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Hybrid Cayman Iguana, male *Cyclura nubila lewisi* x *caymanensis*. Photography: Ron Harrod

THE TROUBLE WITH 'LEWISI

BY R. EHRIG

The Grand Cayman Blue Iguana, *Cyclura nubila lewisi*, is one of the rarest and most beautiful lizards in the world. It is native only to the island of Grand Cayman, Cayman Islands. Already very rare when first described in 1940 (Grant 1940), the Blue Iguana has continued its decline ever since. *Cyclura nubila lewisi* is under intense pressure by man through the severe alteration of habitat and continued presence of introduced feral predators.

C.n. lewisi is a large species of *Cyclura*. It is known to reach a total length of 5.5 ft.(1.66m) (Noegel 1990). Males are larger than females and have a larger head and taller crest. Schwartz and Carey (1977) reported their largest male SVL at 515mm and largest female SVL at 410mm. Adults are dorsally bluish gray to bright blue anteriorly, ranging to blackish posteriorly. The head is bright blue or powder blue. This is the most distinctive feature of this iguana. The Grand Cayman Blue Iguana becomes a more intense blue as it matures.

The total current wild population is estimated at 25-50 individuals restricted to the East End District. This is the eastern half of the island of Grand Cayman. It is also the least settled. *C.n. lewisi* is known to occur at two sites; (1) the seaside of the Queens Highway, near the northeast corner of the island, and (2) adjacent to an active rock quarry near the center of the East End District. A 4-5 year old iguana was road killed on the Queens Highway in the fall of 1991 (see Iguana Times, Vol. 1, No. 3). Several others are known to have been killed there in the last decade (Montanucci pers. com.) This area has some of the best iguana habitat left on the island but also some of the most dangerous due to the highway.

Some reproduction is still occurring in the wild, as evidenced by sightings of subadult and even hatchling iguanas. The Cayman Turtle Farm has a young iguana caught in East End in 1989 which was probably born in the wild in 1988.

Until the early 1980s, the East End was a somewhat isolated place. The construction of the Queen's Highway changed that forever and opened

up many areas to development. Several secondary roads were constructed into some of the last iguana habitat. This resulted in increased sightings and more captives. Many large areas were cleared of native vegetation for agriculture and rock mining operations.

In addition to intense development pressure, feral cats and dogs pose a great threat to the remaining wild population of *C.n. lewisi* (Montanucci 1990 pers. com.). Caymanian farmers have been known to trap and kill iguanas. In recent years traps have been found (Avery 1987), some with iguana remains inside them (Burton 1991 pers. com.). In March 1991, I was told by a Caymanian that, "he could get an iguana whenever he wanted."

In 1990, the Lizard Advisory Group (LAG) of the American Association of Zoological Parks and Aquariums (AAZPA) designated *C.n. lewisi* as a species of high priority for conservation and captive management. A number of American zoos agreed to devote considerable space and resources for captive breeding of this rare iguana. The National Trust for the Cayman Islands embarked on a captive breeding program with a substantial budget for a public information campaign and construction of captive enclosures. It appeared that the Cayman Blue Iguana was on the road back from extinction, but this is when things started to get complicated.

In August, 1990, Edward Louis and Denise Garcia, graduate students under the supervision of Dr. Scott K. Davis (Texas A&M University) went to Florida to collect blood samples for a genetic study. DNA was isolated from the blood samples, and restriction endonuclease analysis of the mitochondrial DNA (mtDNA) revealed genetic markers which differentiate the three subspecies of *Cyclura nubila*. Preliminary results confirmed what had long been suspected by several parties, that some of the captive population were hybrids between the two Caymanian subspecies. In early 1992 additional blood samples were taken on Grand Cayman and on Little Cayman. The iguanas kept at the Trusts breeding facility, the Cayman


Turtle Farm, and several privately held animals were sampled. Six Little Cayman Rock Iguana, *Cyclura nubila caymanensis* kept at several locations on Grand Cayman were also sampled. On Little Cayman, three additional iguanas from the wild population were sampled. The recent samples have allowed a definitive assessment of the genetic background of all iguanas tested. The results indicated that the majority of iguanas in captivity in the United States are hybrids between the two subspecies. All of the pure *C.n. lewisi* are the offspring of one female.

On Grand Cayman, all the wild caught iguanas are pure *C.n. lewisi*. The original pair sent to the Cayman Trust from Florida in 1990, and all the 1990 and 1991 hatchlings are hybrids. Three subadults sent to the Cayman National Trust from Florida in 1991 are also *C.n. lewisi*. The Trust also owns two wild caught pairs, so despite all the initial setbacks there exists a large potential gene pool in captivity on Grand Cayman.

The problems for future captive breeding of *C.n. lewisi* in the U.S.A. are substantial. Before any serious breeding is attempted, many of the iguanas in captivity will need to have their genetic status verified. The vast majority of animals in U.S. zoological collections that have been blood typed have been identified as hybrids. A small number of animals in zoos have yet to be tested. An unknown number of animals are in private hands and few of these iguanas have had blood analysis. Cooperation between a number of individuals will be instrumental in identifying the true *C.n. lewisi*. It seems certain that 75% or more of the animals in the U.S. will be identified as hybrids when the blood analysis is completed.

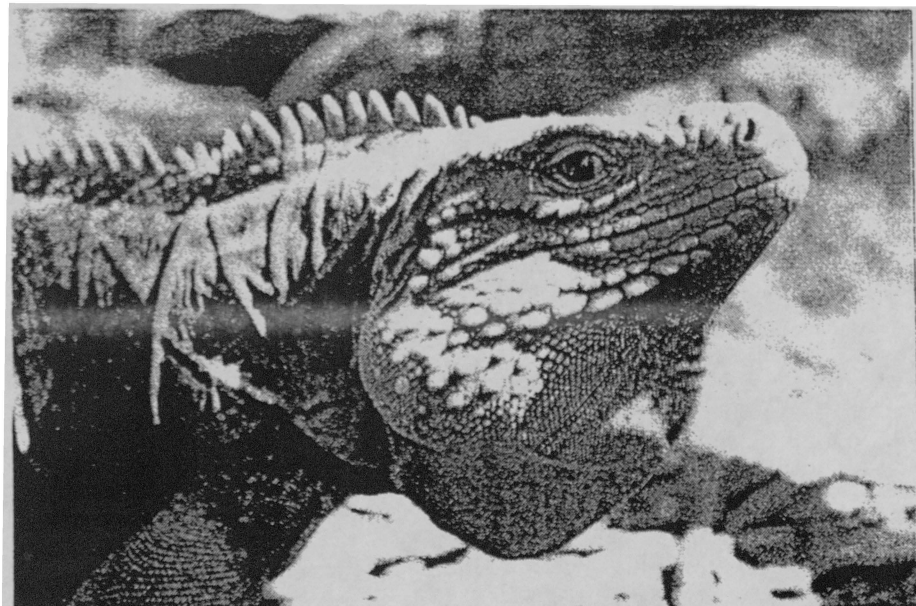
All early breeding in Florida (early to mid 1980's) was done with genetically contaminated animals. The hybrid female among the founder stock of *C.n. lewisi* has been more prolific than the pure female. The hybrid female produced earlier and laid larger clutches. Her offspring have also reproduced in recent years and have complicated the problem.

The pure female has produced offspring with 2-4 wild caught males. Is this sufficient genetic diversity for a captive population? Many questions need to be addressed before a captive population can be effectively managed.

Future articles will address morphological differences between hybrids and purebreds. 

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Cyclura nubila lewisi
x caymanensis.
Photography: R. Ehrig

BOOBY OR BUST!

BY DAVID W. BLAIR

I had wanted to visit Booby Cay for many years, ever since I had read an article by Walter Auffenberg in the "Bahamas Naturalist" magazine where he described it as "One of the most remote of Bahama Islands." This tiny cay is the only known habitat of *Cyclura carinata bartschi*, or Bartschi's Rock Iguana, a lizard of which virtually nothing was known and of which no photographs existed. As I tend to be irresistibly drawn to such places, I decided to visit the cay in June of 1988. I knew Booby Cay was off the northeast point of Mayaguana in the southern Bahamas, separated from the larger island by only .4 km. I found a phone number for the Bahamas Tourist Board and Hotel Reservation Service. I wanted to call and find out what kind of accommodations were available on the island for I planned to take along my wife and six-year-old son.

The woman with the strong Bahamian accent that answered the phone spent several minutes trying to convince me there was no such island in the Bahamas! I assured her there was, at the extreme southern end of the island nation near Great Inagua. Capitulating just a little, she said, "If there is such an island, there is no place to stay there and certainly no reason for anyone to go there!"

Undaunted, I went to my local book store and thumbed through several travel guides to the Bahamas. Finally, in one, I found the mention of a small guest house and restaurant run by a Doris and Cap Brown in Abraham's Bay, the largest settlement on the island. I wrote to Cap Brown at the vague address shown in the guide. While waiting several weeks for a reply, I found out what I could about this remote island. At 110 square miles, Mayaguana is the ninth largest island in the Bahamas, but is very sparsely inhabited with a pop-

ulation of less than 600. Only the western half is settled and Abraham's Bay, where the airport is located, appeared on my map to be about 21 miles by sea from tiny Booby Cay.

Finally one morning I received a call from Cap Brown, assisted by the Marine Operator, from the one phone on Mayaguana. We made arrangements for a room and meals for a week, as well as boat rides to Booby Cay. Cap said the boat ride would take 2½ to 3 hours each way, if the trip could be made at all, for the seas were often too rough for his small boat.

The only thing left was to make airline reservations; there was only one flight a week to Mayaguana from Nassau, the capital of the Bahamas. But eventually everything was set and on a warm June day we completed the last leg of the trip.

As the Bahamasair prop plane touched down on the paved air strip, I tried to peer out of the smudged window next to my seat. A group of 25 or so people and about 10 vehicles, were waiting when we arrived. This turned out to be more people than we would see in any one spot the entire remainder of the trip. There was an air of excitement over the plane's arrival as it brings needed supplies and most of the few visitors to the island. We found Cap Brown, were introduced to the local constable, and had our gear loaded into Cap's worn out American-made car, which had most of its windows missing. We drove several miles down a paved but very potholed road toward Abraham's Bay. Alongside the road was a very dense growth of typical West Indian thorn forest. After 20 minutes, we passed a few houses, half of them deserted, then turned up a small dirt road. A hundred yards in, we pulled up alongside a simple concrete block house painted pastel blue. A small sign with peeling paint above

*"If there is such an island,
there is no place to
stay there and certainly
no reason for anyone
to go there!"*



Mayaguana Iguana, male *Cyclura carinata bartschi*, on Booby Cay. Photography: David W. Blair

the door proclaimed the building the "Mayaguana Sheraton." I looked over at Cap, who was trying very hard not to laugh about his little joke on the tourists.

Later that evening I spoke to Cap about getting to Booby Cay. He explained that although several visitors before us had wanted to make the voyage, the seas were rarely calm enough to make the trip and that no one other than local fishermen had been to the cay in almost four years. I tried to remain optimistic as we sat down to one of Doris Brown's delicious meals of cracked conch and homemade bread.

Two days later, sometime before dawn, there was a rap on the window of our small room. I sat up in bed and saw Cap outside. "The seas look good, let's go!" he said. After getting dressed, loading cameras and gear, we were down at the boat. Cap's twin teenage boys, Carl and Freeman, were with us. The small ancient wooden boat that we were to use had only splintered 2x6's for seats but the engine looked fairly new and in good condition. Cap hooked up the gas tank, pumped the line three or four times to prime it, and pulled sharply on the starter rope. An hour and a half later we were still sitting there, for the motor just would not start. I looked up and saw the sun was already getting high, knowing that by the time we got to Booby Cay it would be straight overhead. At midday on a hot day like this, any iguanas would be heated up and very wary making them extremely difficult to approach and photograph.

Cap, somewhat embarrassed, explained that his own engine was not usable and that he had borrowed this one, which he was not familiar with, from another man. He sent Carl to get the engine's owner and they both returned a half hour later. The man made a small adjustment on the choke, gave one good pull and the motor started right up! Soon we were all in the boat and headed out of the bay. The crystal clear water over white sand changed to turquoise as we slipped through the small channel in the reef. Suddenly the bottom dropped sharply off and we were in the deep blue of the open sea. The three-foot chop was all the boat could handle. The impact of each wave pounded us up and down on the wooden seats for almost three hours, and I

began to wonder if I would still be able to walk when we did finally reach the cay.

Eventually Booby was in sight and the sea again became calmer as we re-entered the reef about a half mile off shore. The rusted hulk of a huge stranded freighter could be seen further out on the reef and the rough seas and winds sent constant spray and foam over it. As we got closer to the cay, it became very shallow and we slowed to watch for rocks and coral heads. The area around Booby Cay is excellent for "conching" and normally Cap and his boys would collect as many as they could, but it was Sunday and the deeply religious inhabitants of Mayaguana do no fishing on the Sabbath. Instead they walked the perimeter of the cay looking for net floats, drift lumber, ropes, and anything of value that the seas had washed up on the shore.

It took me a few minutes to ready my camera gear before I began to make my way down the coast looking for iguanas. There were many sea birds in the air overhead and their cries drew me to a sandy area near the beach where they had numerous nests, each containing a single down-covered chick. I took a few pictures and moved quickly on so the parent birds would return to the nests and again provide the necessary shade for the chicks from the intense sun. Soon I began to see a few iguanas scurrying through the brush. Bartschi's Rock Iguana is a close relative of the Turks and Caicos Rock Iguana found on islands fifty miles or so further south. Large specimens are about two and one half feet long and are gray dorsally, mottled with paler gray to cream on the head and neck; the iris is golden. The iguanas were fairly numerous with all sizes present, from juveniles to adults, indicating a healthy reproducing population. However, the iguana is vulnerable due to the small size of the cay and the fact that it is found nowhere else in the world. Booby Cay is less than two kilometers long and only .5 kilometers wide. There are two small land-locked lakes and only about two thirds of the island provides suitable habitat. Originally iguanas probably ranged island-wide but today are concentrated on the western half of the cay where the vegetation is more dense. A current threat to the iguanas are the herds of goats which are living on



Mayaguana Iguana, female *Cyclura carinata bartschi*, on Booby Cay. Photography: David W. Blair

the cay. I saw one group of about ten goats on the eastern portion of the island. Here the vegetation was heavily grazed and stunted. This area was littered with goat droppings.

After spending about four hours on Booby Cay, we all met back at the boat. Cap and his sons had a good haul of booty from their beach combing. We loaded everything into the boat and started the long trip back to Abraham's Bay. The wind and waves were up somewhat and the small boat was nearly swamped twice by large breakers as we made our way through the reef and into the open sea again. Several hours later we were back at the "Mayaguana Sheraton" enjoying spicy conch stew and fresh baked bread.

The weather remained favorable so I made arrangements with Cap for one more trip to Booby Cay. The following morning, one day before we were scheduled to leave Mayaguana, we were up before dawn and down at the boat for an early departure. Again the engine was difficult to start, but he had it running after thirty minutes. This time, however, it wouldn't accelerate! Cap cut a piece of heavy monofilament fishing line and tied it directly to the accelerator arm on the carburetor, then threaded it through a hole in the engine cover which he snapped back into place. It seemed to work okay this way but I privately questioned the wisdom of undertaking a trip of this kind with a jerry-rigged engine.

More than one tank of gas is required for the six hour round trip to Booby Cay. This time, instead of a second tank, Lewis put a plastic jug on board filled with several gallons of fuel. It had no cover and he propped it up carefully in the rear of the boat. We left the harbor once again, turning east toward the Cay. This trip down was slower than the first for every few minutes the fishing line would slip out of Cap's hand and the boat would come to a stop. The water was a little rougher, also, and after dropping down hard off the crest of one particularly large wave, the two by six wooden plank seat snapped underneath us.

Hours later we again entered the reef near Booby Cay and the breaking waves rocked the boat badly. As the boat slowed, we all began to smell gasoline. The extra jug of gas required for the return

leg of the trip had tipped over and was now almost empty. We could see another fishing boat a mile or so away and after dropping me off on the cay, they took off in that direction to try to borrow some gas and then begin to dive for "konks."

I had another successful visit, counting more than forty iguanas that day and obtaining additional still photos and video recordings. I saw the boat returning after several hours and made my way back to the beach to meet them. They were clad only in their undershorts and had the boat piled so high with conchs that the water was only a few inches below the rails. I was afraid we would surely swamp as we attempted to exit the reef but the sea had grown quite calm and we had no problems. I asked if he was able to borrow any gas and was told he could only get one gallon. I didn't even ask if that was enough, for the concerned look on his face and the fact that the main gas tank now read only one quarter full told the whole story.

The boys went right to work cleaning the conchs and discarding the shells and entrails overboard. About half way back the boat ran out of gas. We were a mile off shore from the eastern uninhabited portion of Mayaguana where there are no roads. Cap picked up the one oar he had on board and began to paddle us slowly toward the coast. Fortunately, the wind had strangely become dead calm and the water was like glass. An hour later we had made some progress and were within half a mile from land. Suddenly the wind came up again and began to blow us away from the island. Within a short time we had lost all the progress we had made by paddling.

After drifting for hours, it was now getting late in the day. It would be dark in two more hours. I remembered from my maps that there was nothing between us and Cuba, two hundred miles away. In frustration, I went to the back of the boat and removed the cap to the empty gas tank. I tipped it up and balanced it on one corner, about an ounce of gas collected in the low point of the can. I pushed the rubber intake hose into the small puddle of gas and called Carl over to try the engine one more time. Surprisingly, after two or three pulls, the engine started. "Head to shore quick!" I shouted. We were heading straight toward shore at a fast clip

and all began to cheer. After a few minutes, the engine sputtered twice, then died. We were now less than a quarter mile offshore, but the wind immediately began to blow us back out again. I looked into the tank once more. There was now only about a teaspoon of gas left in the corner. Positioning the hose one final time, I nodded at Carl. He jerked on the pull cord and it fired again. It ran for only one minute but took us to within one hundred meters of the beach where the water was shallow enough to stand. We all hopped out and walked the boat in the remaining distance. Although we were still quite a way from Abraham's Bay, everyone was obviously very relieved to be back on shore. I expected Cap to pull the boat up on the sand and wait for help to arrive since we were now long overdue. Instead, he began to walk the boat in waist deep water toward home, more than five miles away. "This way we'll be that much closer when they find us," he said.

As the sun was setting, we heard the sound of another boat and soon saw it was heading directly toward us. Had we still been drifting out to sea, I doubt they ever would have seen our small craft. When the boat drew nearer, we could see it was Cap's oldest son. After learning that we had run out of gas, he poured some in our tank and we began to follow him back to town. I expected my wife to

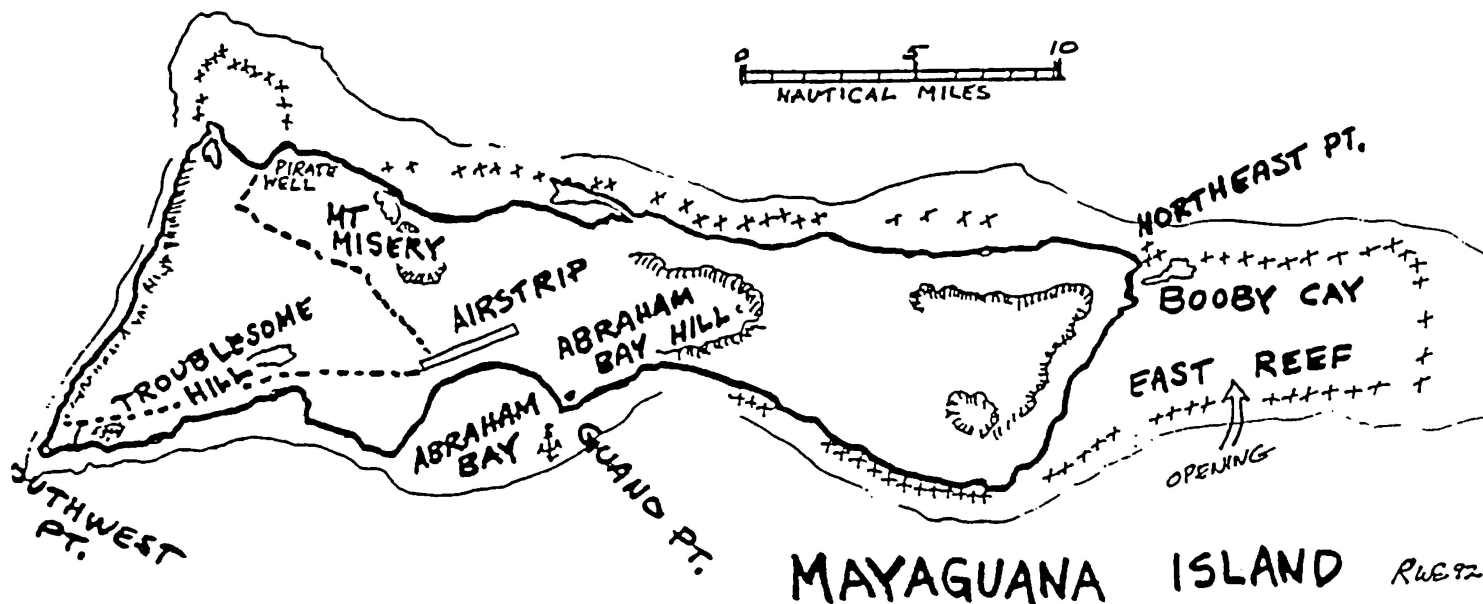
be worried but was surprised to hear that Mrs. Brown was more anxious than anyone and had been waiting at the dock for hours. At the first sight of our boats returning, however, she had run home so Cap wouldn't know how worried she had been. She immediately began brewing a pot of coffee, for she knew that was the first thing he would want.

We did learn a couple of important things from this successful visit to Booby Cay. First, that *Cyclura carinata bartschi* still survives and, in fact, is successfully reproducing on the cay, although the number of juveniles is low. Secondly, that the feral goats now present must be removed before the entire island is denuded by over-grazing. This should not be too difficult a task to accomplish on such a small cay. I can only hope it is not initiated too late to preserve the viability of the world's only surviving population of Bartschi's Rock Iguana.



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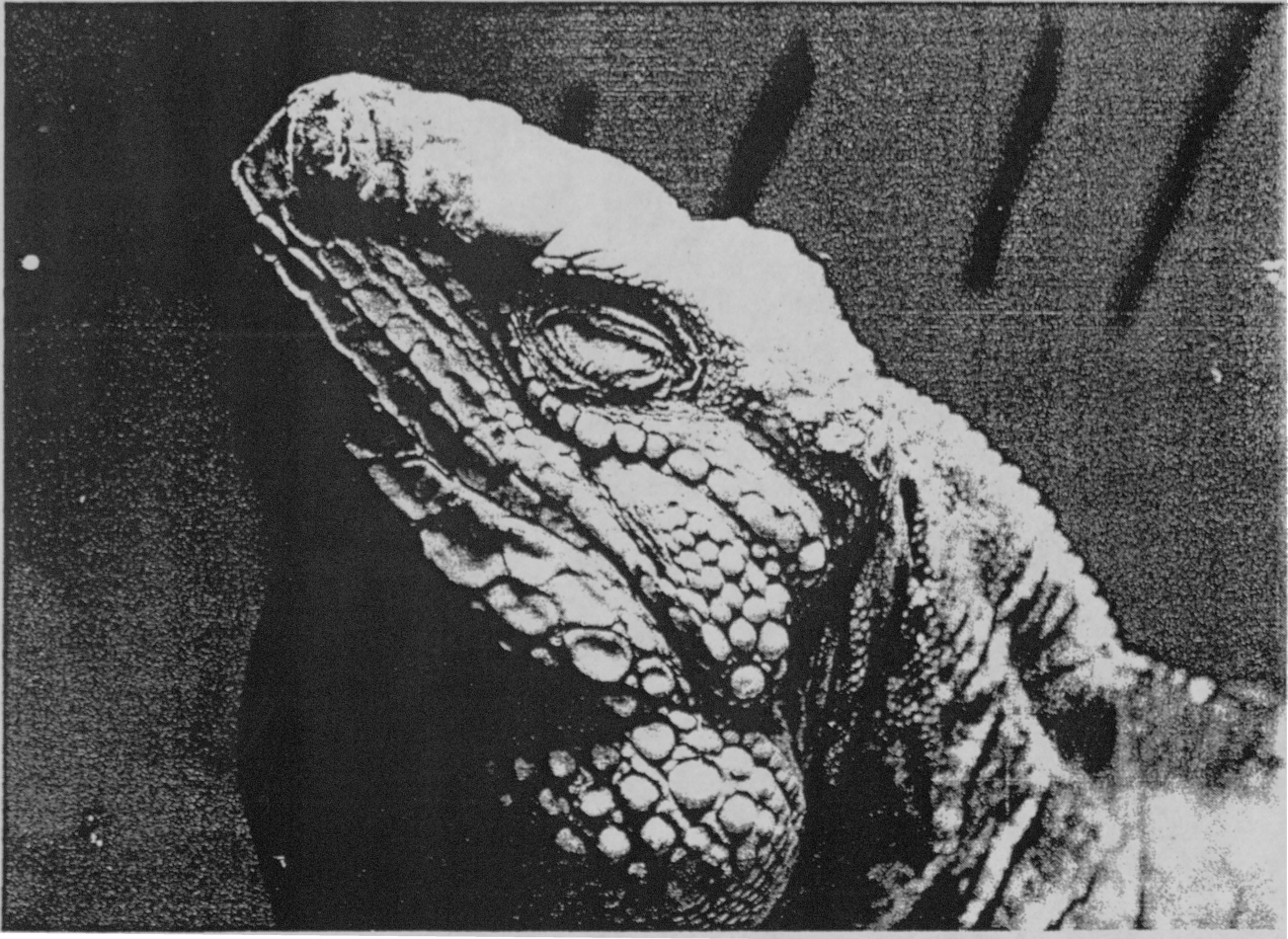
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FRENCH ANDROS IGUANAS

John Bendon writes from the south of France, where he has been keeping iguanas in captivity for a number of years. He has bred *Iguana iguana* and kept Rhino Iguanas, *Cyclura cornuta*, but his apparent favorite was a very large Andros Island Iguana, *Cyclura cyclura* (see *Iguana Times*, Vol. 1, No. 3). He was very tame and would patiently

wait by the front door to go for a walk in the garden. This animal was one of the few of his species to ever be in captivity in Europe. He weighed twenty-two pounds at the time of his death, and his remains were donated to the Natural History Museum of London. ✎



Andros Iguana, *Cyclura cyclura*, in France. Photography: J. Bendon

IGUANA RESCUE GROUP

An iguana rescue group has been organized by some members of the International Iguana Society. Janet Truse and Deborah Neufeld discovered that there were many poorly kept iguanas needing rescue and rehabilitation in central Florida. There are also perfectly healthy iguanas, who's owners could no longer continue to keep them.

Their first rescue, called "Lucky," was salvaged from a pet shop and at two years of age weighed only three ounces. He had several broken bones and partially paralyzed rear legs. Lucky was hand fed 7 weeks before he walked and fed on his own. He is currently 37 inches long and weighs 2 lbs. and except for a hunchback, he looks healthy and normal. Placement of rehabilitated iguanas into good homes is the primary goal of this project. At this time, 10 *Iguana iguana* and 1 *Ctenosaura similis* have had their quality of life substantially improved. Contact is maintained with both new and sometimes old owners.

The Iguana Rescue Group has been fortunate to have concerned and caring members. Lori Sandlin has provided rehabilitation support. Veterinarian, Mark Wilson has provided medical

care. Special thanks to Wayne Hill, president of the Central Florida Herpetological Society for allowing an IIS table at CFHS meetings.

The Iguana Rescue Group

Florida (Central-north-gulf coast)


Contact

Deborah Neufeld
P.O. Box 423332
Kissimmee, Florida 34742

Janet and Dennis Truse (407) 846-6976
Lori Sandlin (407) 877-6136

South Florida and Elsewhere

IIS (305) 872-9811

Caring and devoted people are needed to assist. Rescued animals are available for placement to IIS members. Please contact the above for further information. We hope this will lead to the establishment of regional groups as the demand exists. 

The International Herpetological Symposium, Inc.

Announces the 17th Annual Symposium

to be held in Miami Beach, Florida

June 17th through June 20th.

Call for papers

The IHS presents papers on herpetoculture, natural history, veterinary medicine and other topics related to herpetology. Individuals interested in presenting a paper at this meeting should write to Richard Ross, MD, Institute for Herpetological Research, P.O. Box 2227, Stanford, CA 94309.

A GOOD WAY TO SPEND A HURRICANE

IIS member and Everglades Herpetological Society President, Joe Wasilewski spent the night of Hurricane Andrew in a Tamiami Airport warehouse with 350 snakes, 1,000 mice, and several dozen iguanas, monitors, toucans and alligators. As sections of the roof ripped off and windows broke, Joe scrambled to protect his companions, helped by his ten year old son, Nicholas. The warehouse survived the storm with several inches of water on the floor.

Immediately after the hurricane, the iguanas engaged in intense breeding activity. The snakes were also extremely active. The snakes "were frisky," said Wasilewski "its the wrong time of the year for breeding, but I honestly believed if I put them together, they would have tried something." Green iguanas normally breed in February, March, and April in South Florida.

Joe believes falling barometric pressure unleashed the reptiles libidos. The air pressure dropped from near 30 inches to well below 28 in a

short time. Ray Ashton, author of three field guides on Florida, amphibians and reptiles, agreed with Wasilewski's conclusions.

Ashton said "Activities of some native snakes and lizards increases considerably as barometric pressure drops below 29.9 inches and is falling." An Everglades HerpHerpetological member also reported to Joe that her Savanna monitors also bred after Andrew, four months earlier than usual.

The Galapagos tortoises at the heavily damaged Miami Metrozoo also mated after the storm, perhaps further evidence of storm-induced breeding activity.

...I honestly believed if I put them together, they would have tried something...

Heavily damaged trees and shrubs also produced some out of season flowers in the recently sunny landscapes of southern Dade County. Are these all evolutionary responses to the destructive effects of hurricanes? We hope readers will inform us of other phenomena experienced during tropical storms.



WILD: Right after the storm, pythons like this one, pictured with Joe Wasilewski and son Nicholas, became uncommonly frisky.

CYCLURA COLLEI UPDATE

We have recently received word from Dr. Peter Vogel, head of the *Cyclura collei* Research and Conservation Group, that they now hold thirty-one Jamaican iguana hatchlings in captivity in Kingston. These animals will be reared for captive breeding stock and eventual re-release into the wild. Unfortunately, the Jamaican Ministry of Mining has requested to have half of the Hellshire Hills declared as a limestone quarry zone. This would

almost certainly spell disaster for the remaining population of iguanas in the Hills. A major campaign is now underway to have the entire forty-four square miles declared a protected area under a recent Jamaican law. We wish Dr. Vogel great success in this endeavor. Perhaps Goat and Little Goat Islands should also be considered as possible sanctuaries. 🦎

DNA STUDY RESULTS

Edward Lewis of Texas A&M University has just released results of his blood haplotype study of *Cyclura n. lewisi* in captivity. Unfortunately, most of the specimens tested are apparently intergrades with the closely related iguana *C.n. caymanensis*, including numerous animals held in the captive breeding program on Grand Cayman Island. This

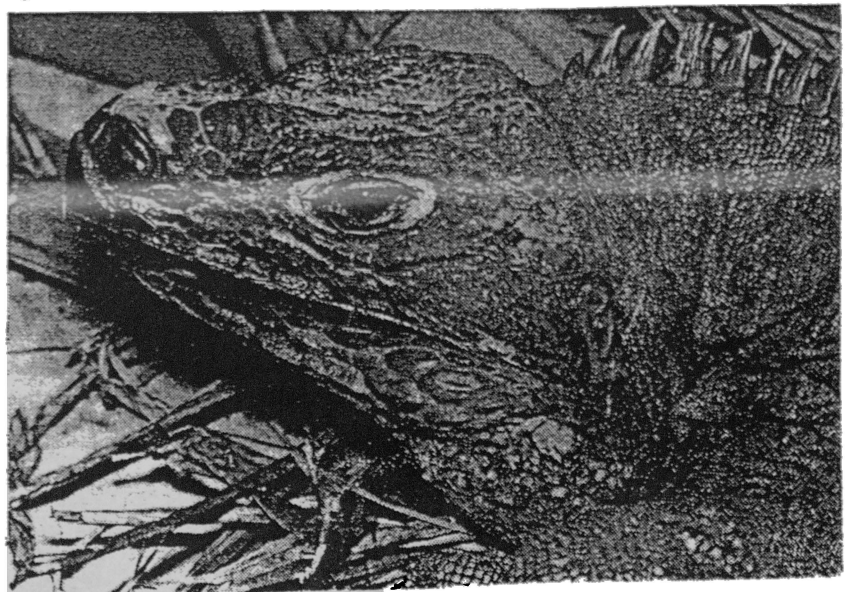
is cause for concern as many of these animals had been scheduled for eventual release into the wild. It may be appropriate to sterilize all hybrid animals, at least on Grand Cayman, to reduce the chance of contamination of the few remaining wild iguanas.



MAGUEYES CUBAN IGUANAS

A visit in June 1992 by Dave Blair, IIS VP to Isla Magueyes, Puerto Rico has revealed that the previously reported "thriving" population of introduced Cuban Rock Iguanas, *Cyclura n. nubila*, apparently now consists mostly of older adult animals. Although his visit was very brief and only a portion of the island was explored, not a single hatchling or juvenile was seen. In fact, the youngest

animal observed was at least three years of age. Long term employees on the island confirmed that the number of iguanas has declined in recent years. Several cats seen on the island may be responsible for the scarcity of small iguanas for their prowess as efficient lizard predators has been well documented in the past. 🦎



Jamaican Rock Iguana, *Cyclura collei*.
Photography: Peter Vogel!

LIZARD LETTERS

Dear Robert,

With great interest I've read "Salmonellosis: will it pose a problem for iguana husbandry?" by Gregory Z. Scott (IGUANA TIMES 1 (5): 16-17) and I feel compelled to make some comments and supplements.

For continuous success in iguana husbandry and breeding it is extremely important to carry out some measurements of preventative medicine. This is particularly true for newly acquired specimens. A quarantine period of at least two months is essential in preventing infectious diseases from spreading in a collection. Ideally the quarantine facility should be located at a site distant from the long term animals. During the quarantine period fecal examinations for endoparasites need to be performed. Depending on the results the iguanas should be treated against potential pathogenic parasites, namely *flagellates*, *amoebas*, *strongylids/ascarids*, *Capillaria sp.*, *Strongyloides sp.*, and *cestodes*. However, the treatment of the commonly found oxyurids and ciliates is usually not necessary. The feces of the long term animals should be re-examined for parasites at least annually.

Force-feeding a dying iguana with a liquified mixture of romaine, banana and carambola is not a good idea. The additional stress of food in the stomach presents yet another burden for the severely depressed system of the iguana, and bears the risk of aspiration of food during regurgitation, resulting in fatal foreign-body-pneumonia. The initial treatment for dehydrated and depressed animals consist of the administration of parenteral fluids, either subcutaneously or intracoelomically (20-25 ml lactated Ringer's solution per kg body weight). The animal should be presented as soon as possible to a veterinarian who has experience with iguanas for an accurate diagnosis and further treatments.

Every iguana that dies in captivity should undergo a thorough postmortem examination including at least histopathology. I assume that the mentioned yellow granular necrotic lesions in the liver should be called *pyogranulomas* rather than *pyrogranulomas*, since the former term has been established for these kind of lesions.

As described in the report one should always try to isolate the causative agent(s). However, the proper han-

dling of the samples is essential in gaining any reliable results. Placing tissue sections in 10% formalin results in safely killing of all pathogens, making isolation attempts impossible. Tissue samples must be taken out of the specimen using sterile techniques and should be immediately placed in a sterile petri dish. A specimen for microbiology can be taken using a sterile cotton swab which then is placed in a suitable transport medium and sent on ice as quickly as possible to a diagnostic laboratory.

Cultures taken from the cloaca or gut always yield a variety of different organisms, making interpretation of results almost impossible. Several organisms besides *Pseudomonas*, *Aeromonas*, and *Salmonella* have been incriminated being the cause of septicemia in reptiles such as *Serratia*, *Corynebacterium*, *Streptococcus*, *Staphylococcus*, *Klebsiella*, and *Echerischia coli*.

Identifying *Salmonella sp.* by examining a blood smear appears very questionable. The diagnostic method of choice is culturing them and identifying the cultured bacteria by testing their metabolic abilities and by using serological techniques. Several new strains of *Salmonella sp.* has been found since 1982, speaking of approximately 2000 different strains nowadays (Silliker and Gabis, 1988).

Septicemia is more likely to occur in reptiles which are immunological depressed. Moving an iguana from one locality to another results in stress due to dramatic environmental changes such as terrarium, cage mates, keeper, climate, diet, and differences in quality and quantity of microbes (bacteria, fungi, and viruses). These stress factors can lead to a serious depression of the iguana's immune system resulting in fatal infections with normally non-pathogenic agents which occur in the environment or even in the intestine of the animals themselves.

A high percentage of healthy reptiles are carriers of *Salmonella*. The same is true for *Pseudomonas*, *Aeromonas*, *Klebsiella*, *Staphylococcus*, *Streptococcus*, and several other potential pathogenic bacteria. The problem is not the prevalence of these bacteria itself, but rather the above mentioned factors which decrease the resistance of these animals against opportunistic microbes. Good husbandry especially proper nutrition and terrarium climate as well as the prevention of social

and handling stress is the best way of preventing these kind of diseases.

Yours sincerely,

Gunther Kohler
Liesingstr. 11
6450 Hanau 9
Germany

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Sir,

I found your article on the captive husbandry of the Cuban Rock Iguana to be very interesting. I would, however, caution on the use of cat food in the diet. Cat food has a very high fat and liposoluble vitamin content (A and D) and could result in kidney damage and difficulty in digestion. Dog food would be more acceptable. You might also mention that iceberg lettuce, celery, watercress, etc., are nutritionally useless.

Keep up the good work. I enjoyed this article and the rest of the Iguana Times.

Sincerely,

Thomas Ryan, D.V.M.
30 West Green Street
Westminster, MD 21157



Dear Bob,

I just received Vol. 1, #5 of Iguana Times. I was struck by your article on diet of iguanas. I have been working on diet and nutrition of herbivorous reptiles for more than a decade, and I become impressed yearly about the importance of feeding too much protein. I think your reported diet may be dangerously high in protein, and the consequences could be kidney damage and/or infertility. Of course, you are giving protein in all of the plant components of the diet that you listed; particularly in the legumes. Additional animal protein may be adding more protein than a good herbivore can handle. We have been working with the Vet School here (indeed, one of my graduate students is a V.M./Ph.D. student) on problems associated with subsidizing with too much protein in desert tortoises, desert iguanas, chuckwallas, and green iguanas. It is very difficult to give a diet that is too low in protein as long as animals get a balanced "salad" of food, and also get plenty of UV radiation. Of course, more protein often means faster growth, but consider the problems faced by the sea turtle culturists who now find many turtles sterile because of too much protein.

Best regards,

C. Richard Tracy
Professor
Department of Biology
Colorado State University
Ft. Collins, Colorado 80523



LIZARD LETTERS (CONT.)

Dear Mr. Ehrig

I happened upon the June 1992 issue of *Iguana Times* – the first I've seen. Your article on diet and feeding of the Cuban Rock Iguana was of great interest to me.


As a veterinarian that specializes in nutrition, I work with many different species. I don't care for the current recommendations (mostly from vets, it seems) in the U.S. regarding protein intakes (mostly for Green Iguanas). It just doesn't make sense nutritionally, given the gastrointestinal anatomy, nutritional heritage, and food preferences of these animals.

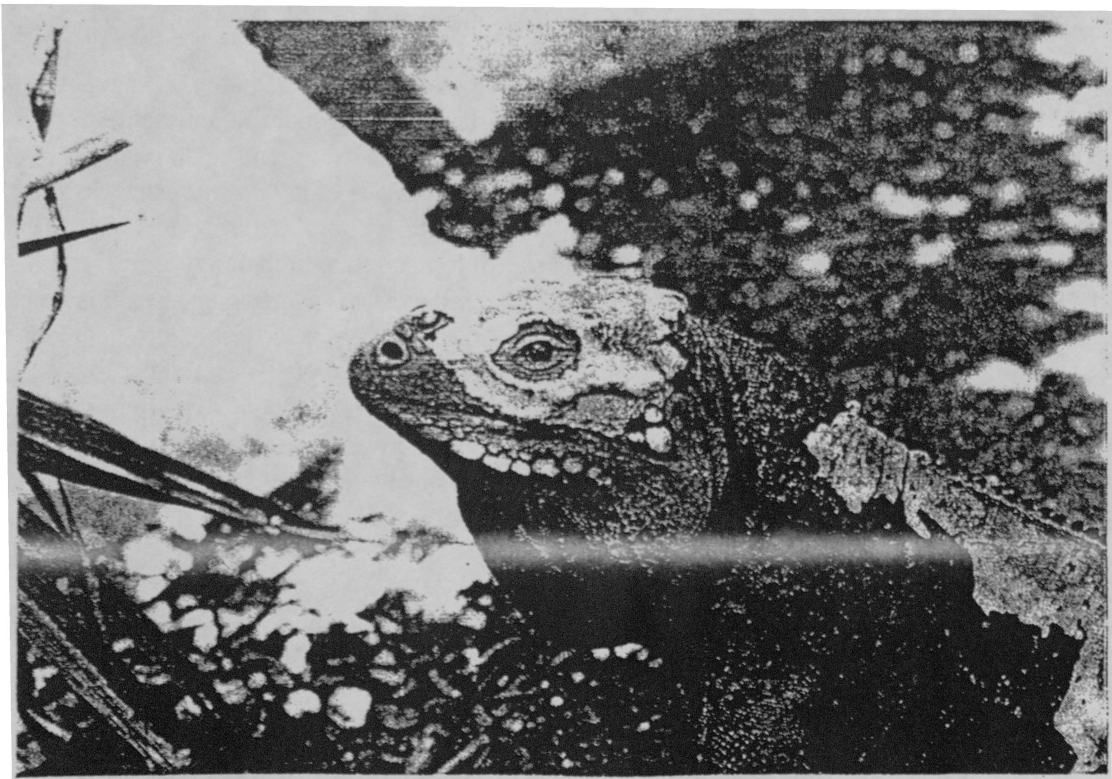
I am interested in learning more about your work. Would it be possible to send me reprints of any further work that you've published? For example, are there any nutrient analysis for the plant lists you completed for the Bahamian Cays?

Sincerely,

*Susan Donoghue, VMD, DipACVN
Nutrition Support Services
Rt 1 Box 189, Pembroke, VA 24136*

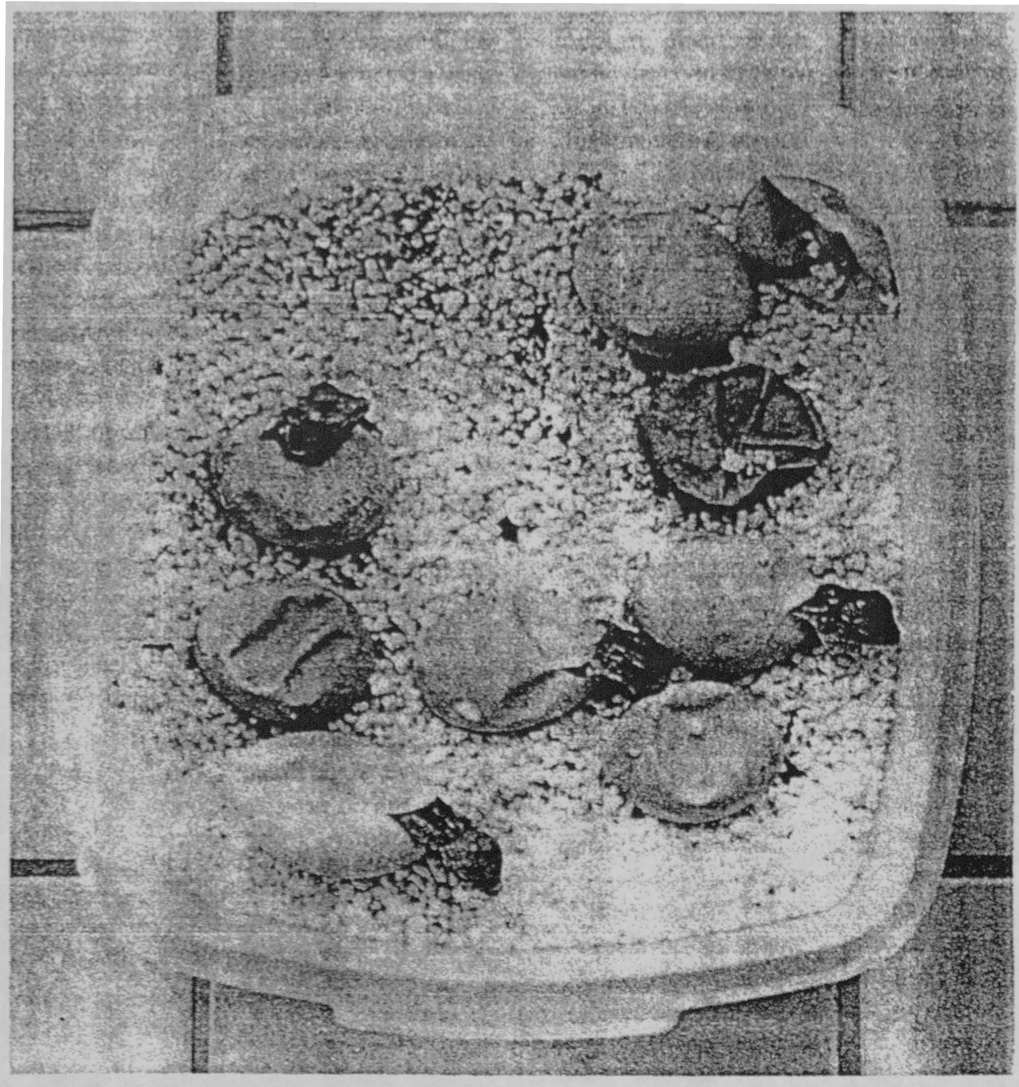
Shortly after publication of the *Basic Iguana Diet* (I.T., Vol. 1, No. 5) IIS member, Phillippe de Vosjoli asked for permission to reprint it in his new book, *The Green Iguana Manual* in the feeding section. As a result of appreciated input from Dr. Tracy and Dr. Ryan, we lowered the amount of the supplemental protein in the diet (2-7% to 1-5%). We also have eliminated cat food from the diet. Gravid and post gravid females, and actively growing younger animals receive the highest amounts of supplemental protein. Underweight animals being rehabilitated also may benefit from the extra calories of the higher percentages, but on a temporary basis. The bulk of any diet should consist primarily of generous amounts of fibrous plant material provided on a daily basis. Our diet is very much lower in supplemental protein than nearly all traditional iguana diets. Recent evidence suggests that we best serve our animals with a diet more closely approximating what they eat in the wild.

R.W.E. 



THE CAPTIVE HUSBANDRY AND PROPAGATION OF THE CUBAN ROCK IGUANA *CYCLURA NUBILA* PART 4. BREEDING

WILL BE CONTINUED IN THE NEXT ISSUE...



Hatching of Cuban Rock Iguana, *Cyclura nubila*. Photography: Ron Harrod

IGUANA NEWSBRIEFS

RED GREEN IGUANA

We suggest all IIS members attempt to obtain a copy of the September-October issue of *Audubon Magazine* published by the National Audubon Society. On page 63 of this issue is a full page color photograph of one very red male *Iguana iguana*. The photograph accompanies an article on the Llanos of Central Venezuela, a vast grassy savanna half the size of Texas. Unfortunately, no other information is provided about this most colorful variant.

NO PROBLEM FOR IGUANAS

August 23, 1992 — Hurricane Andrew stormed through the Northern Bahamas. North Eleuthera, Spanish Wells, and Harbour Island all experienced severe destruction. The westerly track of the storm at 25:5 N was well north of all Bahamian iguana populations. None were believed to be seriously affected. Our sympathies are with the the Bahamians who were. We hope they will achieve a full recovery from this serious storm.

IGUANA SMUGGLING CONVICTION

Tom Crutchfield, a Florida reptile dealer was convicted of conspiring to smuggle four endangered Fiji Banded Iguanas, *Brachylophus fasciatus* into Miami, Florida in 1989. Others have been indicted, including Anson Wong of Malaysia who reportedly shipped the Fiji Iguanas in a shipment of other animals. The Fiji Banded Iguana is the more widespread of the two endangered Fijian iguana species. There are thirty-four legal Fiji Banded Iguanas in the United States. Crutchfield was convicted in June in Miami. The U.S. Attorney is seeking a prison sentence and fine. Crutchfield is expected to appeal the conviction.

CYCLURA PROGRAM

On July 9, 1992 IIS President Robert Ehrig presented a slide program on *Cyclura* for the Tampa Bay Herpetological Society. The program featured habitat comparisons of three species of *Cyclura*. Tampa Bay couldn't have been a more hospitable group. Deborah Nuefeld and Janet Truse assisted in the presentation.

BREEDER'S EXPO

Third Annual Captive Breeder's Exposition was held at the Twin Towers Hotel in Orlando, Florida on August 15th and 16th, sponsored by the Central Florida Herpetological Society. Wayne Hill, President of Central Florida Herpetological Society reported that there were over 4,000 attendees this year. Accolades go to the Expo staff who were all courteous and helpful. For the third time the Expo was a huge success and a lot of fun. IIS members Deborah Nuefeld, Janet and Dennis Truse, Lori and Rachel Sandlin manned the IIS booth with live exhibits of five *Iguana iguana*, one *Cyclura nubila*, and one *Ctenosaura similis*. Due in part to the live animals, the IIS booth was very popular and resulted in fifteen new members and two renewals. On behalf of the International Iguana Society, we would like to welcome all our new members.

GREEN IGUANAS IN PUERTO RICO

I.I.S. member, D. Scott Gallagher reports green iguanas, *Iguana iguana* turning up in the wilds of Puerto Rico with greater frequency. He recently sent us a photograph of a very large male retreating into a wetland on the island. The popularity of green iguanas as pets has increased in recent years. The San Juan Star, July 31, 1991 announced "The Day of the Iguana has Arrived," and "Iguanas are the Hottest Pet in Area Pet Shops." Green iguanas have been imported into the island for many years, but never in the numbers that are presently arriving. Puerto Rico native *Cyclura* species have been extinct for over one hundred years, but the variety of tropical habitats on the island may prove hospitable to *Iguana iguana*.

Statement of Purpose

The International Iguana Society, Inc. is 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.

The Iguana Times, the newsletter of the society, is distributed quarterly to members and member organizations. Additional copies are available at a cost of \$4.50 including postage. Annual dues for The International Iguana Society are \$25.00 for individuals and \$30.00 for organizations which receive double copies of the newsletter. Early renewal is available for current members for 1993 membership until December 15, 1992 at the discounted rate of \$20.00 for individuals.

Write to:

The International Iguana Society, Inc.
Route 3, Box 328
Big Pine Key, FL 33043



Solicitations

Members of the I.I.S. are encouraged to contribute articles for publication in the Iguana Times, following a format like that shown in the first issue. The articles can deal with any aspect of iguana biology, ecology, behavior, husbandry, systematics, etc. Members are also welcome to submit letters to the Editor for publication in future issues of the newsletter.

The Editor

I.I.S. Bookstore

As a service to our members, a limited number of publications will be distributed through the I.I.S. Bookstore. We believe this will become a valuable source of information. The following publications are now available:

- 1) **The Green Iguana Manual**, by Philippe de Vosjoli. 1992. \$7.50 (including postage); \$8.75 (non-members)
- 2) **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)

Write to: I.I.S. Bookstore
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Escondido, CA 92025

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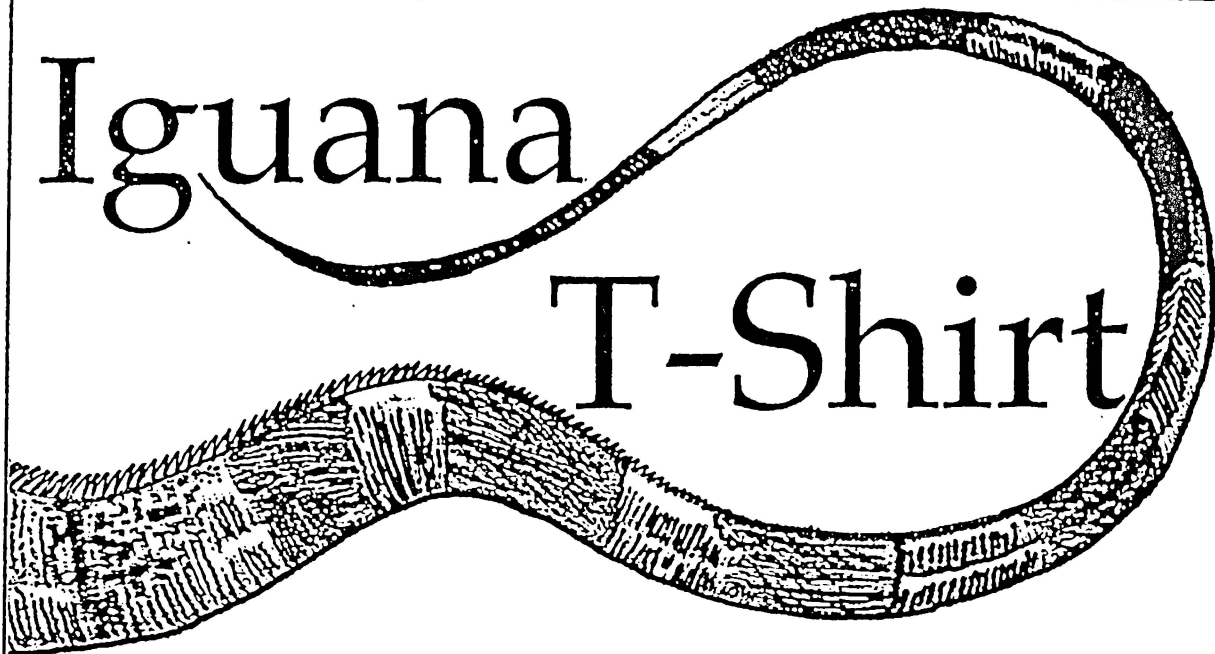
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Iguana

T-Shirt



Dunthorpe Press is pleased to announce the signing of James W. Hatfield III to write his book "Green Iguana — The Ultimate Owner's Manual". His three years of research will culminate in the book's release in early 1993.

To show our excitement about this long-awaited book, we are offering a pre-book promotional iguana T-shirt.

BACK OF THE SHIRT

- * A very detailed, realistic pen-and-ink drawing of a huge iguana that takes up most of the back of the shirt.
- * So detailed that you can see individual scales, spines and color patterns.
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- * At the top in burgundy-colored lettering is the title of the book and the name of the author: "Green Iguana — The Ultimate Owner's Manual" by James W. Hatfield III.
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The 100% cotton pre-shrunk white shirt comes in Medium, Large and X-Large. The shirt is top-quality, heavyweight material, with reinforced shoulder stitching, made in the U.S.A. The cost is \$15.00 (plus \$2.50 S&H*). Please allow 2-3 weeks for delivery.

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