

Iguana Times

THE JOURNAL OF THE INTERNATIONAL IGUANA SOCIETY
\$6.00

VOLUME 4, NUMBER 1
MARCH 1995



Male marine iguana, *Amblyrhynchus cristatus*, on mating lek with smaller females at Genovesa, Galapagos Islands, Ecuador. Photograph: Martin Wikelski



3rd Annual IIS Conference/Research Expedition

November 13-18, 1995, to study endangered *Cyclura rileyi rileyi* at Bahamian Field Station, San Salvador Island, Bahamas. Cost: \$859 including round trip airfare, meals, and lodging from Ft. Lauderdale, Florida.

Spend a week on a remote tropical island assisting an important iguana research and conservation project. Seminars and presentations by an impressive roster of internationally known iguana experts. Opportunities for snorkeling, swimming, photography, and assisting conservation efforts on behalf of the critically endangered San Salvador iguana. Open to all current I.I.S. Members in good physical condition. To guarantee a reservation for this trip of a lifetime, send \$400.00 per person deposit to:

The International Iguana Society, Inc.
Department of Biology
Southern College
Collegedale, TN 37315



Deposits should be received no later than June 15, 1995. Detailed informational packet will be sent to all registrants.

DIVING DRAGONS OF THE GALÁPAGOS

MARTIN WIKELSKI

MAX-PLANCK INSTITUT FÜR VERHALTENSPHYSIOLOGIE
DEPARTMENT WICKLER, D-82319 SEEWIESEN GERMANY

To be enthusiastic about a Robinson Crusoe life-style is one thing. To actually live more than half a year on a desert island in the middle of the Pacific Ocean is another, especially if you cannot take along fresh fruits (because of the possibility of introducing exotic plants and insects) and there is no electricity, not to mention refrigerator. One also learns how to get by with very little fresh water when one has to carry every single quart and receives supplies only once a month. But when my two Ecuadorian co-workers, Victor Carrillo and William Revelo, and I landed with our gear on the rocky coast of Santa Fe, in the Galápagos archipelago, we didn't think about the hardships ahead; we were too fascinated by the piles of marine iguanas that were stretched out on the bare lava boulders. They looked like petrified mini-dinosaurs soaking up

the warm rays of the sun. I couldn't believe how tame they were.

I thought back to the descriptions of the lizards I had read: David Porter, who captained the Essex in the early 1820s against British commercial fleets, found "myriads of iguanas, of an enormous size and the most hideous appearance imaginable. At first fearing they would attack... our crew soon discovered them to be the most timid of animals and had, in a few moments, knocked down hundreds of them with our clubs, some of which we brought on board and found to be excellent eating."

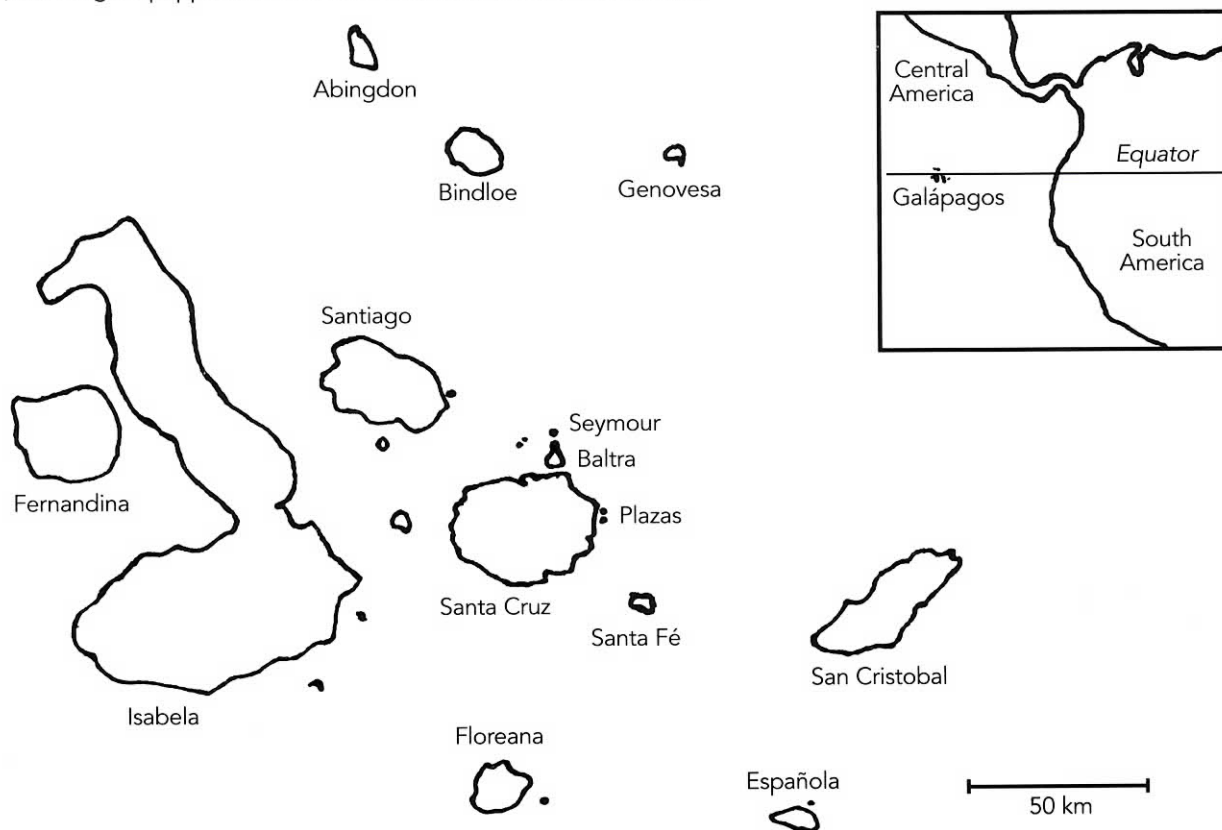
Charles Darwin, on his famous Beagle voyage, never really warmed up to the iguanas: "The rocks on the coast are abounded with great black lizards between three and four feet long; it is a hideous-looking creature, of a dirty black color,



Photograph: Martin Wikelski

The Galápagos Archipelago

(excluding Culpepper and Wenman to the northwest of Fernandina)



stupid and sluggish in its movements.”

I don't, of course, share his view. Marine iguanas are wonderfully unique, the only lizards that feed in the sea, grazing on beds of algae in the intertidal zone and even diving for submerged seaweed. The reptiles' diving ability is truly impressive. Normally the iguanas make shallow dives lasting from two to ten minutes, but they can descend to nearly 40 feet and remain submerged for as long as an hour. Darwin did admire their underwater feats, noting that “a seaman on board sank one, with a heavy weight, thinking to kill it directly; but when, an hour afterwards, he drew up the line, it was quite active.”

Marine iguanas inhabit mainly the southern, wave-exposed coastlines of the 16 or so Galápagos islands, where algae are nourished by cold, upwelling currents. Highly social, the iguanas live in colonies, some with as many as 4,000 individuals per mile. Their ancestors probably reached the archipelago on debris drifting off the South American coast and carried westward by the Humboldt Current. Authorities estimate it would

take at least two weeks to cover the 600 miles from Ecuador, the nearest landfall, to these isolated volcanic mounds. Genetic studies support the hypothesis that the marine iguanas, *Amblyrhynchus cristatus*, and the land iguanas, *Conolophus subcristatus* (which also occur on the islands), represent two separate invasions from the mainland. (The 1992 discovery of submerged islands east of the Galápagos has increased the archipelago's age from four to five million years to 30 million, and challenges this theory.) Reptiles, along with birds, rats, and bats, are among the few higher vertebrates that could survive the oceanic trip. Their low metabolic rate, resistance to water loss, and tolerance for high temperatures made it possible.

Though marine iguanas are noted for their diving capability, only the larger individuals dive frequently; the smaller lizards cool down too fast in the cold currents. Marine iguanas' size varies from island to island, with the larger lizards living on southwestern islands where the Cromwell Countercurrent brings an abundance of nutrients

that support vast algae grounds. Males on the island of Fernandina reach about 10 pounds, whereas the largest males on Isabela tip the scales at 26 pounds, and females weigh six. On Genovesa, the biggest males weigh hardly more than two pounds and females less than a pound and a half, weights so small one might question whether these animals have enough muscle mass to swim in the rough waves. But the sea is calmer around Genovesa and about eight degrees warmer than in the west, permitting even small animals to stay submerged.

Why subtidal feeding evolved appears obvious: as marine iguanas multiplied, algae became scarce, particularly for larger individuals. They began to forage deeper and deeper in the intertidal zone and eventually discovered the underwater algae—and possibly their own diving abilities. Being able to dive for food frees the lizards from dependence on the daily low-tide cycle, which offers only some two hours of optimal feeding.

Ninety-five percent of all feeding activity, however, occurs in the intertidal flats and reefs

exposed at low tide, which are shared by most females, small males, and juveniles. We've never seen hatchlings enter the water. Hordes of bright red Sally Lightfoot crabs also scuttle among the clumps of algae, sharing the iguana's food.

For the most part, the iguanas eat the small, usually less than half an inch long, red and green algae that thrive both above and below sea level. They seem to avoid the brown algae, which do not offer enough nutrients to survive.

How can so many lizards thrive on just algae? There are two answers. First, a reptile in the tropics needs relatively little energy. One ounce of algae per day is sufficient caloric intake for a two-pound marine iguana. And second, algae grow quickly. Some seaweeds double their length and increase their mass up to six times in two weeks.

Shortly before low tide, marine iguanas can be seen warming themselves before entering the cold waves. The bigger animals can store more heat and thus feed deeper and longer. Still, diving lowers the body temperature by about ten degrees, and the iguanas return to shore with body tem-



Male marine iguana, *Amblyrhynchus cristatus*, on Santa Fé. Photograph: Martin Wikelski



Marine iguanas normally feed on seaweed in the inner tidal zone; larger ones often dive for their food.

peratures only slightly higher than sea temperature. The smaller lizards stay higher on the shore. A severe drop in body temperature could weaken their ability to run away from breakers and put them in danger of being swept out to sea, where they may be eaten. Small iguanas, therefore, shuttle between the cold intertidal flats and the warm lava rocks and on some days make up to eight feeding forays during low tide.

It appears that the lizards' biorhythms, synchronized with the lunar cycle of tides, let the marine iguanas "know" when to snack. Feeding by the bigger iguanas, however, is largely determined by water temperature and solar radiation. They can be found swimming around noon time every day, regardless of tide.

To cope with the high salt content of their diets, marine iguanas have the most efficient salt-excreting glands of all reptiles. The glands are located just above the nostrils. By sneezing frequently, the lizards expel the salt in small white geysers, which often give these black lizards a whitewashed look.

After eating, a marine iguana must reset its body temperature and heart rate (from 30 to 100

beats per minute), because the digestive system works best at a constant, relatively high temperature. By flattening their dark bodies against the warm lava rocks, the lizards expose as much skin surface as possible to the sun and the rock surface. The flow of heat from the rocks is controlled by vessels in the marine iguanas' chest, which close and open to regulate body temperature. To prevent overheating, the lizards elevate their torsos and face the sun, thereby diminishing the amount of body area exposed and allowing the cooling coastal breezes to convect heat away. Unable to sweat, most marine iguanas pant when the temperature approaches 104 degrees. Not so the hatchlings; they sometimes enter the intertidal flats with body temperatures of 108 degrees and, in general, have higher body temperatures than all the other marine iguanas. This allows them to digest their food in half the time adults require and supplies the energy needed for fast growth.

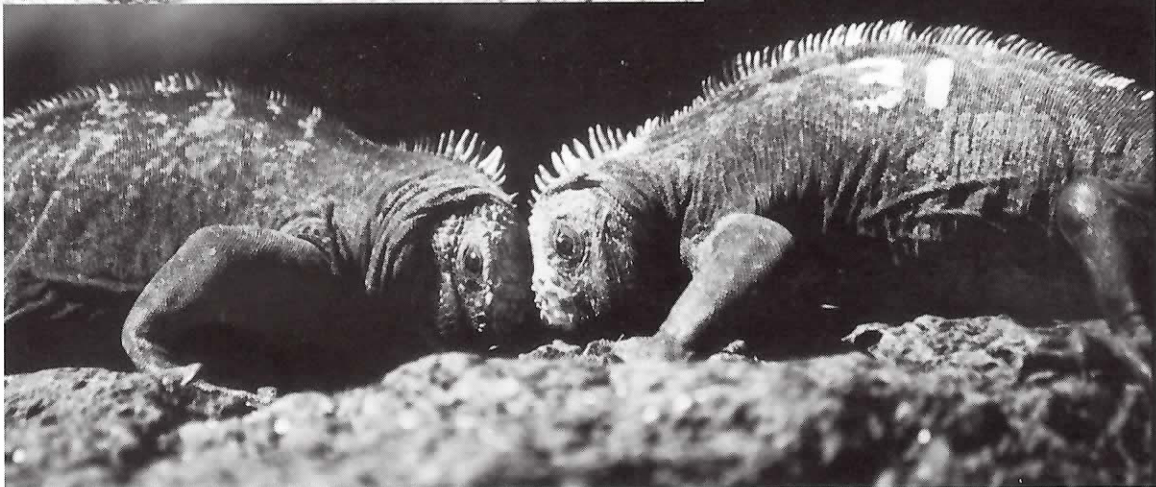
Onset of the breeding season varies from island to island: December to January on Santa Cruz, November to December on Santa Fé, for example. During this period the adult males become aggressive, staking out and defending ter-

ritories against intruders. Males feed less often and allocate available energy to reproduction. Consequently they don't grow and don't shed their skin. On some islands, the lizards' body color changes from black to shades of red, orange, and green. The effect is particularly dramatic on Española, where the males' green back spines conjure up childhood visions of dragons. But this coloration is not, as many might suspect, a signal to other lizards—male or female—about the qualities of that particular male. Females don't choose males according to color, and males don't react to the color patterns of other males. Rather, pigments from the plants they eat build up in the unshed skin, so body color reflects the type of algae they are feeding on. On Española, the color varies because they feed on diverse species of algae; on Fernandina, the iguanas mainly eat sea salad (green algae) and are brownish-green.

Males claim territories in the females' preferred resting places, which may be nothing more than exposed rocks, where they position themselves to appear as large and imposing as possible. Actually, a male's appearance is probably less appealing to a female than his territory; the more desirable the territory, the more opportunities for its owner to copulate. The best territories are above high tide, away from breaking waves, with sunny areas and shady crevices, ideal for the lizards' most time-consuming activities: basking and digesting. Some males occupy transition territories near low tide, waylaying females en route to the algae beds.

Holding onto a territory isn't easy. It allows the claimant little time to eat because another male may take over. Even when an iguana stays put, he often has to face other males who come to challenge him. Much head-bobbing and side

showing will often scare off an encroacher. But if males are of equal strength and size, such encounters can lead to head butting and pushing, and escalate to damaging fights. Many males carry scars from these bouts, which can last for hours or be



Recent studies by the author suggest that marine iguanas are the first reptiles documented to exhibit a lek mating system, in which males, shown fighting here, compete at traditional display areas for high dominance ranking within the group. *Photographs: Martin Wikelski*

taken up again the next day. Exhausted by these exertions, male iguanas are often in no condition to reproduce year after year, so they sometimes “take off” a year, avoiding the “mating scene” and hanging out in bachelor groups while they gather strength for the next season.

In 1990 we saw some of the first marked male hatchlings from 1981 occupying territories and copulating with females (about 6,000 animals have been marked so far). Yet there were no prize males and some didn’t reproduce at all. It probably takes 10 years for males to reach sexual maturity, so we estimate that “old fighters” known since 1981 must be at least 20 years of age.

Females move between territories as they like, but are subject to advances if they stray into a male’s territory. Once a female enters his territory, the male circles around her, nodding. If she stays, he mounts her and, holding her by the neck, drags her around. If the female endures this treatment and remains motionless, the male twists his tail around hers and copulates for up to 25 minutes, though sperm release begins after three minutes.

When walking among territories, females are constantly harassed by small, agile males. Large

er males will often push these smaller males off the females before they can release their sperm. During this year’s field work, we discovered that the smaller males counter this by masturbating and storing the sperm in their cloacal pouches. They can then release the sperm immediately upon mounting a female, before the larger males have a chance to knock them off.

Male defense of the breeding territories goes on for a month, after which the male loses his vivid color through shedding and becomes less aggressive. About the same time, the female begins to look for a nest site. She may have to walk several hundred yards inland in search of a sandy plot, where, together with hundreds of other females, she digs a burrow. This results in a complicated underground tunnel system of nests, and we still don’t understand all the processes that go on during egg-laying. Not surprising, fights erupt over the better sites, particularly those that offer shelter from Galápagos hawks, which on some islands prey on nesting females. When a suitable nest has been prepared, the female lays one to six leathery white eggs about the size of a chicken’s. She guards them vigilantly for a few days to two weeks



Female iguanas mate most frequently with high-ranking males. *Photograph: Martin Wikelski*



With limited nesting areas, females often compete for the best sites to dig their burrows. *Photograph:* Martin Wikelski

to ensure that they are not dug up by other females. Away from the sea, without food and drink for a week and more, the females soon look dirty and haggard.

Incubation takes about 95 days. On Santa Fé, hatchlings emerge in the first two weeks of May. The hatching of thousands of marine iguanas within a short period makes for better chances for survival. Still, many of the babies fall prey to snakes, lava gulls, hawks, and owls, and on some islands, feral cats and dogs. During the first year of life, iguana mortality can be as high as 60 percent.

Working on the Galápagos is somewhat like being in a wildlife paradise. One day, we shared our camp with 18 short-eared owls (some sitting on our shoulders while we read), four land iguanas, 50 Galápagos doves, three hawks, and a whole passel of rice rats, not to mention Darwin's finches, mockingbirds, lava lizards, and geckos. Sea lion pups play in the tidal pools (our bathtubs), and Galápagos and hammerhead sharks, schools of clownish-colored fishes, sea turtles, and lobsters swirl around when we snorkel.



The enormous investment in reproduction is evident from this egg laid by the female pictured. Marine iguanas lay the largest eggs of any iguanid species. *Photograph:* Martin Wikelski

The future of the marine iguanas, however, is unclear. When the project was started 14 years ago by Andrew Laurie, of Cambridge University, only about 4,000 people lived on the islands. Today there are nearly 12,000, and many of the new arrivals are attracted by the economic poten-

tial of the tourist industry rather than the islands' intrinsic beauty. Now, most tourists make supervised three- to seven-day boat trips to visit various islands. Ninety-five percent of the land area is owned and administered by the Galápagos National Park Service. Tourists are not allowed to stay overnight on the islands, are restricted to special areas, and must stay on designated trails. But as more people arrive, there will be more public and political pressure to give away park property for settlers and tourist facilities. Plans are already underway for a several-hundred-bed hotel on Isabela, which would be the end of the gentle boat-bound nature tourism.

In addition, introduced animals, such as cats, rats, pigs, and dogs, prey upon and compete with many native species. The park service is committed to controlling them and thus protecting the wildlife, but money is scarce and sometimes politics intervene. Fortunately, no introduced vertebrates survive on Santa Fé, so we have been able to observe marine iguanas undisturbed...though introduced blood-sucking flies and wasps recently invaded our private Eden.

The text of this article is reprinted with permission from the May/June 1993 issue of Wildlife Conservation.



During nesting season, the Galápagos hawk may prey heavily on female iguanas, sometimes killing them by holding their prey in the hot sand until they overheat. Photograph: Martin Wikelski



To a curious sea lion, an iguana may be an object of play. Photograph: Martin Wikelski

LIVING WITH TEE BEAU:

Sharing Your Life and Home with a 26-year-old Male Rhinoceros Iguana

WRITTEN BY: MICHELLE HAMILTON

AS RELATED BY MONTY KRIZAN, OWNER/OPERATOR OF MONTY'S TRAVELING REPTILE SHOW, INC.

1106-A PHILIPS ROAD

ARROYO GRANDE, CA 93420

Early in the 1970's, Monty Krizan was a relative newcomer to the field of herpetology. His interest in all creatures was inspired at an early age growing up on a farm in Wisconsin. A specific interest in reptiles came as Monty entered his twenties and managed a bar/rec center in Burnsville, Minnesota. Business and participation was sluggish, so Monty bought a Burmese python and built an exhibit cage to display the python. From this experience, Monty learned that human beings will stand and look at things they claim not to like.

Since 1974, Monty has made his living exclusively by exhibiting, lecturing, breeding, caring, maintaining, and loving his collection of approximately 100 reptiles. Monty himself is deserving of an entirely separate story, but the focus of this article is Tee Beau, the male rhinoceros iguana that has been Monty's companion for most of its 26-year-old life.

Tee Beau was imported into the U.S., via Florida, as a 6 in. hatchling sometime in late 1969. To this day, there is some question as to whether Tee Beau came from Mona Island or Hispaniola (Haiti and the Dominican Republic). Early in 1970, Terry Odegaard, an avid herpetologist, took custody of this young iguana that had received rude treatment from larger lizards during its

travel. Odegaard returned to his home in Minnesota and began rehabilitating this young lizard with the help of a veterinary student at the University of Minnesota.

Tee Beau came to live with Monty in 1973. Their lives have become intertwined since that time as they travel extensively throughout North America to deliver a message that reptiles are survivors from the past. In the early stages of Tee



Monty and Tee Beau

Beau's association with Monty's Traveling Reptile Show, he displayed a 'cool' behavior, almost statue-like when he was introduced to the public. Sometime in the late 1970's, however, Tee Beau began to display the dominant behavior typical of most male rhino iguanas. Subtle behavioral changes exhibited by Tee Beau increased Monty's awareness that this little 20 lb. creature feared nothing under certain circumstances—from repelling dogs and cats to even charging an

80,000 lb. semi-truck that parked too near his perceived territory in a truck stop. But despite all these displays of dominant behavior, Tee Beau appeared to know when to turn it on and when to turn it off around the general public.

What makes Tee Beau a unique individual is that he has continuously been exposed to many other reptiles including large pythons and boas, assorted lizards, a 170 lb. alligator snapping turtle, and an 18-year-old, 8 ft. alligator named Albert. Tee Beau is oblivious to all except Albert; the mere sight of the alligator results in Tee Beau yielding territory and dominance instantly. R-E-S-P-E-C-T! But the ability to discriminate between Monty and *all* other human beings is cer-



Tee Beau and ice cream—not a good food item for a cold-blooded, herbivorous lizard.

tainly one of Tee Beau's most amazing and endearing talents.

During exhibition at the Calgary Stampede, for example, Tee Beau spent his allotted time on the front table as a gaff to draw people to the reptile exhibit. Typically, Tee Beau was content to sit under his basking lamp or natural sunlight for his daily tour of duty; but on occasion, the mere sight of Monty sent this lizard into an all out 'bull rush' with the intent of evicting Krizan from the premises. The amazing thing about this is that

Monty can be in the exhibit or mingling with a crowd 100 ft away, and instantly Tee Beau can spot him.

In order to satisfy this combative urge, Monty has adapted several approaches that allow Tee Beau to benignly assert his dominance. For example, the favorite enemy in Tee Beau's eyes is a 20-year-old institutional-sized rubber plunger, which has been beaten and pummeled into submission so many times by Tee Beau that it is now unrecognizable. This has not harmed Tee Beau, but rather served to dissipate his excessive energy and achieve a feeling of Mission Accomplished—without having to chase off Monty.

At other times, Tee Beau can display gentle

behaviors and a charming curiosity. When on exhibit at a shopping mall in San Jose, California, Tee Beau was lying on a terrazzo floor enjoying the flood of sunlight through a skylight. An unsuspecting 2-year-old with an ice cream cone squatted near Tee Beau for a closer inspection. Tee Beau sauntered towards the youngster—and carefully helped himself to the dollop on the top of the cone. Generally, Tee Beau receives a high quality herbivore

diet supplemented with

vitamins and minerals, but an easy ice cream treat certainly could not go unsampled.

Monty attributes Tee Beau's longevity while living in a most unusual environment to a number of things: freedom of movement, quality of diet, plenty of natural sunshine, exposure to other iguanas and reptiles, and stimulating interaction with Krizan and the general public on a daily basis. Tee Beau has more than just a simple routine—he always has something to do, something to keep him occupied.

The creation of Monty's Traveling Reptile Show was the result of a personal fascination with reptiles that manifested quickly into a desire to share these unique creatures with other people. Monty's first endeavors began with classroom situations, where he performed "show and tell" activities for former college mates who had become teachers at local schools. As Monty gathered more information about where the reptiles came from, their long history and their impact on the ecosystems in which they naturally live, he became a self-taught naturalist/environmentalist. He used reptiles as a magnet to draw the audience to the conclusion that many of these critters eat insects and rodents—and should therefore be considered our natural allies.

Initially, Monty transported the reptiles in portable containers designed to control temperature and offer secure environments. As Monty's business increased it became apparent that he would need a method to transport and display the reptiles that could be not only environmentally controlled for the animals but provide living quarters for himself as well.

In 1979, Monty found a company that manufactured large draft horse trailers. Together, the company and Monty worked and reworked designs, and finally decided upon a 40 ft. fifth-wheel trailer with six spacious display windows on the sides. On July 9, 1979, the new trailer shell was delivered to Monty's driveway. For some reason, still unknown to Monty, he had booked an exhibition in Illinois for September 20, 1979—and now the race was on. For the next 69 days and nights, Monty, with the help of a carpenter, a window glazer and a close friend, built the deluxe edi-

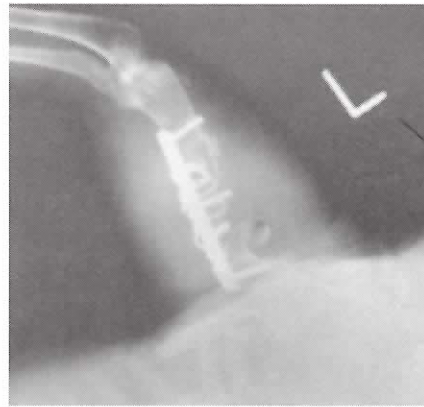
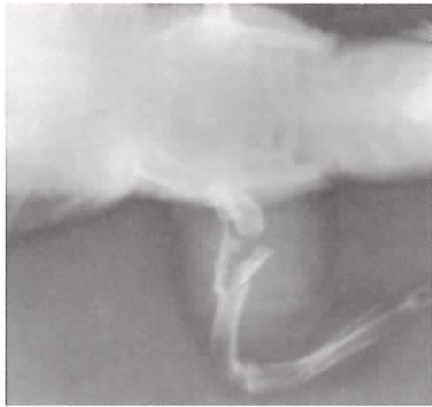


Monty's Traveling Reptile Show—ready to roll.



tion of Monty's Traveling Reptile Show—which continues to serve him well. This trailer is well-insulated and powered with a 12-volt electrical system. It also has an oversized generator that can be put into use with the flick of a switch to provide additional power when traveling under extreme conditions. When the trailer is parked or exhibiting, the environment of each cage can be finely tuned to deliver all occupants their desired requirements. In order to accommodate Tee Beau's freedom of movement, he was given the main hallway in the trailer. Early on he displayed a liking to the shower, which provided a clean, secure place. To this day, Tee Beau continues to occupy the shower in the trailer—or in Monty's own home—to do at the end of the day what he does best—SLEEP!

Beginning in 1981, Monty and Tee Beau were contracted to create a weekly television program in Alberta, Canada. The program centered around reptiles and the environment, and offered a meaningful alternative to young viewers on Saturday mornings. Over the course of the next eight years, Monty and Tee Beau starred in approximately 70 episodes of Monty's Traveling Reptile Show. Tee Beau quickly gained the respect of the film crew,



Tee Beau's shattered left rear leg—before and after surgery.

who never failed to ask “where is he?” when Monty entered the studio. Although Monty had a certain talent for capturing the media spotlight, Tee Beau also demonstrated an ability for claiming center stage. Each 30-minute program began with Monty and co-host Tee Beau welcoming the viewers and studio audience to the show. Regardless of the content of the show, Tee Beau frequently found a way to make unsolicited cameo appearances in front of the camera.

Time and time again, Tee Beau demonstrated a desire not to be left out of anything going on at the Monty's Traveling Reptile Show exhibit. In 1985, two days prior to the opening of the Minnesota State Fair, Tee Beau fell and severely shattered his left rear leg. Doctors at the University of Minnesota Hospital of Veterinary Medicine recommended removal of the leg or putting Tee Beau down. At the insistence of Monty, the veterinarians instead performed a six-hour surgery during which they used a 3-inch steel plate, four screws and wire to secure the bone fragments. Leg reconstruction was completed by wrapping the leg in a huge blue cast which served to immobilize the limb until healing was complete. Tee Beau was discharged to Monty with instructions to keep him cool and immobile. That lasted overnight. The following day it was business as usual for Tee Beau, who demanded to resume his position at the table, in the glorious sunlight, right in front of the exhibit. Tee Beau's threshold for pain, obviously, is different than a human's. He appeared to demonstrate heart and pride as he opened the Minnesota State Fair seemingly obliv-

ious to the events of the preceding 72 hours.

The metal and screws in Tee Beau's leg held fast and allowed the limb to repair, but his tissues eventually rejected the metal. This progression was followed for 3-1/2 years by Fredrick L. Frye, D.V.M., M.S., of Davis, California. Dr.

Frye removed the rejected metal during a surgical procedure in March of 1989. The injury has had no lasting effects on Tee Beau's excellent health—and certainly has not affected his ability to execute his famous 'bull rushes.'

Monty describes 22 years of traveling 750,000 miles throughout the U.S. and Canada as anything but a typical day at the office. “I could have stayed home under one roof and enjoyed my collection of reptiles, but I chose not to. I don't believe that I could have accomplished what I have without the companionship of a half-hateful iguana named Tee Beau. He has been described to me by many experts in the field of animal behavior as one of a kind.”

Having a lifestyle that resembles Monty's, George Lewis spent his entire life handling elephants. During the depression years he hauled “Tusco”, a 7 ton Asian elephant, throughout the U.S. on a flatbed truck. Upon meeting Tee Beau in the late 1970's, George advised, “Don't ever let anything happen to this guy—you can never replace him.” Presently, Tee Beau appears to be mellowing in his old age, spending many of his days basking in the sun on the deck of Monty's home in California. However, Monty admits that often he must still yield to the whims of his stubborn iguana. “Sometimes I can't even go into the house through the door I want to use, as Tee Beau will be patrolling that area.” Mere eye contact with Tee Beau will alert Monty to choose another house entrance if he wishes to avoid a confrontation. To sum up Tee Beau, no words seem to fit better than those of Dr. Fred Frye: “WHAT A BEAST!”

SALMONELLA

BRECK BARTHOLOMEW
195 WEST 200 NORTH
LOGAN, UT 84321-3905

FDA Bans Iguanas and Monitor Lizards From Pet Trade

No, the Food and Drug Administration didn't really ban iguanas and monitors... yet. But there has been an alarming number of news reports and health alerts warning that these lizards carry *Salmonella* and it wouldn't surprise me if a ban was suggested in the near future. Reports of lizard-associated salmonellosis are varied and increasingly frequent:

- 22 February 1995: The Utah Department of Health announced that there have been a few cases of salmonellosis in which lizards were involved.
- January 1995: The State of New York issues health alert to reptile owners about *Salmonella* after infant's death (Anonymous, 1995a).
- October 1994: Several cases of salmonellosis involving reptiles are reported in Ohio (Anonymous, 1995b).
- Winter 1994: State of California Health and Welfare Agency issues memo entitled, "*Salmonella* and Reptiles," which discusses 22 cases of salmonellosis attributed to reptiles (Jackson, 1994).
- September 1992: Utah Department of Health publishes report entitled, "Lizard-associated Salmonellosis—Utah," in the Journal of the American Medical Association (Lanser et al., 1992).
- February 1992: Indiana Center for Disease Control publishes report of iguana-associated salmonellosis in the Journal of the American Medical Association (Anonymous, 1992).
- 1992-1995: Herpetoculture magazines and regional societies increasingly report on *Salmonella* and health concerns for the herpetoculturist.

These are just the reports I am aware of; certainly many more exist. But why am I concerned? *Salmonella* is known to be carried by most reptiles (as well as many other animals) and can *potentially* cause serious health problems for humans and rarely even death. Shouldn't people be aware that their animals could transmit *Salmonella* to humans? The answer is of course they should know this, however, the way we are spreading the word is what worries me.

Thirty years ago baby turtles were the pet trade fad. People could buy hatchling turtles at most department stores and virtually all pet stores for literally pennies (<\$2). Turtles were so cheap and cute that millions were sold every year to people who really didn't know the first thing about caring for reptiles. Many of these turtles were purchased for children, a few of whom eventually got salmonellosis. Reports of turtle-associated salmonellosis became relatively common. The media, with their usual concern for the public's well-being, jumped on the story causing people to panic. Baby turtles were flushed or released by the thousands, not only because of the *Salmonella* threat, but because their owners didn't expect the turtles to grow up, or they tired of them. In 1968 the State of Washington prohibited the sale of turtles that were not certified "*Salmonella* free." By 1975 the sale of any turtle under four inches carapace length was prohibited by federal law, with a few exceptions, and Maryland, New York and New Jersey banned the sale of all turtles! Many of these bans are still in place.

All in all, the four inch ban seemed to work. Its premise was that children couldn't put large turtles into their mouths, thus reducing the transfer of *Salmonella*. The actual reason the ban worked, however, was more likely because it halted the mass sale of turtles to uninformed pet owners.

In more recent times, reptiles and amphibians have become very popular in the pet trade once again. Instead of just baby turtles, many other animals are fashionable, including iguanas and monitor lizards. Like the baby turtle fad, baby iguanas, and to a lesser extent monitors, are relatively inexpensive, cute, and readily available. Many of the people purchasing these lizards are uninformed about proper care and maintenance, and thus are at a higher risk of getting salmonellosis. Unlike thirty years ago, there are now several magazines available to help educate the many budding herpetoculturists. Unfortunately, some of these magazines have recently resorted to tabloid style articles designed to excite rather than educate (e.g., Anonymous, 1995a). Also, some individuals, in the interest of getting attention, admittedly lie and purposely mislead the public as to the proper care and husbandry of iguanas (Richards,



Green Iguana, *Iguana iguana*.

1994). So once again we find ourselves in the same position we were in thirty years ago: reptiles are *too* popular, too many reptile owners are uninformed, and in an effort to “inform” the public about potential health problems the media is creating a panic situation. Hopefully it is still early in the cycle of things and if we begin working now we might be able to prevent unnecessary bans on iguanas and other reptiles.

In order to calm the imminent hysteria we

must be well informed as to what the actual threat is. *Salmonella* is a type of gram-negative bacteria with over 2,000 serotypes (strains). It is commonly found in amphibians, reptiles, birds, mammals, food, etc. Over 200 serotypes have been reported from reptiles, many of which are rarely found in other North American hosts. Just like snakes, only a small fraction of the serotypes are considered dangerous to humans. And just like snakes, all serotypes are given a bad rap. The few dangerous serotypes can cause a disease called salmonellosis in both reptiles and humans as well as many other animals. Salmonellosis is characterized by gastroenteritis and diarrhea, and is often misdiagnosed as the flu. Many people have had salmonellosis without ever knowing it, and still more people carry *Salmonella*. Although *Salmonella* may cause salmonellosis, it usually doesn't result in a noticeable disease in otherwise

healthy animals. Chances are that if you have many reptiles, some of them are carrying some type of *Salmonella*. The same is true for birds and farm animals. Transmission can occur via a number of ways, but virtually all involve gastrointestinal tract fluids/excrement in some manner.

Salmonella has some resistance to dehydration and freezing

and can survive for long periods outside of a host animal. An example of this resilience and the mode of transmission is the case of an eight-week old infant that got salmonellosis from a monitor lizard. Lanser et al. (1992) reported:

“One month before onset of illness, the family pet had been a 2-foot-long savannah monitor lizard (*Varanus exanthematicus* [sic]), which the parents reported had loose stools for the 8 months it was in their possession. In March, they returned

the lizard to the pet store and traded it for a python. Specimens obtained from the snake and its plastic cage did not yield *Salmonella*. However, *S. poano* was recovered from fecal specimens left by the lizard nearly 3 months earlier.

“The infant had not had contact with either reptile; they were handled only by the father. Because of the height of the cage, the father had to climb in it to handle the lizard and clean the cage. He did this with bare feet, a potential means of spreading contamination in the home. Heat rocks from the cage were washed in the kitchen sink, and may have been a source of household contamination.”

Exactly how the baby came in contact with the *Salmonella* will never be known, but a number of possibilities exist. One aspect of this report that is particularly disturbing is that monitor feces were still available for testing after three months!

With this basic information about *Salmonella* we can come to several common sense conclusions to help prevent salmonellosis from becoming a problem. Probably the most important thing to do is to practice good hygiene! Most people wash their hands after cleaning cages for obvious reasons. But many people fail to wash their hands after holding an animal. Think about it. The animal lives in a cage where it defecates. You may remove the feces, but is the animal clean? *Salmonella* has been found in shed skins, even several months after molting (Grier et al., 1993). Sure, reptiles are “clean” animals, but they’re not sterile. Therefore, always wash your hands after handling any animals, cage accessories, etc.

Cages should be kept clean. Get into a routine



Green Iguana, *Iguana iguana*.

of checking each cage every day. Clean cages as they become soiled. Periodically disinfect cages and all accessories with a 10% solution of chlorine bleach (note: do not use chlorine bleach for amphibian cages). Thoroughly rinse cage and all accessories to remove bleach solution. Chlorine bleach is one of the most effective disinfectants available, but prolonged use can damage some materials. Always wear gloves when using bleach and never mix bleach with anything except water. Although most bacteria and viruses are destroyed after a short contact with bleach, ten minutes has been found to be optimal for disinfecting purposes. Don't use the kitchen for anything related to animal husbandry. Washing cage accessories in the sink can promote the spread of pathogens. Bathroom sinks and tubs should be disinfected after use for cleaning or soaking animals and their cages.

Individuals with weak immune systems, such as small children, the elderly, and immune-suppressed individuals should be careful when handling animals. Only healthy animals should be handled, if any are handled at all.

When giving a presentation using animals,

only use healthy animals. Animals that are under stress or otherwise unhealthy are more susceptible to salmonellosis than healthy animals. *Salmonella* is more likely to be shed (and transferred) by animals when they have salmonellosis or are unhealthy. Do not allow animals or shed skins to be handled unless facilities are readily available for participants to wash their hands.

Don't eat, smoke, or put things in your mouth while working with animals. Dedicate certain equipment (e.g., pens and pencils) exclusively to handling areas.

Certainly the list could go on, but everything relates to good hygiene. The question of what to do if your animal has salmonellosis is a tricky one. Some veterinarians recommend euthanasia, others will treat the disease. There are many problems with both options and neither will be discussed here. See the suggested reading (below) for a discussion of what to do if your animal has salmonellosis. I would recommend trying to avoid the situation by purchasing only healthy animals (no matter how good of a bargain the sick one is) and keeping your animals healthy. Cages should provide a low stress environment and animals should not be allowed to roam free in the house.

In conclusion, *Salmonella* is potentially serious, however, reptiles are only a minor source for the bacteria. You have a much greater risk of getting *Salmonella* from other sources than from your pet reptile. Nonetheless, reptiles are an appealing target for the media and much hype will be generated around this topic. As herpetologists/herpetoculturists we should be careful not to fuel the fire. Rather than emphasize the fact that reptiles carry *Salmonella*, we should focus on good hygiene and husbandry. It is my opinion that the popularity of reptiles is at the root of the problem. Uninformed pet owners are often careless and allow their animals to deteriorate, thus increasing their risk of getting *Salmonella* from their pets. We need to make a point of contacting these people and educating them. Unfortunately, we must also educate pet store owners and employees. The task is not an easy one, but we should begin work now rather than wait until it is too late!

Literature Cited

- Anonymous. 1992. From the Centers for Disease Control. Iguana-associated salmonellosis-Indiana, 1990. *J. Amer. Med. Assoc.* 267(8):1053-1054.
- Anonymous. 1995a. New York State issues health alert. *Herp News Today* (March):1,3.
- Anonymous. 1995b. Salmonellosis: Reptile-associated salmonellosis. *Toledo Herpetol. Soc. Monthly Newslet.* 6(3):3-4.
- Grier, J. W., M. S. Bjerke and L. K. Nolan. 1993. Snakes and the *Salmonella* situation. *Bull. Chicago Herpetol. Soc.* 28(3):53-59.
- Jackson, R. J. 1994. *Salmonella* and reptiles. *J. San Joaquin Herpetol. Soc.* 3(3):22.
- Lanser, S., S. Mottice, P. Newcomb-Gayman and C. R. Nicols. 1992. Lizard-associated salmonellosis—Utah. *J. Amer. Med. Assoc.* 268(11):1396.
- Richards, A. 1994. Just who is Henry Lizardlover? (His name says it all). *Reptiles* 1(6):68-69.

Suggested References

- Anonymous. 1994. California Zoological Supply's sanitary guidelines for keeping reptiles. Tips on avoiding *Salmonella*. *Newslet. Minnesota Herpetol. Soc.* 14(4):12.
- Corliss, J. M. 1994. *Salmonella*—A possible health threat. *Captive Breeding* 3(1):17-18.
- de Vosjoli, P. 1994. *The Lizard Keeper's Handbook*. Herpetocultural Library Series Advanced Vivarium Series, Lakeside, California. 175 pp.
- Frye, F. L. 1991. *Reptile Care: An Atlas of Diseases and Treatments*. TFH, Neptune City, New Jersey. 654 pp.
- Grenard, S. 1995. Salmonellosis transmitted to people by lizards. *Herp News Today* (January):9.
- Highfield, A. C. 1994. *Tortoise Trust Guide to Tortoises and Turtles*. Carapace Press, London. 60 pp.
- Mader, D. R. 1994. *Salmonella* and baby turtles. *Reptiles* 1(4):32-33.
- Mader, D. R. 1994. Treating mites with olive oil, *Salmonella*. *Reptiles* 1(5):30-33.
- Mader, D. R. and K. DeRemer. 1993. Salmonellosis in reptiles. *Vivarium* 4(4):12-13,22.
- Marcus, L. C. 1980. Bacterial infections in reptiles. Pp. 211-221 in: J. B. Murphy and J. T. Collins, (eds.), *Reproductive Biology and Diseases of Captive Reptiles*. Society for the Study of Amphibians and Reptiles, Meseraull Printing, Inc., Lawrence, Kansas.
- Rossi, J. and R. Rossi. 1994. General guidelines to reduce zoonotic disease associated with captive reptiles and amphibians (keeping herpetoculturists healthy). *Vivarium* 5(6):10-11.
- Rossi, J. and R. Rossi. 1994. Salmonellosis. *Southwest. Herpetol. Soc. Newslet.* 24(2):11.
- Salzberg, A. 1994. Preliminary report: Live freshwater turtle and tortoise trade in the United States. *The Humane Society of the United States and Humane Society International*. 39 pp.
- Zimmermann, E. 1995. *Reptiles and Amphibians: Care, Behavior, and Reproduction*. TFH, Neptune, City. 384 pp.

This article was excerpted with permission from INTERMONTANUS, published by the Utah Association of Herpetologists.

L I Z A R D L E T T E R S

Veterinary Research at Texas A&M

I am an exotic animal veterinarian and teach zoological veterinary medicine at Texas A & M University. My research interests include the pharmacology of antimicrobials in reptiles. I am finishing research on the new quinalone, Baytril, in the Kemp's Ridley sea turtle, Texas rat snake, and ball python. At some point, we would like to investigate this drug in lizards. No one has completed the pharmacokinetics of Baytril in any lizard species. Our work investigates the absorption, distribution, and elimination of the drug after it is injected, and from the assay of the serum concentration [we] determine the proper dose and frequency. I might add that I am impressed with the *Iguana Times*. It is timely, well-written, and professional.

*James H. Johnson, DVM
Texas A&M University
College Station, Texas*

Sex-determination by Head-bobbing?

We are members of the I.I.S. and have two green iguanas in our apartment. We have a question about "head-bobbing" by one of them. According to the vet, "Trixie" is a female. "Norton" is a male. But he is not 100% sure about Norton. They are both about two-and-a-half-years-old. Trixie does this head-bobbing when she is with the other iguana or [with] one or both of us. She is doing it more frequently for the last six months, prompting this letter. Is it a sign of aggression, mating or illness? Perhaps the vet goofed on the sex determination.

*Angela A. Lainhart
Flushing, New York*

Head-bobbing behaviors of iguanas may be exhibited at any age, by individuals of both sexes, and may be directed toward any iguana regardless of sex or social status. They are frequently directed even toward humans, not just in captivity but in the field as well. As an important form of communication, the expression of head-bobs is generally species-specific, and may be associated with social status, territoriality, aggression, courtship and other behaviors. Thus, the context and meaning of head-bobs can be difficult, if not impossible, to interpret. You or your vet should try another means of sexing your pet, such as probing for hemipenes (see Iguana Times, Vol. 1, No. 3).

—The Editors

Why So Few Spikes?

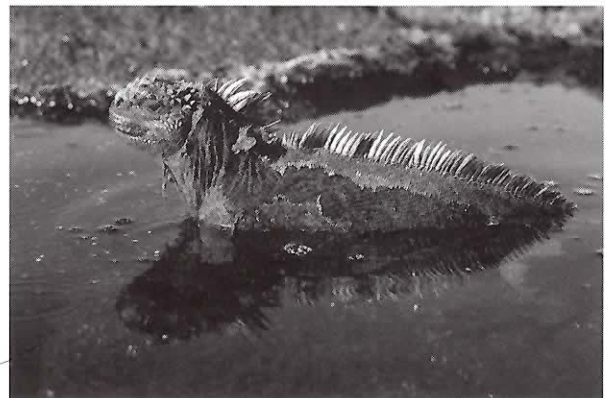
I read your newsletter and look forward to receiving it every quarter. It has been informative and very interesting. My only suggestion would be to add a "Dear Doctor" column so that people can ask questions about various concerns they may have about their pet iguanas.

My husband and I have a green iguana, named Yoshi, who is about 2 1/2 years old. She is healthy, very strong, feisty and growing quickly. We are sure she is a female. Ever since we got her in April 1993, she has had very few spikes on her back. There are a few large spikes on the back of her neck and a few small strays on her back. Only her tail is covered with them. In the bare areas on her back, she has bumps that look like her spikes will grow out from them. Our vet has no idea why she has a spikeless back. What has caused this and what can we do to encourage their growth? Is it a vitamin deficiency? She eats a wide variety of fruits, vegetables, leafy vegetables and very small amounts of supplemental protein. She also receives the proper UV light and warmth.

*Julie Ziring
Columbia, Maryland*

At present, we have not heard from a vet willing to answer these types of questions. If we did, we would give your suggestion serious consideration. As to your concerns, it sounds like you have a healthy, properly cared for iguana. But just as in the distribution, color and texture of hair in humans, there is much individual variation in the distribution, size and shape of spines in iguanas. In your case, Yoshi sounds like she is very distinctive, but her lack of dorsal spines has nothing to do with her overall health, which sounds good.

—The Editors



UPCOMING MEETINGS

18th Annual All Florida Herpetology Conference— April 22, 1995, at the Reitz Union Auditorium, The University of Florida, Gainesville, Florida. *Speakers:* Walter Auffenberg, David Auth, David Barker, Greg Brock, James Cox, Dante Fenolio, Bob Herrington, Harvey Lillywhite, Peter May, Joseph Mitchell, Ray Pawley, Michael Ready, Kevin Wright. *For more information:* Contact David Auth, Division of Herpetology, Florida Museum of Natural History, University of Florida, Gainesville, FL 32611. Telephone (904) 392-1721.

IGUANA-Workshop '95— June 24, 1995, at Hanau, Germany. *Speakers:* O. Ilies, G. Kohler, W. van Marken Lichtenbelt, D. Modry, I. Rehak, J. Schmidt, W. Schmidt, P. Velensky, M. Vesely. *For more information:* Telephone 06181-14914.

3rd Annual IIS Conference/Research Expedition— November 13-18, 1995, Bahamian Field Station, San Salvador Island, Bahamas. Program: *Speakers* will be announced; field trips will offer opportunities to participate in ongoing conservation research of *Cyclura rileyi rileyi*, the endangered rock iguana, endemic to San Salvador.

Eeghana Iguana

by Melodie's Creations



Available as brooch or pendant.

(chain not included)

14K Gold \$389.00
Silver \$49.00

Each piece is registered and numbered.

To order by MC/AEMISA: 615-584-7437

Or mail check or money order to:
Melodie A. Blair
7212 Kingston Pike
Knoxville, TN 37919

Add \$5.00 for shipping/insurance
in Tennessee, add sales tax.
Foreign orders please call for shipping charge.

TREASURER'S REPORT

International Iguana Society, Inc.
January 1, 1994—December 30, 1994

Cash Balance as of December 30, 1994:

Total Cash Balance	\$12,291.52
Total Period Revenues	13,510.35
Total Period Disbursements	13,177.67
Excess of Revenues over Expenditures	532.74

Cash Revenues:

1. Membership Dues	\$11,168.14
2. Goods Sold	1,956.08
3. Interest Earned on Accounts	209.16
4. IIS Conference BBQ	120.00
5. Contributions	75.00

Cash Expenditures:

1. Iguana Times	
a. Printing	\$6,620.67
b. Postage	1,997.47
c. Supplies	144.75
2. Office Expenses	964.07
3. Cost of Goods Sold	1,279.90
4. Advertising and Promotion	135.00
5. Annual Conference	1,093.96
6. Conservation Assistance	587.95
7. Accountant Fees	175.00
8. Labor Cost	117.60
9. Florida Incorporation Fee	61.25



HONDURAN ENVIRONMENTALIST KILLED

Environmentalist Blanca Janeth Kawas Fernandez was shot and killed in a drive-by shooting in the northern coastal city of Tela. Kawas, 48, was shot twice in the head on February 6, 1994, as she sat in her living room. Honduran police believe it was a paid assassination.

Kawas was president of the private Foundation for the Protection of Punta Sal, Lancetilla, and Texihault. Police suggested her death may have been related to the group's advocacy of greater protection of Tela National Park, a 61,750 acre refuge for Honduran iguanas and an amazing assemblage of other biodiversity.

Source: Miami Herald Wire Service

HUMANE OFFICER'S 'KISS' SAVES IGUANA

It wasn't a prince in disguise, but a Humane Society officer says she has no regrets about puckering up to save a boy's pet iguana. Officer Tori Matthews performed mouth-to-mouth resuscitation after the iguana, which had been scared up into a tree by a dog, tumbled into a swimming pool and sank. Matthews grabbed her net and dived into the water, emerging with the pet.

"Now that I look back on it, it was a pretty ugly animal to be kissing," remarked Matthews, but "the last

thing I wanted to do was tell this little boy that his iguana had died."

Source: The Associated Press

EARLY FATHERHOOD

Marcie Ehrig reports the 1994 summer births of 123 green iguanas (*Iguana iguana*) at Finca Cyclura, Big Pine Key, Florida. The hatching of four clutches occurred between June 26 and July 23. Clutches were laid on April 12 (42 eggs), April 14 (20 eggs), April 22 (25 eggs), and May 14 (43 eggs). An infertile clutch was laid on May 9. The April 14 clutch was fathered by a nineteen-month-old male who had bred with a six-year-old female. Both were born at Finca Cyclura.

The young male resides in a 25 x 20 ft (8 x 6.5 m) enclosure with two female green iguanas, and two male and four female rhinoceros iguanas (*Cyclura cornuta*). Brutus II, the father, was raised entirely out of doors on a 100% vegetarian diet! He is the youngest breeding of his species recorded at Finca Cyclura. He continued trying to pursue his career of fatherhood in January and February, 1995, and more fertile eggs are expected in April 1995.

Source: Marcie Ehrig, Finca Cyclura

NEW TREATMENT OF METABOLIC BONE DISEASE

Dr. Douglas Mader, D.V.M., has developed a relatively new and effective therapy for treatment of metabolic bone disease in iguanas. This affliction, exceedingly common among pet green iguanas, results from an improper diet and/or lack of full-spectrum lighting. These calcium- and vitamin D3-deficient iguanas exhibit rubbery and misshapen lower jaws, swollen limbs and loss of appetite. Their weakened bones are subject to fractures. Many die without prompt treatment.

The new treatment involves administration of calcitonin-salmon, a synthetic hormone designed for use in humans with post-menopausal osteoporosis, hypercalcemia, and other calcium disorders. The drug helps to rebuild bone more quickly in afflicted iguanas.

Source: Reptiles 1(3):68-72

I.I.S. IN THE NEWS

What's the hottest trend in pets? Iguanas, of course! With their recent surge in popularity, iguanas are increasingly the focus of headlines across the country. As a consequence, I.I.S. and/or its officers have been described or quoted in recent publications including Audubon magazine, The New York Times, The Los Angeles Times, The Daily Advance (Elizabeth City, North

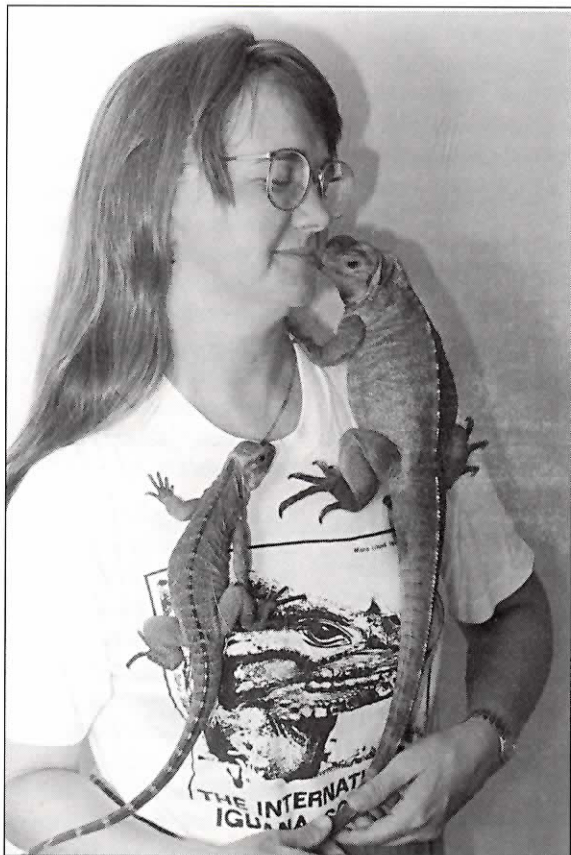
Carolina) and Herp News Today.

Unfortunately, much of the publicity over iguanas has been less than beneficial to the green iguana, the species most in demand in the pet trade. With imports to the United States exceeding 700,000 per year, the pressure on wild populations has become an issue of concern. Furthermore, a high percentage of these lizards are believed to die within the first year.

"People who don't know how to take care of iguanas are selling them to people who don't know how to take care of iguanas," commented I.I.S. President Bob Ehrig, as quoted in The Daily Advance. "If dogs were treated as badly as iguanas," added Ehrig, "it wouldn't be allowed."

On the more positive side, the December issue of Iguana Times was reproduced to accompany a cover story on I.I.S. in the April issue of Herp News Today. The feature described recent changes in the editorial staff and provided readers with the address and membership rates of the Society. New membership inquiries were quickly received as a consequence of the free publicity.

THE OFFICIAL INTERNATIONAL IGUANA SOCIETY T-SHIRT



\$12 plus \$2 for postage & handling (\$1 P&H for each additional shirt)

Sizes available in Small, Medium, Large, and X-Large (model and iguanas not included).

Send check or money order to:
International Iguana Society, Inc.
Route 3, Box 328
Big Pine Key, FL 33043

I.I.S. Bookstore



Photograph courtesy of Jayme Gordon

As a service to our members, a limited number of publications will be distributed through the I.I.S. Bookstore. The following publications are now available:

Iguanas of the World: Their Behavior, Ecology and Conservation, Edited by Gordon Burghardt and A. Stanley Rand. 1994. Most complete single iguana book ever written—highly recommended. 472 pp. **\$60.00** (including postage); **\$75.00** (non-members)

The Green Iguana Manual, by Philippe de Vosjoli. 1992. **\$7.00** (including postage); **\$8.75** (non-members)

Guide to the Identification of the Amphibians and Reptiles of the West Indies (Exclusive of Hispaniola), by Albert Schwartz and Robert Henderson. 1985. **\$19.00** (including postage); **\$27.00** (non-members)

Schwarze Leguane, by Gunther Köhler. 1993. **\$19.00** (including postage); **\$24.00** (non-members). Excellent Ctenosaur guide book, photographs, range maps, text in German.

Iguana Times Back Issues available: Vol. 2, #2, Vol. 2, #3, Vol. 2, #4, Vol. 3, #1, Vol. 3, #2, Vol. 3, #3 for \$6.00 each. Add \$1.00 for shipping & handling for single issues, and \$2.00 for 2 or more issues. *All other issues are currently sold out, but may be reprinted in the future.*

Send check or money order (payable to International Iguana Society) **to:**

I.I.S. Bookstore
Route 3, Box 328
Big Pine Key, FL 33043

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.
Department of Biology
Southern College
Collegedale, TN 37315

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 both PC and Macintosh formats. Please include file name, software name and version number on the disk; a hard copy printout is still required. Shorter articles, research updates, letters, and announcements may also be submitted to the editor via e-mail (send to hayes@southern.edu). For any contribution, please include your name, address and phone number.

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

Advertising Policy of Iguana Times

We advertise only non-living products (except feeder insects). All products have been examined and been found to be high quality and fairly priced. Contact I.I.S., Department of Biology, Southern College, Collegedale, TN 37315, for more information.

I.I.S. 1995 Board of Directors

Robert W. Ehrig
President
Big Pine Key, FL

William K. Hayes, PhD
Vice President
Southern College
Collegedale, TN

David Ehrlich, DVM
Treasurer
Grassy Key, FL

Thomas A. Wiewandt, PhD
Wild Horizons
Tucson, AZ

John B. Iverson, PhD
Earlham College
Richmond, IN

Michael E. Ripca
Leaping Lizards Graphic Design
Drexel Hill, PA

I.I.S. 1995 Advisory Board

Gordon M. Burghardt, PhD
University of Tennessee
Knoxville, TN

Howard E. Lawler
Arizona Sonora Desert Museum
Tucson, AZ

Richard R. Montanucci, PhD
Clemson University
Clemson, SC

Richard Moyroud
Mesozoic Landscapes
West Palm Beach, FL

Ross Burnaman
Secretary
Tallahassee, FL

Julian Duval
Indianapolis Zoo
Indianapolis, IN

I.I.S. 1995 Editorial Board

Allison C. Alberts, PhD
Zoological Society of San Diego
San Diego, CA

Gordon M. Burghardt, PhD
University of Tennessee
Knoxville, TN

Ronald L. Carter, PhD
Loma Linda University
Loma Linda, CA

Arthur C. Echternacht, PhD
University of Tennessee
Knoxville, TN

John B. Iverson, PhD
Earlham College
Richmond, IN

J. Andy Phillips, PhD
Zoological Society of San Diego
San Diego, CA

Martin Wikelski, PhD
Max-Planck Institut
Seewiesen, Germany

Iguana Times Staff

William K. Hayes, PhD
Editor-in-chief
Collegedale, TN

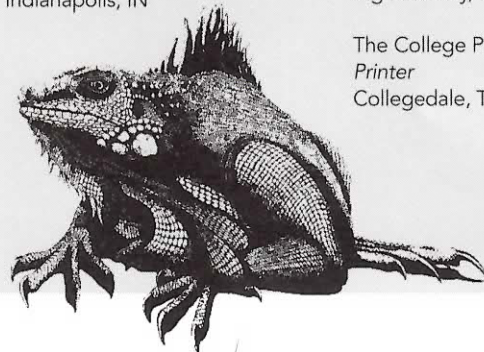
Robert W. Ehrig
Managing Editor
Big Pine Key, FL

Michael and Janet Ripca
*Production Coordinators and
Associate Editors*
Leaping Lizards Graphic Design
Drexel Hill, PA

Caroline Jones
Editorial Assistant
Chattanooga, TN

Marcie Ehrig
Administrative Assistant
Big Pine Key, FL

The College Press
Printer
Collegedale, TN





Male land iguana, *Conolophus subcristatus*, balances precariously on his hind legs to consume *Opuntia* cactus pad in the Galapagos Islands, Ecuador.