is resulting in bad publicity. They're concerned that new legislation may restrict or limit sales of their low-overhead "produce." Many are quick to dismiss the reports, arguing that health officials often misdiagnose the source of infection—never mind that the salmonella serotypes (strains) cultured from the victims are common in reptiles but virtually absent in traditional pets, as well as in ordinary herpetophobic humans. They're panicked about their livelihood. How else will they put bread on the family table, and pay for their next collecting junket to Madagascar? And this, the money aspect, is where I see a serious conflict of interest.

Few pets today are less costly—and more expendable—than the green iguana. As many as a million hatchlings each year are sold in U.S. pet stores. The overwhelming majority of these animals die within their first few months. Most new owners are, for the most part, ignorant about how to care for their new pets. Given the low replacement cost for their pet (\$10-20), who would bother taking the lizard to a vet when the first symptoms of ill health become apparent? Because the iguana often falls sick before it is even sold, the signs of ill health often go unrecognized until the animal simply dies. But should the hatchling be lucky enough to thrive and eventually attain adult size, it may become ignored or ill-treated thereafter until it dies. More often it is released in a most inhospitable environment or

relocated to a new home. Don't even think about calling a zoo since they are inundated with offers of unwanted iguanas.

After considering the fate of the average baby iguana, why then are so many pet iguanas sold? Because money speaks louder than the conscience—and much louder than a dying lizard. If more herpetoculturists and reptile brokers truly cared for the critters they proclaim to love so dearly, surely they'd give this little fellow a break. With a profit margin that is miniscule compared to so many other herps, surely these marketers of mass mortality could lighten up a bit on the iguanas. But, sorry to say, green bills in the wallet are much more important than millions of green little ghosts floating out the windows of every other herpetophilic home in America.


If some of the louder-hissing herpetoculturists are speaking out to avoid an outright ban on the sale of all reptiles, that would be more understandable. But we're talking here about a single, overexploited species that is neither inexpensive nor easy to keep in captivity. When one particular pet supplier labels as a "knee-jerk reaction" recent contemplation of possible restrictions or an outright ban on the sale of all green iguanas in the state of Oregon, I have to wonder what he's really thinking about.

Really, what *is* he thinking about? I'm thinking about a few thousand baby iguanas that just might suffer a less shameful fate than they would in Oregonian homes. I, for one, think it would be a good idea, whether legislative or otherwise, to reduce the number of baby iguanas exploited as discardable live "toys" in the United States. To me, Oregon would be a good start.

To sell more expensive reptiles with less exacting care requirements to well-heeled, well-informed hobbyists is one thing, but mass-marketing baby green iguanas to anyone having a few bucks in the pocket and a videotape of Jurassic Park at home is another thing altogether. The truth is that *every* reptile dealer *knows* that baby green iguanas are doomed from the word go. At under \$20, every kid on the block wants one. A quick glance in virtually any pet store would reveal the sorry conditions under which the languishing lizards are kept before even being sold.

The emaciated little babies gather in bunches on a single unchopped leaf of iceberg lettuce, their skin dangling from their ribs. Several unsampled chunks of dog food and a gleaming dog bone reside in one corner of the cage, and an insurmountable twelve-inch pitcher of water in the opposite corner.

"God help us all," the reptile brokers cry out. "They're gonna shut down the sale of iguanas just like they did the baby turtles." How many of them ever saw the tears of children as they buried their short-lived turtles? Baby iguanas will be banned next! Just imagine how many children will be deprived of the joy of seeing the toes of a lizard curl under, its mouth agape, in the final paroxysms of death. How tragic such legislation would be!

It's really quite ironic, all the fuss over a few kids and other folk becoming sick because of iguanas. So many herpetoculturists today are expressing their frustration and alarm—not over the kids that become ill, but because iguanas may one day be banned from commercial sale. They've missed the point altogether. They're whining about the wrong issue. I suppose I should feel sorry for these misguided people who have chosen to stifle or disregard their conscience. But I feel more compassion toward the iguanas and the unfortunate few humans who become ill because of them. 

*Iguanas can indeed become gentle, amiable—even magnificent—pets if their needs are properly understood and appreciated. Indeed, the very existence of the International Iguana Society is due, to no small extent, to the surging popularity of iguanas and the need to communicate information to pet owners. Thousands of pet iguanas are alive and well today because of responsible individuals—breeders, dealers, veterinarians, product manufacturers, textbook authors and the like—who offer sound, honest advice on how to care for iguanas as pets.*

*Although salmonella infection by reptiles is a relatively rare occurrence, the threat is very real and can be minimized by appropriate precautions. The International Iguana Society advocates the recommendations established by the Centers for Disease Control (see Iguana Times, Vol. 4, September 1995).*

## SWAMPA GOES TO KINDERGARTEN TO HELP ITS SURVIVAL

UTILA TIMES, GREEN SECTION

**K**indergarten kids all around the world are rarely quiet and attentive, especially on Utila [Utila, Honduras]. I was privileged to see one of these rare moments of 'all eyes up front.' The 'lizard people,' as the islanders called them, were showing the kids the 'king of the iguanas'—the swamper.

The windows were closed and the temperature was rising, yet the kids were sitting silently, eyes wide and mouths open. A larger than life image of a male swamper was on the wall and a real live one was about to come out of a sack.

The 'lizard people' are a team, made up of locals, BICA, COHDEFOR, German & Dutch scientists and biology students from the University of Tegucigalpa. They have come together to study and help protect this unique swamp iguana that is only found on Utila.

The swamper is an endangered species, and it is these kids at kindergarten that have the most to gain from its protection and survival.

There was once a crocodile on Utila. No one will ever know if it was unique to Utila, as they were all killed about 40 years ago. Who knows what the effect has been on the lagoons and swamps where it once lived. One thing is for sure, everything in nature plays an important role in the survival of all the species and Utila is worse off in some way, as it is missing a part of the cycle of life.

Even if we don't know how something fits into the big picture, it does have a part to play and we must respect it. Mother nature is happiest when everything is in balance.

Different plants and animals naturally fade out of existence, like the dinosaur, so why the big deal about an animal becoming extinct?

The reason for the alarm and the urgent need for action and protection is the rate that animals and plants are disappearing from the earth's surface, never to be seen again. For millions of years species became extinct every century.

Now more than 1,000 different species of plants and animals become extinct each year.

We will never know where else the swamper once lived, but because of destruction to habitats and hunting, it is now only found on Utila. Information was first recorded on the swamper in 1898 and then again in 1960, and until last year no one knew if it still existed. The leader of the team, Gunther Köhler, was told when he arrived on Utila last year that there were two types of large iguana living on Utila—the highlander and the swamper. To Gunther's delight, he was able to identify the swamper as the little known *Ctenosaura bakeri*.

Once man becomes aware of the swamper's predicament and stops hunting it for a while, future generations of Utilians will be able to continue enjoying the fun of going out, once in a while, and catching an iguana for dinner. If we keep killing something simply because we can, eventually it simply won't be here anymore, ever!

The swamper, from the information gathered by the team, is very low in numbers, with very few females over 3 years [in age]. They are at the point of sure extinction if hunting, especially in the mating and nesting season, continues. If it is halted for a few years they will grow in numbers and their survival will be assured.

Knowledge mixed with experience brings wisdom. The day at the kindergarten was exactly this. Students learned to tell the difference between males and females, why it is so important not to hunt the females when she has eggs, and they got a chance to touch and look at one up close.

Joshua Henderson summed it up best. "If we kill and eat the swamper, it will be just like the crocodile that lives here no more." He's hoping that all future generations will have the same opportunities to see and occasionally eat iguana, and that it is not something they only learn about in a book.



### Who are the 'Lizard People'?

A team of 10 Germans and one Dutch scientist arrived on Utila April 6 to team up with locals, iguana hunters, conservation groups, authorities from COHDEFOR, biology students from the University of Tegucigalpa and the children of Utila to help protect a very special species of spiny-tailed iguana. It exists nowhere else in the world—the *Ctenosaura bakeri* or better known as the swamper.

The team is lead by Gunther Köhler, a lover of reptiles and amphibians. Although young, he has dedicated the past 20 years studying them and the team really cares about ensuring the continued existence of all species and travel all over the world researching, educating, learning and most importantly, raising the awareness of the little-known reptile world. Of the 12 different species of spinetail recorded, Gunther discovered two of them.

In his quiet, yet confident voice, Gunther explained that he feels the swamper really is the king of the iguana family. "With his big spines, the swamper sits high on his throne in the tall trees above the swamp." The swamper is the only spiny-tailed iguana that lives in the swamp and is a lot more docile and slow moving than the more common highlander (*Ctenosaura similis*), that lives in more arid habitats.

The swamper, according to Gunther, is in danger of extinction if hunting continues at its current rate. The Dodo bird was clubbed to extinction because it was such easy prey. The swamper is also easy prey, especially when the females leave the swamp, where they are protected by camouflage, and go to the beaches to lay their eggs. Not only is the female killed, the future generations of swamper are also destroyed.

The team of scientists were on the island for a month and left with their goals fulfilled and more questions than when they arrived. They were out in the field every day, sludging through the swamp counting, marking, identifying, taking blood samples and recording information about this relatively undocumented reptile.

Nests were studied and recording devices were left behind to record information about the early



*Ctenosaura bakeri*. Photograph: Gunther Köhler

stages of the swamper's life cycle. "In order to protect an animal properly, you must understand everything about the species," explained Gunther. He will be joining the team when they return in July to study the hatchlings and they'll return again the following mating and nesting seasons.

In between swamp expeditions, they were going around the schools and local community sharing their knowledge and interest with all who wanted to listen.

The team employed the services of the iguana experts, the local hunters, who could aid in the difficult task of spotting them in the trees as well as to learn all the local knowledge available. This time the hunters were making a living squelching through the mud helping to protect the swamper rather than kill it.

A slide show was given to a packed house at the 07 Bar and numerous meetings were held with locals and the authorities.

Utilians are very proud people and the swamper is an example of why they can be proud. With the increased awareness that this study is


bringing to the swamper, there is a good chance that the recent law prohibiting the hunting of the swamper will not need to be enforced. But if need be, the local authorities and Alcalde, Fulton Jackson, are 100% behind the protection of this unique Utilian iguana.

The highlight of the scientists stay was the Earth Day march, when 300 school kids paraded the streets of Utila celebrating the swamper and recognizing the need for its protection.

Currently the news is not good for the swamper. The area studied has a capacity to sustain 300 swampers, yet only 30 were found and less than half were females. A disappointing amount of females were found nesting on the beaches compared to last year and none were found over 3 years old. It would seem that over-

hunting of the older and bigger ones has really taken its toll. Now is the time for urgent action.

A current optimistic estimate is that there are only a few thousand swampers in existence. A hunter on average catches 10 iguanas a day and there are about 20 hunters on the island. Not all these are swampers, but if this hunting were to continue the swamper will certainly only live in our memories, not our lives.

A documentary for German TV is also in the process of being filmed and will be completed in July. Combined with the lectures, articles and publications that the team will be doing when they return home, and the continued work of BICA and COHDEFOR on Utila, the recovery of the swamper is surely certain. 

## UTILA IGUANA GETS HELPING HAND FROM FOREIGN FRIENDS

WENDY GRIFFIN  
HONDURAS THIS WEEK

The swamper wishwilly is a unique animal. The only place on earth you can see this spiny-tailed iguana is the island of Utila. Unfortunately, the wishwilly is in trouble. A dozen years ago it was common to find up to 40 animals in a single tree, says Web Muñoz, an Utila native. Now you can look all afternoon and find only three or four. If the wishwilly dies out in Utila, there will be no more swamp-dwelling garrobos anywhere else in the world.

There are two agencies responsible for protecting the wishwilly. These are the Utila branch of the Bay Islands Conservation Association (BICA-Utila) and the Honduran Forest Development corporation (COHDEFOR). As an organization previously devoted exclusively to commercial logging, however, COHDEFOR has little institutional capacity to protect endangered species.

Fortunately, the wishwilly has found some foreign friends, and German and Dutch biologists are now working with BICA, COHDEFOR and

the National Autonomous University of Honduras (UNAH) to protect the endangered reptile.

In order to plan a conservation program, you first need information about the species you're trying to protect. Is the primary cause for the decline of the animal the overhunting of the female during nesting season, or are there other problems, like pollution or destruction of habitat? If the solution is a ban on hunting during the breeding season, when, exactly, is the breeding season? Would a protected area help? What kind of habitat must be included in the protected area?

A team of biologists was led by Gunther Köhler, who works at Jonan Wolfgang Goethe University and the Senckenberg Museum in Frankfurt, Germany. His local counterpart is Roger Cruz of COHDEFOR. The team began by hiring local wishwilly hunters to work as guides, so that they could earn an income helping the animal rather than hunting it.

Next, a study showed that the overhunting of

females was indeed the cause of the decline of the animal. None of the hunted females was over three years old and wishywillies don't lay eggs until they are two years old. With this information, it was easier to persuade the municipality to ban iguana hunting and to fine violators.

Bans are easy. The hard part is getting people to comply with them, especially since stewed iguana is one of the favorite traditional foods on the island. The team launched an extensive educational campaign, complete with a slide show, in the schools, and covered the community with posters and information. The approach appears to have worked. Last year biologists found 22 people hunting iguanas during the breeding season. This year they found none.

Not only did the campaign cut down on hunting, it also cut down on the willingness of the people to buy the hunted iguanas.

In addition to raising community awareness and training Hondurans in conservation methods, the wishwilly program had other unexpected results.

The biologists discovered two previously unknown species of lizard and found five other reptile species not known to inhabit Utila. Previously it was believed that the island had only one species of frog. Now scientists know there are at least three, including a little yellow tree frog.

Five agencies helped fund the work of the team: the German Herpetological Society, the German Iguana Society, the Zoological Society for the Conservation of Species and Populations, Bundesverband für Fachgerechten Natur und Artenschutz and the Netherland Herpetological Society. The students in the project paid their own


expenses. When the researchers return in July they will complete a documentary on the project, which will be shown on both Honduran and German television.

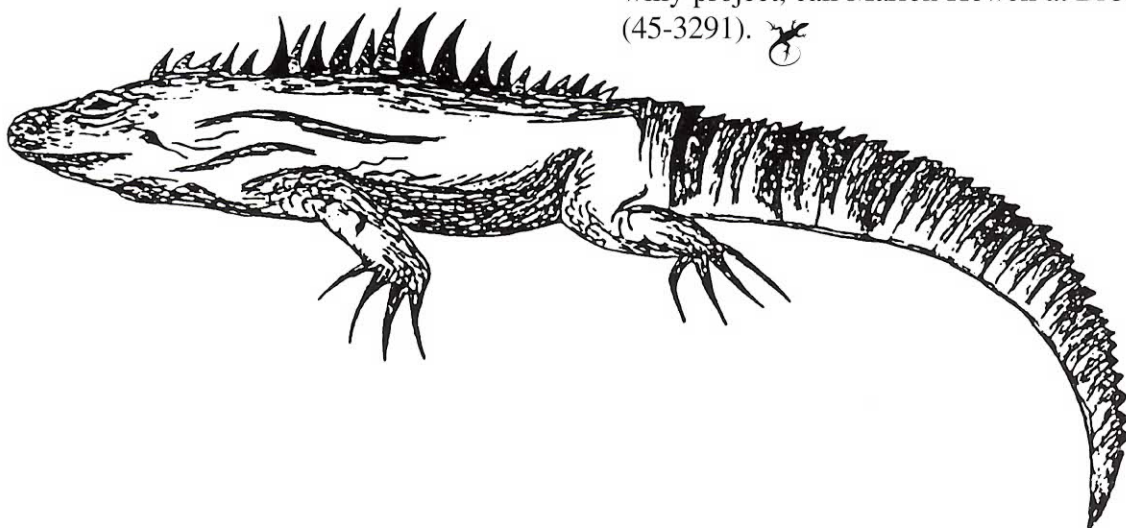
The funds raised through the video will be used to set up a laboratory on Utila for the continued study of the wishwilly. A number of questions remain to be answered before the next series of projects can be implemented, including a wishwilly farm that would further reduce hunting by marketing bred iguanas. The lab will also help stimulate the growing scientific tourism sector.

Roger Cruz says this is COHEDEFOR's first project on the Bay Islands and one of the group's first ventures out of the pine forest and into the beach zones.

It is hoped that the wishwilly project will serve as a model for other such projects on Utila. Honduran scientists and the Utila community now have the skills they need to implement similar projects for other species, especially the five bird, mollusk and rodent species that inhabit the island exclusively.

The UNAH students who participated in the program said they learned more during one week in the field than three years of theory classes. Because many foreign researchers come and go in Honduras, publishing their finds back home in their native languages, the wishwilly project was a welcome one because it relied so heavily on the participation of Hondurans. The participation of the UNAH students was financed by BICA, the Broadleaf Forest Project of Canada and COHDEFOR.

For more information about the Utila wishwilly project, call Marion Howell at BICA-Utila (45-3291). 



## LIZARD LETTERS

### Dear Editor:

My 6-year-old pet iguana recently died suddenly after consuming T-Rex Iguana Dry Formula (Adult Vegi). He was perfectly healthy when I fed him. A few minutes later, I found him thrashing violently from side to side with his mouth open, obviously in respiratory distress. His skin was pale and yellow instead of his usual dark green. He was breathing only in small squeaking gasps, and these became less frequent as he tired from the thrashing. He closed his eyes. Breaths were now more than a minute apart.

Thinking that he was choking, I performed several chest compressions—my best reptilian version of the Heimlich maneuver, without success. I forcibly opened his mouth and removed several pieces of iguana chow, then sped off to the local vet. By the time I arrived, his heart was not beating, as demonstrated by a Doppler probe, and there was nothing more to be done.

I learned from the veterinarian, however, that it is almost impossible for iguanas to choke to death. An iguana's trachea is rather far forward, just behind the tongue, and its entrance is raised a few millimeters above the surface of the mouth. The vet confirmed by intubation that the trachea was not obstructed by food particles.

The most likely cause of death, I believe, is acute bronchospasm (asthma) triggered by an allergic reaction to a particular food item—in this case, T-Rex Iguana Dry Formula (Adult Vegi). I had been feeding small amounts of this commercial formula for more than a year, usually in combination with fresh food, but in retrospect, I do recall much milder episodes of what looked like choking behavior after some feedings.

Interestingly, report of a similar fatal reaction after feeding pasta to a pet iguana recently appeared on the Internet ([rec.pets.herp](http://rec.pets.herp)). Since wheat is a major ingredient of both pasta and the T-Rex food, the most likely cause of death in both cases is wheat-induced allergic bronchospasm. In humans, there are reports in the medical literature of asthma-like symptoms, or even potentially fatal anaphylactic reactions, related to consumption of foods containing wheat. This is thought to be due to allergic hypersensitivity to the protein gluten, the major protein constituent of wheat. Anaphylactic reactions typically begin with bronchospasm and respiratory distress (similar to asthma) and can proceed to shock and death if untreated. Gluten also provokes in certain people a syndrome of

GI upset called “non-tropical sprue” that is thought to be immune-mediated.

I am unaware of any data on prevalence of wheat allergy in iguanas, but the anecdotal occurrence of two similar cases in the past week would suggest that it may not be uncommon. Of course, T-Rex commercial formula is not necessarily harmful for iguanas that are not allergic to wheat. But iguana owners may want to watch carefully for signs of respiratory distress after introducing any new food item, especially a commercial formula or other food containing wheat.

*David K. Welsh*

*Harvard Medical School*

*welsh@helix.mgh.harvard.edu*

### Related references:

- Burr, M. L., A. M. Fehily, N. C. Stott and T. G. Merrett. 1985. Food-allergic asthma in general practice. *Hum. Nutr. Appl. Nutr.* 39:349-55.
- Okazaki, M., H. Kitani, T. Mifune, F. Mitsunobu, S. Saito, N. Asaumi and Y. Tanizaki. 1992. Food-dependent exercise-induced anaphylaxis. *Intern. Med.* 31:1052-5.
- Vichyanond, P., N. Visitsuntorn, M. Tuchinda. 1990. Wheat-induced anaphylaxis. *Asian Pac. J. Allergy Immunol.* 8:49-52.

### Hey!

I'm getting your magazine for a year. I'd like to say it's very interesting and instructive. I like it very much.

I've got a small problem about it—the green iguanas. When they are in the nesting season I give them a box with a small amount of sand in it. They know why this box is so they put the eggs into it. But there is a problem. Why are they scratching all around the eggs right after nesting and damage the egg shells? Everywhere is written the best way is to remove the eggs immediately, but I can't do it always.

And there is another thing. Is it necessary to disinfect the eggs when you put them on hatching? And how to do it? Can the temperature oscillate and if it can, how much? Thank you for the answers.

*Your sincerely,*

*Simon Krasovec*

*Slovenia*

*Editor's note:* 1) Putting a smaller box within the box, or filling box with some burlap might provide female with a nesting medium which might cushion the eggs. 2) She is attempting to bury the eggs. Removing the eggs immediately after the female lays will prevent damage to the eggs. 3) Do not disinfect the eggs. The temperature can fluctuate between 83°–90° F during a daily cycle.

# NEWS OF THE SOCIETY

## International Iguana Society, Inc. Annual Treasurer's Report January 1, 1995 – December 31, 1995

*Cash Balance as of December 31, 1995:*

1. Florida Account . . . . .	14,340.97
2. Tennessee Account . . . . .	431.75
Total Cash Balance . . . . .	14,772.72
Total Period Revenue . . . . .	29,086.97
Total Period Disbursements . . . . .	26,605.86
Excess of Revenues Over Expenditures . . . . .	2,481.11

*Cash Revenues:*

1. Membership Dues . . . . .	10,252.00
2. Goods Sold . . . . .	4,836.65
3. Annual Conference . . . . .	13,186.00
4. Contributions . . . . .	525.00
5. Interest/Dividends on Accounts . . . . .	284.77
Total Cash Revenues . . . . .	29,086.97

*Cash Disbursements:*

1. Iguana Times	
a. Printing . . . . .	7,704.35
b. Postage . . . . .	2,371.55
c. Supplies . . . . .	217.65
Total Iguana Times . . . . .	10,293.75
2. Office Expense . . . . .	561.21
3. Cost of Goods Sold . . . . .	1,311.18
4. Advertising & Promotion . . . . .	265.92
5. Annual Conference . . . . .	12,770.85
6. Conservation Assistance . . . . .	100.00
7. Labor Cost . . . . .	237.90
8. Florida Incorporation Renewal . . . . .	61.25
9. Bank Debit . . . . .	6.00
Total Cash Disbursements . . . . .	26,605.86

*Excess Revenues Over Expenditures*

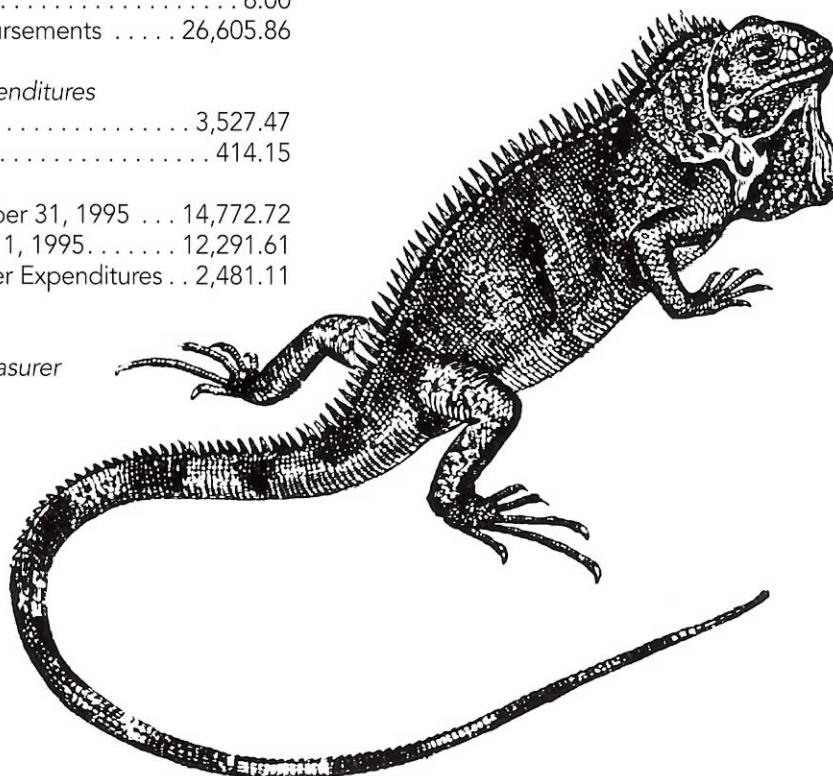
1. Goods Sold . . . . .	3,527.47
2. Annual Conference . . . . .	414.15

Cash Balance as of December 31, 1995 . . . . .	14,772.72
Cash Balance as of January 1, 1995 . . . . .	12,291.61
Period Excess Revenue Over Expenditures . . . . .	2,481.11

Reported By:  
David M. Ehrlich, DVM, Treasurer

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## IGUANA NEWSBRIEFS

### KISS OF THE KOMODO DRAGON

The **Denver Zoo** recently has received some little-wanted publicity concerning its Komodo dragons, giant lizards that are native to Indonesia. In mid-January, the Zoo began a special nine-day exhibit featuring their unique dragons. However, by late January, at least 25 visitors to the exhibit had reportedly become infected by *Salmonella*, a bacterial illness that causes diarrhea, cramps, vomiting, headache and fever. The 25 confirmed cases of salmonellosis ranged in age from infants to 25 years. At least three of the people required hospitalization. Apparently none of the zookeepers were affected.

During the special exhibit, a zookeeper would hold a Komodo dragon so that visitors could get a close-up look. Whereas some of the infected people touched the lizards, others apparently became infected by mere contact with straw in the exhibit or other objects the lizards had touched. *Salmonella* was cultured from at least one of the Komodo dragons. Contamination was presumably spread via contact with fecal matter.

Source: Denver Post

### CALIFORNIA HOUSE FIRE BLAMED ON CLUMSY IGUANA

Dozens of snakes, lizards and turtles were rescued recently from a burning building in Napa, California. The fire in the two-story, wood-frame home was ignited when an iguana tipped over a heating lamp in a bedroom closet.

Napa Fire Department spokesman, Captain Don Cohn, said the smoldering, slow-burning blaze occurred at the home of Scott Pollock, a 34-year-old travelling snake handler. Cohn said that Pollock was away overnight, and when he returned home at about 9 a.m., he found the house full of smoke. "He was very lucky," Cohn said. "He came home at the right time. If he had come home five minutes later, the house would have been fully engulfed in flames."

"He had a bunch of newspapers on the floor to catch iguana droppings," Cohn stated. "In addition, there was a fluorescent heating lamp and a 100-watt heat lamp which were attached to a shelf with a spring clamp. We think the crawling around of the iguana knocked the lamp off the shelf."

Damage was estimated at \$10,000—\$7,500 to the building and \$2,500 to the contents, including the loss of several animals trapped in the smoke-filled closet. Fatalities included the iguana, a python, a boa constrictor, a Japanese dragon and another lizard.

Source: San Francisco Chronicle

### NEW THREATS TO AN ENDANGERED BAHAMIAN IGUANA

IIS members **Sandra Buckner, John and Sheila Iverson, Ron Carter and William Hayes** recently visited the only remaining population of *Cyclura rileyi cristata*, an endangered Bahamian rock iguana. This lizard, which numbers only in the hundreds, occurs on just one small island in the Exumas. While camping on the cay they saw a handful of rats—which have been implicated in recent declines of iguana-sized tuataras in New Zealand and certain rock iguanas in the Caribbean. More perplexing were the obvious footprints of a raccoon that somehow had found its way to the cay. The handful of iguana carcasses found—some of which appeared to be well-chewed—suggests the raccoon was capable of preying on even the adults. Plans are underway to initiate a rat-eradication program not just on this cay but also on several rat-infested cays of San Salvador Island that host *Cyclura rileyi rileyi*. The raccoon, too, will have to be captured and removed.

Source: Editors

### GREEN IGUANAS IN UK

On 22nd September 1995, IIS member **Roger Lamb** of West Midlands, England, successfully hatched his first second generation common green iguanas. All five fertile eggs hatched and are doing well.

These were laid on 4th June 1993 by a female he had captive bred, and are to his knowledge the first in the United Kingdom. Roger has kept green iguanas for the past 10 years and has hatched a total of 82 green iguanas to date. During this time he has experienced a number of failures in reproduction but has also enjoyed several 100% hatch rates.

For the past 4 years he has been using vitamin D<sub>3</sub>, which has proven to be the key factor in his successful reproduction rates in a more northerly climate.

## Statement of Purpose

The International Iguana Society, Inc. operates as a non-profit, international organization dedicated to the preservation of the biological diversity of iguanas through habitat preservation, active conservation, research, captive breeding and the dissemination of information.

## Subscription Information

*Iguana Times*, the journal of The International Iguana Society, is distributed quarterly to members and member organizations. Additional copies are available at a cost of \$6.00 including postage. Annual dues for The International Iguana Society are \$25.00 for individuals, \$35.00 for foreign memberships, and \$35.00 for organizations, which receive double copies of the newsletter.

### Write to:

The International Iguana Society, Inc.  
PO Box 430671  
Big Pine Key, FL 33043

## Solicitations

Members of the I.I.S. are encouraged to contribute articles, letters to the Editor, news items and announcements for publication in *Iguana Times*. General articles can deal with any aspect of iguana biology, including conservation, behavior, ecology, physiology, systematics, husbandry, or other topics. Submission of photographs to accompany articles is encouraged.

Manuscripts based on original research are solicited to communicate recent findings not only to other scientists but to the general public as well. We wish to instill in our readers a greater appreciation for scientific research and a better understanding of how it can contribute to the conservation of threatened iguana populations or the well-being of captive specimens.

**Research Articles** will be subjected to peer review, and should be fairly general in scope (i.e., manuscripts having extremely detailed theoretical or statistical bases should be submitted to more appropriate journals). Manuscripts of any length will be considered, and must be accompanied by an abstract of corresponding length. Authors can expect rapid turnaround time for the reviews and quick publication of acceptable material. Research articles will be cited as appearing in the *Journal of the International Iguana Society*, and will be forwarded to the major citation and abstract journals.

**Research Updates** should be comparatively brief and written in non-technical language. They will not be subjected to peer review. Submission of photographs to accompany research reports is encouraged.

All manuscripts must be typed, DOUBLE-SPACED, with 1" margins, on 8 1/2" X 11" paper, following a format like that shown in the most recent issue of the journal. Original research articles must be submitted in triplicate. If at all possible, manuscripts should be accompanied by a disk (3 1/2" or 5 1/4") containing a word-processing file of the manuscript. We support most word-processing applications in DOS, Windows, and Macintosh formats. Please include file name, software name and version number on the disk; a hard copy printout is still required. Send manuscripts to the Editor at Department of Natural Sciences, Loma Linda University, Loma Linda, CA 92350. Shorter articles, research updates, letters, and announcements may also be submitted to the editor via e-mail (send to WHAYES@CCMAIL.LLU.EDU). For any contribution, please include your name, address and phone number.

Authors of one page or more of print are entitled to five copies of the issue in which their article appears. Reprints may be purchased upon request to the editor.

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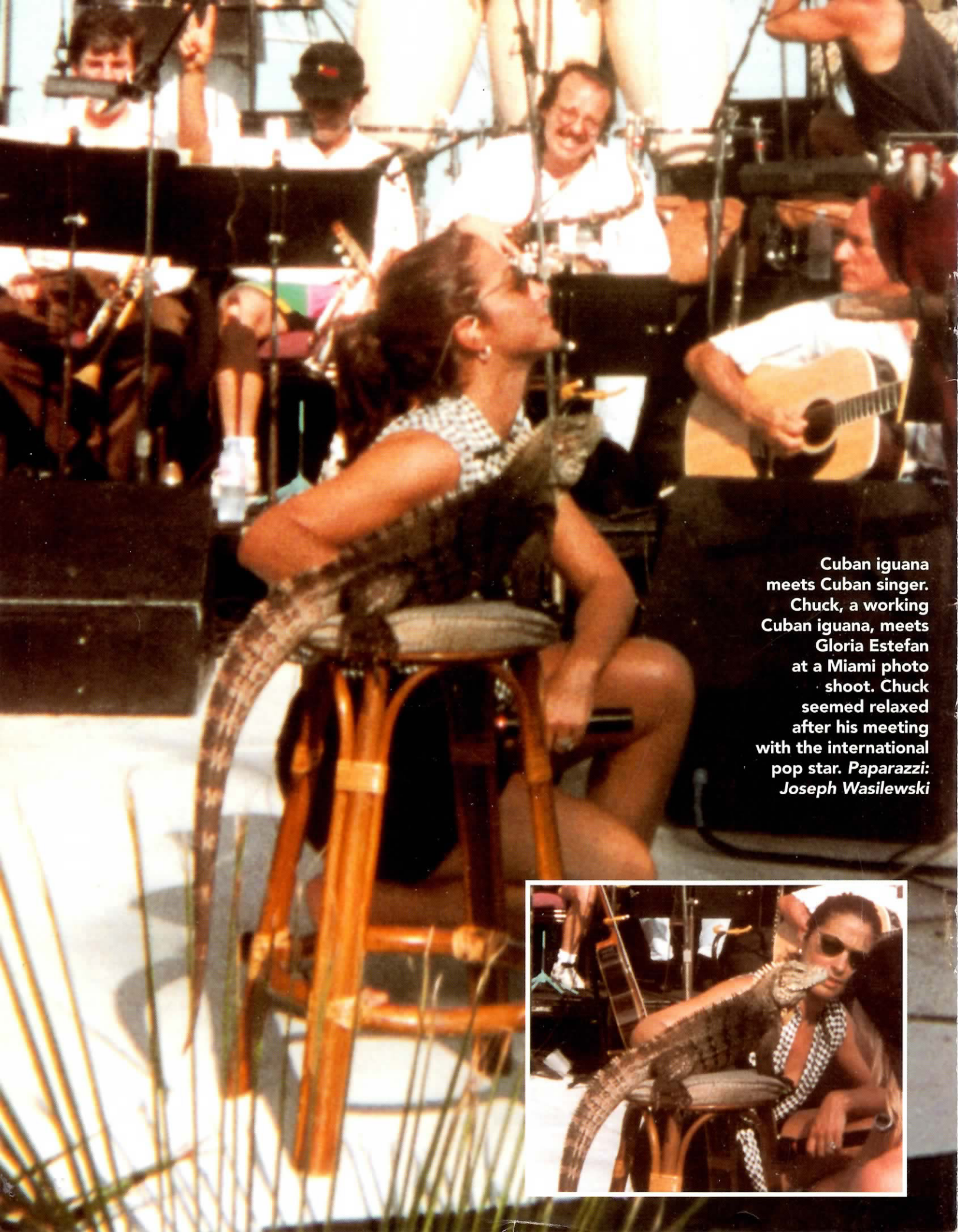
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Cuban iguana meets Cuban singer. Chuck, a working Cuban iguana, meets Gloria Estefan at a Miami photo shoot. Chuck seemed relaxed after his meeting with the international pop star. *Paparazzi: Joseph Wasilewski*

