

# WEST INDIAN IGUANAS OF THE GENUS *Cyclura*

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Rock Iguanas of the genus *Cyclura* are among the largest and most impressive lizards in the Western Hemisphere. Unfortunately, the genus also includes some of the fastest disappearing, and most Critically Endangered lizard species on Earth. Historically these iguanas have always been restricted to islands in the Bahamas, the Greater Antillies and the Virgin Islands, although their former range was certainly much greater than it is today. On most of the islands where they still occur, they are the largest surviving native land vertebrates. In fact, adult iguanas have virtually no known natural predators. Their decline in numbers likely began in pre-Colombian times when the Arawak and Lucayan Indians sought them as food items to supplement their meager diet. The pressures of hunting by these native peoples may have initiated the process of decline in the numbers of rock iguanas, but the real devastation began with the arrival of Europeans to the islands. Not only was extensive habitat lost as the human population increased, but with him, man brought his domesticated animals, many of them turning feral. Today the greatest threats to the rock iguanas are probably the direct predation by, or competition with these introduced animals. The list is extensive, with cattle, goats, pigs, rats, mongoose, dogs or cats present on most inhabited islands throughout the West Indies.

These large diurnal lizards inhabit subtropical areas of West Indian dry (xerophytic) thorn forests typical of many Caribbean islands. The substrate is usually heavily eroded limestone containing many caves and crevices that the iguanas utilize as retreats. Several species sometimes also dig their own burrows in sandy areas. Adults usually establish home ranges around these retreats that they actively defend against intruders. At least seasonally the home range of a dominant male will often overlap that of one or more females. Most wild *Cyclura* are generally polygamous but individuals may also be promiscuous or monogamous.

Rock iguanas are chiefly herbivorous, ingesting the leaves, flowers and fruits of as many as 58 different native plants on a single island. They also consume a very small amount of animal matter in the form of very easily attainable items such as insects, land crabs and carrion, which can include dead seabirds, fish and, rarely, other iguanas. Iguanas are good climbers, especially when young, and have been observed browsing in trees more than five meters above the ground.

Mating virtually always occurs during the same two or three week period each year, regardless of climatic conditions. This would indicate that breeding activity is triggered by seasonal changes in the day length, or photo period. Depending upon the species, mating occurs from late May until mid June, with oviposition occurring approximately forty days later. Females often travel outside of their normal activity ranges to areas that are suitable for nesting. Smaller species of rock iguanas, and very young females of many species, may lay between

two to six eggs, while some of the largest forms may lay as many as twenty-three. On average, *Cyclura* eggs are among the largest eggs laid by any lizard on earth. After laying eggs, females of some species will often guard their own nest site for up to several weeks, repelling any intruder that ventures too close. The temperature at depth within nests that have been monitored by researchers remained a surprisingly constant 30–33C throughout much of the incubation period which can range from 65-90 days. It often requires the combined effort of many hatchlings to dig out of a nest chamber, sometimes not emerging for as long as two weeks after actual hatching. Unfortunately, mortality rates for juveniles can be extremely high and on at least some islands they approach one hundred percent. In the wild, rock iguanas reach sexual maturity at two to nine years of age. It is believed that they are also among the longest lived of any lizard, reaching ages of at least twenty-five to forty years. Some researchers believe that some may actually live to be closer to seventy-five or eighty years of age!

The most recent taxonomic revision to date of the lizard genus *Cyclura* was conducted by A. Schwartz and M. Carey in 1977. They examined 378 preserved specimens and named seventeen forms representing eight species. According to the I.U.C.N. Red List of these recognized forms, at least one is thought to be extinct, eight are Critically Endangered, five Endangered and the remaining three Vulnerable.

We believe our success in breeding these iguanas at Cyclura Research Center is due to several factors. The first of these factors is providing a high quality, balanced

diet heavy in green leafy vegetables that have a positive calcium to phosphorous ratio. We feed a mix from the following list on a daily basis to hatchlings and 2-3 times per week to adults.

**Green Leafy Vegetables:** Kale, Collard greens, Mustard greens, Parsley, Chard, Turnip greens, Escarole and Dandelion Greens.

**Legumes:** Bean sprouts (alfalfa, mung, soybean, etc.), Beans (lima, kidney, string, etc.)

**Mixed Vegetables:** Squash, grated (banana, summer, zucchini, etc.), Corn, Broccoli, Cauliflower, Asparagus, Brussels Sprouts and Yams.

**Fruits and flowers:** Melons, Apples, Plums, Pears, Bananas (sparingly), Figs (very high in calcium) and Grapes. Hibiscus flowers, Dandelion flowers and Squash blossoms.

**Optional Items (less than 5% of diet for juveniles and gravid females, 2% for other adults):** Dry, low fat, low protein, premium senior or less active dog food soaked in water first to soften, primate diet, monkey chow biscuits.

**Supplements:** Multi-vitamins for reptiles, calcium and mineral supplements.

**Water:** Fresh water for drinking is available at all times or offered at least every other day

A mix is prepared from the above list consisting of about 70% leafy greens, 15% mixed vegetables, 10% fruit and flowers, and less than 5% animal protein based products. Chop or grate finely for juveniles (a food processor works well) or more coarsely for adults. It is not necessary to feed a huge variety of items at every feeding. Simply vary the items offered from week to week so that a great variety of foods are fed overall.

All of our adult iguanas are kept in outdoor enclosures on a year-round basis. Within each cage is a heated hide box. The top of each hide box is hinged so that the interior is easily accessible and a lockable door is cut in the front to allow animals entry. A rigid heating pad ("pig blanket") designed specifically for use with animals is used as a heat source in each box. This heating method has proved successful for more than 20 years in inland Southern California where outside winter temperatures sometimes drop to as low as 23F (-5C). All heaters are wired to a time clock so they may be run for only a few hours at night, or used continuously during inclement weather. Supplemental heat is not used at all during six months of the year. It is first turned on in the fall when nighttime temperatures begin to drop below 55F (12.5C). Animals are then checked each evening to be sure that they are inside the heated boxes. When temperatures drop to lower than 50F (10C) the doors to all the boxes are closed every evening and opened up again every morning. This not only helps to retain heat within the unit, but also prohibits any animal from leaving the box when outside temperatures are dangerously low. At the other extreme mid-summer temperatures can sometimes reach 110F (44C). To help moderate such heat, 70%

shade cloth is installed over 2/3 of each enclosure. A drip irrigation line runs down the center of each roof with spray nozzles every few meters. These misters are controlled by an automatic watering timer which can either be programmed to come on as often as needed or operated manually. Fresh water faucets are present in each cage for washing and refilling water receptacles. Previous authors have listed lack of sufficient space as the primary reason that rock iguanas fail to thrive and reproduce in captivity. While I would certainly agree that enclosures provided should be as large as possible, access to natural sunlight and adequate diet is at least as important. We have had young adult *C. nubila* produce viable eggs in cages with as little as 3.25 square meters of floor space. A more appropriate size, however, for a large adult pair would be at least 9 square meters of floor area supplied with several basking sites. Visual barriers can be helpful in reducing stress during breeding and nesting seasons. We have tried several different arrangements for establishing breeding groups including pairs, trios and quads. Dominant adult males can rarely be kept together except in extremely large enclosures (200 sq. meters) that are usually impractical for the average breeder to construct. Females are often quite aggressive toward one another and nearly always establish a pecking order. Submissive females often do not do well and usually remain smaller and exhibit a slower growth rate than their dominant counterparts. Relationships sometimes change very quickly in an apparently compatible trio or quad. Even after many peaceful months together, a subordinate female may suddenly be found with missing digits or more serious lacerations. This often occurs immediately after another

female cage mate has oviposited (laid eggs). The most compatible group has proven, not surprisingly, to be one male and one female. We arrange cages in such a way that males can see one another and display back and forth. There is some evidence that these displays may help to stimulate breeding activity.

Copulation can occur at various times throughout the year in captivity, particularly when iguanas are introduced to each other for the first time. Normally though, breeding takes place for just a few weeks each year during May, June and July. I have observed successful copulation on many occasions. It is usually preceded by numerous head bobs by the male, who then circles around behind the female grasping the nape of her neck in typical iguanid fashion. He then attempts to restrain her and to maneuver his tail under hers to position himself for intromission. Copulation generally lasts from 30 to 90 seconds (rarely longer) and a pair is rarely observed mating more than once or twice per day. Our captive *C. nubila* are always the first species to oviposit beginning as early as the first week of June. *C. cornuta* are usually somewhat later, nesting in July and August. Any eggs laid after October 1<sup>st</sup> have always been infertile. Gravid females normally begin the nesting process with a reduction in the intake of food and an increase in activity level about two weeks before laying. Abdomens of large, mature adult females often become distended to the point where the outline of individual eggs can easily be seen. Several days before actual egg laying, females begin to dig all over the cage, excavating many shallow depressions. It usually takes an entire afternoon to excavate a complete nest burrow. Females

often remain in burrows overnight rather than returning to their regular retreats. Occasionally females will remain underground up to two days while laying eggs, but more often emerge the following morning and begin to fill the nest burrow with sand. Huge quantities of sand are moved from around the nest site until a large mound is formed over the spot where the eggs were laid. We always remove the eggs immediately after being laid and artificially incubate them indoors, but many females will continue to guard their now empty nest site for weeks afterwards. If the mound of sand is raked flat after egg removal, a female will often immediately move large quantities of sand to attempt to re-cover the area. This behavior normally lasts for one or two weeks but can be induced in some individuals for months afterward by simply turning on the sprinkler system or by a moderate rain.

We are very pleased with the advances made in captive propagation at Cyclura Research Center and other facilities around the world. Captive-produced animals provide a source for zoos, research, and the private sector without exerting any pressure on wild populations. Although still controversial, more and more of these animals may be recycled back into the wild to restock depleted areas. This has been done for years in the Dominican Republic with *C. cornuta* and programs begun in both Jamaica the Cayman Islands will attempt to do the same with *C. colei* and *C. n. lewisi* in the near future. Ultimately, the continued survival of *Cyclura* iguanas will depend upon how aggressive we are in preserving their natural habitat and attempting to reverse much of the damage that has already been done to it.



Until, and unless, these goals are accomplished, captive breeding programs will remain their most important hedge against extinction.

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