

BOOK REVIEW

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This excellent book review is reprinted with permission from Herpetological Review 25(2):85-87 (1994). Although it was critically written for a scientific audience, and legitimately points out a number of shortcomings, most iguana owners nevertheless will find sufficient useful information to make purchase of the book worthwhile.

Iguanas: A Guide to Their Biology and Captive Care, by Fredric L. Frye, B.Sc., D.V.M., M.Sc., CBiol, FIBiol, Fellow, Royal Society of Medicine, and Wendy Townsend. 1993. Krieger Publishing Company, Krieger Drive, Malabar, Florida, 32950, USA. ISBN 0-89464-695-8, 145 pp. US \$28.50.

Of late, iguanas have captured the imagination of the pet buying public. Trade in live iguanas has increased at least tenfold over the last decade and the green iguana (*Iguana iguana*) now ranks behind only the red-eared slider (*Trachemys scripta*) among wild terrestrial vertebrates in international commerce. No wild bird or mammal species is traded in numbers of this magnitude (A. Gaski, pers. comm.). About 90% of the more than 300,000 iguanas marketed each year are destined for the US (Fig.1). What effect this trade has on wild stocks of iguanas is unknown. Perhaps the demand for iguanas would be lessened if survivorship of the captives was prolonged through knowledgeable caretaking. Frye and Townsend have produced a handbook on care of captive iguanas.

Despite the title, this book will not appeal to biologists. This is a book for pet owners. The first twelve pages describe the biology of wild and captive iguanas. Fifty pages of husbandry suggestions follow, augmented by thirty pages of descriptions of diseases that warrant the attention of a veterinarian. The concluding chapter consists of endearing anecdotes about the junior author's personal menagerie.

There are several valuable features of this handbook. The menu lists will be useful for all iguana owners. The lesson on how to grow sprouts in jars could be new information for some

readers. Townsend's anecdotes about the difficulties she has had maintaining strongly territorial animals in her home drives the message home in a singularly effective manner. The layout and binding are pleasant.

Although the book is liberally endowed with Townsend's beautiful if occasionally fanciful drawings of a diversity of iguanines, the focus is narrower. Thirty-four of the thirty-six photographs are of *Iguana iguana*, as is virtually all of the text. For example, the statement, "Six or eight weeks prior to and during courtship, male iguanas acquire bright gold or orange coloring over much of the body, as well as a whitened head," describes only *Iguana iguana*—and should be restricted to selected populations of that species (Rodda, 1992). The emphasis on green iguanas is appropriate from a conservation standpoint, as few of the other iguanines have wild populations capable of withstanding commercial exploitation (Burghardt and Rand, 1982). Unfortunately, concern for this problem is never stated, other than the recognition that several species are "not available in the pet trade."

A potential strength of this book is that the two authors provide very different perspectives. Unfortunately, little was done to integrate their efforts. For example, on at least two occasions virtually identical paragraphs appear within a few pages. The transition between authors is jarring, as the folksy familiarity of Townsend's prose contrasts with the stiff and disjointed jargon of Frye's contributions.

A pet owner is likely to find much of Frye's writing inscrutable. For example, Frye uses a contrasting font to highlight the importance of the obscure phrase "amphigonia retardata," when most readers would be satisfied with calling it sperm storage. Frye doesn't seem to have reached a decision as to his target audience. For example, he gives dosages of a prescription drug for treatment of herpes, a disease that the pet owner is incapable of diagnosing, but coyly refuses to give information

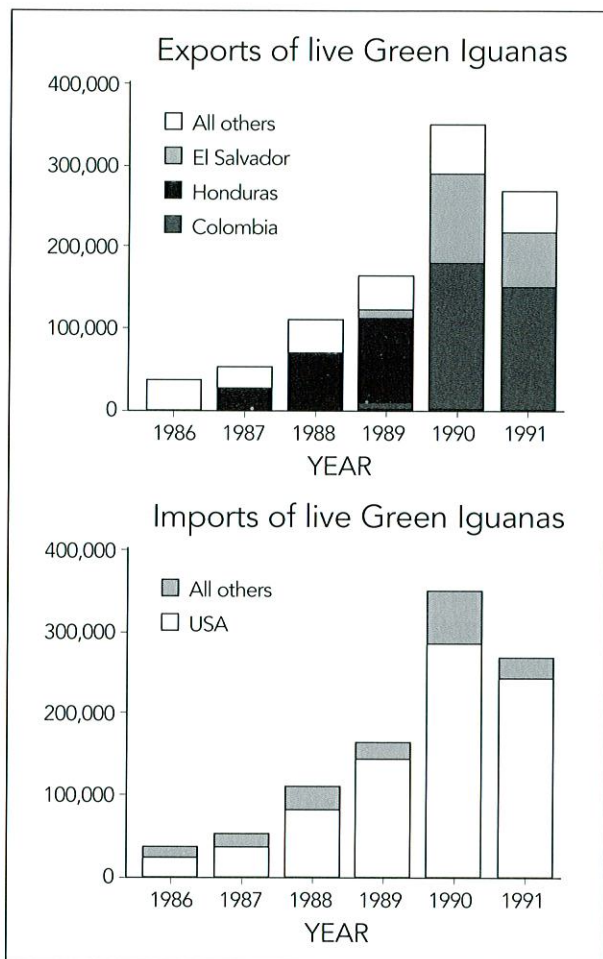


Figure 1. World Conservation Monitoring Centre and CITES Secretariat statistics for international trade in *Iguana iguana*. Data for 1991 and 1992 are incomplete at this time, but indicate further increases in exports from Colombia and imports into the U.S.

on the appropriate dose of kaopectate to use for iguanas with diarrhea, a readily diagnosable ailment (usually corrected through diet, however).

It appears that neither authors nor editors concerned themselves with the details of manuscript preparation. Within the taxonomic index over half of the scientific names are not italicized, whereas others, even those in the same genus, are. The text refers to Fig. 3 for a view of femoral pores, but these structures do not appear in either Fig. 3 or Fig. 4. I sought help from the index, but information in figures is not indexed. Eventually I stumbled across the pores in Fig. 7. Egg dimensions are captioned as being in cm, but the values given (e.g., 40 x 80) must be in mm. In a throwback to Wynne-Edwards (1962), Frye informs us that "Territoriality... serves to pre-

serve each species in its most vigorous state." We are informed that "tall cages must have more than one door... Fig. 11," but there is only one door in Fig. 11. Some of the photos (e.g., Figs. 12a, 12b) are pointless, some are too poorly reproduced to detect the item of interest (Fig. 14b), and others are redundant (there are five color photographs to show that regrown tails may be imperfect). Photographs of females mutilated by frustrated territorial males (Figs. 20a, 20b) are labeled as if such mutilation were normal. For a list of toxic plants, the reader is referred to Table 3, which is the list of preferred foods. Some iguanas do well on "toxic" foods (Auffenberg, 1982), a consideration omitted from this work.

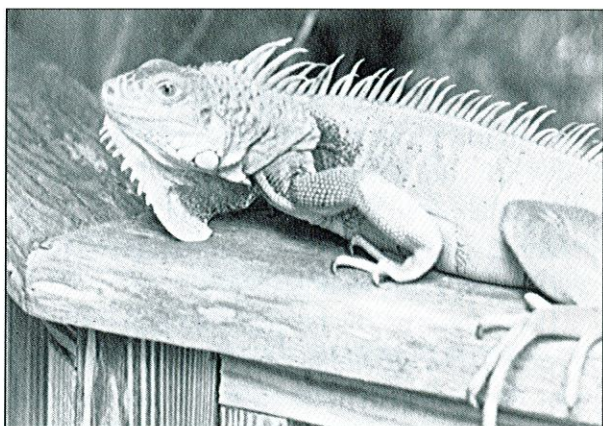
There is a conspicuous lack of scholarship in the tabulation of data. For example, the table intended to summarize what is known about egg development cites a few anecdotal captive observations for *Iguana iguana*, but neglects a number of significant captive studies (Bagh, 1962; Braunwalder, 1979, and references therein; Enderlein, 1963), including several that are in the recommended readings (Miller, 1987; Putz, 1982; Van Aperen, 1969). More significantly, the authors completely overlook all data from systematic studies of *Iguana iguana* egg development (e.g., Bock et al., 1989; Licht and Moberly, 1965; Muller, 1972; Phillips et al., 1990; Rand, 1968, 1972; Rand and Dugan, 1980; Ricklefs and Cullen, 1973; Swanson, 1950; Werner, 1988; Werner and Miller, 1984). One of the table sources, Boylan (1963), does not appear in the literature cited (it is a personal communication cited in another work).

The authors appear insensitive to the unnaturalness of some behaviors seen in captivity. For example, on the basis of captive anecdotes they assure us that iguanas themselves consider homosexual behavior normal. I don't know what opinions iguanas have on the subject, but homosexual mounting is transitory and rare in wild green iguanas (Dugan, 1982; Rodda, 1992).

I was annoyed by the incessant promotion of business for veterinarians. Frye overly enthuses about the "cadre of well trained veterinarians" who have an "armamentarium of highly effective" treatments that are available for whatever

ails an iguana. The pet owner needs to know when an ailment is serious enough to require professional care, but not all veterinarians are well equipped to deal with exotic pets, and it is arguable that “any unusual lump, or bump, swelling, discoloration, or ‘sore’ ” requires professional veterinary attention. Frye spends most of a page warning readers that untreated flatulence may kill their iguana. He warns that if post-ovipositional females are “depressed” they should be taken to a veterinarian at once. (Post ovipositional females are probably more in need of a good meal, as they may not have eaten for several weeks or months.) He warns readers that “overly large, misshapen, or decomposed eggs with normal shells, infection, or low blood calcium levels are conditions which require immediate veterinary care.” I do not know how a pet owner is expected to identify these conditions in the gravid female, nor is any guidance offered.

The book provides a valuable service through the numerous color photographs of iguanas with metabolic bone disease. These photographs will no doubt motivate readers to supply their pet with a nutritional diet. The authors include numerous warnings about the importance of appropriate calcium phosphorus ratios. Unfortunately, they fail to specify what ratio is needed. Their generally useful dietary advice is offset by their inclusion of the grossly erroneous myth that juvenile green iguanas are carnivorous. Although carrion feeding has been observed once in adult green iguanas (Loftin and Tyson, 1965), and a single anecdote has been published of a juvenile eating



Free ranging Florida Keys green iguana, *Iguana iguana*.
Photograph: R.W. Ehrig

a caterpillar in the wild (Hirth, 1963), all other data from wild green iguanas indicates that they are herbivorous at all sizes (Barbour, 1932; Iverson, 1980, 1982; Rand et al., 1990; Troyer, 1982, 1984; Van Devender, 1982). Frye and Townsend's Table 2 notwithstanding, insects, arachnids, and eggs are not usual food items for green iguanas. This book makes the controversial declaration that digestive tracts of baby iguanas must be inoculated with unspecified microorganisms, but no information is given as to how this might be accomplished. Elsewhere they specify that coprophagy should be discouraged.

Among the more difficult problems presented to the keeper of pet iguanas is that of reproduction. In my experience, the reproductive cycles of captives are often poorly synchronized, with hormonally excited males attempting to mate or fight with cage mates that are not in breeding condition. This problem is not discussed, nor are any suggestions given for providing the captives with a synchronizing environment. The authors state that females cease feeding 2-3.5 months after copulation. This may be an artifact of reproductive asynchrony; wild iguanas in the llanos of Venezuela cease feeding coincident with copulation (Rodda, 1992). Natural reproduction is erroneously characterized in a variety of other ways as well. For example, they state that iguana males mark their females with femoral pore secretions. They may in some areas, but this has not been observed in wild green iguanas (Dugan, 1982; Rodda, 1992). Contrary to the information given, some iguanines are reported to guard nests (Wiewandt, 1982). The authors state that significant embryonic growth does not occur in the several months during which oviducal eggs are retained in iguanas; Licht and Moberly (1965) observed limb buds and a functioning heart at oviposition in *Iguana*. The authors ambiguously state that maturity occurs at age 2 or 3 years depending on whether the iguanas were raised in captivity (which is which?). The available data for wild green iguanas (Zug and Rand, 1987) exhibit a mode of five years. The book makes the perhaps ghoulish comment that females “should be healthy and possess excellent flesh” prior to mating. This strikes me like those yellow “child in



Free ranging Florida Keys green iguana, *Iguana iguana*.
Photograph: R.W. Ehrig

car” warning labels seen in some cars driven in the U.S. Does this mean a pet owner should not strive to take care of their charges at other times?

While the care recommendations given in this book are generally sound, there are a few that should be refined. For example, there are redundant warnings that pet iguanas may harbor malaria, but the authors fail to note that iguana malarias are not among the malarias that affect humans and are not transmissible to humans. The advice to force feed an iguana if it fails to eat after two weeks must be tempered by the recognition that newly hatched individuals, breeding males, and gravid females normally fail to eat. Newly acquired individuals may need to be maintained in opaque cages for them to begin feeding (Troyer, pers. comm.). There are repeated warnings that cages must be sprayed or animals given water to drink. Pet owners should not become alarmed if their pets fail to drink standing water. Wild green iguanas have been seen to drink only when they are not feeding during the breeding season (Rodda, 1992). However, captive iguanas typically suffer from insufficient humidity; spraying the animals and their cages is a useful but often incomplete cure for this problem. The directions given in this book with regard to humidity are unreasonable. On the one hand they recommend including powerful ventilation fans on cages; on the other they specify 85-95% humidity for tropical iguanas. In my experience, maintaining 85-95% humidity in cages in typical modern houses is simply impossible even if the ventilation is omitted. Furthermore, if such a high humidity level is attained, mold and pathogens will propagate

uncontrollably. The alfalfa pellet substrate that they recommend will rapidly absorb moisture and become unusable in a high humidity environment.

The book’s final chapter by Townsend is a delight to read, even if the hijinks reported (e.g., sleeping with “Goober” and “Peanut,” smuggling iguanas aboard commercial aircraft in socks pinned to undergarments) provide unfortunate role models. Townsend indicates a willingness to assume that iguanas are capable of assuming human roles: “As [a hatchling] is beginning to get used to the human face, in his eyes, the expression of fear is almost completely replaced by what one might call wonder.” Perhaps, but if this leads to animal welfare requirements for daily clean sheets and a mint on their pillow, we will have erred.

Remarkably enough, for a book oozing with affection for iguanas, no effort is made to promote the welfare of wild iguanas. The epilogue vaguely promises that keeping iguanas will somehow help save the rain forest. It will do so only if the display of captives results in effort or at least funds being channeled to rain forest preservation activities. Showing off a pet may simply generate more demand for sales of wild animals. The authors include an appendix listing herpetoculture organizations, but they fail to promote iguana conservation in any meaningful way. Many island iguanines are desperately in need of help. Responsible pet owners will want to support the conservation activities of groups like The Nature Conservancy’s International Program or the International Iguana Society. Pet stores and iguana owners should be encouraged to tithe a percentage of their earnings to such efforts.

If you are looking for a book on the biology of iguanas there is yet no volume to surpass Burghardt and Rand (1982). If you are looking for a book on the pet trade in iguanas, it remains to be written. If you are looking for a guide to care of green iguanas, pick up Beltz (1989) or de Vosjoli (1992). These booklets provide more authoritative information in a more comprehensible form, at a fraction of the price.

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Adult male, Ricord's Iguana, *Cyclura ricordi*.
Photograph: Jeff Wines