

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

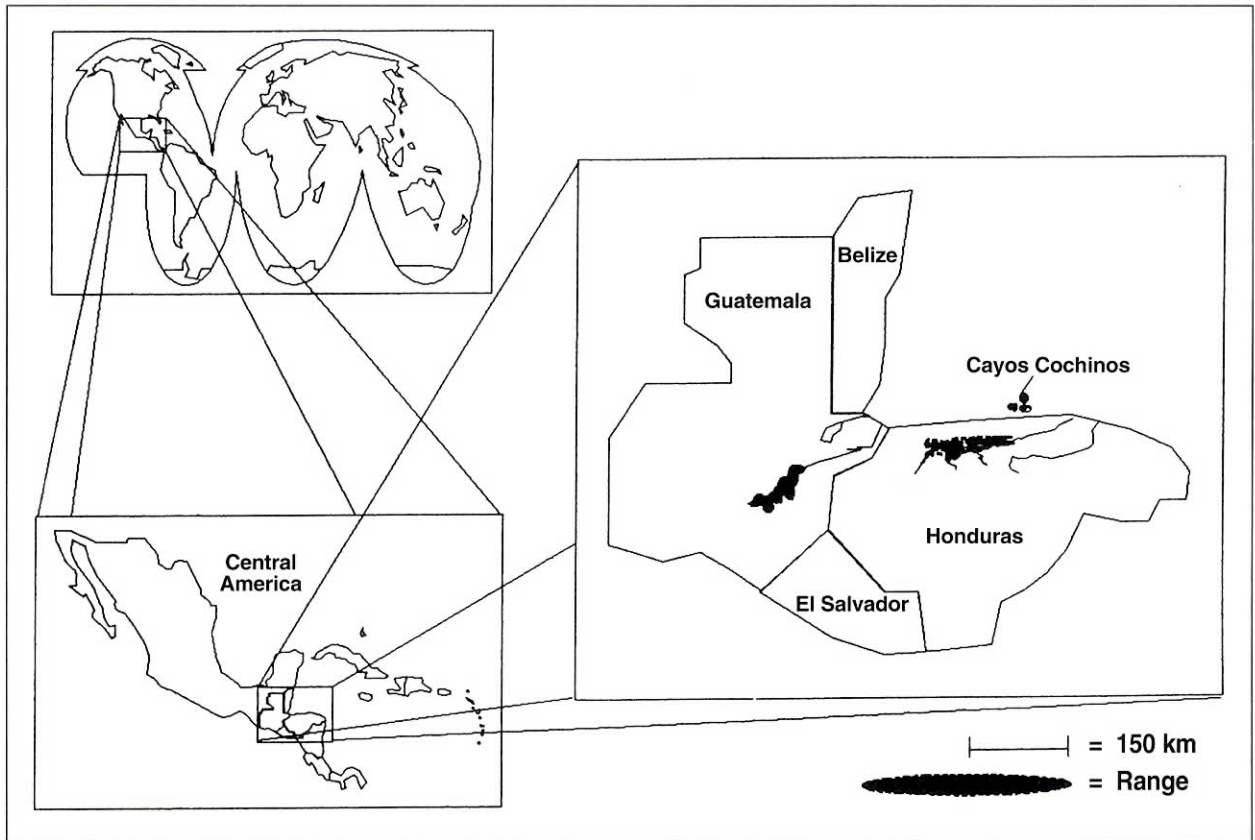


Figure 1. Known distribution of *Ctenosaura plearis* in Central America.

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. plearis* 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 plearis 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. plearis* is characterized by high annual mean temperatures and low annual mean rainfall. Sea-

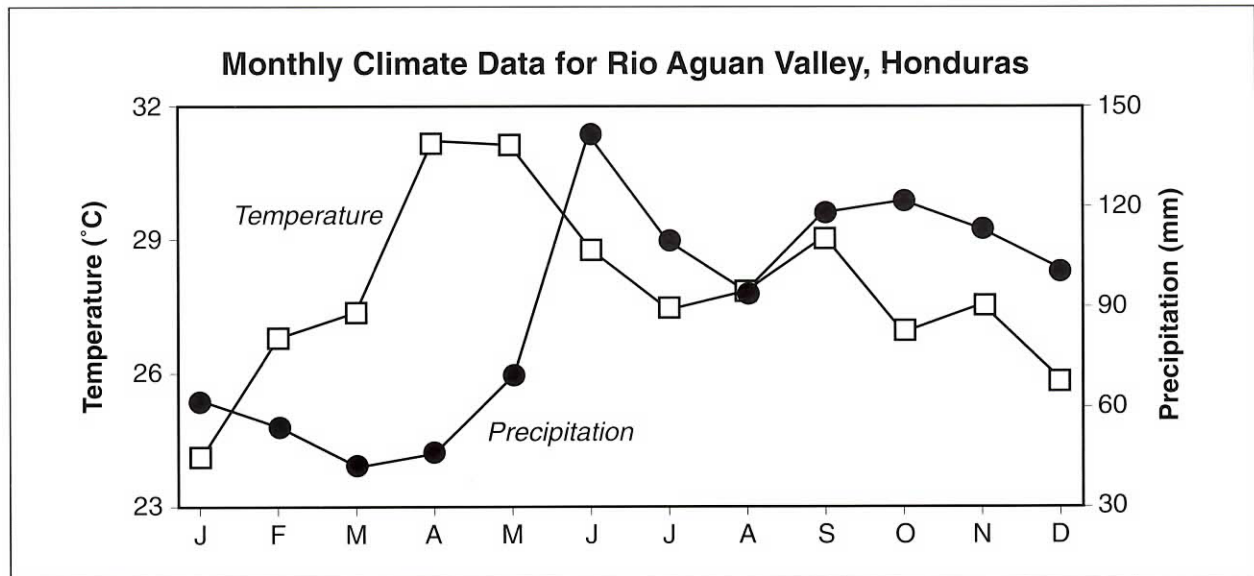


Figure 2. Climate data for Rio Aguan Valley, Honduras, showing average monthly temperature (°C) and precipitation (mm rainfall). After Meyer and Wilson (1985).

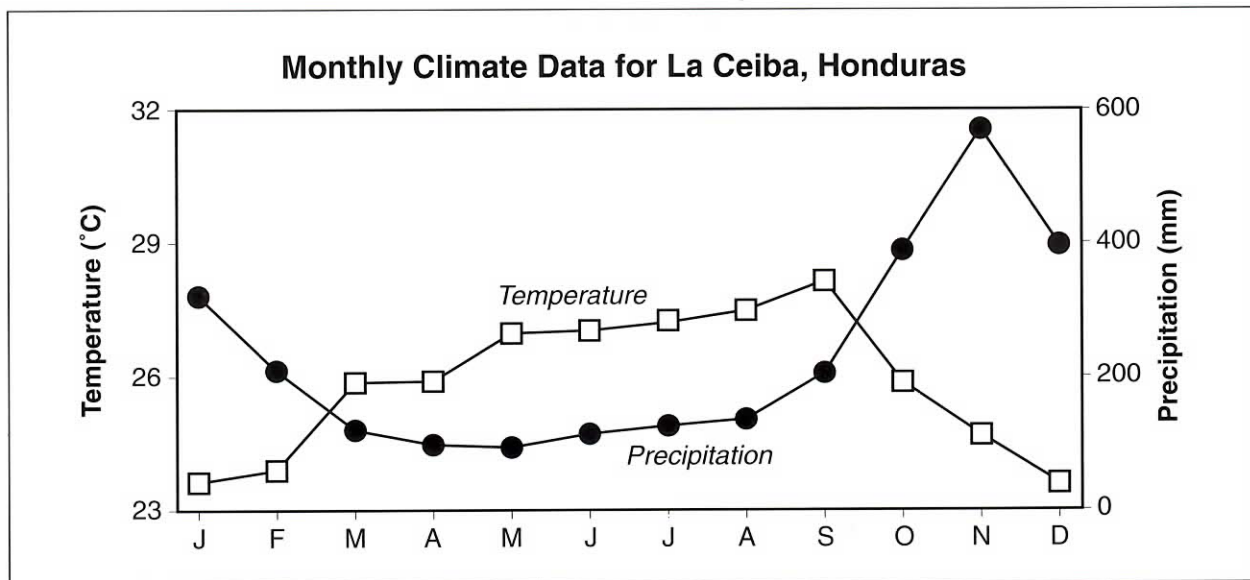


Figure 3. Climate data for La Ceiba, Honduras, showing average monthly temperature (°C) and precipitation (mm rainfall). La Ceiba is on the coastal mainland, adjacent to the Cayos Cochinos. After Meyer and Wilson (1985).

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 <i>Ctenosaura palearis</i>				
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: <i>Erythrina hondurensis</i> , <i>Acacia riparia</i> , <i>Pithecolobium dulce</i> , <i>Bursera simaruba</i> , <i>Coccoloba</i> spp., <i>Clusia flava</i> , <i>Hasseltia floribunda</i> , <i>Celtis iguanea</i> , <i>Cupania yunckeri</i> and <i>Agave</i> spp.	150-600	>24	<500-1000
Dry Tropical	Deciduous hardwood of 25 m height; patchy tree cover and savannah grasslands. Typical plant species: <i>Sterculia apetala</i> , <i>Enterolobium cyclocarpum</i> , <i>Albizia adinocephala</i> , <i>Calycophyllum candidissimum</i> , <i>Cordia alba</i> , <i>Bursera simaruba</i> , <i>Acacia pennpennatula</i> , <i>A. costaricensis</i> , <i>Luehea candida</i> , <i>Mimosa tenuiflora</i> , <i>Zanthoxylem culantrillo</i> and <i>Genipa caurto</i> .	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: <i>Bursera simaruba</i> , <i>Cecropia</i> spp., <i>Coccoloba unvifera</i> , <i>Cocos nucifera</i> , <i>Conocarpus erectus</i> , <i>Elaeis oleifera</i> , <i>Ficus</i> spp., <i>Hibiscus tiliaceus</i> , <i>Ipomea pes-caprae</i> , and <i>Wedelia</i> 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).

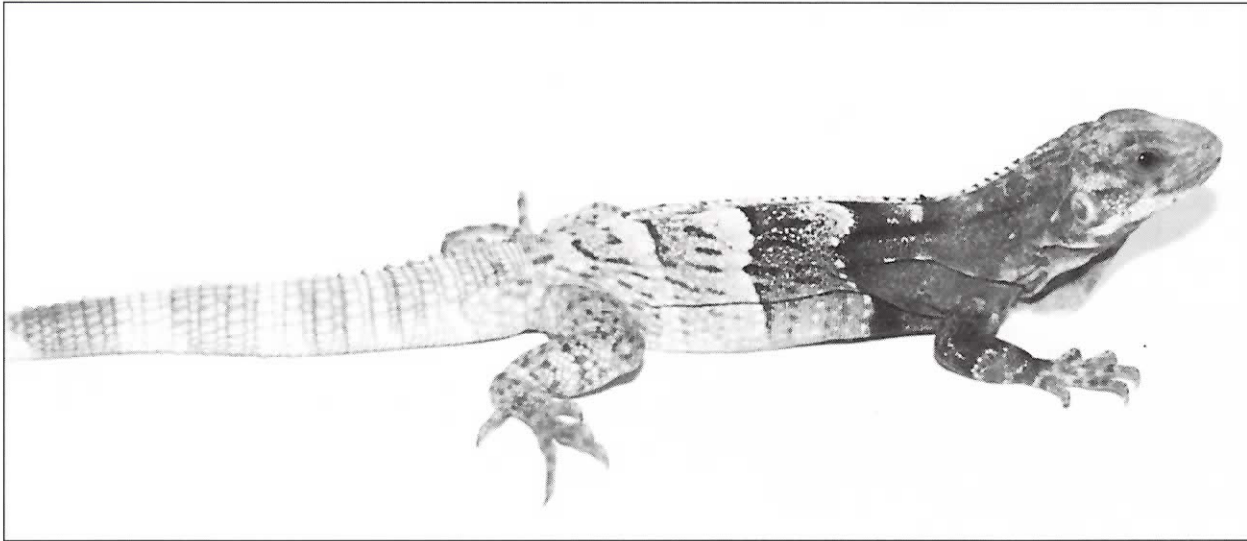
Thus, the range of *C. palearis* falls within three vegetation zones: arid tropical, dry tropical, and moist tropical (Meyer and Wilson, 1985). These zones are described in detail in Figure 4.

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 pri-

vacy 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. Ctenosaurs 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.

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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.