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Male Cuban iguana, *Cyclura nubila*, at Guantanamo Bay, Cuba.
Photograph: A.C. Alberts

THE PALEATE SPINY-TAILED IGUANA, *CTENOSAURA PALEARIS* STEJNEGER: DISTRIBUTION AND LIFE HISTORY

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Distribution

The Paleate Spiny-tailed Iguana, also known as Ctenosaur, Iguana Negra, and Garrobo (Buckley and Axtell, 1990), is restricted to specific river valleys in southeastern Guatemala and northern Honduras. Disjunct populations exist in the Valley of the Rio Motagua in Guatemala, and in the Valley of Rio Aguan and on Cayos Cochinos in Honduras (see Figure 1; Etheridge, 1982; Buckley and Axtell, 1990; Wilson and Cruz Diaz, 1993).

Subadult male *Ctenosaura palearis*. *Photograph: Bruce Elfström*

General Description

First described by Stejneger in 1898, *Ctenosaura palearis* is a medium-sized spiny-tailed iguana. Snout to vent length (SVL) for adults ranges from 140 mm for small females up to 270 mm for large males; total lengths can exceed 660 mm. In some captive individuals SVLs have reached 345 mm (Buckley, pers. com.).

Unlike most other species of the genus, *C. palearis* is equipped with a large pendulous dewlap measuring up to 50 mm in depth in large males, and less developed in females. The dorsal surface is dominated by a crest of flat "spade-like" spines starting from the neck and continuing almost to the base of the tail. The dorsal spines may measure 15 mm in height, and are more pronounced in males. In adults, these scales usually lay flat against the dorsum. The upper surface of the hind legs is covered with heavily keeled scales, giving the legs an armored appearance (one of the defining characteristics of the former genus *Enyaliosaurus;* ctenosaurs were once grouped into two distinct genera that later were lumped into one). As the name spiny-tailed iguana implies, all ctenosaurs have a tail covered, to differing extents, with whorls of heavily keeled scales. *Ctenosaura palearis* has a pattern of one keeled whorl of scales interrupted by one whorl of smooth scales, continuing for the majority of the tail's length. The species has strong sharp claws for climbing and digging. As adults, *C. palearis* are sexually dimorphic: males are larger and develop the swollen jowls and cranium common to many iguanids.

The coloration of adults consists of shades of gray, black, white, fleshy-yellow, and green/blue

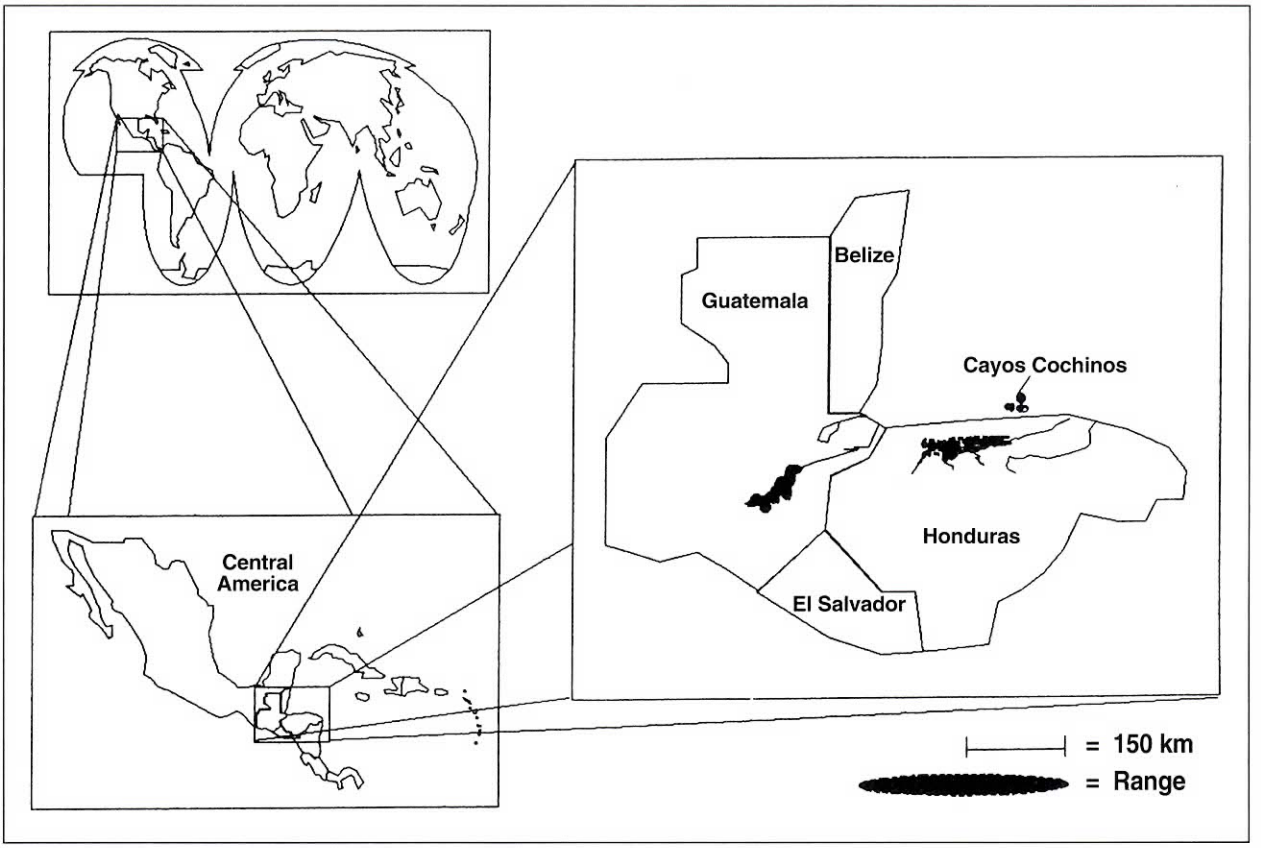


Figure 1. Known distribution of *Ctenosaura palearis* in Central America.

hues. The head, excluding the dewlap, is most commonly a greenish gray, lightening towards the chin which is whitish green. The bottom of the chin and dewlap are an intermix of fleshy-yellow and gray patches. The anterior third of the body, including forearms to base of head, is black with diffuse white bands that may or may not continue across the ventral surface (Bailey, 1928). The posterior portion, including the hind legs, is light gray to light aqua blue with black bands. These bands range from heavy coloration in juveniles to virtual absence in adult males. The tail is light greenish-white to light gray with darker gray banding. Juvenile coloring is generally cryptic, following the same approximate pattern as adults only with varying shades of brown orange, brown, tan, and gray in place of the adult's gray/green, black, light green, and white respectively. In general, juveniles have more banding and streaking throughout. The very young may have an overall greenish color that is soon lost after hatching. As with most other species in the genus *Ctenosaura,* temperature, stress, and time of day is reflected in moderate color and patterning changes.

Recent work by Larry Buckley of Southern Illinois University has shown that the populations of *C. palearis* in Honduras and Guatemala differ from each other in as many as seventeen morphological characteristics, which may warrant separation into two distinct species. The most evident differences in the Guatemalan versus Honduran populations are the smaller adult size, lack of black on the anterior portion of the animal, and many scale differences (Buckley, 1992).

Habitat

Ctenosaura palearis is found in some of the hottest and driest areas in all of Central America. Stuart (1966) said of the Rio Motagua Valley, "Whether or not true desert occurs within the region [Central America] is debatable. If it exists any place it is found in the middle valley of the Rio Motagua." In general, the habitat of *C. palearis* is characterized by high annual mean temperatures and low annual mean rainfall. Sea-

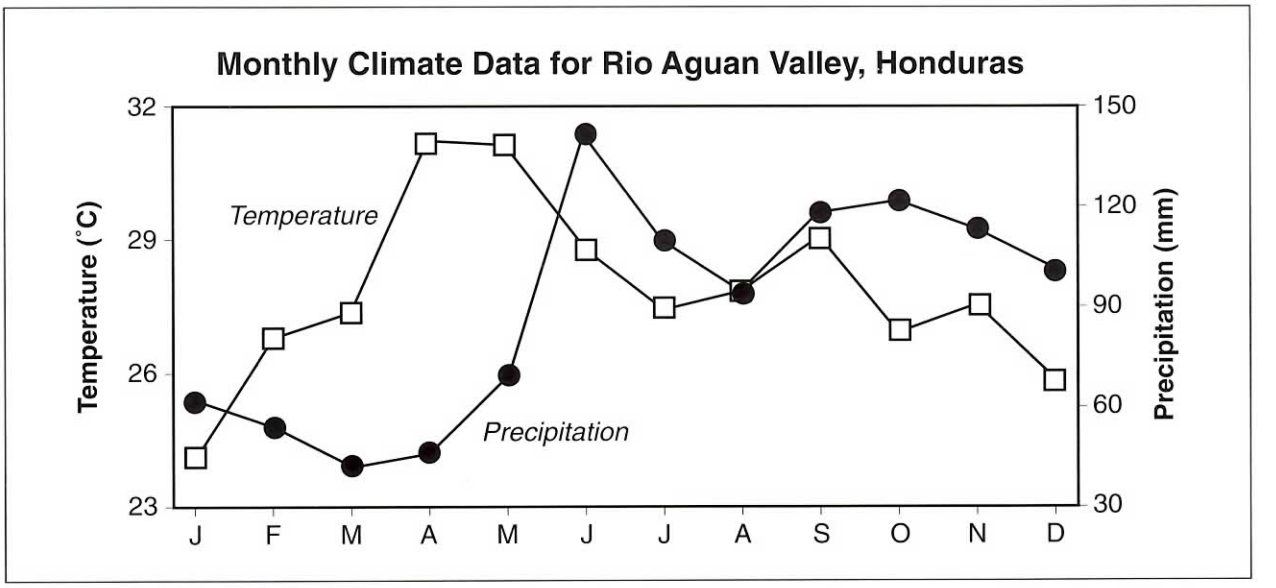


Figure 2. Climate data for Rio Aguan Valley, Honduras, showing average monthly temperature (°C) and precipitation (mm rainfall). After Meyer and Wilson (1985).

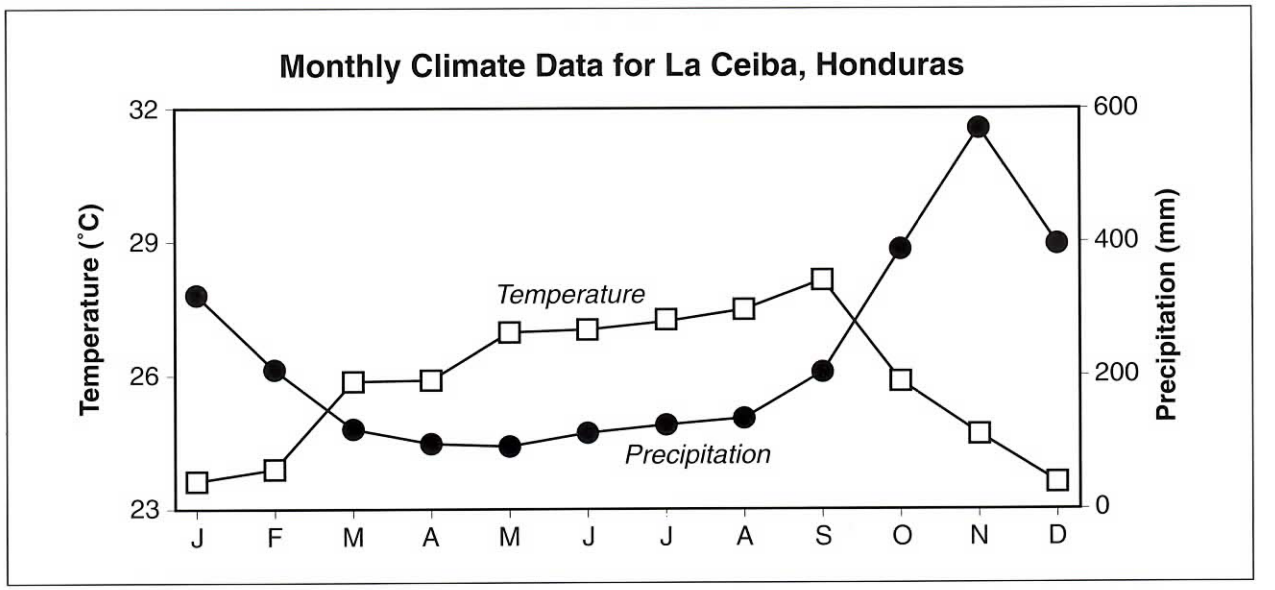


Figure 3. Climate data for La Ceiba, Honduras, showing average monthly temperature (°C) and precipitation (mm rainfall). La Ceiba is on the coastal mainland, adjacent to the Cayos Cochinos. After Meyer and Wilson (1985).

sonal variations that are noteworthy include a relatively cool and dry period from December to January, a hot and dry period from March to May, after which rainfall increases dramatically and temperatures decrease slightly (Figure 2). The Rio Aguan and the Rio Motagua valleys fall within the arid and dry tropical vegetation classifications (Meyer and Wilson, 1985).

While the distribution of *C. palearis* is largely restricted to hot dry areas, the fact that this species is present on Cayos Cochinos, albeit thought to be a relatively recent introduction or range expansion (Buckley, pers. com.), shows that it is capable of thriving in quite different environmental circumstances. The group of islands known as the Islas de los Cochinos, or Cayos Cochinos, are composed of moist tropical vegetation. This zone is characterized by a cool wet winter period from mid-October to mid-January (see climatic details, Figure 3, for the La Ceiba

Habitats Occupied by *Ctenosaura palearis*				
Vegetation Zone	Typical Vegetation	Alt. (m)	Temp (°C)	Rain (mm)
Arid Tropical	Deciduous hardwood of <10 m height; abundant succulents and thorn scrubs; patchy tree cover and thick ground cover; tree cacti up to 10 m height. Typical plant species: *Erythrina hondurensis, Acacia riparia, Pithecolobium dulce, Bursera simaruba, Coccoloba* spp., *Clusia flava, Hasseltia floribunda, Celtis iguanea, Cupania yunckeri* and *Agave* spp.	150-600	>24	<500-1000
Dry Tropical	Deciduous hardwood of 25 m height; patchy tree cover and savannah grasslands. Typical plant species: *Sterculia apetala, Enterolobium cyclocarpum, Albizzia adinocephala, Calycophyllum candidissimum, Cordia alba, Bursera simaruba, Acacia pennpennatula, A. costaricensis, Luehea candida, Mimosa tenuiflora, Zanthoxylem culantrillo* and *Genipa caurto.*	0-600	>24	1000-2000
Moist Tropical (Cayos Cochinos)	Primarily evergreen of up to 60 m height; generally low and open with occasional large trees. Typical plant species: *Bursera simaruba, Cecropia spp., Coccoloba unvifera, Cocos nucifera, Conocarpus erectus, Elaeis oleifera, Ficus* spp., *Hibiscus tiliaceus, Ipomea pes-caprae,* and *Wedelia* spp.	0-143	>24	2000-4000

Figure 4. Habitat specifications for the three vegetation zones inhabited by *Ctenosaura palearis*. Altitude, mean annual temperature and mean annual precipitation (rainfall) are indicated for each zone. Details from Meyer and Wilson (1985) and Wilson and Cruz Diaz (1993).

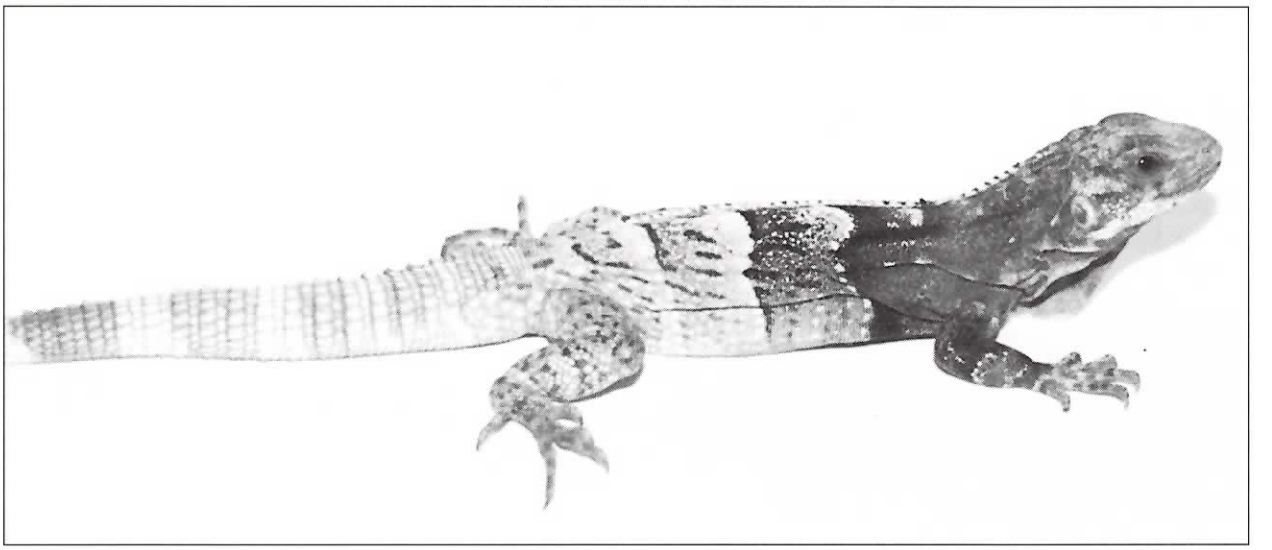
area, which is the mainland adjacent to Cayos Cochinos).

Thus, the range of *C. palearis* falls within three vegetation zones: arid tropical, dry tropical, and moist tropical (Meyer and Wilson, 1985). These zones are described in detail in Figure 4.

Ctenosaura palearis is thought to be more arboreal than most others of its genus. Echternact (1968) stated that adults have been found in trees at heights of 20 m. Personal observation has shown that *C. palearis* spends more time perched high on tree branches compared to other ctenosaurs, although juveniles may show less of this habit.

Agonistic and Antipredatory Behaviors

With this species, intraspecific conflicts will loosely follow this sequence: 1) head-shakes and twists; 2) slow exaggerated full head-bobs; 3) lat-



3 month old *C. palearis*. *Photograph: Bruce Elfström.*

eral body compression; 4) parallel alignment to one another with erection of dorsal crest; 5) gaping mouth; and 6) physical attack in the form of chase-and-bite or mouth-to-mouth lock and wrestle. The head movements seen in *C. palearis* typically consist of a series of shudder-bobs followed by an exaggerated bob in a twisting motion. The twisting motion seems to be unique and to date has not been seen in other *Ctenosaura* species by this author, although it is common in the *Cyclura* genus. The dewlap is almost always extended during aggressive behavior. These conflicts are usually in male-male interactions but have been noted by the author, to a lesser extent, in female-female interactions. When threatened by a predator or antagonist, *C. palearis* will usually take flight at the slightest provocation, often up the nearest tree. However, at close quarters the predator will be subject to tail lashing and direct attack in the form of biting. I have had this species launch itself, mouth wide open, directly into my face. Generally, captive specimens settle quite well in captivity and can be approached quite closely and handled. Captive born specimens are often flighty when young, but will become tame by their fourth month. Some adults attain the tameness of green iguanas or *Cyclura* species, remaining calm when picked up and handled, often soliciting physical contact with the keeper (Grazell, Pasicom, Buckley and Axtell, pers. com.).

Reproduction

Mating behavior has not been well studied. Courtship consists of the male approaching the female with head and trunk low to the ground. Prior to and during approach to the female, the male will bob its head rapidly (Buckley and Axtell, 1990). If females are less than submissive males will chase and attempt to pin a female by the neck, and then mate; otherwise, females will allow attention from males leading to mating. Mating usually occurs during late winter to early spring.

Little is known about the reproductive biology of this species in the wild. Females are thought to lay eggs during mid to late spring. A captive female was reported to have laid 11 eggs on April 14 (Buckley and Axtell, 1990). Captive reproduction has occurred in zoological institutions and in private breeding facilities in the U.S., and more so in Europe, where the genus *Ctenosaura* is more popular. The gestation period is similar to *C. similis,* approximately 70 days, and is followed by a period of 65-90 days for egg incubation. In captivity, reproduction should occur if temperature, photoperiod and humidity are appropriately controlled. Either a compatible pair should be caged together, or the female may be introduced to the male during the breeding season. A moist potting mixture of soil/sand should be made available as for green iguanas (De Vosjoli, 1992) in a chamber large enough for the animal to dig a suitable nesting site. Incubation temperatures and

humidity are not specifically known but should follow that of the green iguanas with a slightly dryer vermiculite mixture (see de Vojoli, 1992; Frye and Townsend, 1993). I incubate all my *Ctenosaura* eggs in a 1:2.5 ratio (mass) of vermiculite:water at 29.5°C.

Adult males are much larger and more powerful than females, and care must be taken if pairs are kept together. Supervised introduction of a female to a male during breeding season is probably the best course of action, unless one is certain of pair compatibility; even so, male aggressiveness increases during breeding season and this must be taken into account.

Captive Care

Ctenosaura palearis adapts well to captive conditions if imported when young or, ideally, born in captivity. Wild caught individuals should be treated for endo/ecto-parasites accordingly. All newly acquired lizards should be given much privacy to acclimate. Bright colored food is accepted readily by many recently imported ctenosaurs; few in my experience will pass up blueberries (these can be mixed with more suitable diets to get the animal eating well). Captive diet consists of a well-balanced green iguana diet supplemented with vitamins. In general, young ctenosaurs are thought to consume larger amounts of animal protein than adults. Van Devender (1982) showed that in *C. similis* amounts of animal protein intake was in reverse correlation to SVL and that adults rarely consumed animal protein. Janzen (1983) stated that *C. similis* adults commonly take animal protein but still less than that consumed by the very young. Frye and Townsend (1993) provide a graph depicting a diet composed of 75% animal protein for ctenosaurs, but give no reference or data for their figure. With these references in mind, it is most likely safe to say that young *C. palearis* will require some portion of animal protein in their diet, and as the animal matures the

Captive-bred 1 year old male *Ctenosaura palearis*. Note dewlap difference between male and female. *Photograph: Bruce Elfström*

Captive-bred 1 year old female *Ctenosaura palearis*. Notice scarring from conflict with former cagemate, before separation. *Photograph: Bruce Elfström*

percentage of animal protein should be lowered. I feed my young ctenosaurs a diet of 65% vegetable matter and 35% animal protein (usually insects or small mice corresponding to iguana size). I tend to lean away from extremes, such as Frye and Townsend's suggested value, and reduce animal protein to approximately 10-15% at 1-1/2 years of age, and 0-2% for adults. There is no doubt that *C. palearis* will, like most other medium to large *Ctenosaura,* eat any animal small enough to swallow, but I prefer to err on the side of minimal protein at adult size rather than risk a case of gout or other medical complications. Additional protein and calcium can be given to breeding females to ensure adequate nutrition for egg production. Fresh water should be provided at all times in a vessel large enough for soaking.

As previously stated, *C. palearis* requires high mean temperatures. The species should be provided with a "hot spot" of 35°C and a daytime (depending on the season) background temperature of no less than 22°C. Nighttime drops to 17°C are acceptable as long as daytime highs allow for proper digestion (i.e., 35°C). Heat should be provided through a light source and not via "hot rocks," which may malfunction and cause burns. *Ctenosaura palearis* is basically an arboreal basking animal, and tree limbs are frequently used for such purposes. However, because tree limbs normally do not absorb much heat, the iguanas do not require external heat supplied to their ventral surface (for example, by hot rocks). Background nighttime temperatures can be maintained by space heaters, broad reflective infrared heat lamps, or a gentle under-cage heat system with thermostatic control. (Note: do not sacrifice ventilation to increase heat; this can lead to unnaturally high humidity levels).

Daylength should be provided as per seasonal change. A good rule is 10 hours daylight in winter and 14 hours in summer. As with all iguanas, lighting should be in the form of natural sunlight or full-spectrum artificial light. Ctenosaurans require UV light to synthesize vitamin D-3 and metabolize calcium. If artificial full-spectrum light is used, it should be arranged in conjunction with an incandescent "hot spot" so that the basking animal will receive the full benefit of full-

Adult male *Ctenosaura palearis. Photograph: Bruce Elfström*

spectrum lighting. With most full-spectrum lighting, the light should be no more than 12 inches away in order to receive sufficient exposure to the relatively little usable UV-B (De Vosjoli, 1992; Frye and Townsend, 1993). (Note: Placement of glass between source of UV light and animal will block all UV light emitted, and should therefore be avoided). I keep my animals outside for 6 months or more a year. Any exposure to unobstructed sunlight is highly desirable and beneficial—provided the animal has a source of shade to avoid overheating.

Ctenosaura palearis has the potential to grow to 1.25 m in length, and therefore requires a cage of suitable size. A minimum size cage for one large adult is 1 m wide, 3 m long, and 1.5 m high. Each additional female in the cage should have half again this size added. One male per enclosure is a maximum unless the enclosure is very large (at least 10 m × 10 m, or males will engage in constant, highly violent fighting, often resulting in the death of the submissive male from starvation).

A cage substrate suitable for green iguanas will work well with *C. palearis* (De Vosjoli, 1992;

Frye and Townsend, 1993). I personally like alfalfa pellets due to their digestibility, all-natural content, and ability to soak up excess moisture.

Care of young is similar to adults with appropriate diet and food size changes. Exposure of young to natural sunlight is a good idea for proper growth. Young can be kept together if watched for signs of aggression; however, once a certain age is attained, tremendous fighting will cause serious injury if not caught in time. I have found it necessary to separate cagemates and ensure that visual contact between individuals is not possible.

As a captive, *C. palearis* is a seldom seen and strikingly beautiful iguana which should thrive well. Acclimated adults will eat out of their owner's hand and can become quite accustomed to handling (although I personally do not advocate undue handling; stress in animals has many ramifications not yet understood. If the animal is wild caught, handling is most likely detrimental to the health of that animal). This species reminds one of a cross between a lizard of the genus *Cyclura* while still retaining the particulars which allow the genus *Ctenosaura* to succeed under the conditions of high predation and human intrusion that exist in Central America.

Conclusion

Ctenosaura palearis holds a vulnerable status under the Mace-Lande lists. This species is hunted for food and trade, and is threatened by loss of habitat. Tourist diving boats are reported to land on Cayos Cochinos and collect *C. palearis,* which are offered to the passengers as a delicacy (Reptile Camp Taxon Reports, unpublished). The entire population is estimated to contain fewer than 10,000 individuals (Reptile Camp Taxon Reports). There is little reason to believe its population will increase in the near future as is true for most all other species of this genus (Fitch et al., 1982; Buckley and Axtell, 1990). If one is interested in obtaining a living specimen, all channels should be used to obtain only captive-produced animals. Any information gained by careful record keeping in captivity or in the field can only add to our understanding of this rare and beautiful species.

Acknowledgments

I would like to thank my wife, Katharine Elfström, for all her typing help and general patience with me and my large collection of ctenosaurs; she never says I can't have another reptile, for good or bad. All my love.

Literature Cited

Bailey, J. W. 1928. A revision of the lizards of the genus *Ctenosaura*. Proc. U.S. Nat. Mus. 73:1-58.

Buckley, L. J. and R. W. Axtell. 1990. *Ctenosaura palearis* Stejneger paleate spiny-tailed iguana. Cat. Amer. Amphib. Rept. 491:1-3.

Buckley, L. J. 1992. A comparison of Honduran and Guatemalan populations of *Ctenosaura palearis* with its phylogenetic and taxonomic implications. Unpubl. Masters' Thesis, Southern Illinois University.

De Vosjoli, P. 1992. The Green Iguana Manual. The Herpetological Library Series, Advanced Vivarium Systems, Lakeside, California. 71 pp.

Echternacht, A. C. 1968. Distributional and ecological notes on some reptiles from northern Honduras. Herpetologica 24:151-158.

Etheridge, R. E. 1982. Checklist of the iguanine and Malagasy iguanid lizards. Pp. 7-37 *in:* Iguanas of the World. Their Behavior, Ecology, and Conservation (Burghardt, G. M. and A. S. Rand, eds.). Noyes Publications, Park Ridge, New Jersey.

Fitch, H. S., R. W. Henderson and D. M. Hillis. 1982. Exploitation of iguanas in Central America. Pp. 397-417 *in:* Iguanas of the World. Their Behavior, Ecology, and Conservation (Burghardt, G. M. and A. S. Rand, eds.). Noyes Publications, Park Ridge, New Jersey.

Frye, F. L. and W. Townsend. 1993. Iguanas: A Guide to their Biology and Captive Care. Krieger Publ. Co., Malabar, Florida. 145 pp.

Janzen, D. H. 1983. Costa Rican Natural History. University of Chicago Press, Chicago.

Meyer, J. R. and L. D. Wilson. 1985. The Snakes of Honduras, 2nd edition. Milwaukee Public Museum, Milwaukee.

Reptile Camp Taxon Report. Unpublished manuscript, 1994. An international report on Iguanidae: status in the wild and in captivity. (Recieved from Ft. Worth Zoo.)

Stuart, L. C. 1966. The environment of the Central American cold-blooded vertebrate fauna. Copeia 1966:684-699.

Van Devender, R. W. 1982. Growth and ecology of spiny-tailed and green iguanas in Costa Rica, with comments on the evolution of herbivory and large body size. Pp. 162-182 *in:* Iguanas of the World. Their Behavior, Ecology, and Conservation (Burghardt, G. M. and A. S. Rand, eds.). Noyes Publications, Park Ridge, New Jersey.

Wilson, L. D. and G. A. Cruz Diaz. 1993. The herpetofauna of the Cayos Cochinos, Honduras. Herpetol. Nat. Hist. 1993:13-23.

NOTE: *Editors strongly suggest only captive bred Ctenosaurs are appropriate as pets. Wild caught animals generally do not do well and have a low survival rate.*

A REINTRODUCTION PROGRAM FOR THE IGUANAS OF GUANTANAMO

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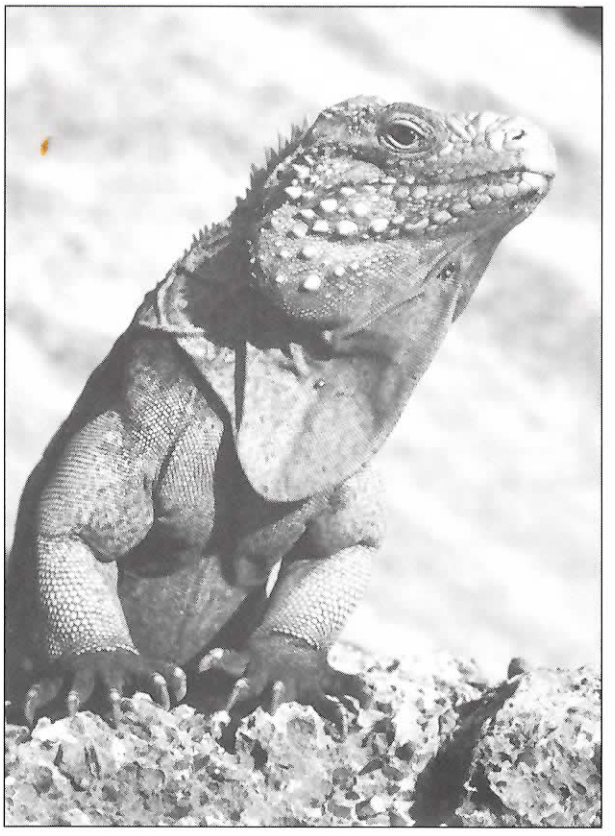
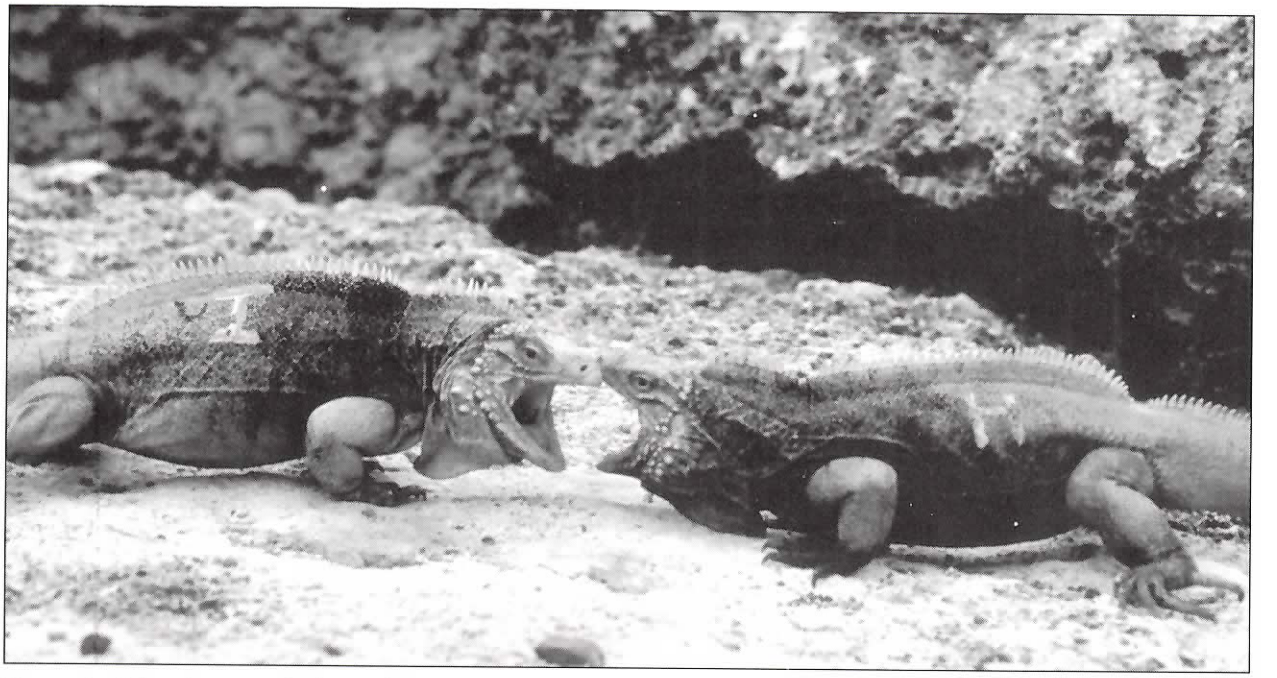
Of the approximately 3,000 species of lizards in existence, no more than 60 attain an adult body mass greater than a kilogram. Despite this, large lizards represent the majority of lizard species considered threatened or endangered. Of all large lizards, the West Indian rock iguanas, genus *Cyclura,* are the most vulnerable, primarily because much of their fragile island habitat has been eliminated by human development or severely degraded by exotic species (Case and Bolger, 1991). Mongooses, dogs, and feral cats prey heavily on juvenile iguanas, and in many areas introduced goats have denuded the native vegetation on which iguanas feed (Iverson, 1978; Carey, 1975). The Jamaican iguana, *Cyclura collei,* considered to be the rarest lizard in the world, probably numbers no more than 50 adults, and several other subspecies of rock iguanas have declined to below 500 individuals (Blair, 1991; Alberts, 1993). Because *Cyclura* are potentially important seed dispersers for native plants (Iverson, 1985), their loss has serious consequences for the ecosystems in which they live.



Male Cuban iguana. *Photograph: A.C. Alberts*

Although rock iguanas continue to decline over much of their range, we believe this trend can be slowed through a concentrated and coordinated research effort directed toward developing practical strategies for population recovery. For the past two years, Dr. John Phillips and I, assisted by field technicians Jeffrey Lemm and Andrew Perry, have been working with a single representative species of rock iguana, *Cyclura nubila,* on the U.S. Naval Base at Guantanamo Bay, Cuba. Our research will ultimately culminate in an experimental repatriation that will test whether hatchling Cuban rock iguanas retained in captivity for a headstarting period prior to release fare better in the wild than those released immediately after hatching. However, before undertaking this endeavor, we felt it was important to gather some relevant baseline data on the ecological relationships, foraging preferences, and social structure of these iguanas in their native habitat.

In the spring of 1993, we began field studies on a group of adult iguanas inhabiting rocky crevices along the windswept coastline at Guantanamo. Due to the relative lack of human disturbance, the density of iguanas at this site was quite high, substantially exceeding published results for



Two male Cuban iguanas, *Cyclura nubila*, in combat. *Photograph: A.C. Alberts*

populations elsewhere in Cuba (Perera, 1985). The daily activity pattern of rock iguanas during the breeding season consisted of a burst of vigorous social activity after morning emergence and sunning, followed by a relatively peaceable migration to nearby areas of vegetation for midday feeding, and ending with a second flurry of social interaction in late afternoon prior to entering night refuges. Dominant males defended small territories oriented around favored rock crevices that overlapped the ranges of several females. Subordinate males did not defend territories, instead roving extensively throughout the study site while suffering constant chases by higher ranking males.

We observed that approximately 80% of adult males engaged in aggressive interactions with other males. Usually these were in the form of a chase, but occasionally strenuous and prolonged stereotypical facial pushing and biting matches ensued between two dominant males in defense of a particularly desirable piece of rock. Our results suggest that dominant males, through their more robust body morphology and superior fighting ability, have better access to potential mates than subordinate males. If dominant males, which represent only about a third of the male population, contribute disproportionately to the gene pool, then the observed variability in male social behavior could have important implications for genetic structuring of local populations.

Prior to oviposition, we transported several adult females to a large outdoor holding pen containing artificial nest sites. Eggs were collected as they were laid and incubated under controlled temperature and moisture conditions. At 1 month of age, hatchlings were transported to our lizard research facility at the San Diego Zoo for a 12-month headstarting period. Since then, they have been maintained indoors as a group in a large enclosure where they have access to natural sunlight through UV-transmitting plastic roofing. The enclosure is equipped with ceramic heating elements to provide localized basking sites, as well as rocks and wood structures to simulate natural terrain.

Studies on reptiles indicate that larger individuals may survive the neonatal period better than smaller ones because they are more successful at avoiding predation and competing for food. This has led to proposals for headstarting, in which animals are raised in captivity until they reach a larger and presumably less vulnerable body size, as a conservation strategy for increasing survivorship of reintroduced or translocated individuals. Headstarting programs have not been without crit-

icism, however. In sea turtles, headstarting appears not to address the fundamental causes of population decline and may actually be harmful to the ecosystem by temporarily removing neonatal turtles, an important link in the marine food chain (Frazer, 1992). Although headstarting programs based on results of computer models have recently been recommended to address the problem of low juvenile recruitment, there has never been a rigorous experimental investigation of the potential advantages and disadvantages of this approach (Dodd and Seigel, 1991).

In a headstarting experiment, we plan to release two groups of hatchlings at our study site on Guantanamo, one that has been raised in captivity for a year and one that has recently hatched. Prior to release, all iguanas will undergo a strict health screening exam to insure against the possibility of introducing disease into the wild population. Each iguana will also receive a minute transponder tag implanted subcutaneously in the left leg for permanent identification. Subsequent surveys of the release site conducted at six month intervals over the next few years should help us evaluate any benefits headstarting may confer.

Unfortunately, the recent refugee crisis, in which Guantanamo experienced an influx of some 45,000 Haitian and Cuban migrants, has postponed initiation of our project until next year. Although significant habitat alteration has resulted from the unforeseen political crisis, officials from both the U.S. Fish and Wildlife Service and the Department of Defense Legacy Resource Management Program have been working closely with base officials and qualified biologists to insure that all biological systems negatively impacted by the refugee camps will be fully rehabilitated. Because a fair percentage of the iguana population on the base has been destroyed, our reintroduction program will take on some additional importance in helping to restore the local ecology of Guantanamo. Once underway, our studies should help us evaluate the utility of headstarting as a viable conservation strategy for increasing depleted populations of this and other species of rock iguanas. Look for updates in future issues of the *Iguana Times!*

Literature Cited

Alberts, A. C. 1993. The most endangered lizard in the world: The Jamaican iguana, *Cyclura collei*. Vivarium 5:12-14.

Blair, D. W. 1991. West Indian rock iguanas: Their status in the wild and efforts to breed them in captivity. Proc. North. Calif. Herpetol. Soc. Captive Propag. and Husb. Conf., pp. 55-66.

Carey, W. M. 1975. The rock iguana, *Cyclura pinguis*, on Anegada, British Virgin Islands, with notes on *Cyclura ricordi* and *Cyclura cornuta* on Hispaniola. Bull. Flor. St. Mus. Biol. Sci. 19:189-224.

Case, T. J. and D. T. Bolger. 1991. The role of introduced species in shaping the distribution and abundance of island reptiles. Evol. Ecol. 5:272-290.

Dodd, C. K., Jr., and R. A. Seigel. 1991. Relocation, repatriation, and translocation of amphibians and reptiles: Are they conservation strategies that work? Herpetologica 47:336-350.

Frazer, N. B. 1992. Sea turtle conservation and halfway technology. Conserv. Biol. 6:179-184.

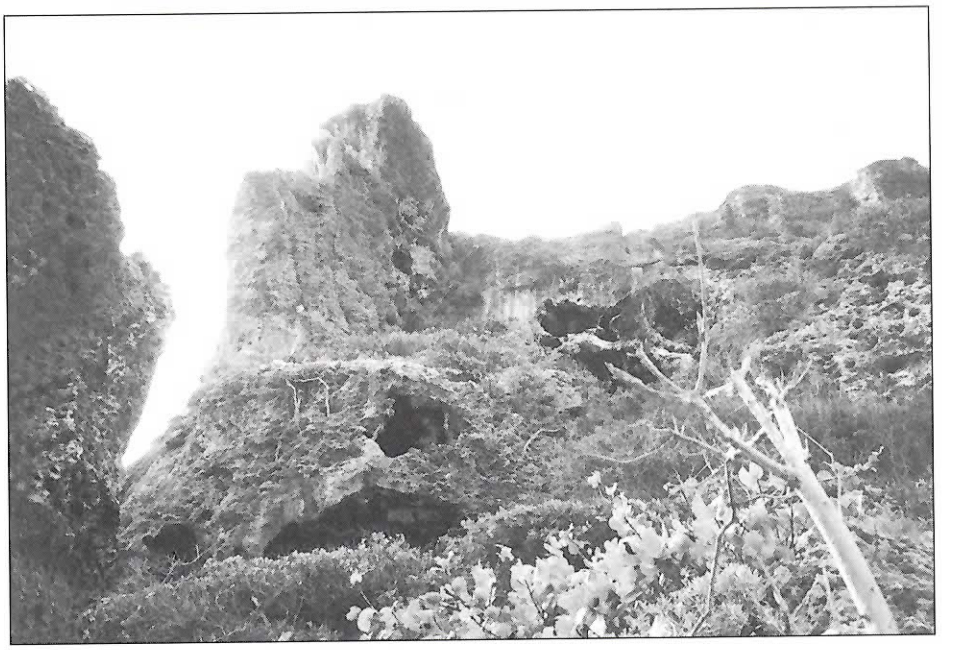
Iverson, J. B. 1985. Lizards as seed dispersers? J. Herpetol. 19:292-293.

Perera, A. 1985. Datos sobre abundancia y actividad de *Cyclura nubila* (Sauria: Iguanidae) en los alrededores de Cayo Largo del Sur, Cuba. Poeyana 288:1-17.

A Trip to Mona Island

Dan and Sylvia Byrd
Ventura, California

We arrived on Mona Island, "Isla de la Mona," around 8:00 on a Sunday morning in June, 1994. The whole island is only eight miles long and five miles wide. We were with a group of 25, which included students from as far away as Germany and France, as well as adults from the United States and Puerto Rico. We unloaded the boat and proceeded to set up camp on the beach called "Sardinera," which was on the west side of the island, with Hispaniola only 50 miles away. This beach had showers and bathrooms. The water was pumped from a well down below. All around we could hear beautiful bird calls and sounds like we'd never heard before. On the beach, the island was very lush with palm trees (and coconuts suddenly falling everywhere!), Australian pines, thick bushes, mahogany trees, poison wood trees, and tons of other trees I didn't recognize. The palm trees and Australian pines are not indigenous to the island. They were planted shortly after the island was discovered. There is a reef which protects Sardinera beach. The water is clear, warm, calm and beautiful. It rains 32 inches a year on the island, but because of the heat, evaporation rate, and porous character of the rock, the whole top "shelf" of the island is very dry and desert-like without standing water. Huge cactus plants and plumeria trees grow, as well as other "desert" type shrubs.



Mona Island. *Photograph: Sylvia Byrd*

I decided to videotape the dock and the beach around our camp site, so I grabbed my camcorder and started walking down the path. As I was nearing the dock area, I heard a rustle and caught sight of something moving out of the corner of my eye. It was a young rhinoceros iguana, about 15 inches from snout to tip of tail. I was about 10 feet away from him. He bobbed his head at me but never ran away or seemed really frightened. After taping him for a few minutes, I decided to run back and get Dan since this was the first iguana sighting; nevertheless, I was afraid the iguana would leave. I ran back to the camp site anyway and looked for Dan, who had wandered off in search of iguanas. I flagged him down and we went back to the dock area. The iguana was still there, sitting on the side of the path, just sunning himself. Dan and I sat there for a good half hour, watching him. We fed him some pear, and he got within three or four feet of us. He seemed to know we weren't there to hurt him (or he didn't care). We were surprised he was so tame.

As we were walking back to our camp site (about 25 yards away), Dan looked to our left, and in another camp site was a pretty big iguana. We did not see hemipenes and she looked to be gravid

Mona iguana. *Photograph: Sylvia Byrd*

because of her huge belly hanging on the ground. We estimated she was about two-and-a-half to three feet from snout to tip of tail, and maybe 12 pounds. She was eating food that the campers occupying the spot had thrown on the ground. We were standing about 15 feet away from her while we videotaped for several minutes as she just stood there. Dan approached her. When he got within eight feet, she started to walk up the hill. Then she stopped, but as Dan approached closer she walked away further. It was as if she were deliberately keeping a minimum distance, without running away. She appeared to lose interest in us, and climbed to the top of a large, round boulder. We could see the head of another iguana up there, but couldn't make out if it was another female or a male.

Around our camp site there were two more huge iguanas. One looked to be female (gravid), and the other was most definitely a male. The male had a much larger head, and his crest was bigger. He bobbed his head at us and seemed upset that we were near him. He would chase the female a few feet away as if to keep her a distance from us. The male was about three-and-a-half feet long, and close to 20 pounds. The female was about three feet and maybe 15 pounds.

We took some trails and walked a few miles through trees and bushes. We then climbed up the side of the cliffs to some caves that had petroglyphs drawn by the Taino Indians, who inhabited the island when it was discovered. We didn't see any iguanas. We walked to the entrance of a beach where a sign was posted that read, "Area de Anidaje de Iguanas, No Entre 1 Julio al 15 de Nov." The sign translates to: Iguana breeding area, do not enter July 1 to Nov. 15. Sea turtles also lay their eggs on this beach. We walked another mile, came to a fork in the road, went right and came upon the small airplane landing strip. We didn't see any iguanas there so we went to the beach on the other side of the trees. We found what we believed to be another nesting area of the iguanas. We figured they weren't sea turtle nesting sites because the burrow area was further away from the beach, among the trees. As we were walking back to our camp site, nearing the beach with the sign posted, Dan spotted a huge iguana. Appearing to be gravid and with no hemipenes, she was very statuesque—just resting there among the bushes. She was about three feet, 15 pounds, like the other iguanas. She walked away quickly when we approached her, hiding behind a huge concrete slab that had fallen over. We didn't see any other iguanas in that area.

Our group was there for a whole week, but because Dan and I had to get back sooner, the captain of the boat was going to pick us up on the eastern side of the island on Tuesday morning. A group of eight geologists and biologists, employed by the Department of Natural Resources, regularly visits the island for 10 days at a time to test for fresh water in the caves and underground. They were heading to the other side of the island on Monday morning, and since they own the only vehicle on the island (an old four-

door truck), we hitched a ride with them. It was a seven mile drive to the other side. We felt very fortunate to have traveled to the top and to the other side of the island. The terrain was completely different on the top, being very flat with extensive cacti and brush. We could see the light house on the far northeast side of the island.

As we descended to the eastern side of the island, we could see a huge Dominican Republic ship which had crashed into the reef some time ago and subsequently was abandoned. It just sits there today. The beach here, "Playa de Pajaros," was absolutely beautiful. There were caves all along the cliffs, as far as we could see. As we were driving down to the beach, we spotted an iguana in the middle of the road. On this side, there were no facilities at all, just a shack that is used as a kitchen when people come to stay. Dan and I set up our camp site on the beach under the cover of several trees. It was much windier on this side and the water seemed rougher. As I was setting up our tent, I noticed two large iguanas watching me. Both of them looked like females (gravid with swollen bellies), about three-and-a-half feet long, and weighing 15 pounds or more. These two looked bigger than the ones on the other side. They seemed to be waiting for me to feed them. The most impressive iguana we saw was an enormous male. He must have been four-and-a-half feet long, and weighed perhaps 30 pounds! He was massive. Indeed, he was by far the biggest iguana I'd ever seen. He had an enormous head, thick, strong arms and legs, and the base of his tail was big. He looked pretty old, but I think I must refrain from guessing how old.

We walked several miles along the beach and found a nesting site. We dug one nest up and discovered the remains of last year's eggs. We saw only one iguana on our way back, which we surprised—and he hissed at us. He looked as if he was blind in one eye. We hiked up the hill to the top of the island and walked another three miles to the light house. We saw lots of land crabs but no iguanas. The light house was very impressive. There was a big house nearby, a two car garage, and a well with fresh water. However, the structures were completely abandoned; no one lives there any longer. It's a real shame they allowed it get so run down.

During our time on the island, we saw about 15 adult and only two juvenile iguanas. We did not go around the entire island, but we feel we should have spotted more juveniles than just two. Goats and small pigs were on the island, we were told, but we didn't see any. We did see one cat running around our camp site. We spoke with a man that comes to the island frequently, and he said that even ten years ago there were more iguanas than there are now. He believed that the cats and birds eat some of the hatchlings.

All in all, we thought the island was a true paradise. But we feel that the iguanas need more protection from the animals that prey on them. People should appreciate the iguanas as a rare and beautiful gift, and do all they can to protect them.

Mona iguana. *Photograph: Sylvia Byrd*

Reflections on Mona Island

Tom Wiewandt, Wild Horizons, Tucson, Arizona

Dr. Tom Wiewandt, who studied the Mona Island iguanas from 1972-1975 to earn his Ph.D. from Cornell University, reflects on his experience on Mona Island and his impressions of its indigenous iguana.

Any trip to Mona Island is an adventure, and I always enjoy reading accounts of a traveler's first visit to this remarkable place. The most intriguing I've come across was discovered in the journal of Rev. Samuel Purchas, entered on 7 April 1607:

"The seventh day, wee arrived at Mona: where wee watered: which wee stood in great need of, seeing that our water did smell so vilely that none of our men was able to endure it.

"Whilst some of the Saylers were a filling the Caskes with water, the Captaine and the rest of the Gentlemen, and other Soldiers, marched up in the Ile sixe myles; thinking to find some other provision to maintaine our victualling. As wee marched, wee killed two wild Bores; and saw a huge wilde Bull, his hornes was an ell betweene the two tops. Wee also killed Guanas, in fashion of a Serpent, and speckled like a Toade under the belly.

"These wayes that we went, being so troublesome and wilde, going upon the sharpe Rockes, that many of our men fainted in the march: but, by good fortune, wee lost none but one Edward Brookes Gentleman; whose fat melted within him, by the great heate and drought of the Countrey. Wee were not able to relieve him nor our selves; so he died in that great extreamitie."

Fortunately, Mona was not terribly inviting to early explorers and most moved on. Today the island has no permanent human residents, only tourists, researchers, fishermen, and a small detachment of government employees. Nevertheless, this tiny island has had a rich history of occupation by Taino Indians, European colonists beginning with Christopher Columbus, pirates, guano miners, treasure hunters, the Civilian Conservation Corps., and the U.S. Air Force.

People came, people went; but unfortunately, goats, pigs, cats, and rats were left behind, now wild and among the principal threats to the island's native flora and fauna. I was extremely fortunate to have spent three consecutive years of my life on Mona as a graduate student studying and filming the habits of Mona's giant iguanas and documenting the impact of these introduced mammals. It's worth pointing out here that the innate "tameness" so often noticed in animals on remote islands comes from having evolved in a place with few natural enemies. This is why introduced predators like cats, dogs, mongooses, and pigs have such a profound impact on native island populations (see John Iverson's article in *Iguana Times*, Vol. 1, Nos. 1, 2).

There are some common misconceptions about the iguanas held by many visitors to Mona. First is size.

These reptiles are so impressive, they often seem bigger than they actually are. Adults are short-tailed and stocky. Based on my data, males average 3.4' overall length (range 3.3-3.6'), and weigh in at 13.5 lb (range 11.0-15.1 lb). Females are somewhat smaller: 3.1' in overall length (range 2.8-3.4'); 10.4 lb (range 7.5-12.1 lb). In three years of fieldwork, I never saw one that, in my estimation, exceeded 4'.

Second is sex. Except for the largest males and gravid females, it's difficult without considerable experience to distinguish males from females in the wild. I have long been intrigued by the similarity in appearance between male and female Mona Iguanas, certainly not the norm for most iguanine lizards. In a nutshell, it seems that in this population, natural selection has favored male-like traits in females, which I've proposed has been an evolutionary consequence of competition between females for limited nest sites on an island where soil is scarce (see my article in *Iguana Times*, Vol. 3, No. 1).

Third are misconceptions regarding the iguana's population size. It's impossible to determine whether this population is expanding or shrinking unless one has an understanding of the animal's activity patterns, year-round. Females, for example, migrate to coastal nesting areas during the nesting season, greatly increasing the density of animals near the beaches for about two months of the year. Obviously at hatching time, young are also concentrated in these areas before they disperse. When it's especially dry and little fruit is available (their preferred food), the iguanas may lay low, passing days, even weeks underground in a state of torpor. When shrubs and trees bear fruit, activity greatly increases and individuals may relocate to sites where such foods are plentiful. All of these findings underscore the importance of methodical, scientifically based long-term population estimates.

Last but not least, it's worth commenting on the signs mentioned by the Byrds which have been posted to discourage visitors from walking through these clearings during the nesting and incubation period (July 1 November 15). Females preparing nest holes or guarding completed nests scatter when they catch sight of a human, which greatly increases the likelihood of nest abandonment and females digging into each other's nests while preparing their own. Even after nesting has ended, visitors pose a serious threat to these animals. While refilling their nest tunnels, females leave an airspace over the eggs, vital to proper egg development, hatching, and emergence (it sometimes takes hatchlings a week or two to reach the surface). This airspace is easily capsized by visitors inadvertently stepping on completed nests, thereby killing the eggs and hatchlings within. Thus, the signs represent a change in the right direction, and should be heeded by those who visit Mona during the sensitive period specified.

Putting conservation measures in place in Latin America is typically a slow and politically challenging process. I would like to encourage all iguana enthusiasts to work towards staying well-informed and getting involved in conservation programs. Island populations are especially vulnerable and need all the help they can get.

JUST MY OPINION: A COMMENTARY ON ZOOS AND THE PRIVATE SECTOR

WINSTON CARD
DEPARTMENT OF HERPETOLOGY, DALLAS ZOO

Recently, I was asked by one of the GHS board members (Bill Brant) to respond to some of the criticism leveled at zoos by members of the private sector. I was reluctant at first, owing to the unreasonably strong opinions some individuals hold in regard to zoos, but after meeting "Sleazeweasel" Morgan at the International Herp Symposium (IHS) in New Orleans and seeing that he was still intact, I decided it would be a cop-out not to respond. The opinions expressed herein are solely my own and may not reflect those of my colleagues.

Most of the negative sentiments expressed by members of the private sector are based on economics and not on a clear understanding of the position of zoo professionals. For instance, some individuals criticize our reluctance to participate in captive reproductive programs with private herpetoculturists. This is not entirely true, for there has been, and continues to be, some very productive, collaborative efforts between zoos and some private breeders. However, the needs of these two groups are not always conducive to parallel efforts. It would be naive in the economically strained environment of today to say that some decisions made in zoos are not based on economic incentives. However, most of our motives are not driven by financial gain. In fact, the reptile department at the Dallas Zoo has given away well over $100,000 worth of animals over the past 10 years or so. In addition, we have placed hundreds of other specimens out on breeding loan during the past several decades. Many of these animals were not just sent to other zoos, but universities, private herpetoculturists and institutions that have exhibited reasonable stability in terms of animal management programs.

Some private breeders complain because we don't release Australian species (i.e., *Aspidites* sp.) into the market. We have been asked by Australian officials who have provided these herps to us not to commercialize in Australian animals, including captive-hatched offspring. While selling these animals may not directly violate Australian laws, our institution has an agreement with Australian officials to distribute these captively generated animals gratis to accredited institutions or universities. We may not jeopardize our relationship with the Australians for the benefit of financial gain.

Beyond the above points, one of the overriding considerations taken into account when our staff is solicited for herps by a member of the private sector is: When has this individual or institution offered any support for our research, education, or conservation programs without attaching strings? The answer, with few exceptions, is not very often. We are under no obligation to sell animals to anyone and if we choose to do so, it is only to those institutions or individuals we implicitly trust and that have historically proven that they are not just interested in personal gain. Selling captive offspring has not contributed to my pay check or the overall financial condition of the department as a whole, because funds generated from these sales are placed in the general zoo society fund, so there is little incentive for us to tolerate any amount of hassle or risk. In other cases, the decision not to deal with some individuals or institutions (including other zoos) has either been based on past experience or ethical considerations. Many zoos refuse to deal with some of the larger importers because of their questionable business practices. For example, during the past few years, moderate numbers of wild-caught green tree monitors (*Varanus prasinus*) have been showing up on price lists around this country. This is a protected species in Indonesia (Wildlife Protection Ordinance No. 134, 1931 and Wildlife Protection Regulation No. 266,

1931, Annex 1) and export permits are usually only issued for scientific or educational purposes. Some exporters have been circumventing this problem by calling these animals *V. kordensis* on permit applications which they may or may not know to be an invalid name. It is conceivable that some importers are aware that this is an invalid name not supported in scientific literature, yet they continue to bring these specimens in anyway. Whether or not importers agree with these regulations is irrelevant as we simply cannot afford to become involved with institutions that either don't know the laws or choose to ignore them. Beyond the questionable legal practices of a few well-known dealers, there are ethical concerns that we must take into consideration as well. A good example of a poor ethical stance is the present situation in Madagascar where large numbers of indigenous herps are being exported worldwide. Some of these species (i.e., *Phelsuma standingi, P. guttata, P. flavigularis, Uroplatus henkli, Zonosaurus quadrilineatus, Chamaeleo balteatus, Mantella cowani, Brookesia perannata* [Brygoo *et. al.,* 1973; Glaw and Vences, 1992; Klaver and Bohme, 1986; Nicoll and Langrand, 1989]) have limited ranges and we have no idea how they, and other Malagasy animals, are being impacted by this massive collecting.

Don't dealers that benefit financially from these animals have some responsibility to help fund research efforts to make this determination? If exporters and importers don't make some attempt to police themselves, it is conceivable that many of the species from this area may be elevated to CITES Appendix I, making it difficult to obtain many species we see commonly today. A valuable source of income for many people in that country will be impacted if a partial or total ban of exportation is enacted. This is clearly a case where short-term economic gains have become more important than the long-term consequences to the wildlife in that beleaguered country and it is inappropriate for us or anyone else to support this trend in any way.

A second question I am commonly asked is: What is a zoo's function? Some individuals in the private sector contend that zoos provide little more than entertainment. I must admit this is true in some zoos, but it is narrow-minded to apply this definition to all zoos. While, out of fiscal necessity, entertainment is certainly a part of a zoo's function, we also make some unique and tangible contributions in other areas. Zoos traditionally justified their existence through educational programs and by claiming to be "arks for the future." However, recent studies indicate that the ways in which zoos have traditionally approached education needs reevaluation (Marcellini and Jenssen, 1988; Murphy and Mitchell, 1989; Serell, 1978).

The Dallas Zoo recently installed 11 prefabricated hands-on educational modules in our reptile building (Reptile Discovery Center) designed in conjunction with the National Zoo and Zoo Atlanta. The design of these modules was based, in part, on the above-mentioned studies. Visitor interviews conducted at all three zoos, before and after installation of the modules, indicate that they have had a positive impact on the visitor experience. Not only did the average time spent in the building increase, but, according to visitor interviews, visitors were more sensitive to herps, meaning that at the very least these people would be more tolerant of these animals in the future. As part of this program, small school groups (20 to 30 students) are isolated in the reptile building for several hours with trained volunteers. Access is limited to the general public, so as not to distract the groups. The children are then encouraged by the volunteers to explore the hands-on modules along with some written material provided by our education department. A puppet show, with a herp theme, is currently being developed as part of this project to make it easier for younger children to relate. In addition, according to a recent phone survey conducted by staff members at the Dallas Zoo, we receive an average of 6000 phone calls each year from the general public (D. T. Roberts and L. A. Mitchell, pers. comm.). A large percentage of these calls were questions concerning husbandry, local reptile identification and general natural history information. Obviously education is an important part of what we do, but we still have a great deal to learn in this area. Captive reproduction in support of conservation has also been used as a clarion call for zoos. This is usu-

ally based on the premise that in some cases captive hatched offspring could be reintroduced to augment decimated wild populations. This idea may have some legitimacy in the future, but it has only been implemented on a small scale in a few instances (i.e., the golden lion tamarin and Arabian oryx) and we still have a great deal to learn about this process. Some private herpetoculturists have also tried to link captive reproduction with conservation (i.e., "conservation through commercialization"). Their contention is that captive reproduction reduces pressure on wild populations, and by placing value on certain species, there will be more incentive to save them from extinction.

There is little evidence to support either of these notions and an examination of one of the many dealers' lists available today suggests the opposite may be true. According to CITES, over 68,000 ball pythons (*Python regius*), 11,000 savannah monitors (*Varanus exanthematicus*), 7,000 *Phelsuma lineata,* 4,500 *Phelsuma madagascariensis,* and an additional 7,000 unidentified *Phelsuma* were exported in 1990 alone. These are just a few examples, but numbers for many other surveyed species are just as high. Numbers of exported specimens for each species listed above dramatically increased over the previous five years. These numbers do not include specimens taken for the skin trade.

Captive reproduction programs have made some important contributions, but in an area unknown to most people. As an example, captive-hatched/born naive (inexperienced) specimens offer many opportunities for research. Zoo personnel have traditionally focused their efforts on applied research. More recently a few zoo people have begun to utilize these living resources, in collaboration with academic colleagues, for behavioral research with broader implications. Behavioral studies can provide insight into some aspects of natural history, and only through understanding can we hope to make an impact on conservation.

I spent some time in the private sector before moving into the zoo field and continue on a limited scale to produce captive offspring at home. While I understand that many individuals simply maintain private collections because they enjoy reptiles, I also fully appreciate the economics of herpetoculture. It is not my intent to condemn anyone for making money, although I wish I were, but only to point out that there is more than just one side to this issue. There are certainly justifiable criticisms that can be leveled at zoos (no doubt that I will hear some in the near future), and I have tried to outline a few above. Lack of space does not allow me to discuss all aspects of this complex issue here.

Acknowledgments

I wish to thank B. Brant for stimulating me to write this article, and J. B. Murphy, L. A. Mitchell, D. M. Boyer and the rest of the staff of the Department of Herpetology at the Dallas Zoo for helpful advice in its preparation. A special thanks to E. Bessette for those long lectures on this subject. I know you love me, Eugene.

Literature Cited

Brygoo, E. R., Blanc, C. P. and Domergue, C. A. 1973. Notes sur les *Brookesia de Madagascar VII, Brookesia du Marojezy, B. betschi and B. griveaudi n. sp. Reptilia. Squamata.* Chamaeleontidae. Bull. Acad.

Glaw, F. and Vences, M. 1992. A field guild to the amphibians and reptiles of Madagascar. Ventura Publisher. Germany. 331 pp.

Klaver, C. and Bohme, W. 1986. Phylogeny and classification of the Chamaeleontidae (Sauria) with special reference to hemipenis morphology. Bonn. Zool. Mongr. 22: 1-64.

Nicoll, M. E. and Langrand, O. 1989. Madagascar: Revue de las conservation et des aires protegees. Gland: WWF.

Marcellini, D. L. and Jenssen, T. A. 1988. Visitor behavior in the National Zoo's reptile house. Zoo Biol. 7: 329-338.

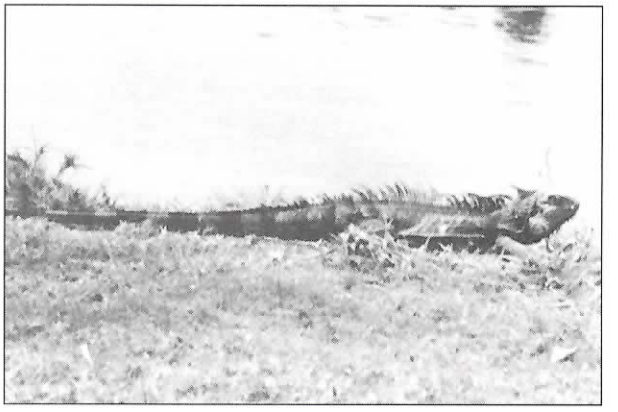
Murphy, J. B. and Mitchell, L. A. t989. "The other side": an experiment in reptile appreciation at the Dallas Zoo. Int. Zoo Yb. 28: 205-207.

Serrell, B. 1978. Visitor observation studies at museums, zoos and aquariums. AAZPA Conference Proceedings 1978: 229-233.

Reprinted with permission from the *Gainesville Herpetological Society Newsletter, Volume11, Number 1.* Winston Card is senior reptile keeper for the Department of Herpetology at the Dallas Zoo. He is currently studbook keeper for Asian forest monitors kept in North American collections, and also writes a column for the bi-monthly herp hobbyist magazine *The Vivarium.* In addition, he has published a variety of technical papers in the *Journal of Chemical Ecology, Journal of Herpetology* and *Herpetological Review,* as well as numerous articles for several popular herp hobbyist magazines.

Iguana Updates from Puerto Rico

Back from Puerto Rico where, in April, we were glad to see the green iguana family (five including two adults) still at their location near a golf course.



They've been there for a decade, having survived Hurricane Hugo. Enclosed are photographs—not the quality of [IIS Board Member] Tom Wiewandt's work, but this iguana family is somewhat wary. It is hoped they remain unmolested, albeit dodging golf balls.

D. Scott and Shirley Gallagher
Mason, Ohio

P.S. The persons who shot iguanas on Mona Island in 1992 were not apprehended, but fortunately there has been no repeat of that heinous act.

Dear Dr. Rodda:

Thank you for taking the time to review *Iguanas: A Guide to Their Biology and Captive Care* [Iguana Times 3(3):14-18; coauthored by Dr. Fredric Frye and Wendy Townsend]. Indeed, it is a book for pet owners. Actually, Dr. Frye's and my "efforts" are indeed "integrated" in the book, with the integration beginning at the planning stages. Aspects of any successful "marriage" are the obviousness of two distinct individuals, plus the presence of an almost undetectable merging of those two. Apparently some readers assume the final chapter to be my only textual contribution. I should admit, you credit Dr. Frye with having said a few things that we said together, that I said, or that I suggested we say... At any rate, while I take issue with a number of your remarks, I am not interested in attempting to convince you of my thoughts on each of them.

An ever-increasing pool of knowledge about iguanas is desirable: I wonder if or when the scientific community will value the observations of non-scientists. Clearly, Dr. Frye does. Recall our acknowledgment in the beginning of the book: "We are...grateful to veterinary colleagues and their *iguana-owning clients* for sharing some of their experiences with these fascinating creatures."

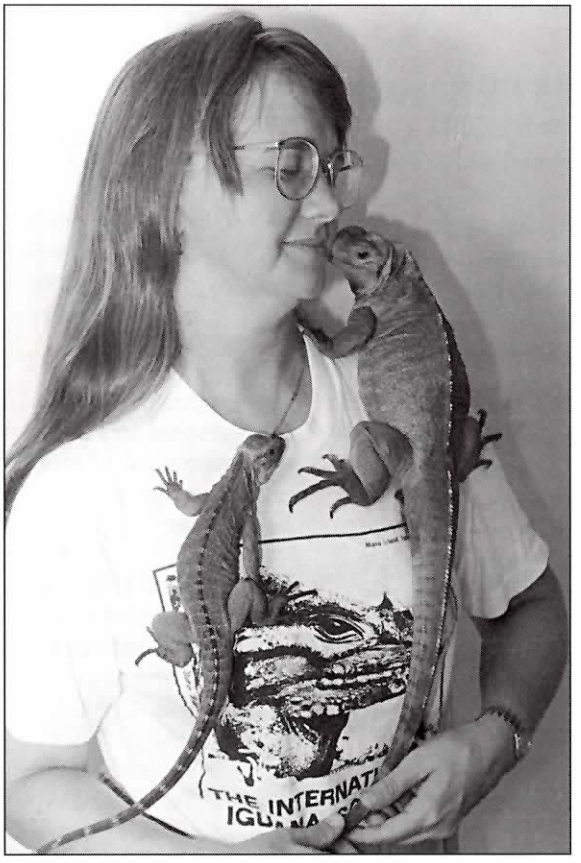
As for the "mint on the pillow," anthropomorphism is again becoming a popular and controversial topic! No doubt you would agree, especially if you have read any of the work of Dr. Jane Goodall, Elizabeth Marshall Thomas, or John Berger (to name only a few). Then there is Carl Kauffeld's classic, *The Keeper and the Kept*. I like his citings of other authors and poets in relation to snakes. One in particular: "If anything could make a snake hater learn respect and admiration for this abused group of animals it would be the study of their eyes. The writer speaks from personal experience!" (from *The Vertebrate Eye*, by Gordon Lynn Walls).

What would you ask Mr. Walls about what he sees in a snake's eyes? That is his observation which I respect. If human beings do not start looking at other non-human beings without preconceived, prejudiced, tunnel-vision ideas, we will never reach greater understanding of animal species or individuals. All beings are qualified to look at and observe life and to discuss what is seen. One might call it "wonder" in the tiny iguana's eyes, one might not. It was my observation that the baby lizard was becoming more curious than afraid. Regardless, his eyes moved me. My interest is that iguana keepers deem their pets as quite capable of looking back at them; as capable of prompting compassion. People do not typically value what they do not understand, what seems remote or non-sentient. It is the masses of pet iguana-purchasing people who vote, who donate monies to conservation—or not. Those are the people who need to look at their pets, understand, and value them.

I am working on a book about green iguanas. It is not a husbandry or biology guide, and it is not purely "anecdotal." I look forward to the book you will write about iguanas.

Wendy Townsend
Callicoon, New York

The Official International Iguana Society T-Shirt



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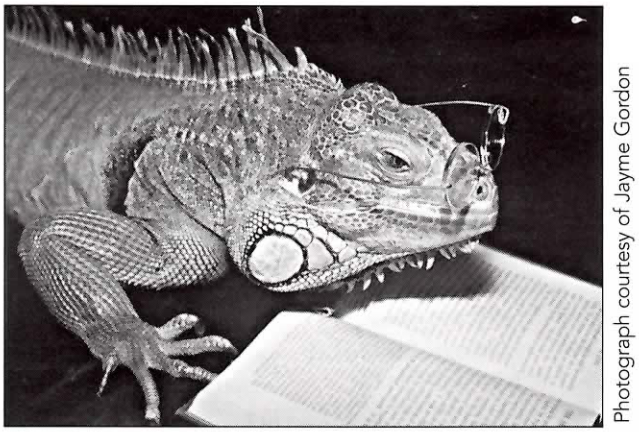

Photograph courtesy of Jayme Gordon

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)

New!

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.*

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Science Class Observes Iguana Reproduction

This past year, the seventh grade science classroom of Douglas Kranich, in Millinocket, Maine, was the scene of a successful breeding of green iguanas. The four-and-a-half year old pair has resided in the science classroom the past two-and-a-half years. In September 1993, Mr. Kranich noticed behavioral changes that led him to suspect sexual maturity of the iguanas. He then observed them mating on at least five occasions during March/April 1994. The resulting eggs hatched in August. Not only was this an excellent learning experience for students, Mr. Kranich carefully noted the husbandry conditions and recorded meaningful reproductive data.

During much of the period, the iguanas ranged freely in the classroom but had access to their ample sized cage as well. Thus, they were exposed to window-filtered sunlight, occasional direct sunlight, and a Vita-lite in their home cage. In addition to the warmth from window light, a reflector lamp (100 W) and an infrared heat lamp (250 W) were available. Although fresh produce was provided during summer months, the iguanas ate primarily store-bought fruits and vegetables. Meat and water were never provided. A reptile multi-vitamin supplement was sprinkled onto food once a week. Both iguanas increased in length from 66 cm (female) and 76 cm (male) in March 1992 to 122 cm in December 1994. Twenty eggs were laid on June 1 (three apparently infertile), and these hatched between August 9 and August 20 (after 70-80 days incubation in moistened vermiculite at 27°C). The offspring averaged 26.3 cm in length and weighed 13 g. All began eating finely chopped greens within two weeks of hatching.

Although much is already known regarding green iguana reproduction, a lot remains to be learned about other iguana species. These observations from a very fortunate science class demonstrate how pet owners and herpetoculturists can contribute useful information about iguana biology.

Source:
Douglas Kranich, Millinocket, Maine

Invalid Claims Pet Iguana Saved His Life

Duane Wright, a resident of the Tucson area in Arizona, frequently falls asleep at night with his pet green iguana, Goliath, lounging on his chest. Disabled by asthma, valley fever and other chronic respiratory disorders, Wright occasionally stops breathing during the night—a life-threatening situation known as sleep apnea. One night in spring 1994, Wright recalls being awakened by Goliath at about 1:30 am. "She was beating me with her tail as hard as she could," he claims, "digging with her claws and scratching me in the face." The iguana had roused her master just in time, because he had quit breathing and barely had sufficient energy to reach for his bronchi-clearing medication. Who needs a pet dog or cat when a cold-blooded reptile can look after one instead?

Source: Tucson Citizen, June 1, 1994

1994 IIS Iguana Conference

On 20-23 October 1994, the International Iguana Society, Inc., held its second annual conference, once again at Marathon, Florida. The meetings began with the Second Annual IIS B-B-Q, at a picnic pavilion on the beach of Bahia Honda State Park. Twenty-nine members and guests were present to wine and dine on generous portions of food, to soak in the sunlight of a cloudless sky, and to float about in the refreshingly cool waters.

The IIS Board of Directors held two meetings to discuss the future of the Society and its programs.

Among other things, the Board is exploring the possibility of holding its third conference on San Salvador Island, Bahamas, where participants could assist in ongoing research of the highly endangered iguana (*Cyclura r. rileyi*) that is endemic to the island.

A general meeting also convened which featured the exceptional presentation by Dr. John Iverson. His slide lecture focussed on the feeding and digestive adaptations of iguanas, much of which was distilled in the previous issue of *Iguana Times* (Vol. 3, No. 3). He also described his recently developed population models which suggest that conservation efforts should be directed as much toward adult survivorship as juvenile survivorship—a concept that comes as a surprise to many iguana conservationists.

As with the first conference last year, the meetings took place at the Hidden Harbor Turtle Hospital, hosted by Richie Moretti and Capt. Tina Brown. Most of the participants stayed at the Hidden Harbor Motel, where captive and rehabilitating sea turtles were easily viewed in one of the two swimming pools (the other devoted to human use only). Field trips included a behind-the-scenes tour of the Dolphin Research Center (thanks to Laurel Ehrlich), a visit to Gregory Scott's live iguana and botanical collections, and a stroll through Eric Beers' impressive palm garden, with its equally impressive groups of monitors and iguanas.

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

The Iguana Times, the newsletter of the 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, $30.00 for foreign memberships, and $35.00 for organizations, which receive double copies of the newsletter.

Write to:
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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 most recent issue of the newsletter. Articles can deal with any aspect of iguana biology, ecology, behavior, husbandry, systematics, etc.

Manuscripts must be typed, DOUBLE-SPACED, with wide margins, on 8½" x 11" paper, or may also be submitted on disk (3.5" or 5.25"). We support most word processing applications in both PC and Macintosh formats. Please include file name, software name & version number on the disk, and a hard copy printout of your file. Include your address and telephone number on the manuscript.

Members are also welcome to submit letters to the Editor for publication in future issues of the newsletter. Authors of one page or more of print are entitled to three copies of the issue in which their article appears.

The Editors

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.

Adult *Ctenosaura palearis*, male. *Photograph: Bruce Elfström*