

Iguana Times

THE JOURNAL OF THE INTERNATIONAL IGUANA SOCIETY
\$6.00

VOLUME 4, NUMBER 3
SEPTEMBER 1995



Young green iguana, *Iguana iguana*.
Photograph: Thomas A. Wiewandt




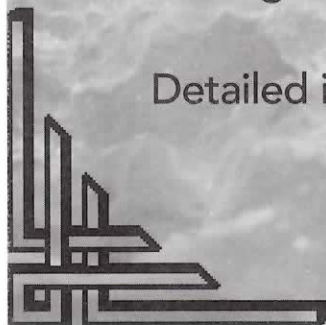
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GREEN IGUANAS: EMERALD GEMS OF THE JUNGLE

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The green or common iguana, *Iguana iguana*, has always been one of the most popular captive lizards, but in recent years its popularity has grown exponentially. This is certainly due to several factors: their spectacular appearance and impressive size, the docility of many individuals, and most recently their relatively low cost (due primarily to the large numbers of farm-raised animals now being imported into the U.S. from Central and South America). Add to all these attributes the fact that iguanas are generally very hardy in captivity and can be quite long-lived (15 to 18-year-old individuals are not unheard of), and it is easy to understand their appeal.

Distribution

Green iguanas have a very wide geographic distribution and are found from northern Mexico (the town of Costa Rica, Sinaloa, on the West Coast and Laguan de Tamiahua, Vera Cruz, on the East Coast) to at least the Tropic of Capricorn in southeastern Brazil and Paraguay. There are also populations on many West Indian islands including Cozumel, the U.S. and British Virgin Islands, Aruba, Bonaire, Curacao, Guadalupe, St. Vincent, Grenada, Trinidad, Tobago, and numerous others.

Recently introduced animals have also established populations in areas well outside their natural range. Wild iguanas have been recorded from several valleys on Oahu, Hawaiian Islands, since the 1950's, and they also appear to be well established in the Miami area southward into the Florida Keys. They are most at home in tropical coastal lowlands under 500 meters elevation, but have been found up to 1,000 meters in some parts of Columbia.

Size

Green iguanas are among the largest lizards in the Western Hemisphere. Some males may

exceed six feet in length and weigh over 15 pounds. Females are generally much smaller, and a four foot, seven or eight-pounder, would be considered large. Compared to iguanas of similar adult size (such as rock iguanas, genus *Cyclura*), the babies are born quite small, with snout-vent lengths of about 2.5 inches.

Two Species

Currently, there are just two species recognized within the genus *Iguana*: the common or green iguana, *I. iguana*, and the Lesser Antillian iguana, *I. delicatissima*, found only on a very few islands in the Lesser Antilles. The main external difference between the two species is that *I. delicatissima* lacks the enlarged subtympanic scale so prominent on *I. iguana*.

Unfortunately, recent studies indicate that *I. delicatissima* is faring very poorly throughout most of its limited range. The pressures of habitat loss, hunting, and introduced exotic animals on delicate island ecosystems has caused the rapid depletion of this unique iguana. It is currently represented in U.S. collections by only a handful of individuals.

The green iguana, although not faring much better in many localities, is found over such a large area—millions of square miles, in fact—that it is not considered to be in any immediate danger of extinction and is listed as a C.I.T.E.S. appendix II animal.

Color Variation

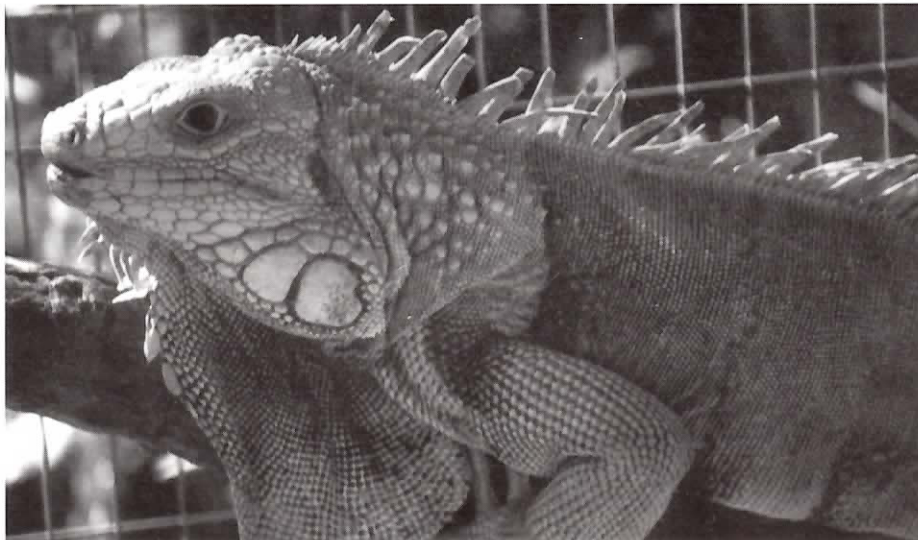
Because of their wide geographic distribution, green iguanas can vary considerably in color, size, and even physical characteristics. At one time, a subspecies, *I. i. rhinolopha*, was recognized based on the enlarged, hornlike scales which are present on the snout of some Mexican and Central American iguanas. This designation was dropped, how-

ever, when it proved to be inconsistent within populations in a given geographic area. North American green iguanas tend to have longer, more pointed heads and generally taller dorsal crest scales than some South American forms. These more northern iguanas may also exhibit more orange coloration, especially in adult males. In fact, there are some populations such as the ones near Playa Manuel Antonio, Costa Rica, where the iguanas have striking red heads!

In contrast, some South American varieties such as those from Surinam and Peru appear to have on average shorter, blunter heads, a stockier build, and rarely exhibit much orange coloration. Instead, many show very attractive shades of blue or turquoise, especially on the head and anterior portions of the body.

Some of the most unusual colors and patterns are seen on the various islands of the West Indies. Colors used to describe some of these animals may include: pink, lavender, gold, yellow, white, and in at least a few specimens, almost solid black. There have even been two or three albinos hatched out on iguana ranches in El Salvador during the last few years.

Nevertheless, the typical iguana is, as might well be expected, some shade of green, often with a darker vertical banding pattern, particularly on the flanks and with wide distinct black bands on the tail.



The green iguana, *Iguana iguana*, has rapidly become one of the most desired pets. However, its specialized requirements are so crucial to its well-being that owners must become well-informed about providing proper care. Photograph: Mark Dubin

Food Value

One of the major reasons that green iguanas have decreased in numbers in the wild, especially near human populations, is that their flesh is highly prized as a food item by many native peoples. In addition, iguana eggs are consumed in large numbers, not just for their food value, but because many consider them an aphrodisiac. This led to thousands of both green and spiny-tailed (genus *Ctenosaura*) iguanas being offered for sale in markets throughout Latin America. These animals were often trussed up, sometimes with their own tendons, and mouths sewn shut with twine. When gravid females were captured, the eggs were often cut out and the adult animal crudely sutured together and then released in the mistaken belief that they would survive and produce more eggs which the iguana hunter could harvest at some future time.

Farming Practices

Recognizing the economic importance of green iguanas to the native people and aware of the rapid decline in numbers of iguanas in some areas, several groups, including the Smithsonian Institution and San Diego Zoo's Center for Reproduction of Endangered Species, began captive breeding programs in Central America more than 10 years ago. Initially, some of these early iguana "farms" did little more than capture gravid

females from the wild and house them until they laid their eggs. The eggs were then incubated in semi-natural conditions until hatching. Once out of the eggs, hatchlings are raised on a homogenous diet to either a size suitable for harvesting for their meat or to where they are large enough to be released into the wild and avoid most of those predators that prey upon young vul-

nerable hatchlings and juveniles.

Since those early days, dozens of iguana farms have sprung up in Central and South America. Although difficult to verify, many of these farms now claim to be self sufficient—that they are raising their own hatchlings to breeding size and no longer take adult iguanas from the wild. These farms have recently realized the huge potential market for these field-raised baby iguanas in the U.S. pet industry and are currently exporting them by the thousands.

Because of political pressures from conservation organizations and in an effort to conserve their own natural resources, many countries such as Mexico, Honduras, and Guyana are currently closed to the export of green iguanas. These closures may change at any time, particularly when new governments come to power. Most of the iguanas now being sold in U.S. pet stores are from Colombia, El Salvador, and Guatemala. Young iguanas from any of these three countries generally arrive in good condition, although importers report “good” and “bad” shipments depending, apparently, upon conditions en route. Domestic U.S. bred iguanas are perhaps the most highly prized of all and generally demand the highest prices. Unfortunately, green iguanas only breed sporadically in captivity and are seldom offered for sale.

Housing for Captives

Large, tame, long-term captive iguanas are the first choice of many people wanting to acquire a new animal. This is often impractical because of the very large enclosures required for these specimens and the fact that they may sell for hundreds of dollars. I have even seen a few very large spectacular individuals command as much as \$1,000 each!

The great majority of iguana owners begin with juvenile animals purchased from local pet stores. It is always recommended that you have a proper cage setup ready before bringing any animal home. Glass terrariums with screen tops are readily available, economically priced, and are produced in a variety of sizes and shapes. You may start a small iguana in a model 20 high terrarium (24" x 12" x 17"), but keep in mind that green iguanas grow rapidly and may eventually

reach four to six feet in overall length. For this reason, the initial purchase of a model 40 (36" x 15" x 17") or larger terrarium may prove more practical and less expensive in the long run.

There are a variety of substrate materials available for use on the cage bottom. The best of these are ones that can be easily discarded when soiled such as butcher paper, unprinted newspaper or industrial paper towels. In areas such as living rooms or offices where a nicer looking material is desired, indoor-outdoor carpet works well. It is often available in a variety of colors including green, blue and brown. Always have two pieces of carpet cut for each enclosure so you will have a clean one to put into the cage while the other is being washed and dried.

A mild disinfectant such as diluted Novasan or one cup of bleach in a gallon of water may be used to sterilize the inside of these glass enclosures during cleaning. Be sure to rinse them out again thoroughly with fresh water after disinfecting.

Heating and Lighting

There are many products available to heat enclosures of this type. For smaller cages, one of the best methods is to use two 25-watt red incandescent light bulbs in a standard aquarium fixture and hood. For larger enclosures, you may use a 60 to 150-watt red bulb or floodlight in a round reflective shop light or clip-on type fixture and hood. Lights should always be outside of the cage so that the animal may not come in contact with the hot surface of the bulb which can cause severe thermal burns. Basking branches large enough to comfortably support the iguana's body can be set up under the light so that a hot basking spot reaching about 100 °F is available. Air temperature within the cage should provide a gradient from about 85 °F on the cooler side of the enclosure to about 95 °F at the warmer end during the daytime. It is important that iguanas reach these higher temperatures for they are hindgut fermenters and cannot properly digest their food at lower temperatures. At night, the ambient cage temperature can be lowered to 75 °F.

Never “guess” at the proper heat in a cage; use at least two wide range thermometers, one at each temperature extreme within the cage to

ensure acceptable heat levels. The wattage, number of bulbs, or distance of light from the terrarium can be varied to adjust for different heat requirements from season to season. Slightly more sophisticated setups can include the use of thermostats to automatically turn lights off and on and to maintain steady temperatures.

The other lighting consideration is that of bright white light during the daytime for both the psychological well-being of the iguana as well as your own enjoyment in observing the animal in its enclosure. A "wide spectrum" fluorescent bulb is probably the best choice here, but it should be pointed out that there is really no substitute for natural sunlight. One hour of sunlight per day is more beneficial than several hours per day of these so-called wide spectrum lights which in several studies have been shown to provide little or none of the beneficial UVB rays needed for the synthesis of vitamin D₃ and the utilization of calcium in the animal's system. For animals that cannot have access to natural sunlight, the addition of a black light bulb that provides UV light in the 290-320 nanometer wave lengths may be helpful.

LIGHT BULB ALERT

Recently, Energy Savers Unlimited, Inc., has introduced an incandescent (non-fluorescent) light bulb that is marketed as a "full spectrum daylight heat lamp." Consumers may conclude that "full spectrum" implies that the bulb supplies sufficient UV light to maintain iguanas in good health. However, IIS has learned from several sources that the bulbs provide such small quantities of UV light that, when used as the only UV light source, iguanas may succumb to metabolic bone disease (MBD). For example, when the bulbs were used as the only light source for 10 juvenile green iguanas at Southern College, all animals began to show symptoms of MBD—some severe—within 3-4 months. By replacing the lights with much more effective full-spectrum fluorescent bulbs, the symptoms completely reversed during the next 6-8 weeks (except for one lizard that died and two others that still exhibit very minor jaw disfigurement). Although the bulb works fine as a heat lamp, IIS urges iguana enthusiasts to rely only on full-spectrum fluorescent bulbs as a UV source when natural sunlight cannot be supplied.

Never place a glass terrarium in direct sun to obtain natural sunlight for your iguana: the glass filters out the beneficial UV rays and the temperature within such an enclosure can quickly reach lethal levels. Instead, construct a wire mesh cage half covered by a tarp, plywood sheeting, or other material to provide a shady place for the iguana to move into if it becomes too warm. Another method is to provide an indoor platform in front of an open window with its screen securely in place. Again, allow an area on the platform where the iguana can move out of the sunlight.

Select a Healthy Pet

Once you are sure you have your cage properly set up, you want to choose an iguana that appears to be in excellent health. Look for an animal that seems alert, has good weight, and is relatively calm. Avoid individuals that are thin, have signs of external parasites or have loose runny stools. Many pet stores now offer free veterinarian checkups for new iguana owners and it is a good idea to take advantage of these as an experienced reptile veterinarian can be an excellent source of medical and husbandry information. You may want to take a stool sample to the exam and, for a small charge, a fecal analysis can be done to check for endoparasites.

Diet and Nutrition

After placing the iguana into its new home, allow several weeks for it to acclimate completely and begin feeding normally before attempting to handle and tame the animal. Newly acquired iguanas may initially be reluctant to feed and can sometimes be enticed with brightly colored fruits, edible flowers, and small amounts of monkey chow or dry low fat premium dog food soaked in water first to soften. Iguanas that are not feeding normally may become dehydrated, for they obtain most of the water they need from their food. To hydrate animals soak them for about 15-20 minutes every other day in one or two inches of warm water in a tall container such as a five-gallon bucket. It is also advisable to keep weekly (or more often) weight records to determine if the iguana is gaining or at least maintaining its weight. An animal that continues to lose weight



Adult male green iguana, *Iguana iguana*, from Costa Rica, Central America. Photograph: R. Wayne Van Devender

may need to be force fed and checked for parasites. Consult a veterinarian for help in these procedures.

Once your iguana has begun to feed normally, it is important to wean it onto a balanced healthy diet. Probably no aspect of iguana care has changed as much in the last few years as diet. Original information on diet was primarily provided by iguana ranchers whose main objective, it must be remembered, was to raise iguanas as quickly and economically as possible to a size suitable for human consumption! Some of the diets recommended as much as 50 percent supplemental animal protein in the form of dog food or monkey or primate chow biscuits. We now know that these high animal protein diets provided an accelerated growth rate, but also caused many health problems: visceral gout, cystic calculi, renal failure, and infertility.

The bulk of any good iguana diet should be green leafy vegetables with a positive calcium-to-phosphorus ratio. These include collard greens, chard, beet greens, parsley, mustard greens, kale, turnip greens, dandelion greens, alfalfa, bok choy, and so forth. Members of the cabbage family (cabbage, kale, brussel sprouts, bok choy, broccoli,

and cauliflower) are fine in small amounts, but in large quantities can cause thyroid problems and goiters in reptiles. Spinach and beets contain oxalates which act as calcium binders and should be fed only sparingly. Other vegetables which can be chopped or grated and added to the basic mix of at least three of the above greens are squash, carrots, string beans, peas, corn, sweet potatoes, and sprouts; fresh, frozen or canned (not dried) beans (garbanzo, soy, limas, kidneys, etc.); and prickly pear cactus pads. These vegetables should constitute about 80 percent of the diet.

Fruits and flowers can make up another 15 percent of the diet. Good choices are figs, melons, grapes, cactus apples, pears, tomatoes, apples, peaches, plums, guavas, papayas, mangos, and most berries. Bananas have a very low calcium-to-phosphorus ratio and should be fed in only small quantities. Edible flowers are relished by iguanas and can include hibiscus, dandelions, geraniums, nasturtiums, carnations, roses and squash blossoms.

The remaining one to five percent of the diet can be sources of supplemental protein—commercial foods such as dry low-fat premium dog foods (Science Diet Canine Maintenance Light,

Iams Less Active, Pro Plan Dog Lite, etc.), fortified crickets and meal worms. This figure is for juvenile, gravid or post-gravid iguanas and the percentage of protein can be dropped to as low as one percent for most adult iguanas. Although many experts feel an iguana needs 20 percent protein in its diet, many of the vegetables offered contain plant protein and it is questionable whether iguanas actually need any animal protein to do well. Make sure all food is chopped to appropriate bite size for each iguana. A food processor works well in preparing a fine mix for small iguanas.



Adult male green iguana, *Iguana iguana*, from Columbia, South America.
Photograph: Ken Glander

Several new commercial iguana foods which claim to be nutritionally complete have appeared in the last few years and may be a convenient way to feed iguanas, if the manufacturers' claims can be substantiated. Hatchling to one-year-old green iguanas should probably be fed on a daily basis, while older animals may be offered food about three times per week.

A controversial issue in iguana diets is the use of vitamin and mineral supplements. While over-supplementation has sometimes been shown to cause problems in adult iguanas, most researchers feel that it is a useful and necessary part of an appropriate diet for juveniles and ovulating females. A mix of one part powdered bird or reptile vitamins to one part calcium supplement may

be dusted lightly over food two or three times per week for iguanas in the high-need group and once a week or less for other adults. It should be pointed out, however, that some of the top breeders of common and rare iguanas in the U.S. use no supplementation whatsoever, relying solely on a very diverse, well-balanced herbivorous diet.

Determining Sex

Iguanas, especially immature individuals, are somewhat difficult to sex externally. Adult males in general are larger, have bigger heads and jowls, taller dorsal crest scales, larger femoral pores, and

develop enlargements on the ventral base of the tail which indicates the presence of hemipenes, their reproductive organs. Before the onset of these secondary sexual characteristics, other methods may be used to sex iguanas: manually everting the hemipenes by exerting pressure on the tail base, and the use of sexing probes; males probe about two to two and one-half times the depth of a similar

sized female. Both of these procedures should only be attempted by persons experienced in their operation. There is even a company in California which sexes birds by the examination of a drop or two of blood and has expressed a willingness to develop a similar technique for iguanas.

Reproduction

Green iguanas grow rapidly, reaching sexual maturity in their second or third year. The smallest breeding females measured in the wild in Colombia and Nicaragua are about 200-250 mm snout-to-vent length and are believed to be 21 to 33 months old.

As iguanas mature, they become territorial and can be quite aggressive toward one another.

This natural fact is often ignored in captive collections wherein numerous individuals are commonly housed together. Conditions can change rapidly in these "compatible" groups and an iguana may one day be found with severe wounds inflicted by a cage mate, particularly during the breeding season.


Iguanas are, therefore, best housed individually or, if breeding is the ultimate goal, one male to one or two females in a spacious, well-designed enclosure with visual barriers and individual basking sites.

The timing of egg laying varies considerably, apparently depending upon latitude. Oviposition usually takes place in March and April in Belize, in April and May in Florida, and in June and July in southern California. It is believed that successful copulation occurs approximately 40 to 50 days before the eggs are actually laid and males may become very aggressive at this time, both toward other iguanas and their human owners. Several weeks before females lay, they often reduce their food intake. It is important at this time to ensure that they have a proper nest site in which to construct a nest burrow and deposit their eggs, sometimes numbering from 30 to 60 or more in a clutch. Outdoors, a pit or open box filled with moist sand or potting soil works well. Indoors, a closed plastic container with a hole cut for entry and filled with a suitable nesting material works equally well.

Once laid, the eggs are best removed and incubated artificially in covered plastic containers half-filled with moistened vermiculite. This incubation medium is formulated by adding one to one and one-half parts distilled or purified water, by weight, to the dry material. Eggs are kept in the same position as they were laid, half buried in the vermiculite, with the other half exposed to the air, and are placed into an incubator set at 86 °F (30 °C). The lid to the container is opened for one minute every three days to allow for some air exchange, and any infertile, molding eggs are removed.

If all goes well, the hatchlings emerge after about 70 to 90 days. As the hatchlings begin to exit the eggs, it is best to replace the lid of the egg container with a vented cover and to leave the

babies in the container for up to three days to allow the "umbilical" scar to heal. Hatchlings begin to feed within about two weeks and are offered a very fine mix of the same diet fed to adults along with a few small insect food items. Some studies indicate that hatchlings may benefit from being fed small quantities of fecal matter from a healthy adult iguana to establish the initial microflora needed for effective hindgut fermentation.

Considering the huge number of green iguanas in captivity, very few have actually bred and successfully produced offspring. As we learn more about the nutritional, physical, and psychological requirements of these fascinating lizards, this aspect of their biology will be something that more and more green iguana enthusiasts will be able to experience and enjoy. 

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The manuscript for this article was revised and reprinted with permission from a similar article that appeared in Reptiles magazine (Volume 1, Number 1, 1993). The author and editors thank Richard Montanucci for his critical comments.

WHAT DO WILD GREEN IGUANAS EAT?

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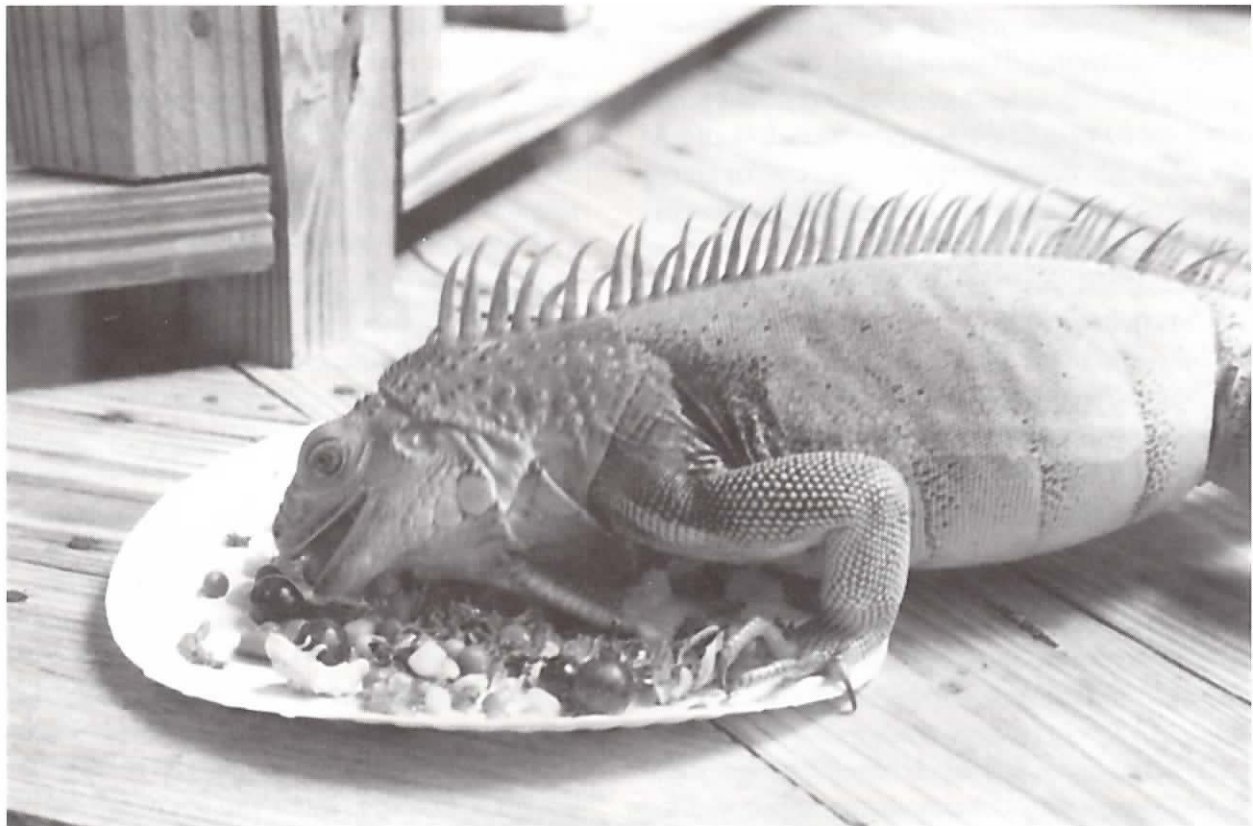
In an age of convenience, an abundance of artificial diets for iguanas (and many other reptiles) are readily available from a number of suppliers. These diets apparently are popular among pet owners—but are they truly popular, or even healthy, for the pets? Although billed by nearly all manufacturers as “a nutritionally complete diet,” evidence supporting the claims for these diets may or may not hold up under close scrutiny.

How does one determine the proper nutritional requirements of an iguana? There are many factors here to consider, including much more than just the relative percentages of protein, carbohydrates, and fats. A plethora of vitamins and minerals must be supplied in proper quantities, and intake of natural fiber is essential to maintain

digestive functions. Oversupplementation of protein and vitamins can result in serious health problems for an iguana. Moreover, nutritional requirements undoubtedly vary with age and reproductive condition of the lizard.

So, who has truly unraveled the mystery of proper iguana nutrition? I seriously doubt that anyone has. Nevertheless, we can rest assured that the typical diet of a wild iguana must be nutritionally complete.

Because so little is known about the natural diet of green iguanas, what is known can be communicated with relative ease. I simply wish to summarize the findings from several field studies conducted by highly qualified scientists. Although unpublished observations by naturalists most cer-



On her own accord, this free-ranging green iguana visits Finca Cyclura (“Iguana Farm”) on Big Pine Key, Florida, to feast on a mixture of raw vegetables and chopped fruit. *Photograph: Robert W. Ehrig*

tainly hold additional details, the following three studies pretty much summarize what we know of the green iguana's diet in the wild.


Wayne Van Devender (1982), at his study site in Costa Rica, provided the first detailed analysis of the diet of green iguanas (15 juveniles and 5 adults). Whereas the spiny-tailed iguanas also present consumed considerable numbers of insects (juvenile iguanas in particular), the green iguanas fed exclusively on plants. (The widely held misconception that juvenile green iguanas feed largely on insects stemmed from a single observation published by a scientist in the 1960's.) Both juvenile and adult green iguanas fed mostly on leaves, but they also consumed fruit and flowers. The species of plants eaten were not reported.

Stanley Rand and colleagues (1990) evaluated the diet of green iguanas (31 adults) in Panama. Once again, leaves were most prevalent but smaller numbers of flowers and fruit were consumed. Animals, including insects, were absent from the diet. Ninety-five species of plants were surveyed at the study site. Whereas 26 species of plants were identified in their diet (mostly common to abundant species), only 1-4 plant species were eaten in a single meal; hence, if the diet is varied to meet nutritional requirements, it may be done so over a period longer than a few hours of foraging. Further, not all leaves were equally desirable: the iguanas expended energy to feed on some leaves rather than others closer at hand.

Wouter van Marken Lichtenbelt (1993), more recently, reported on the diet of green iguanas on the Caribbean island of Curacao. Of 54 plant species present, 24 were consumed by iguanas. Diet composition varied according to seasonal availability. The iguanas consumed mostly flowers during the dry period (February to May) to increase water intake—which still was too low for long-term maintenance. Early rains at the end of May stimulated the growth of young leaves, which soon began to dominate their diet (up to 78% by July). In August and September they ate a more mixed diet of leaves and flowers which gave way to mature leaves during the wet season (October to January). In wet years, fruit became important during the dry season, while in dry

years mature leaves dominated their diet to a greater extent. Factors other than seasonal availability of plants and water contributed to their selective feeding preferences, including energy content and digestibility of food items, digestive tract capacity, costs of searching for an item, and protein requirements (especially for reproductive females). Although potentially important, secondary plant compounds (some exhibiting toxicity) were not considered in this study.

What can be learned from these studies? Clearly, green iguanas in nature are essentially strict vegetarians that feed on leaves, fruits and flowers having considerable bulk and roughage. The processing of every meal they consume occurs after it enters its mouth—not before, as in commercially supplied diets. They naturally consume a wide diversity of plant species (at least over the long term), thereby ensuring adequate nutrition. And supplemental animal protein does not appear to be a natural component of their diet.

I simply urge the reader to carefully consider offering their pets a diversity of natural food items—real plant parts—such as those recommended in the article by David Blair (this issue). Although preparation of the food by hand may be more time-consuming, it certainly is more economical and very possibly healthier for iguanas than the prepackaged diet approach. 

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NEED A HOME FOR AN UNWANTED IGUANA?

Update on Iguana Rescue of Central Florida

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As of July 1993, Iguana Rescue of Central Florida is pleased to report that approximately 130 iguanas have been rescued since the organization was formed in 1991. The survival rate of rescued iguanas—despite many arriving in poor condition—holds steady at about 90%. Janet Truse, who truly is the heart of the group, fields in excess of 300 calls a year from people seeking information. Although a good number of the calls are local, many are received from throughout the U.S. and some have even come from England. Iguana Rescue offers approximately 15 presentations annually for local groups interested in all aspects of iguana biology, and during these roughly 4,000 iguana care sheets and IIS applications have been distributed. As a result, dozens of new members have joined IIS—including four individuals that became acquainted with the Society during a garage sale at Janet's home.

When inquiries arrive, our first priority is always to share information and help people KEEP their iguanas. But, when that option is no longer realistic, we're glad to offer the animal to an informed and caring individual. The Rescue group continues to require IIS membership for anyone interested in adopting a rescued iguana, and some have joined IIS motivated largely by the hope of obtaining such an animal. Most of the rescued iguanas are small, but many of them are adults in need of a caring home. Seventy percent or more of the lizards happen to be males. The iguanas arrive from as far away as New York: last year the New York Herpetological Society shipped six homeless iguanas, and we expect a shipment of eight more to arrive in the near future.

Iguana Rescue has operated and will continue to do so by means of unpaid volunteers. Nevertheless, there are many expenses associated with our work. Recently, we have taken steps to incorporate, which should make it easier to solicit

it much needed funding for our efforts. We would like to encourage IIS members in other parts of the U.S. (and in other countries) to form rescue groups of their own. For those interested, our assistance and paperwork are readily available upon request.

Please make every effort to get out amongst the public and express your interest and concern for these majestic creatures that fascinate so many people. Let's show the children how to cherish these animals, and how to treat them properly. Hopefully, the next generation and the iguanas they live with will benefit from what we communicate today, and from what we can add to our knowledge base in the future. We are confident that our efforts—and those of many others—will make these goals attainable.

Many thanks are due to Janet and Dennis Truse, Deborah Neufeld, Sandra Hart, Lori Hurd, Marlene Lash, Johnnie and Charlene Bruce, Mike Worwetz, Carl and Janet Fuhri, Joe Wasilewski, Robert and Marcie Ehrig, Eric Beers, and so many others for their rescue efforts and assistance. The iguanas deserve the best that we can offer them.

Telephone numbers for Iguana Rescue of Central Florida:

- Janet and Dennis Truse:
(407) 957-5633
- Deborah Neufeld and Sandra Hart:
(407) 847-0725

Iguana Times is pleased to feature the activities of any organization that contributes to the well-being of iguanas.



RESEARCH UPDATE

JOHN G. SHEDD AQUARIUM STUDIES POSSIBLE DECLINE OF EXUMA ROCK IGUANAS IN BAHAMAS

CHUCK KNAPP

JOHN G. SHEDD AQUARIUM
1200 SOUTH LAKESHORE DRIVE
CHICAGO, ILLINOIS 60605 USA

Habitat loss, feral animals, and hunting pressure have led to declines in most rock iguana species (genus *Cyclura*). These pressures have not only reduced most iguana populations but have devastated some taxa, bringing them to the verge of extinction. The staff at Shedd Aquarium have recognized the need for *Cyclura* conservation, and facilitates its preservation efforts through education, captive breeding and active field research.

Shedd Aquarium is currently working with two species of rock iguana in captivity: *Cyclura nubila caymanensis x nubila*, from the islands of Little Cayman and Cayman Brac, and *C. n. lewisi*, from Grand Cayman Island. The colony of *C. n. caymanensis x nubila* is housed on display to promote education through public interpretation and lectures. The Grand Cayman iguana, *C. n. lewisi*, has received much attention at the Aquarium due to its severely endangered status, and is awaiting reproductive age for captive breeding (Knapp, 1993).

The Aquarium is also conducting field surveys to help assess the status of certain wild iguana populations. A brief survey of the Exuma rock iguana, *Cyclura cyclura figginsi*, was conducted from 4 to 6 June 1994 on Guana Cay in the Exuma Island

chain of the Bahamas (Knapp, 1995). The cay is located in the Jewfish Chain that juts southwestward from Great Exuma. Guana Cay was selected as the study site because previous studies on the cay in the 1970's by Carey (1976), Windrow (1977) and Coenen (1995) supplied an abundance of baseline data in which to evaluate two decades later the present population.

The 1994 survey yielded 32 iguana captures for which weights, measurements and sex ratio data were collected. Of the thirty-two captured iguanas, 53% were males (N=17) and 47% were females (N=15). Windrow (1977) delineates juveniles as less than 22.5 cm snout-vent length (SVL). No iguanas <25 cm SVL were captured or observed during the study. The mean SVL of the captured iguanas was 29.9 cm (range = 25.5 to 36.5 cm).



Cyclura nubila caymanensis x nubila at the Shedd Aquarium. Photograph: Edward G. Lines

The mean weight of the captured iguanas was 1.18 kg (range = 0.7 to 1.8 kg). Certain female iguanas weighed significantly less than others with similar snout-vent lengths. Since these females were captured in early June and nesting burrows appeared to be used, a possible explanation could be that females with lower weights in relation to body size had deposited their clutch of eggs prior to capture.

The island vegetation was inventoried and food preference data were collected through direct observation of feeding and scat analysis. Preferred food items during the study were leaves and flowers of black torch (*Erithalis fruticosa*) and leaves of rice wood (*Strumpfia maritima*).

The census revealed, through transect surveys, that the iguana population appeared to be slightly lower (64 iguanas) than previous studies. Carey (1976) and Windrow (1977) estimated the Guana Cay population to be between 80 to 90 individuals. The fact that we observed no juveniles on the cay raises concern about stability of the population.

Representatives from Shedd Aquarium are returning to Guana Cay in October 1995 to search more carefully for juveniles as well as to conduct secondary iguana and vegetation surveys. Gaulin Cay, located north of Guana Cay, will also be surveyed. Weights from captured female iguanas may help us determine if the inconsistent female weights from the 1994 study were the result of ovoposition in late May or early June. Scat analysis and vegetation inventories will again be utilized to determine seasonal food availability and preference.

Gaulin Cay will be more challenging to survey because, unlike the Guana Cay population that is desensitized to the presence of humans, Gaulin Cay iguanas are extremely wary and nervous. Observations by myself, Ron Harrod and Tina Henize during an International Iguana Society sponsored survey in May 1993 indicated that the animals would not tolerate the presence of humans within four meters. The May 1993 observations at Gaulin Cay revealed what appeared to be a stable population, with all age classes of iguanas being represented.

These surveys will be supplemented by new



Cyclura cyclura figginsi perched atop a seven-year apple on Guana Cay, Exumas, Bahamas. Photograph: Chuck Knapp

research techniques, including DNA analyses based on blood samples taken from the field, and the use of a laser guided non-contact thermometer. The DNA analyses will be performed by Dr. Scott Davis at Texas A&M University. Dr. Davis' work will help to complete a *Cyclura* genetic data set which will determine how closely the different taxa are related. The DNA work will also help to elucidate the extent to which the isolated Guana and Gaulin Cay populations have diverged genetically.

The laser guided non-contact thermometer will be used to record iguana skin temperatures during different activities throughout the day. There is a slight chance to observe hatchling iguanas as they emerge from their nests; therefore, temperature conditions at nesting sites will also be monitored.

This research trip is open to the public, but limited to nine active participants. For an itinerary and registration form, contact Amy Ihde at 312-939-2426, ext. 3311. For more detailed information about the iguana research, contact the author at ext. 3401.





An aerial view of Guana Cay. Note the small boat and researchers on the beach. *Photograph: Sandra Buckner*



Rock iguana habitat at the Shedd Aquarium. *Photograph: Edward G. Lines, Jr.*

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John G. Shedd Aquarium Research Expedition—October 22-29, 1995, to study endangered *Cyclura cyclura figginsii* in the Exuma Islands, Bahamas, aboard the Aquarium's research vessel, the R/V Coral Reef II. Opportunities for snorkeling, swimming, photography, exploring. Cost: \$1,425, plus airfare. *Leader:* Chuck Knapp. *For more information:* Contact Amy Ihde at (312) 939-2426, ext. 3311.

REPTILE-ASSOCIATED SALMONELLOSIS: SELECTED CASES

CENTERS FOR DISEASE CONTROL
ATLANTA, GA 30333, USA

During 1994-1995, health departments in 13 states reported to CDC persons infected with unusual *Salmonella* serotypes in which the patients had direct or indirect contact with reptiles (i.e., lizards, snakes, or turtles). In many of those cases, the same serotype of *Salmonella* was isolated from patients and from reptiles with which they had had contact or a common contact. For some cases, infection resulted in invasive illness, such as sepsis and meningitis. This report summarizes clinical and epidemiologic information for six of these cases.

Case Descriptions

Connecticut. During January 1995, a 40-year-old man was hospitalized because of an acute illness characterized by constipation, lower back pain, chills, and fever. He reported having taken ranitidine and an antacid for symptoms of heartburn before onset of mild diarrhea 3 days before hospitalization. A blood culture yielded *Salmonella* serotype Wassenaar. A magnetic resonance image scan of the right sacrum suggested osteomyelitis. Ciprofloxacin therapy was initiated for presumed *Salmonella* osteomyelitis, and he was discharged after 14 days. All household contacts were asymptomatic. The family had purchased two iguanas (*Iguana*) in October 1994; although the patient denied directly handling the iguanas, he reported having recently cleaned their aquarium. Stool samples obtained from both iguanas yielded *Salmonella* Wassenaar.

New Jersey. During September 1994, a 5-month-old girl was hospitalized because of an acute illness including vomiting, lethargy, and fever; on admission, she had a bulging fontanelle and stiff neck. Blood cultures and cerebrospinal fluid yielded *Salmonella* serotype Rubislaw. She was treated with intravenous ceftazidime for *Salmonella* sepsis and meningitis and discharged

from the hospital after 10 days. Other members of the family were asymptomatic. The infant routinely was fed infant formula. Although the family did not own a reptile, the infant frequently stayed at a babysitter's house where an iguana was kept. Culture of a stool sample from the iguana yielded *Salmonella* Rubislaw. The infant was reported to have not touched the iguana; however, the iguana frequently was handled by the babysitter and other members of the babysitter's family. All members of the babysitter's family were asymptomatic, but stool cultures from two members, including a child who had frequently played with and fed the infant, yielded *Salmonella* Rubislaw.

New York. In December 1994, a 45-year-old man infected with human immunodeficiency virus was hospitalized because of weakness, nausea, vomiting, and diarrhea. His CD4+ T-lymphocyte count was <50 cells/uL. Cultures from blood and sputum samples yielded *Salmonella* serotype Illa 41:Z4Z23:- (*S. subspecies Arizonae*). He owned corn snakes and, until shortly before onset of illness, had worked at a pet store where he handled reptiles frequently. *Salmonella* sepsis was diagnosed, and he was treated with oral ciprofloxacin.

North Carolina. During December 1994, a 2-day-old boy born 8 weeks prematurely developed respiratory difficulties, had pneumothorax diagnosed, and was transferred to a referral hospital. Blood obtained at birth for culture had been negative, but a culture of blood obtained 9 days later because of an elevated white blood cell count yielded *Salmonella* serotype Kintambo. He was treated with intravenous ampicillin for *Salmonella* sepsis and was discharged from the hospital after 30 days. Eleven days after the positive culture was collected, *Salmonella* Kintambo was cultured from a blood sample obtained from a

12-day-old acutely ill boy who was born at 28 weeks' gestation and had shared a room at the referral hospital with the first infant. The second infant was treated with intravenous cefotaxime for *Salmonella* sepsis and was discharged after 44 days. Both infants had been in the hospital continuously from birth until onset of illness. The mother of the first infant reported having had a diarrheal illness 4 days before the birth of the infant; she frequently handled a savanna monitor lizard (*Varanus exanthematicus*) that the family had purchased in September 1994 and kept in a cage in the kitchen. Culture of a stool sample from the lizard yielded *Salmonella* Kintambo. The second family did not own a reptile.

Ohio. During January 1994, a 6-week-old boy was hospitalized because of diarrhea, stiff neck, and fever; culture of samples of blood and cerebrospinal fluid yielded *Salmonella* serotype Stanley. The infant was treated with intravenous cefotaxime for *Salmonella* sepsis and meningitis and discharged from the hospital after 56 days. He had been fed only formula and had not attended a child-care facility; household contacts were asymptomatic. The family had purchased a 4-inch water turtle in April 1993. A culture of stool from the turtle yielded *Salmonella* Stanley. Although the infant had not had contact with the turtle, other family members had had direct contact, and the turtle's food and water bowls were washed in the kitchen sink.

Pennsylvania. During October 1994, a 21-day-old girl was hospitalized because of an illness including vomiting, bloody diarrhea, and fever. She received empirical treatment with intravenous ampicillin. A culture of stool yielded *Salmonella* serotype Poona; she was discharged from the hospital after 11 days. Other members of the family were asymptomatic. The infant had been fed infant formula and had not attended a child-care center. The family owned an iguana, and culture of a stool sample from the iguana yielded *Salmonella* Poona. Although the infant did not have contact with the iguana, the iguana was handled frequently by her mother and other members of the family.

Additional investigations. In addition to the six states in this report, seven other states (Cal-

ifornia, Colorado, Florida, Illinois, Minnesota, Oregon, and Utah) have reported recent isolation of the same *Salmonella* serotype from samples obtained from patients and reptiles with which they had been in contact or associated. Several of these states issued press releases about the risk for acquiring salmonellosis from reptiles. In addition, some states have issued health alerts to pet stores to warn owners and prospective owners about the risks for salmonellosis associated with contact with reptiles and to provide instructions about proper handling of reptiles; store owners have been asked to post the alert and provide copies to all persons purchasing a reptile.

Discussion

For most of the cases described in this report, the identification of rare *Salmonella* serotypes in persons who had no other apparent exposures was linked to direct or indirect contact with a pet reptile from which the same serotype was isolated. In addition, these cases are consistent with previous reports indicating that direct contact with a reptile is not necessary for transmission of *Salmonella* (CDC, 1992a,b). This report also illustrates the severe complications of *Salmonella* infection that can occur in young children, immunocompromised persons, and infants during the peripartum period.

Reptiles are popular as pets in the United States: an estimated 7.3 million pet reptiles are owned by approximately 3% of households (G. Mitchell, Pet Industry Joint Advisory Council, personal communication, 1995). Because the most popular reptile species will not breed if closely confined, most reptiles are captured in the wild and imported. The number of reptiles imported into the United States has increased dramatically since 1986 and primarily reflects importation of iguanas (27,806 in 1986 to 798,405 in 1993) (M. Albert, Fish and Wildlife Service, U.S. Department of the Interior, personal communication, June 1994).

A high proportion of reptiles are asymptomatic carriers of *Salmonella*. Fecal carriage rates can be more than 90% (Chiodini and Sundberg, 1981); attempts to eliminate *Salmonella* carriage in reptiles with antibiotics have been unsuccessful.

ful and have led to increased antibiotic resistance (CDC, 1992a; Shane et al., 1990). A wide variety of *Salmonella* serotypes has been isolated from reptiles, including many that rarely are isolated from other animals (reptile-associated serotypes). Reptiles can become infected through transovarial transmission or direct contact with other infected reptiles or contaminated reptile feces. High rates of fecal carriage of *Salmonella* can be related to the eating of feces by hatchlings—a typical behavior for iguanas and other lizards—which can establish normal intestinal flora for hindgut fermentation (Troyer, 1982).

During the early 1970s, small pet turtles were an important source of *Salmonella* infection in the United States; an estimated 4% of families owned turtles, and 14% of salmonellosis cases were attributed to exposure to turtles (Cohen et al., 1980). In 1975, the Food and Drug Administration prohibited the distribution and sale of turtles with a carapace <4 inches; many states prohibited the sale of such turtles. These measures resulted in the prevention of an estimated 100,000 cases of salmonellosis annually (Cohen et al., 1980). However, since 1986, the popularity of iguanas and other reptiles that can transmit infection to humans has been paralleled by an increased incidence of *Salmonella* infections caused by reptile-associated serotypes (Cieslak et al., 1994).

Because young children are at increased risk for reptile-associated salmonellosis and severe complications (e.g., septicemia and meningitis)(Cieslak et al., 1994; Ackman et al., 1994; Dalton et al., 1995), reducing exposure of infants or children aged <5 years to reptiles is particularly important. The risks for transmission of *Salmonella* from reptiles to humans can be reduced by avoiding direct and indirect contact with reptiles (see box).



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CENTERS FOR DISEASE CONTROL

Recommendations for Preventing Transmission of *Salmonella* From Reptiles to Humans

- Persons at increased risk for infection or serious complications of salmonellosis (e.g., pregnant women, children aged <5 years, and immunocompromised persons such as persons with AIDS) should avoid contact with reptiles.
- Reptiles should not be kept in child-care centers and may not be appropriate pets in households in which persons at increased risk for infection reside.
- Veterinarians and pet store owners should provide information to potential purchasers and owners of reptiles about the increased risk of acquiring salmonellosis from reptiles.
- Veterinarians and operators of pet stores should advise reptile owners always to wash their hands after handling reptiles and reptile cages.
- To prevent contamination of food-preparation areas (e.g., kitchens) and other selected sites, reptiles should be kept out of these areas—in particular, kitchen sinks should not be used to bathe reptiles or to wash reptile dishes, cages, or aquariums.

This article is reprinted from Morbidity and Mortality Weekly Report (Vol. 44, No. 17, Pp. 347-350), published by the Centers for Disease Control and Prevention. Dr. Edward Ramsey, D.V.M., kindly brought this article to our attention. We'd like to add one more point: that properly maintained captive-born reptiles are much less likely to be carriers of infectious disease, and should always be preferred as pets to wild-caught reptiles.

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

An Orange-Crowned Iguana

As a new member of the International Iguana Society, I am enjoying reading your journal. I am enclosing several photos of iguanas taken just outside of Puerto Vallarta, Mexico, at Los Animos Beach in early January of 1994. I was hoping you could help me with a species/feature identification question regarding the iguana, Pancho, that I am holding in the photo. (Other iguanas were photographed at the same place at the same time, but none had the same unusual feature as Pancho). I would have assumed before my trip to expect to see many green iguanas (*Iguana iguana*), but wasn't sure if Pancho was a different species or just had an unusual and attractive mutation.



This particular iguana had an interesting feature, which may be sort of difficult to make out in the photo, but made him unlike any of the other iguanas I saw at the time in Mexico or have since seen in photos in various iguana books. This iguana had a ruffle like piece of skin (similar to dewlap skin) on top of his head, arranged like a crown that did not close in the back. It was not part of the crest of spines that began at the top of his neck. This ruffly crown-like head piece was mostly orange like the color on his tail and had a purplish band or stripe near the top. In any case, this "crown" on Pancho's head was attractive and unusual (in my limited experience with various iguanas) and it made me curious.

This particular iguana was responsible for fostering my interest in these fascinating creatures, and I am always eager to learn more about them. If you have any ideas about my question, let me know.

Jane M. Steiner
West Palm Beach, Florida

The bizarre "crown" described by you is unlike anything that we have seen or heard of. The lizard was indeed a green iguana, but the crown is clearly an aberration. It may be the result of a genetic mutation, but it could just as well be a developmental anomaly. — The Editors



Re: The Spineless Iguana

I read Julie Ziring's letter about her spineless iguana in the March 1995 issue of *Iguana Times*. When I was doing my undergraduate thesis on iguana feeding behavior, I bought two iguanas with black scabs covering their bodies. I think this was caused by poor living conditions while in the pet shop. After I had them a little while, their skin cleared. One healed perfectly with no scarring, but the other lost almost all his spines when the scabs were shed off. I think this affliction is common in pet shop iguanas, and is nothing to worry about once the iguana receives proper nutrition and living conditions.

Thank you for an excellent journal!

Catherine Dickert
Gansevoort, New York

Research In Iguana Times

I just wanted to take a moment to tell you how much I have enjoyed reading *Iguana Times*. The latest issue is good and your article on *Cyclura rileyi* is very interesting. The journal is becoming increasingly professional in style and substance. I hope that more researchers will use it to publish their studies in the future. Congratulations on a fine job; keep up the good work.

Richard R. Montanucci, Ph.D.
Clemson University, South Carolina

We too hope that more researchers will consider *Iguana Times* (a.k.a. Journal of the International Iguana Society) as the outlet for their research. Because we want readers to better understand how research can contribute to the conservation of endangered populations and well-being of captive animals, we are now publishing research articles that are fairly general in scope (i.e., understandable), as explained in the editorial policies on the inside back cover. Nevertheless, before readers despair that the journal will become too scientific to understand, rest assured that we will continue publishing "popular" articles of highest quality. Thus, *Iguana Times* has become a unique journal that blends the best of both scientific and popular reading. — The Editors.

Twin Rhinoceros Iguanas

On November 22, 1994, twin Rhinoceros iguanas (*Cyclura cornuta cornuta*) hatched [among] a clutch of 10 eggs. With a SVL of 95 mm and a total length of 270 mm, they were only 60 mm shorter than the normal iguanas hatched from the same clutch.

The twins left the egg in the same direction and they were linked together only with the navel-string on a single yolk sac. After the twins left the egg, I had to cut the navel-string so that they did not get hurt. On the second day I observed the young iguanas drinking water; one week later they took their first food. It is possible the twins will reach the same size as normal iguanas.

Schmidt Jürgen
Oftering, Austria

We are familiar with three instances of twinning in iguanas. In 1988, a hybrid *Cylura nubila lewisi* x *caymanensis* produced a clutch with an egg containing twin hatchlings, in Florida. In 1990 we hatched a clutch of 7 eggs from a Cuban iguana, *Cyclura nubila* (see *Iguana Times*, Vol. 2, No. 1). Eight hatchlings emerged from the seven eggs. Both twins survived and were about 80% of the size of the other hatchlings. They were both oriented in the egg in the same direction and, at one point, both heads were pro-

truding from the egg side by side. Both twins were females; a friend has raised one in central Florida, and the other was raised in the Florida keys. This latter animal is normal but is slightly smaller than other iguanas her age. She has not yet laid eggs, although we have had Cuban iguanas lay eggs that hatched on their 4th year birthday. Lastly, we know of twin green iguanas (1 male and 1 female) born more recently in central Florida. We believe twins may reach the same size as their siblings.

Your successful hatching of twin rhinoceros iguanas is the first we know of. We hope you will raise them and keep us advised of their condition. Good luck! — R. W. Ehrig



Six year-old male, captive-born *Cyclura cornuta*.
Photographs: Deborah Neufeld

WANTED: Back issues of *Iguana Times*: Vol. 1, Nos. 1-6, and Vol. 2, No. 1. Please contact Terry Gentry: 411 Fieldgreen Dr., Jonesboro, GA 30236; telephone (404) 477-1654.

IGUANA SMUGGLING OUT OF CONTROL

IIS has received numerous recent reports of smuggled iguanas entering the U.S. pet trade. Last year, as many as 230-300 endangered rhinoceros iguanas are believed to have been smuggled through one south Florida reptile dealer alone. Many of the smuggled iguanas were thin and emaciated, some even having cactus spines imbedded in their skin. The impact of these and other illegal activities may render many natural iguana populations unrecoverable. Sadly, most of these animals soon die in captivity, victims of stress and improper care—not to mention unrestrained greed. It seems unfathomable that the perpetrators continue to get away with these illegal acts. An article in the December issue will detail some recent smuggling activities, explore ramifications of the exploited iguana populations, and offer suggestions as to how iguana enthusiasts can help put a stop to these shameful misdeeds.

Source: IIS members

NEW IGUANA SPECIES RE-DISCOVERED!

Just a year ago IIS member **Gunther Kohler** published the discovery of a new species of spiny-tailed iguana, *Ctenosaura flavidorsalis*, in Honduras. This year he has described

yet another species, from Campeche, Mexico, which was named *Ctenosaura alfredschmidti* in honor of a well-known herpetologist. The lizard was described on the basis of a single specimen collected in 1962 and observations of eight live iguanas studied at the same locality in October 1994.

Source: Salamandra 31(1):1-14.

IGUANAS EXPLODE ON HOT VOLCANIC ROCKS

We have a third-hand (or thereabout) report of a bizarre happening that recently occurred in the Galapagos Islands. Sometime earlier this year, a volcanic eruption occurred on Fernandina that lasted for several months. Apparently, as the molten lava cooled after flowing to the seas, marine iguanas ran onto the rocks, possibly seeking warmth—obviously in excess of anything within their experience. So quickly did the heat expand the air in their lungs and digestive tracts that the iguanas simply “popped” before they could escape. Iguanas are well known for their tendency to gulp air when disturbed, which may have contributed to the gruesome effect. Evidently some land iguanas died as well. We hope to learn firsthand details in the near future.

Source: Galapagos Travel, San Juan Batista, California

SAN SALVADOR IGUANA REDISCOVERED ON HIGH CAY

In the last issue of *Iguana Times*, Hayes et al. reported that the San Salvador rock iguana, *Cyclura rileyi*, is now restricted to seven small cays (although a few lizards persist on the main island). The iguana was considered extirpated on High Cay and on six additional cays. However, during a June 1995 symposium held at the Bahamian Field Station, IIS member **Sandra Buckner** and several colleagues

discovered fresh iguana tracks on High Cay, the largest of the offshore cays (see photo below). As a consequence of this exciting find, participants at the IIS Conference/Expedition (see inside front cover) in November will devote some time searching for the lizard(s) to collect (among other data) blood samples that should offer more insight on genetic diversity within and between the isolated populations.

Source: Sandra Buckner, Nassau, Bahamas.



THE OFFICIAL INTERNATIONAL IGUANA SOCIETY T-SHIRT

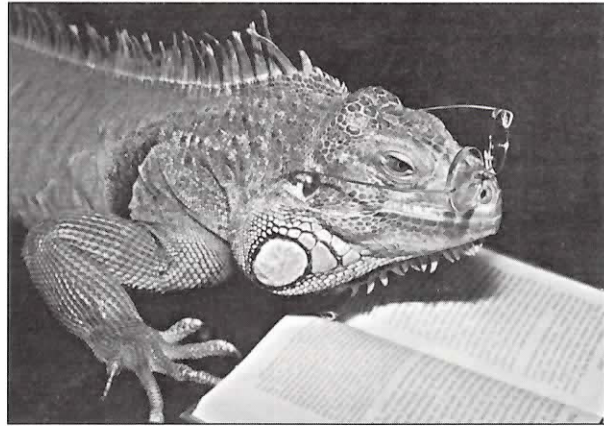


\$12 plus \$2 for postage & handling (\$1 P&H for each additional shirt)

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

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Route 3, Box 328
Big Pine Key, FL 33043

I.I.S. Bookstore



Photograph courtesy of Jayme Gordon

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

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

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

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

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

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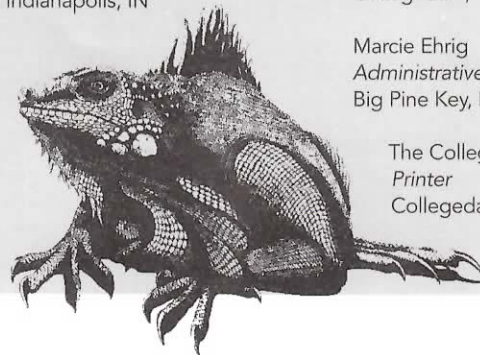
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