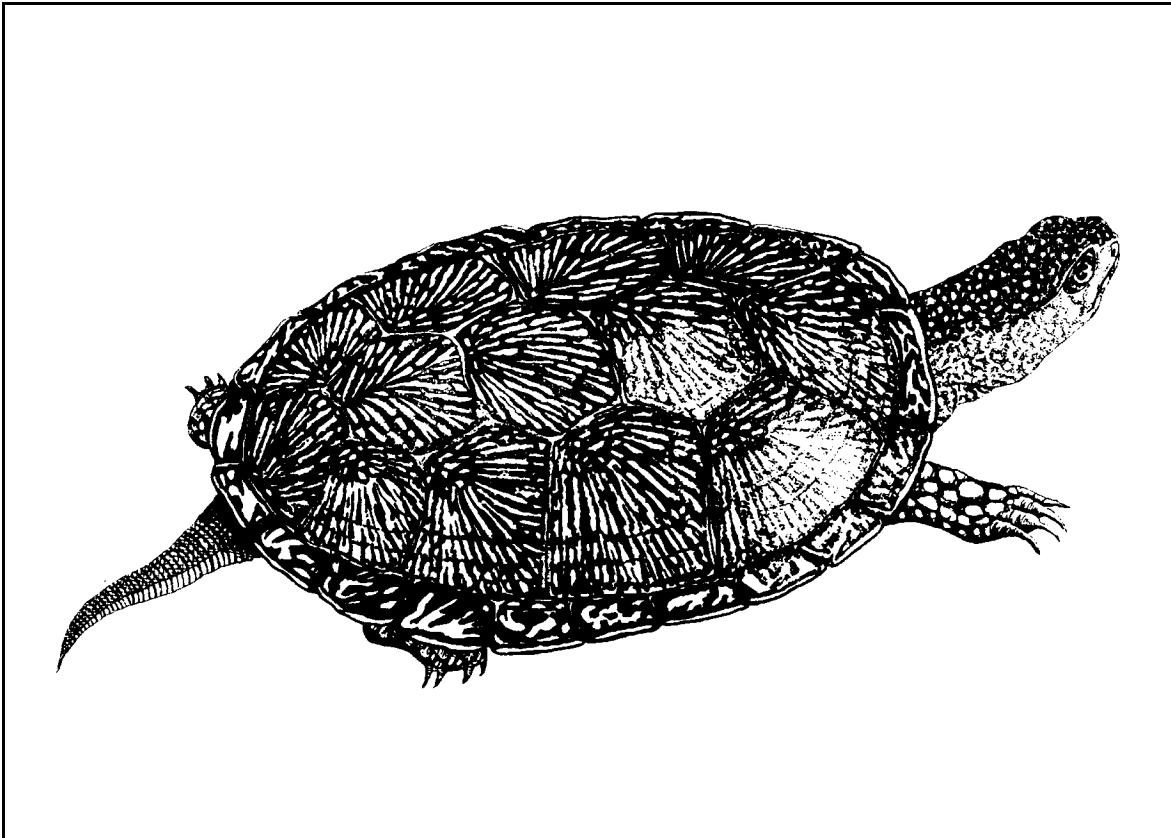

BULLETIN

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Chicago Herpetological Society



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September 2003



BULLETIN OF THE CHICAGO HERPETOLOGICAL SOCIETY

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Morphology of the *Limnonectes* Tadpole, with Notes on its Feeding Ecology and on the Breeding Habits of *Limnonectes* Frogs in Riparian Punjab

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Abstract

Morphology of *Limnonectes* tadpole is described, with notes on its feeding ecology and reproductive habits of *Limnonectes* frogs in riparian Punjab.

Introduction

The genus of cricket frogs, *Limnonectes*, is a complex of 15 species widely distributed throughout southeast Asia. Pakistan forms the westernmost border of the distribution range of this genus (Dubois, 1984; Khan and Tasnim, 1987; Mohanty and Dutta, 1999). In riparian Punjab this genus is represented by two species: *Limnonectes limnocharis* Boie, a high altitude species that does not range southward beyond Punjab and *Limnonectes syhadrensis* Annandale (Figure 1), a low altitude species that does not occur in the alpine regions; however, the two species are sympatric in riparian Punjab. The adults are morphologically distinguished; however, their tadpoles are not distinct from each other (Khan, 1979). Therefore the present description refers to the tadpoles of both *Limnonectes* frogs inhabiting riparian Punjab. The *Limnonectes* tadpoles, however, are morphologically distinct from the tadpoles of all other sympatric frog species (Khan, 1979, 1982a, 1996).

The cricket frogs are small, inconspicuous (snout-vent length 35–40 mm), and essentially inhabit marshy grasslands. There they forage in the vegetation around irrigation channels, torrents, seepage pools and paddy fields, and are rarely seen away from aquatic situations (Khan, 1979; Khan and Tasnim, 1987). The frog readily jumps into water to escape enemies, then immediately swims back and escapes in the grass, where it is difficult to locate. The frog is a remarkable jumper.

In the riparian environs of Punjab, the breeding season of *Limnonectes* extends from mid April to early September.



Figure 1. *Limnonectes syhadrensis*, adult female.

During the pre-monsoon period (April–June) most breeding activity occurs in seepage pools along water channels. During the monsoon season (July–August), many of the temporary ponds and puddles that have appeared are utilized; however, the main breeding activity during this period centers in paddy fields.

The call of *Limnonectes* is a characteristic series of repeated high notes “taa, taa, taa, taa,” that sounds like the clatter of a typewriter or teletype; however, some say it is like the chirping of field cricket, hence the name cricket-frog (Mohanty and Dutta, 1999). The calling male sits at an isolated high spot, concealed within grass, well away from water (Khan and Malik, 1987). Pairing occurs sometime during the night; next morning the spawn can be seen floating on the surface of the water, and soon breaks into individual eggs, which stick to grass blades (Khan, 1982b).

Materials and Methods

For the present study tadpoles were collected using a fine-meshed hand-net from various localities along the northwestern border of Rabwah City. Other tadpoles, collected from Datta and Manshera in northern Pakistan, were used for comparison. The following description pertains to tadpoles at developmental stage 35 (Khan, 1965).

A few tadpoles were maintained live in an aquarium to study their normal behavior. However, most of the tadpoles were preserved and stored in Bouin’s Fluid, following the procedures of Khan (1991, 2002).

The *Limnonectes* tadpole is a medium sized, delicate, light brown creature, with a spotted tail. During the pre-monsoon period (April–June), the tadpoles are collected from seepage pools and relatively shallow ponds along irrigation channels; usually these have little or no emergent vegetation. However, post-monsoon (late June–August) these frogs invade paddy fields. In both situations *Limnonectes* tadpoles occur sympatrically with tadpoles of other local amphibians, from which they can be distinguished by the following key (modified from Khan, 2000):

1. Total length of tadpole does not exceed 30 mm-----2
Total length exceeds 30 mm-----3
2. Oral disc positioned at the level of body ventrum----- *Bufo*
Oral disc lifted up from the level of body ventrum---
----- *Limnonectes*

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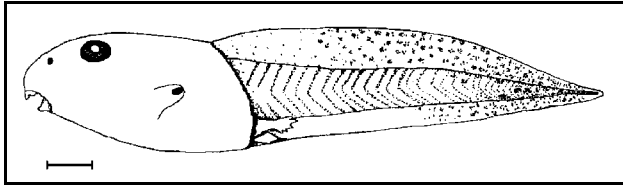


Figure 2. *Limnonectes syhadrensis*, tadpole developmental stage 35 (scale bar = 1 mm).

3. Oral disc ventral; belly bulging laterally; total length 40.18–42.00 mm-----*Euphlyctis*
 Oral disc anterior; belly not bulging; total length 38.9–40 mm-----*Hoplobatrachus*

Morphology of the *Limnonectes* tadpole

Body oval, longer than broad, broadest and deepest at the middle, ventrum convex, the anterior half of the body flexed forwards and upwards. Eyes dorsolateral, nearer to the snout than to the posterior border of the body, visible from dorsal and lateral views, not from below. Nostrils small, dorsolateral, nearer to tip of snout than eye, visible from dorsal and lateral views. Snout broadly obtuse, slightly projecting over the oral disc, which is more anterior than ventral, as the curve of the body lifts it from the level of the midbody ventrum (Figure 2).

Spiracle tube short, fused with body wall on the left side. Spiracle oval, at mid-left of body. Tail long, about one to two times the length of the body. Tail muscle broadest at base, gradually tapers towards acute tip, with distinct myotomal markings on tail latrum. Dorsal fin broad, angularly inserted at the body, with wavy margin, broadest at the middle, ventral fin narrower and straight. Anal tube distinct, slightly curved leftward. The hind limb shows five distinct toes, with thigh and shank well marked.

Color: Dorsum uniform light greenish-brown, belly whitish, specks of melanophores adorn fin margins, more concentrated on the posterior half of the tail.

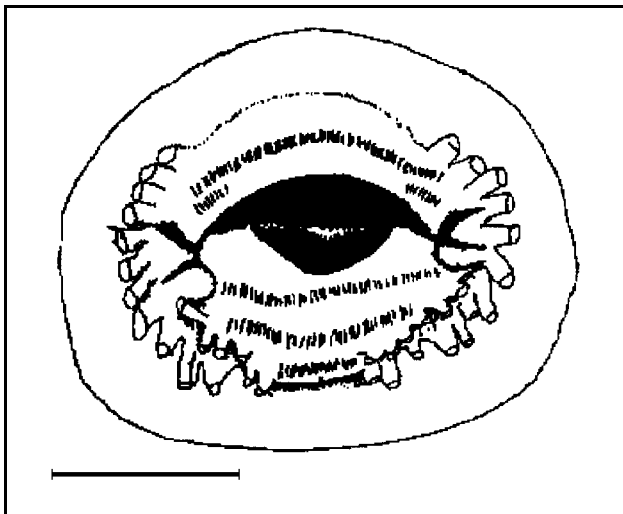


Figure 3. *Limnonectes syhadrensis*, oral disc (scale bar = 1 mm).

Measurements (in mm): Body length 7.2–7.6; tail length 11.0–11.2; interorbital space 1.6–1.8; internarial space 1.0–1.1; greatest breadth of body 4.6–4.8; depth of body 3.8–3.9; tail muscle height at root 0.8–0.9.

Oral disc (Figure 3): The upward-flexed head pulls the oral disc up from the level of the belly ventrum. Oral disc small, transversely oval, anterior labium narrower than the posterior. A group of thick, blunt oral papillae at the side of the oral disc extend along the posterior labium, where narrowly interrupted mesially.

The labial surfaces are lined with rows of keratinized, dark brown teeth; anterior labium with an outer continuous row, second with only a few teeth on the right and left sides, broadly interrupted mesially. Posterior labium broader, with three rows, the third and outermost is smallest, median, about one-third the size of the inner two. Teeth are uniserial in arrangement, dental formula being 2(2)/3.

A single tooth consists of three tiers of similar pieces, nested within each other, each piece less than 0.5 mm long. The flattened, orally curved crown is produced into three sharp cusps on the sides. The cylindrical base piece of the tooth overlaps the bases of the other two pieces; the whole is embedded in the labial tissue as a single tooth (Figure 4). The beak blades are thin: the anterior is narrow, broadly arched, with a fine serrated edge, while the posterior is broader, V-shaped and serrated. The labial palps enclose thick lobulations alternating with deep grooves (Figure 3).

Annandale and Rao (1918) reported a 2(2)/13 dental formula for *Rana syhadrensis* (apparently the 13 is a misprint). Boulenger (1920) reported 1 / 2 tooth rows; in another specimen he records five tooth rows; he does not record localities for his specimens. However, Liu (1950, Figure 78) shows a typical *Limnonectes* oral disc in his collection from China.

Ecology of the *Limnonectes* tadpole

The pre-monsoon habitat described above is very unstable, as it is periodically flooded, washing away planktonic nutrients and tadpoles; moreover it is soon dried out during drought, as

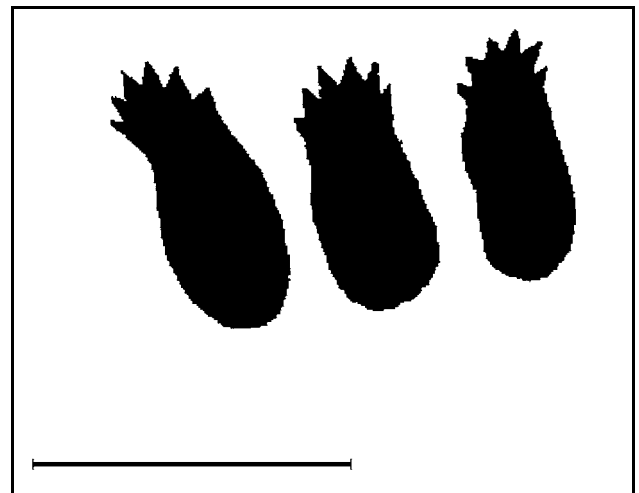


Figure 4. *Limnonectes syhadrensis*, labial teeth (scale bar = 1 mm).

the pre-monsoon period is very dry in Punjab. During this period it is the only site holding water so breeding is mostly confined to it. The fates of the tadpoles developing at such temporary sites are uncertain. However, monsoon breeding is more successful, since water level in the paddy fields does not depend on rain only—a certain water level is maintained by artificial irrigation to save the paddy crop from drying. There is no danger of washing away of nutritive plankton. Tadpoles have ample food and time to complete metamorphosis (Khan and Malik, 1987). All *Limnonectes* species are widely distributed throughout paddy producing southeast Asia (Dubois, 1984).

The tadpoles periodically move up and down in the water column, apparently grazing in the plankton-rich mid-column layers. The planktonic diet is supplemented by particulate matter rasped from submerged vegetation. The buccopharyngeal morphology of the *Limnonectes* tadpole is specialized to process coarse as well as fine food particles. In the oropharyngeal passages, the buccal floor and roof papillae are fewer and

fine with fine serrations. Moreover, the mucous entrapment system is comprised of fine-pored glandular surfaces. The subvellar secretory tissue is finely ridged as in *Microhyla ornata* and is compact in the form of a torus. Fine particulate filtrate almost clogs the first branchial chamber where this torus is situated.

The other tadpole in riparian Punjab with cuspidate teeth, *Bufo stomaticus*, lacks tiered teeth like those of *Limnonectes*. Moreover, the diet of *B. stomaticus* rarely includes plankton, as there is no accumulation of floccular material in its branchial baskets. The material rasped by the *Limnonectes* tadpole is much finer than that by *stomaticus*, apparently because of the tri-tiered teeth of *Limnonectes* tadpole.

Of the riparian tadpoles *Limnonectes* is most successful, as it acquires food by rasping as well as by filtering planktonic bloom. Moreover, adult *Limnonectes* frogs are small, good jumpers and are more aquatic, which are the plus points for their wide distribution and extensive speciation throughout southeast Asia.

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Lost and Found: Preface to a Contribution by Albert Schwartz

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The “Florida Exotic—Nonnative Species Conference” was held at Florida Atlantic University, Boca Raton, on 19-20 April 1979, in order to bring together parties concerned with the spread of feral nonnative vertebrates in Florida. Larry David Wilson, Albert Schwartz and I were the invited herpetological presenters. Larry and I were involved with research on exotic amphibians and reptiles (Wilson and Porras, 1983), and Al had published extensively on the herpetofauna of the region, including a classic paper on the amphibians and reptiles of southern Florida (Duellman and Schwartz, 1958).

At that meeting, I summarized changes that transpired with respect to the herpetofauna of south Florida, both native and exotic, and Larry presented an overview of the historic and present-day environment of the region. Al was scheduled to present his historical perspective of the south Florida herpetofauna but, unfortunately, was unable to attend. As a former student and good friend of Al’s, he asked that I present his paper and I obliged.

The untimely death of Al Schwartz in 1992 sent shock waves throughout the herpetological community. Subsequently, Robert Powell and Robert W. Henderson organized a symposium in Al’s honor, which was held at the Annual Meeting of the Society for the Study of Amphibians and Reptiles in 1994. Proceedings of that symposium were published two years later (Powell and Henderson, 1996).

Recently, while updating my files, I came across the Schwartz manuscript that I read at that memorable conference nearly a quarter of a century ago. The information contained therein is not only informative and nostalgic, but chilling—especially in view of the ecological devastation that south Florida has continued to undergo since those days. Because the document contains information of historical importance to biologists, I consulted with Wilson and Henderson to see if it would merit publication at this late date. Both encouraged me to write this preface and submit the paper for publication.

The loss of native biodiversity in southern Florida is occurring at an alarming rate, perhaps like in no other region of the United States. Parallels can be drawn from the uncontrolled population growth and rapid urbanization that this region has experienced, and thus eyewitness accounts such as the one provided by Schwartz are of immense historic importance and significance. Additional information on this topic appears in Small (1929), Simpson (1932), Barbour (1944), Douglas (1947), McCluney (1971), and Wilson and Porras (1983).

The Schwartz paper has been modified slightly from its original version. Sections summarizing the spread of two introduced species, *Anolis sagrei* and *Osteopilus septentrionalis*, were deleted because essentially the same information appears in Wilson and Porras (1983).

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South Florida Herpetology: An Historical Perspective

Albert Schwartz

I first came to southern Florida as a potential graduate student at the University of Miami in 1944. From that time until the present (1979), a span of 35 years, I have not always been a resident of the area, as well as my basic biological training, have centered on southern Florida. Thus, even though I attended the University of Michigan for my doctorate, the topic of my doctorate research was the mammals of southern Florida and the Upper Florida Keys. It was during the collecting of mammals for that project that I began to become increasingly aware of the changes in the habitat and the fauna being made in southern Florida. Simultaneously with my mammal work, I also began making collections of amphibians and reptiles here; these collections resulted in the 1958 publication with William E. Duellman as co-author, of a paper dealing with the herpetofauna as it then was. In the ensuing 21 years, changes in the habitat have been so massive that it is profitable to return to that time period and ascertain what changes have been made, and what effects they have had. Students in my Field Biology class at Miami-Dade Community College occasionally remark that, as I take them to a remnant of a once-extensive oak or tropical hammock, this is more of a history course, in a sense, than a biological one. And they are right.

What, then, was southern Florida like in the mid-1940s and 1950s? Let us imagine the absence of the Palmetto Expressway and I-95. The village of Hialeah was a small settlement on the Miami Canal; areas north of Hialeah as it then was were farmlands, and such places as the Palm Springs Mile and the balance of suburban Hialeah did not exist. No causeway went to Key Biscayne—one traveled by boat and when one arrived at Key Biscayne, one was greeted by abandoned *Cocos* plantations and hordes of mosquitoes. Going south on the mainland, once one passed Sunset Drive and the Holsom Bakery, there were scattered small settlements between there and Florida City on the two-lane U.S. 1. Florida City was a last outpost of civilization until one reached Tavernier on southern Key Largo. Most of Key Largo and Plantation Key were dense tropical hammock, with an occasional conch's shack—no laundromats, movie theaters, restaurants, motels (the last motel was at Florida City)—to relieve the “monotony” of lush tropical growth. On the mainland, west of South Miami (itself somewhat of an outpost) was Snapper Creek Hammock, reachable only by two-track dirt road and foot, with limestone sinks replete with epipetric ferns. Travel from Florida City to the small fishing village of Flamingo was via a marl road that, during and after a rain, was a hazard beyond description. But at least at Flamingo there was “motel”—unpainted frame cabins, each with a bed, table, two chairs, a pitcher and basin, a kerosene lamp, and an outhouse for all. These cabins were for the most hardy of fishermen who wanted to spend a weekend or longer in the true “wilds” of Florida.

The Tamiami Trail (first opened in 1928) existed much as it is today (but without settlements or conveniences). Once one left the Flagami Hotel (which was at what is now the place

where the Palmetto Expressway and S.W. 8th Street intersect), you were on your own. Gas was not readily available until one reached the village of Ochopee, and the next stop was Naples, then a small village that had been the terminal of the Court Railway Line until 1942. The Loop Road, that error in the construction of the Tamiami Trail, was then a two-track dirt road with its occasional wooden bridges in disrepair, so that, if the water was or had been high in the Everglades or Big Cypress Swamp, it was not unusual to be forced to turn around rather than to be able to complete the total 21-mile circuit—a bridge was not where it should be.

When I studied plant taxonomy at the University of Miami in 1946, I recall a field trip to Baker's Haulover. This was an all-day affair from Coral Gables (you packed a lunch and made sure you had enough gasoline), since north of the 79th Street Causeway and the McFadden Hotel, the road was two-track loose sand. There, of course, was no bridge crossing the Haulover. But there was extensive beach area where one could collect and observe the beach flora. Today, I cannot take my Field Biology class to *any* beach area in the Miami area since the length of coastal Dade County is filled with hotels, condominiums, residences, county and city parks, all modified from their primal condition and, of course, untouchable as far as collecting of any sort is concerned.

All of the above give a thumbnail sketch of southern Florida in the 1940s and 1950s. If one had to summarize the conditions then, one could say there was limited settlement in Miami (no shopping centers or outlying housing developments); still extensive undisturbed beach areas; a great amount of Everglades and cypress regions; beautiful oak and tropical hammocks, some extensive; few to no national, county or city parks. But even this almost (comparatively) ideal picture was of course not what the original settlers encountered when Miami was first established and developed in the 1890s. I feel sure that an original settler would have thought that by 1944 massive changes had already taken place—and they had. But the changes in the following decades have been even more massive and more destructive and inhibiting to the flora and fauna.

Now, Greater Miami stretches almost as far west as Krome Avenue (building along North Kendall Drive in the past five years has gone apace, with the destruction of farmlands and Everglades—Pineland ecotone) and, doubtless, within the next five years Miami will reach Krome Avenue itself. The Everglades formerly (1940s and 1950s) occurred on both sides of Krome Avenue from the Trail southward for many miles. Now, these peripheral lands have been converted into U-pick-'em fields and larger farming projects. The building of a complex of levees and dams has altered the original drainage pattern of the Everglades (but this is itself a long story, since man early in south Florida history made valiant and futile attempts to “drain the Everglades,” thereby changing the flow pattern unalterably). The establishment of Everglades National Park has indeed preserved much of the primitive flora and

fauna of the subtropical portion of southern Florida. But now, the Federal Government must establish a huge refuge in the Big Cypress region to protect the drainage pattern in the park area from development coming from the west.

Tropical hammocks, of which the great Brickell Hammock once extended from the mouth of the Miami River at least as far south as Coconut Grove, are gone except for isolated enclaves. The same is true for Snapper Creek Hammock. Most smaller hammocks have been devoured by expanding Miami. Shopping centers and their concomitant parking lots have paved over extensive areas. Residential developments have done even more damage and will continue to do so. Even the Federal Government has destroyed some undisturbed pinelands, at the northern extreme of the distribution of the Antillean plant *Tetrazygia bicolor*. I know of nowhere on this southern coast where I can show a class or collect living *Uniola*, *Ipomoea pes-caprae*, *Tournefortia*, and a host of marine strand plants—there simply are no original beach areas left. Another habitat that suffered early is rosemary scrub; this is particularly unfortunate since this habitat is the sole situation where one could observe *Sceloporus woodi*, the scrub lizard. When I was collecting in southern Florida in the 1950s, this habitat occurred as far south as Dania on the east coast, and to Marco Island on the west coast; *Sceloporus* occurred there. It has been literally years since I have seen either a rosemary plant or a scrub lizard in southern Florida. Since this same habitat was also the prime one for *Gopherus polyphemus*, the gopher tortoise, it too has become quite rare and is absent from former south Florida range.

What, then, has been the impact of man on the fauna and flora of south Florida? One can hardly find a positive aspect (but there is *one*). Negatively, it has been a rapid history of habitat destruction with elimination of populations of organisms from areas where they were once abundant. And this is the key: animals themselves have rarely (if at all) been over-collected for commercial or scientific reasons; rather, the tremendous growth of Miami as a prime Sun Belt city has caused habitat destruction with its companion destruction of animals and plants.

The one positive aspect to this dismal picture is that those species that are ruderal or edificarian have thriven. This is

true not only of amphibians and reptiles, but also of birds and mammals. Quasi-urban situations bring about situations where *some* animals, tolerant of the intervention of man and his works, do better than they would under natural circumstances.

A sequential series of factors seems to account for this situation. First, as Robertson pointed out many years ago in reference to the south Floridian avifauna (and in comparison with the terrestrial Bahamian avifauna) south Floridian habitats are less well used and have many open niches than are similar habitats in the Bahamas. Secondly, Robertson's contention concerning birds can be equally well extrapolated to amphibians and reptiles. One has only to consider the species of amphibians and reptiles that occur in the southeast of North America or even in northern Florida to note the striking difference in species-diversity between the local herpetofauna and that farther north. A single example will suffice: plethodontid and ambystomid salamanders have their New World center of species diversity in southeastern North America, both in the mountains and in the lowlands. These are the dominant terrestrial salamanders in the southeast. South Florida has four native salamanders, none of them plethodontids or ambystomids, and none are strictly terrestrial. Yet suitable habitat exists here and at least plethodontids occur in the tropical lowlands of South America. Thus, the terrestrial-salamanders niche is totally open in south Florida. Thus, in summary, south Florida is "underpopulated" as far as species-diversity of amphibians and reptiles is concerned.

The consequence of these facts is that "recent arrivals," whether by natural or human means, have a relatively good chance of success. If one adds to these a third factor, the destruction of natural habitat, already underoccupied, by human intervention, and a fourth, that the "invading" species is ecologically tolerant, its success is virtually guaranteed.

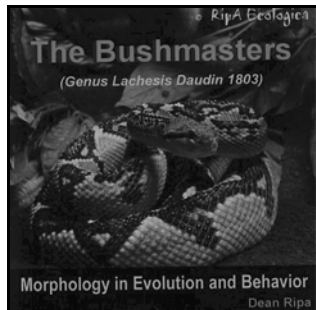
In summary, it is my contention that introduced species of amphibians and reptiles have played a small role in affecting the populations of native species. I know of no such unequivocal case of such an effect. Rather, it has been man's impact on the environment that has made many species much less common species than they were 35 years ago. Habitat destruction equals reduction of animal populations in most cases; southern Florida very well confirms this equation.

Book Review: *The Bushmasters (Genus Lachesis, Daudin, 1803): Morphology in Evolution and Behavior* by Dean Ripa. 2001. Wilmington, NC: Ripa Ecologica. ISBN 0-9705561-0-1. \$34.95*

* Available on CD-ROM only from Ripa Ecologica at www.bushmastersonline.com

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The Bushmasters (Genus Lachesis, Daudin, 1803): Morphology in Evolution and Behavior provides the first monograph dedicated to these amazing serpents and how their morphological adaptations allow them to survive in a manner that is a paradox to other large pitvipers. *Bushmasters* is unique in that it is distributed by Ripa Ecologica on CD-ROM. While a printable format is provided on the CD, it is best viewed on-screen with an HTML browser (such as MS Internet Explorer or Netscape Navigator). This allows the reader to fully absorb the detail captured in the high-resolution photographs contained within. Each photograph is embedded as a clickable thumbnail expanding into a full-screen image. I found that that the book is best viewed at a resolution of 1024 × 768 in 16-bit color. The Table of Contents contains hyperlinks allowing the reader to jump to any chapter.



Chapter 1 provides the allure that draws so many herpetologists to this most unusual of serpents. Ripa describes what makes this snake as mysterious and mythological as its Latin genus, *Lachesis* (after the Greek Goddess who spins the thread upon which one's fate hangs). After reading this you start to get the sense that you are reading a romantic novel as opposed to a herpetology book. It's easy to understand though if you've ever been entranced by these large reptiles. Chapter 2 is straightforward. In typical, dry, scientific-article fashion, it simply lists the catalogue specimens deposited in various museums throughout the Americas, which are the basis for Ripa's recommending the elevation of the northwestern South American population of (currently) *Lachesis stenophrys* as a new species.

In Chapter 3, Ripa provides an overview of the three species of bushmasters currently recognized. (Note: While many of the morphological features are described within the text, Ripa includes tables at the end of the book that present these morphological differences in a manner more readily available for the herpetologist wanting a quick reference key.) In describing the Central American bushmaster (*Lachesis stenophrys*), Ripa makes an argument for elevating the northwestern South American populations as a new species. Ripa provides unique insight into possible dispersal theories in Chapters 4 and 5, which apply not only bushmasters, but will strike an interest to anyone with an interest in the evolution of Neotropical flora and fauna. After reading these two chapters several times, many questions arose as to how an area such as Costa Rica's Osa Peninsula is populated with fauna that bears a

close resemblance to that of Brazil's Pantanal, yet, the two land masses have only been connected by a land bridge for 3.5 million years (a mere drop in the bucket of geologic time).

Chapters 6, 7 and 8 summarize the feeding habits of bushmasters, focusing on the disparity that despite being enormous pitvipers, they have a very low threshold on the size of prey they can swallow. Chapter 9 introduces a theory as to why this feeding habit may have evolved. Ripa theorizes that it may be the result of form following function. These snakes inhabit cooler, more humid microclimates relative to the sympatric *Bothrops asper*. Digestion occurs more slowly at cooler temperatures and digesting larger prey is more taxing for an ectothermic animal. In an environment where constant rainfall makes losing prey an ever present possibility, these snakes need every bit of energy they can muster.

Ripa contends in Chapter 10 that more often than not, bushmasters prefer to remain concealed in an underground burrow rather lie diurnally exposed (or near cover) on the surface of the forest. I have personally observed the shock syndrome that wild caught bushmasters will go into which, was described by Ditmars in 1937. Personal observations of captive bushmasters only leads me to the same conclusion as Ripa: that healthy bushmasters rarely emerge from the security of their burrows before dusk and if they do, it usually indicates something is environmentally out of balance.

Chapter 11 introduces the notion that the bushmaster, being a strike-hold predator, may actually be more active in its habits than one expects of most large "sit-and-wait" predators. Several excellent skeletal images in this chapter illustrate the enlarged vertebral ridge of bushmasters, which allows them to use a cantilevering motion to pin prey items to the ground. The radiotelemetry work of Greene and Santana of 1983 is critiqued in Chapter 12, while in Chapter 13 Ripa follows up by questioning how certain scientific platforms are skewed by the means in which the subjects are studied (i.e., does altering an animal's physical condition alter its behavior, and consequently our observations of it?) This is only one of several instances in the volume where Ripa takes a philosophical approach to herpetology, rather than the usual "regurgitating observations" approach.

Chapter 14 is essentially a reprint of the article that first appeared in the CHS *Bulletin* in August 1994 [Ripa, D. 1994. Reproduction of the Central American bushmaster (*Lachesis muta stenophrys*) and the black-headed bushmaster (*Lachesis muta melanocephala*) for the first time in captivity. Bull. Chicago Herp. Soc. 29(8):165-183] describing the first captive breeding of the two (then) Central American subspecies. Chapter 15 describes the hybridization of the two Central American species, which may have at one time occurred natu-

rally. These progeny can not only reach a potential size exceeding either of the two pure parental species, but also tend to have a demeanor more schizophrenic (personal observation) than a pure *Lachesis melanocephala*. The previous two chapters are more documentary whereas, Chapter 16 is more along the lines of rhetorical elaboration where Ripa will anecdotally recount his experiences with various aspects of bushmaster husbandry and biology—in this case, the role male combat has in stimulating reproduction. Chapter 17 expands on the role of male combat and its role in the bushmaster social order, again elaborating on possible explanations for why bushmasters will combat. Often Ripa will provide a reasoning for why bushmasters behave in a certain fashion, by comparing and contrasting the same behavior in other pitvipers, such as the sympatric (and more successful *Bothrops asper*). This is no better exemplified than in Chapter 18 where sexual dimorphism is discussed and point/counterpoint offered why in many species males are larger, yet in *Bothrops*, for example, females are larger. Ripa contends that because male combat in *Lachesis* is physically so brutal and demanding, the strongest males don't necessarily pass on their genes as one might guess. Likewise, females tend to be smaller because of the physical demands of breeding, relative to other large crotalids. This is presented in the form of logical narrative, as opposed to a presentation of scientific data—yet one thing remains: the arguments are well thought out owing to Ripa's vast experience and years of working with the large Neotropical pitvipers.

If the first 21 chapters don't grab your attention, the last three will! Chapter 22 discusses the age-old question posed by enthusiasts of venomous snakes, "which snake is the most deadly?" and the notion of LD₅₀. Years of toxicity studies on bushmasters have yielded the same result—that bushmaster

venom is not that toxic to mice and is relatively weak compared to other crotalids and elapids. The conflict arises when the effects of bushmaster venom on humans produce an 80% mortality rate. This is even more poignant in Chapter 23 where Ripa describes the morbid details of four personal envenomations by *Lachesis*—twice nearly taking his life. The bites were not caused by the 3-meter giants of legend, but by animals merely a few months old and under a meter in length!

I highly recommend *Bushmasters* to anyone with an interest not only in venomous snakes, but in tropical ecology in general. The uniqueness of the bushmaster as an indicator species to the tropical rainforest and tropical wet forest makes it important in studying the fragility of tropical ecosystems. *Bushmasters* provides the first in-depth volume documenting the habits and idiosyncrasies of these magnificent pitvipers. Dean Ripa, through anecdotal accounts and detailed observations, has unlocked many of the mysteries that eluded some of the most renowned herpetologists for over 70 years (and still elude those of us who keep them). While not entirely based on scientific data, the arguments presented are logically accurate based on years of experience in the field. Ripa makes many intriguing arguments and rational explanations that, at the very least, make one question previously published literature to the extent that the simplest answer, neat and concise though it may be, may *not* be correct. This is most evident in his questioning the speciation path of the bushmasters and the simple argument that the species were merely separated by rising mountain chains. While simple for most to grasp, and fitting neatly in a timeline, this explanation does nothing to explain, for example, the morphological similarities that *Lachesis melanocephala* shares to a greater extent with *L. muta* rather than its nearest (distancewise) relative, *L. stenophrys*.

Bull. Chicago Herp. Soc. 38(9):184-185, 2003

Book Review: *Die Europäische Sumpfschildkröte* (The European Pond Turtle ["Marsh Turtle"]) by Uwe Fritz. 2003. Laurenti-Verlag, Bielefeld. 224 pp. In German. Softcover. ISBN 3-933066-14-X. Contact Laurenti-Verlag (www.laurenti.de) to purchase.

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Dr. Uwe Fritz is the leading authority on the European pond turtle (*Emys orbicularis* [Linnaeus, 1758]). He was the senior editor for the Proceedings of the *Emys* Symposium at Dresden, Germany (Fritz et al., 1998), reviewed here in 1999 (*Bull. Chicago Herp. Soc.* 34(5):138-139). The European pond turtle is of special interest because of its wide range, covering much of Eurasia and extending into North Africa; its large number of recognized subspecies; and the fact that it is the only species of the family Emydidae that occurs in the Old World. This detailed volume is destined to become the classic work on the taxon.

Chapter 1 consists of a general introduction to the subject

with particular emphasis on past studies relative to present problems. Chapter 2 deals with the systematics and phylogeny, fossil record, and zoogeography of the species. In the systematics and phylogeny section, the author presents four phyletic interpretations as to the relationships of *Emys* to the other genera in the subfamily Emydinae. Which of these interpretations is most nearly correct is presently unresolved. Generic names for the Emydinae used in the book follow recently proposed taxonomic changes (i.e., *Actinemys* = *Clemmys marmorata*; *Glyptemys* = *Clemmys insculpta* and *C. muhlenbergii* [see Collins and Taggart, 2002]). The depth of coverage of the fossil record is exhaustive, and is very pleasing

to this reviewer, as all four of the extinct *Emys* species are illustrated. The zoogeography section presents the concept that *Emys* arrived in the Old World from North America by way of the "Bering Bridge" between the Late Oligocene and the Middle Miocene, but it is mentioned that this route has recently been questioned by Lapparent de Broin (2001) and Holman (2002). The chapter then continues with a discussion of the Tertiary colonization of the Palearctic and radiation in the Old World by *Emys*, its response to the effects of glaciation and the availability of glacial refugia in the Pleistocene, and finally, the expansion and then restriction of its range in the Holocene.

Chapter 3 provides a very detailed discussion of the dissemination of *Emys orbicularis* within its modern range. Areas discussed separately are (1) North Africa; (2) the Iberian peninsula, Balearic islands, and Madeira; (3) Corsica, Sardinia, and continental Italy and Sicily; (4) Western and Middle Europe; (5) the Balkans; (6) Eastern Europe and Northern Middle-Asia (Georgia, Armenia, Azerbaijan, Iran, and Turkmenistan); and Asia Minor. The numerous range maps included in this chapter are clear and very easy to interpret.

Chapter 4 deals with a detailed description of the various biological attributes of *Emys orbicularis* including (1) size in various situations; (2) general anatomy of the skull and shell, including a lengthy table with the names applied to the bones and horny shields of the carapace used by various workers and those used by the author (those of the plastron seemingly have been standardized for quite some time); (3) the penis; (4) blood characteristics; (5) karyotype; and finally (6) the characteristic variations in the species, including a very detailed section on geographic variation which will be extremely useful those interested in turtle taxonomy.

Chapter 5 deals with the taxonomy of *Emys orbicularis*. This species not only contains 13 subspecies, but also 7 recog-

nized subspecies groups. One might wonder if this is excessive splitting, but the excellent color photographs of these subspecies certainly indicate observable differences. To indicate some of the taxonomic problems ahead, Fritz, in Fritz and Holman (in press) states: "It is only a question of time until some of the 13 current subspecies of *Emys orbicularis* will be elevated to full species rank by applying the new species concept." Moreover, Parham and Feldman (2002) proposed that the Pacific pond turtle (*Actinemys*) and Blanding's turtle (*Emydoidea*) be placed in the genus *Emys* along with the possibly polytypic *E. orbicularis*. If both of these changes occur, a rather unusual taxonomic configuration will emerge in the Emydinae.

Chapter 6 will certainly be of interest to all herpetologists as it deals with the natural history of the European pond turtle. Subjects include: (1) "biotop," with black-and-white photographs of typical habitats in various parts of the modern range of the species; (2) food habits; (3) reproductive biology (*Emys orbicularis*, by the way, has Temperature Dependant Sex Determination); (4) population dynamics: including population composition in different regions, age structure, sex ratios, predation and behavior (including such areas as activity rhythms, orientation, and reproductive behavior).

Although this book is written completely in German, readers who are not fluent in this language should not despair. The many range maps, labeled drawings of skeletal and other parts, black-and-white photographs of habitats in different parts of the *E. orbicularis* range, tables, and especially the excellent color images of the various subspecies of *Emys orbicularis*, provide much information by themselves. Moreover, the 23-page list of references (in small print), many of them in English, is invaluable. In these ways, the book will be a treasure in your herpetological library, especially if you love the study of turtles, as many of us do.

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HerPET-POURRI

by Ellin Beltz

Thanks to everyone who contributes to my column, both by mail and email. As long-term readers know, one of my most prolific contributors is Wes von Papineau. I've often teased him that he should be rewarded for his efforts, but he modestly points out that he is already a member of the garter snake order of the salamander commandos and needs no further honors.

Be that as it may, he has a knack for finding the most obscure herpetological cannon fodder from journals around the world. Here this month is an "all Wes — all 2003" sampler. Enjoy!

Great use of a shovel

"If you spend your backyard hours these days swatting mosquitoes and sweating West Nile, you might want to expand the range of your concern. Start by looking down, preferably before you take that next step. Snakes are sliding into some unsettling spots around Rapid City, as drought turns well-watered backyards and lush flowerbeds into serpent motels. . . . When it gets hot and dry, they're more likely to try a hunting trip into new turf—which could be your bluegrass. It could also be your garage [found a local woman, who then] used a shovel to carry the two young rattlers from her garage to a nearby open area, where she let them go. 'I guess you're not supposed to do that,' she said. . . . The Humane Society of the Black Hills recommends that you leave rattlers alone, call the Humane Society and keep track of the serpents until an animal-control officer arrives." [Rapid City, S. Dakota, *Journal*, August 25]

Familiar tales — unfamiliar places

- "A snake that eats frogs and rats as an infant and works its way up to chickens, rabbits and even wild pigs, is believed to be responsible for this summer's gradual disappearance of the familiar chickens in front of the Metro Police West Patrol sector [in Nashville, Tennessee]. A boa constrictor is believed to be living somewhere in the precinct. . . . After two intact snake skins were found recently that indicate the predator is roughly 8 feet long and 'pretty big' in the center. 'The chicks disappeared and then the chickens disappeared and then we had, finally, one rooster left and then he disappeared,' [said the police official, who] speculated that somebody had the snake as a pet and took it to the woods when it got too big." [Nashville *City Paper*, August 25, to Wes from Desiree Wong]

- "A heat lamp in a snake cage is believed to have caused an apartment fire Friday morning in Beloit. When Beloit Fire Department personnel arrived at the apartment complex. . . they found heavy smoke in a first-floor apartment and hallway. . . . The fire started in the apartment's bedroom, where officials believe a heat lamp in a snake cage overheated. The snake survived the blaze and was picked up by the Rock County Humane Society. The fire was contained to the bedroom and caused an estimated \$6,000 structure and content damage." [Beloit, Wisconsin, *Daily News*, August 23]

- "Animal Rescue League of Boston officers, responding to what they thought was a bogus report of an alligator in Jamaica Pond, could hardly believe their eyes yesterday afternoon when they spied a roughly 2-foot-long reptile swimming in the water. 'He kept popping up,' said an amazed [Lieutenant], who along with [a] native Louisiana [woman] netted the pint-

sized gator after about two hours of trying. 'Someone obviously dumped it here.' It's not exactly a man-eater, but the pond's resident ducks should sleep easier tonight. . . . It's illegal to keep alligators as pets in Massachusetts without a state license. [Boston *Herald*, August 22]

Another way to fossilize

"Crocodiles are being cooked alive in Kakadu National Park because of unusual weather patterns, it has been revealed. Rangers have uncovered a mass grave of 30 crocodiles killed by heat. 'They literally cooked to death,' [a] park crocodile management officer . . . said. 'They would have tried to crawl into the mud, but it wasn't damp enough. It would have been a bloody horrible way to die—just absolutely shocking. We got to the site about a week after they died, but it was clear what had happened—the floodplains had dried out. There were carcasses all over the place and the smell was unbelievable. . . . Kakadu National Park covers 19,000 square kilometers and is 257 km from Darwin. . . . The park's crocodile population . . . [is] about 6,000.'" [Northern Territory, Australia, *News*, August 25]

Seychelles giants breeding

"Biggie the tortoise has been reunited with his old girlfriend at Bristol Zoo Gardens. The two were originally paired together in the 1970s but Mrs. Biggie, as she is known to staff, was sent to a private collection because Biggie found another mate. But now Mrs. Biggie is ready to become a mum—at the age of 50—and has returned to Bristol Zoo Gardens to be reunited with her lost love. The giant tortoise enclosure has been expanded and Biggie's keepers are hoping to breed more giant tortoises, even though Biggie will be an old man to have children—his age is estimated at between 80 and 100. Recent research has found that Biggie and his new partner are possibly some of the last remaining Seychelles giant tortoises, an almost extinct species. But DNA tests have so far proved inconclusive so a mystery still surrounds Biggie and any future offspring. He was bought by Bristol University in the 1960s and was donated to the zoo in 1975. Mrs Biggie was at the zoo for a year before she was sent away." [Bristol, U.K. *Evening Post*, August 23]

Does the house always win?

"An endangered salamander that lives in the heart of Sonoma County will likely snarl a North Bay Indian tribe's plans to build a casino near Rohnert Park, but the project still appears to be feasible, county and city officials say. The proposed 360-acre casino site used mostly for hay fields and cattle grazing is within the potential range of the California tiger salamander, which federal officials in March said is on the verge of extinction and worthy of protection under environmental laws. . . . If tiger salamanders are detected or the land is considered to be salamander habitat, the tribe might be able to configure the project to avoid jeopardizing the animal, local officials said. But if federal officials determine that building the casino and hotel would kill salamanders or destroy its habitat, the tribe could be required to buy land elsewhere for tiger salamander habitat preservation. That could entail

lengthy negotiations with the U.S. Fish and Wildlife Service, and there are no clear guidelines because the tiger salamander is new to the endangered species list.” [Santa Rosa, California, *Press Democrat*, August 23]

Remember “-icide” means to kill, part 227

“Rumor has it that *Phrynosoma cornutum*, horned lizards — yes, we’re talking horny toads here — have virtually vanished from Texas soil, victims of unscrupulous exotic pet dealers who’ve shipped them off to foreign lands like New York City. Not true, said [the] educational director of the Sibley Learning Center in Midland. ‘You may not see many in town anymore except in vacant lots . . . but I think it’s because people have poisoned the harvester ant nests around their homes, and that’s the horned lizard’s food source.’ Still, the little lizards are on the endangered species list in Texas and Oklahoma . . . where aggressive swarms of fire ants are displacing harvester ants and other insects. Stories of fire ants moving in for the kill on unsuspecting horned lizards may be true . . . but a lizard would have to lap up 2,000 fire ants to satisfy its minimum daily requirement of 200 harvester ants. . . . Driven by tales of fire ant ferocity, West Texans may be mistakenly poisoning harvester ants. . . .” Ninety percent of people quizzed on the ants misidentified the harmless harvester as a fire ant.” [*Houston Chronicle*, August 22]

We move in all directions when we can

“An attempt to pretty up the office brought an unusual surprise for a Saint John [New Brunswick, Canada] worker. A potted plant . . . had an unexpected hitchhiker, but this isn’t the first time such a thing has occurred in the port city. ‘I’m sitting at my office,’ [the man] says, ‘working at my computer and I just caught something out of the corner of my eye, crawling up the wall. And at first I thought it was a spider, but it moved really fast and then it stopped and it stayed in one location for some time.’ The creature turned out to be a small lizard that normally lives in Florida. Alan DeGrass, the Reptile Man, was called in to wrangle the tiny common brown anole . . . [He] says the creatures turn up in the Maritimes quite often. One recent shipment of house plants from Florida, for example, brought in 20 lizards. . . .” [CBC, 22 August]

Rabbit-proof fence, dingo-proof fence, toad what?

“A wildlife expert involved with the Frogwatch program says a cane toad fence on the Cobourg Peninsula, northeast of Darwin, will not stop the spread of the pests. Cane toads are expected to reach the peninsula, Darwin and Palmerston by this wet season. The fence is one of the suggestions being considered by the Territory Government in an effort to protect native species from the toads. [He] says the toads are likely to use the sea to swim around the fence and the money may be better used elsewhere.” [Australian Broadcasting Corp., August 22]

Are they worried about *Salmonella*?

“More than 100 personnel from the Civil Defense and the Internal Security Forces have unsuccessfully been stationed in [a suburb of Beirut, Lebanon] to catch a giant, carnivorous lizard. The issue is considered to have become potentially dangerous as the reptile, believed to be a Komodo Dragon, supposedly ate a horse five days ago, according to locals. . . . The Komodo dragon, not native to Lebanon, is usually found

on the islands of Indonesia, and it is believed that the reptile was brought to Lebanon four years ago by a German who lived in the area. As a water lover, the reptile on Tuesday supposedly went to a residential villa and swam in the pool. . . . The Civil Defense department is using all means at its disposal to catch the reptile, which was first noticed by residents two weeks ago, but is finding it difficult to locate the beast. . . . The lizard, believed by the Civil Defense to be a Komodo dragon, is causing panic in the area, particularly once it was learned that the reptile is the world’s largest land-based lizard and a meat-eating monster. The reptile will also devour any animal it can dismember. . . . [A local official] will contact embassies here to ask for help in handling the issue. ‘We also contacted the Discovery Channel. . . . If we are able to send a photo of the animal to prove it is a Komodo dragon, the Discovery Channel confirmed it will send a team to resolve the issue. . . .’ While some are scared of the Komodo dragon, others assert that no such animal could be found here. On Wednesday, *Al-Mustaqbal* newspaper quoted experts denying the possible existence of such a reptile here. But . . . three residents have so far confirmed that they had seen the lizard and later identified it as being a Komodo dragon. . . . [The official] hoped that the reptile would be caught before heading to areas such as Nahr al-Kalb [forest], where it can easily hide.” [Beirut, Lebanon, *Terranet*, August 22]

Sixty years in the desert

“A real live crocodile is the unlikely outsized good-luck charm of [Kidal, a town in northeastern Mali, Africa,] where it has been a celebrated citizen since 1945. A million and one legends surround this venerated creature who is believed to ward off the evil eye and protect the inhabitants of Kidal. Kidal has attracted world attention recently, bad publicity that its inhabitants say they would have rather avoided. It was widely believed that the 14 European tourists taken hostage by an Algerian Islamic group were held in northern Mali. The town’s mostly nomadic population of 77,000 subsist on very little in the vast barren desert. Their lives are so hard, they need a mascot. Hence the crocodile. Brought to the area from Mali’s interior by Jean Clauzel, a French colonial administrator, the crocodile has fascinated generations of visitors for nearly 60 years. So small was the creature when it first arrived, that his tail resembled a grey lizard’s, and he was given only a few weeks to live. But he survived, and was housed in the colonial fort that still crowns the town, before being moved next to the old prison, no longer in use. The grand old citizen is preparing to move residence for the third time. He will be lodged in a basin between two date palms in the town’s administrative offices. There is no official budget to feed the creature. . . . But . . . successive administrators have continued to look after the reptile, believing that their professional future depended on the mascot’s longevity. The local officials will have to turn a blind eye to townspeople smuggling themselves onto the premises at night to continue their tradition of leaving offerings of large chunks of meat for the crocodile. ‘There are people who come here to feed the crocodile, hoping that it will protect them from bad luck,’ says a guard. The hardy creature, now three meters (10 feet) long, with half-closed eyes, swishes his tail as he lolls in the tank’s warm greenish water. He has survived the extreme desert temperatures and tough winters of Mali for more than half a century. But fatigue and old age are begin-

ning to take their toll. The crocodile also survived the Tuareg uprising in the 1990s, when even the rebels did not dare to touch it. 'Everybody avoided shooting in the direction of the animal,' an ex-rebel affirmed." [Johannesburg, South Africa, *The Independent*, August 21, from Desiree Wong to Wes]

How many snakes in Blackpool?

"A poster campaign is being launched in Blackpool to dissuade people from having their pictures taken with snakes. It is part of a crackdown by the town's trading standards department on illegal street traders. Photographers, who operate on the promenade without licenses, drape a large python around the shoulders of customers and charge them to take a picture. But following an increase in the number of complaints from visitors, council officers are distributing the posters in the hope of stopping people paying the traders. The notices are written like a hostage note from a Burmese python with the snake pleading against being held captive, being handled roughly and photographed. . . . The poster campaign, which has the full support of the RSPCA, is one of a raft of measures currently under way to put an end to the exploitation of snakes as photographers' aids on the promenade, [said a local official who added:] 'We are receiving more and more complaints from the general public concerning the welfare of the snakes used in this trade. . . . The council says enforcement staff are now out seven days a week tackling the problem.'" [London, U.K., British Broadcasting Company, August 21]

1,205 Stars fall back to earth

"Another consignment of 305 star tortoises meant to be smuggled to Kuala Lumpur was seized by the Forest department officials from a passenger at the international airport here late on Monday. One person was arrested. The Chennai Wildlife Warden . . . said during a baggage check, the airport authorities found the tortoises packed in a carton. Even before the baggage reached the customs checkpoint it was seized and the information was passed on to them. Following the information, a team of wildlife officials . . . seized the consignment and secured the passenger. He was identified . . . [as a 35-year-old] from Netaji Nagar, Tondiarpet. Preliminary investigation with the arrested person revealed that he got the star tortoises from Vishakapatnam in Andhra Pradesh. Cases have been filed under various sections of the Wildlife Protection Act and the person was produced in Alandur Municipal Court, which remanded him to 15 days judicial custody. . . . The seized specimen was said to be not more than two years old, said the wildlife authorities. On August 8, the officials of the Deputy Directorate of Wildlife Southern Region seized 900 star tortoises meant to be smuggled to Singapore. Following the escape of the smuggler, the officials after obtaining permission from the Alandur court released the tortoises at the Guindy National Park. But, this time as they were able to arrest and remand the smuggler, the authorities were planning to obtain permission to release the seized specimens at Arignar Anna Zoological Park, Vandalur, as the GNP had a huge population of star tortoises." [Chennai, India, *The Hindu*, August 20]

Frog and Turtle Tunnels

"*Décidément, on ne fait pas les choses à moitié pour sauver la vie des animaux sauvages. Après les célèbres tunnels aménagés pour protéger les grenouilles du marais du lac*

Brompton, voici que les tortues du marais du lac Magog ont droit à leur clôture pour leur sécurité. Il s'agit d'un projet unique au Québec." A protected road crossing for turtles will be built near Lake Magog. It will be similar to those that have been built to protect frogs near Lake Brompton. This is the first project of its kind for Quebec. [*La Tribune*, Sherbrooke, Quebec, August 18]

Chytrid appeal

"The Colorado Division of Wildlife is asking for the public's help in monitoring fragile boreal toad populations, along with stopping the spread of the fungus believed to be responsible for putting the toad at risk of extinction. Boreal toads have been an endangered species in Colorado for the past decade and still are declining. While biologists aren't exactly sure what caused the toads' demise, they believe it is because of a fungus called *Batrachochytrium dendrobatidis*, or frog chytrid. . . . Boreal toads were known to exist at one time in the Weminuche Wilderness and along the Pine River. 'We haven't seen any in the last 10 years,' said . . . a wildlife biologist with the Division of Wildlife in Durango. 'Several people have looked, including trained herpetologists. That's not to say they don't exist. We're just not locating them.' [He added] that that biologists have found at least three new boreal toad breeding sites. 'But every time they end up being chytrid positive. We're seeing the fungus have a significant impact on these sites. . . . Hikers, campers and anglers can help by disinfecting their shoes and any equipment . . . with a 10 percent bleach solution, and any mud that collects on surfaces or wheels of vehicles should be removed. Boots and waders should be soaked briefly in a bleach solution and allowed to dry thoroughly. . . . Boreal toads (*Bufo boreas boreas*) began declining about 20 years ago and are federally listed as 'warranted but precluded' under the Endangered Species Act. Surveys indicate as much as 85 percent of Colorado's population has disappeared. The Division of Wildlife has been taking steps to ensure the toads' survival and has been rearing them in captivity since 2000. A breeding population of more than 1,000 toads was established at the division's John W. Mumma Native Aquatic Species Restoration Facility in Alamosa in the San Luis Valley. The boreal toad, which grows to a maximum length of 4 inches, is one of 17 amphibian species native to Colorado. They live almost exclusively above 8,000 feet and can be found up to 12,000 feet. They live in forested areas and need shallow standing water for breeding. There are about 68 known breeding populations of boreal toads in the southern Rocky Mountains, and most of those are in Colorado. Most of the breeding populations are very small, and their ability to sustain themselves is uncertain. In the southern Rockies, the boreal toad has dark, brown-black bumpy skin and usually a white or cream-colored stripe down its back. The division asks that if you see a boreal toad, don't touch it or take tadpoles from the water, and contact the division." [Durango, Colorado, *Herald*, July 24]

Also thanks to the folks who sent clippings which I will use next month and to those of you who are about to send some clippings. This column runs on the material sent by its regular readers. Send whole pages of newspaper or magazines with date/publication slug and your name on each page to: Ellin Beltz, POB 934, Ferndale, CA 95536-0934.

Unofficial Minutes of the CHS Board Meeting, August 15, 2003

Lori King called the meeting to order at 7:40 P.M. Board members Tom Anton and Jack Schoenfelder were absent.

Officers' Reports

Recording Secretary: Zoe Magierek read the minutes of the July 18 meeting. The minutes were accepted as read.

Treasurer: Jim Hoffman presented an income statement and a balance sheet. Rich Crowley questioned the year-to-date printing expense, and it was explained that this included the cost of printing the *Bulletins* and new renewal and application forms with the new address. Linda Malawy recommended getting a value inventory of all the books we have for sale.

Membership Secretary: As of the board meeting there had not been a mailing, so membership had not changed since last month. Last month's mailing was to 727.

Corresponding Secretary: Erik Williams mentioned that the Friends of the Chicago River had called him to help them move some snapping turtles out of a wetland they were developing and into another area of the river. He also updated the answering machine message. Lori King asked Erik to add to the machine message that more information on the proposed ordinance could be found on our website.

Standing Committees

ReptileFest: The dates of April 3-4 for the show and April 2 for set-up were announced.

Grants: A Grants committee has been formed. Grant proposals are typically in by the end of December. Mike Redmer will be stepping down as chair of the committee and Lori King thanked him for his efforts in chairing it in the past and for doing a terrific job.

Shows: Ron Humbert said that Springbrook Nature Center in Itasca will be having a show August 24, 10 A.M. - 5 P.M., and that we could use some help. Joan Moore is all set for the last weekend of the Notebaert weekend shows, August 23-24.

Raffle: Ron Humbert thinks we have about four months of raffle items left and he just received another terrarium set-up that can be used as a future raffle prize.

Adoptions: Linda Malawy mentioned doing CHS E-mail list updates about what animals are available.

General Meeting Sales: Joan Moore will bring in an inventory and value sheet about the books we have for sale. There are no more Pillstrom tongs available; all have been sold.

Speaker's Bureau: Mike Redmer did a talk for the Midwest Pond and Koi Society.

Ad Hoc Committees

Trips: Zoo trip sales are going well. Some tickets were sold to Chicago Academy of Science members.

Old Business

PARC: There will be more information on PARC at the next board meeting.

Awards: Joan Moore will proceed with the awards once the wording is decided and information is obtained from Greg Brim.

New Business

Due to the Holidays the December general meeting will be held Wednesday, December 17.

Jim Hoffman moved to adjourn; Jenny Vollman seconded. All in favor, the meeting adjourned at 10:10 P.M.

Respectfully submitted by Recording Secretary Zoe Magierek



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Herpetology 2003

In this column the editorial staff presents short abstracts of herpetological articles we have found of interest. This is not an attempt to summarize all of the research papers being published; it is an attempt to increase the reader's awareness of what herpetologists have been doing and publishing. The editor assumes full responsibility for any errors or misleading statements.

GOPHERSNAKE HOME RANGES

J. A. Rodríguez-Robles [2003, Copeia (2):391-396] notes that knowledge of the home range of an animal can provide insights for studies of behavioral interactions among individuals, and long-term monitoring of particular animals is necessary to determine whether they exhibit seasonal variation in space-use patterns. Four adult male gophersnakes (*Pituophis catenifer*) were radio-tracked in central California for 14 consecutive months to investigate spatial and seasonal movement patterns. Using the fixed kernel density estimator to produce a probability contour, the 95% home ranges of *P. catenifer* ranged from 0.89 to 1.78 ha, whereas their core areas (50% polygons), the most heavily used areas of their home ranges, ranged from 0.1 to 0.29 ha. Movements of male *P. catenifer* were similar in spring and summer and decreased in autumn and winter. The telemetered snakes were close to marshes and *Eucalyptus* woodlands but were routinely found in grassland areas, perhaps because this habitat type may provide abundant food resources and partial protection from predators. Despite their proximity, the estimated home ranges of males 2, 3 and 4 did not overlap. These findings, and those of a previous investigation of activity patterns of *P. catenifer* in eastern Nebraska, suggest that syntopic gophersnakes occupy exclusive home ranges during at least part of their active season.

TURTLE PREDATION ON TADPOLES

I. Gomez-Mestre and C. Keller [2003, Copeia (2):349-356] assessed the effect of predation by large, non-gape-limited vertebrates on the survivorship and size distribution of larvae of four anuran species, using two syntopic freshwater turtle species, *Emys orbicularis* and *Mauremys leprosa*. Predator species and predator sex within species were used as treatments in replicated, factorial experiments for predation trials on tadpoles of *Bufo calamita*, *Hyla meridionalis*, *Rana perezi* and *Pelobates cultripes*. Tadpole consumption rates were significantly higher for the carnivorous *E. orbicularis* than for *M. leprosa*. *Rana perezi* tadpoles were the least consumed, whereas *P. cultripes* and *H. meridionalis* had the lowest survivorship rates, being relatively easier to catch than *R. perezi*. Significant size selection occurred for larger tadpoles of *P. cultripes*, whereas predation upon *R. perezi* tended to concentrate on the smaller size classes. The results point to an overall tendency of turtles to predate upon large tadpoles, yet the outcome of size selection by large vertebrates may depend on phenotypic traits that enhance the escape potential of tadpoles. *Mauremys leprosa* had a high rejection rate of tadpoles, suggesting a higher sensitivity to unpalatability as compared to *E. orbicularis*, especially with relation to *R. perezi*. The results indicate that the effect of unpalatability as a predation deterrent may vary even among taxonomically close predator species.

EFFECTS OF SEED INGESTION BY IGUANAS

J. Benítez-Malvido et al. [2003, J. Herpetology 37(2):301-308] investigated the effect of seed ingestion by two species of iguana (*Iguana iguana* and *Ctenosaura pectinata*) on germination and on seed damage by insects in a Mexican tropical dry forest. Individuals of *I. iguana* were fed with fruits from 11 plant species. Thereafter, the feces were collected, and seeds were removed and sowed. To assess whether seed damage by insects is affected by iguana ingestion, the authors removed and sowed the seeds of the legume tree *Prosopis juliflora* contained in feces of *C. pectinata*. Individuals of *I. iguana* consumed four of 11 plant species (*Cordia alba*, *Momordica charantia*, *Pithecellobium dulce* and *Lycopersicon esculentum*). Overall, germination rate was significantly higher for ingested seeds than for control seeds, except for *M. charantia*, where no seed germinated. The proportion of *P. juliflora* seeds with bruchid damage was significantly lower for seeds ingested by *C. pectinata* (33%) than for control seeds (95%). The results suggest that green iguanas (*I. iguana*) are selective in their diets and that seed ingestion by both species of iguanas affected seed survival, germination rate, and dispersal but that their effects are species dependent. Iguanas might play a significant role in the reproductive strategies of some tropical plants.

RANGE LIMITS OF THE COTTONMOUTH

F. Zaidan III et al. [2003, Copeia (2):231-240] investigated the effects of temperature/photoperiod regimes on monthly male testosterone levels in three groups of cottonmouths (*Agkistrodon piscivorus leucostoma*) to assess the possibility of thermal effects on reproductive function as a range-limiting mechanism in cottonmouths. The three groups used were a field group, a lab control group that received natural temperature/photoperiod conditions, and an experimental lab group that received temperature/photoperiod conditions of a region north of the current range limit. The field and lab control groups exhibited a single testosterone peak in August (34.4 and 14.1 ng/ml, respectively) that coincided with observed reproductive activities in northwestern Arkansas. The experimental group also exhibited a single peak (11.7 ng/ml), but the peak was delayed by one month. The authors coupled energetic calculations with environmental temperature, the timing of reproductive events, and the time available for foraging to demonstrate how pre- and postcopulation reproductive failure may serve as a sublethal range-limiting mechanism. North of their current range limit, the reduced time for energy acquisition may not allow for sufficient juvenile recruitment into the population to replace losses. Therefore, cottonmouths may be prevented from establishing a more northern range limit due to their reproductive physiology.

Advertisements

The Reptile Rescuers Open, October 10, 2003. Four Winds Golf Club, 23110 W. Rte. 176, Mundelein, IL. Entry Fee = \$150 per person. Event Format = 4 Person Scramble. For more information please contact Mark Sandfox at (847) 526-0016 or visit our website at www.ReptileRescuers.com. This golf outing is sponsored by Reptile Rescuers. All of Reptile Rescuers' services (Rescue, Adoption, Shelter, Educational Programs, Website, etc.) are completely free; thus we rely heavily on fund raisers and the generous donations of individuals and corporations. Thank you for your support.

For sale: rats and mice—pinkies, fuzzies and adults. Quantity discounts. Please send a SASE for pricelist or call Bill Brant, *THE GOURMET RODENT*, 6115 SW 137th Avenue, Archer FL 32618, (352) 495-9024, E-mail: GrmtRodent@aol.com.

For sale: murine-pathogen-free rats and mice available in all sizes, live or frozen: pinkies, fuzzies, crawlers, small, medium and large. Frozen crawler mice in lots of 2000, \$.17 each. Also available, full grown hairless mice. FOB shipping point. Master Card accepted. Call (518) 537-2000 between 8:00 A.M. and 5:00 P.M. or write SAS Corporation, 273 Hover Avenue, Germantown NY 12526 for prices and additional information.

For sale: from **The Mouse Factory**, producing superior quality, frozen feeder mice and rats. We feed our colony a nutritionally balanced diet of rodent chow, formulated especially for us, and four types of natural whole grains and seeds. Mice starting from: pinks, \$.17 each; fuzzies, \$.24 each; hoppers, \$.30 each; weanling, \$.42; adult, \$.48. Rats: starting with pinks at \$.45 each, to XL at \$1.80 each. Discount prices available. We accept Visa, MC, Discover or money orders. P.O. Box 85, Alpine TX 79831. Call us **toll-free** at (800) 720-0076 or visit our website: <http://www.themousefactory.com>.

For sale: from Bayou Rodents, excellent quality feeder mice and rats. Every size available. Pinks starting at \$20/100. Orders are shipped by overnight service Monday thru Thursday. We accept Visa, MasterCard and Discover. For more info, contact Rhonda or Peggy, (800) 722-6102.

For sale: **high quality frozen feeders**. Over a decade of production and supply. Seven sizes of mice available: small newborn pinks up to jumbo adults. Prices start at \$25 per 100. Feeders are separate in the resealable bag, not frozen together. Low shipping rates. Free price list. Kelly Haller, 4236 SE 25th Street, Topeka KS 66605, (913) 234-3358 evenings and weekends.

For sale: **Pillstrom Snake Tong**s are available from the manufacturer and are shipped worldwide. Lengths/prices: 26"/\$63, 36"/\$64, 40"/\$65, 46"/\$66, 50"/\$67. Shipping and handling costs in the U.S.: \$8 for the first tong, \$1 for each additional. Pillstrom Tong, 4617 Free Ferry Road, Fort Smith AR 72903-2363, (479) 452-3001 phone, (479) 452-3671 fax. E-mail: pillstromt@aol.com. Website <members.aol.com/mpillstrom>.

For sale: books on African herps. *Snakes of Southern Africa* by Vivian FitzSimons, 1962, 423 pp., 76 color plates, 43 b&w photos, 243 line drawings, range maps, DJ somewhat torn and some missing, otherwise excellent condition, comprehensive natural history info, hardbound, \$75; *The Reptiles of the Kruger National Park* by U. De V. Pienaar, 1966, 223 pp., 100 b&w plates, range maps, softbound, \$40; *Reptiles of Southern Africa* by Rod Patterson, 1987, 128 pp., 232 color plates, includes captive husbandry info, plastic covers, \$25; *Snake versus Man* by Johan Marais, 1985, 102 pp., 62 color plates, a guide to South African species, plastic covers, \$20; *Snakes of Rhodesia* by Broadley and Cock, 1975, 152 pp., 64 color plates, keys, paperbound, \$25; *Snakes of Nyasaland* by R. C. H. Sweeney, 1961, 200 pp., 5 b&w plates, 43 figs., DJ, extensive field observations, hardbound, \$48. Books in excellent condition except as noted. Postage paid for orders \$25 and over, \$2.50 for orders under \$25. Send E-mail address for complete booklist. William R. Turner, 7395 S. Downing Circle West, Littleton, CO 80122, (303) 795-5128. E-mail: SMUparent@aol.com.

For sale: For pick-up only—will not ship. Oceanic Lizard Lounge tank (48 × 17 × 18")—granite frame; 48" fluorescent light strip; tank stand, metal gray textured, double (upper and lower), custom white wood base installed in top position; tank cover, interlocking glass sections w/light sockets, including ceramic bulb; ZooMed Repti-Therm heating pad installed on base of tank. All items are in like-new/excellent condition. Terms of sale: Need to sell everything as a set; offer price—\$275 or closest offer; cash only. Robert Cohen, (847) 433-2531. E-mail: robertcohen@alum.mit.edu.

For sale: Cages—2-Neo arboreal 23×22×24, \$75 each; Vision 3-24×13 including rack, \$75 for all 3; Vision 2-48×29×29, \$75 each; Vision 1-29×24×23 arboreal, \$75; Vision 3-54×18×36 (for large reptiles), \$100 each; \$650 buys all of them!!! You pick them up in Chicago. Nick Rosa, (312) 375-0723; E-mail: nerosa@aol.com.

For sale: one male and two female adult green tree pythons, awesome, ready to breed (one laid 14 eggs last fall but we weren't prepared to hatch them). We paid \$3500 but would sell all 3 for \$3000 including 3 Neo arboreal set-ups w/ misting system. Nick Rosa, (312) 375-0723; E-mail: nerosa@aol.com.

For sale: two 18" creamsicle cornsnakes, \$75 each; one 18" motley cornsnake, \$75; one 3' sunglow motley cornsnake, \$100; two 15" gray-banded/mountain kingsnake hybrids, \$60 each; four 18" blue beauty ratsnakes, \$50 each; two breeding pairs of blue beauty ratsnakes, ~6', \$300 each; one male and two female 3' Chinese beauty ratsnakes, \$250/ trio; three 5–6' cave-dwelling ratsnakes (*ridleyi*), \$1800; one 9' Taiwan beauty ratsnake, docile, \$250; one 28" green tree python, \$350. All are captive-bred. Will consider "best offer" on most. Will deliver in greater Chicago area. Bill, (708) 799-6697.

Free to good home: Colombian red tailed boa constrictor, about 6 feet long, great feeder, very docile. David, (847) 615-2459, after 7 P.M..

Herp Tours: Why pay more? Travel with the International Fauna Society, a 501 (c)3 not-for-profit organization, and experience the Costa Rican rainforest! Stay at the beautiful Esquinas Rainforest Lodge in the untouched herpetological paradise that is Piedras Blancas National Park. Meet new friends, relax in the naturally-filtered swimming pool or in the lush, fauna-filled tropical garden. Discounts for IFS and Chicago Herp Society members. For details, visit The International Fauna Society website at www.faunasociety.org or E-mail: joea@faunasociety.org.

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Pet Sitting: In-home care for all your pets' needs. Specializing in reptiles, amphibians, birds, fish, dogs, cats... Very passionate in herpetology, experienced vet technician at an exotic animal hospital, aquarium technician for over 10 years. Great references available. Call Lisa Collins to book your special care requests, (847) 644-3681. [Northshore based]

Wanted: big-headed turtles; mata mata turtles; Mexican giant mud turtles (*Staurotypus triporcatus*); exceptionally large common snappers (45 lbs. & up); large alligator snappers (over 90 lbs.); spectacled caiman from Trinidad, Tobago and Surinam; dwarf caiman; smooth-fronted caiman; albino turtles (except red-eared sliders). Walt Loose, (610) 926-6028, 9:00 A.M. – 1:00 P.M. or after 11:30 P.M. Eastern Time.

Line ads in this publication are run free for CHS members — \$2 per line for nonmembers. Any ad may be refused at the discretion of the Editor. Submit ads to: Michael Dloogatch, 6048 N. Lawndale Avenue, Chicago IL 60659, (773) 588-0728 evening telephone, (312) 782-2868 fax, E-mail: <MADadder0@aol.com>.

News and Announcements

VOLUNTEERS NEEDED

Fauna Forever is a research initiative of the Tambopata Reserve Society (TReeS, UK Registered Charity No. 298054) that aims to determine the effect of tourism on mammals, reptiles, frogs and birds at five lodges in the Tambopata Area of Madre de Dios, Peru. The group is having no problems finding volunteers for the mammal and bird teams but has had limited interest to date in the places on the herpetology teams. Over the 1-year duration of the project, the Project Fauna Forever research team will require the assistance of 24 volunteers to contribute their time and energy towards a challenging initiative that aims to improve the way man uses the rainforest and its natural resources. The project is broken into four 3-month phases: 7 February 2004 – 28 April 2004; 12 May 2004 – 1 August 2004; 15 August 2004 – 4 November 2004; and 18 November 2004 – 7 February 2005. International volunteer assistants will be required to cover the costs of their participation; additional information about the project can be found at www.faunaforever.com.

HERP OF THE MONTH

Each monthly meeting will showcase a different herp. CHS members are urged to bring one specimen of the “Herp of the Month” to be judged against the entries from other CHS members. Prizes will be awarded to the top three winners as follows: 1st place—6 raffle tickets at next meeting; 2nd place—4 raffle tickets at next meeting; 3rd place—2 raffle tickets at next meeting. Here are the categories for the coming months:

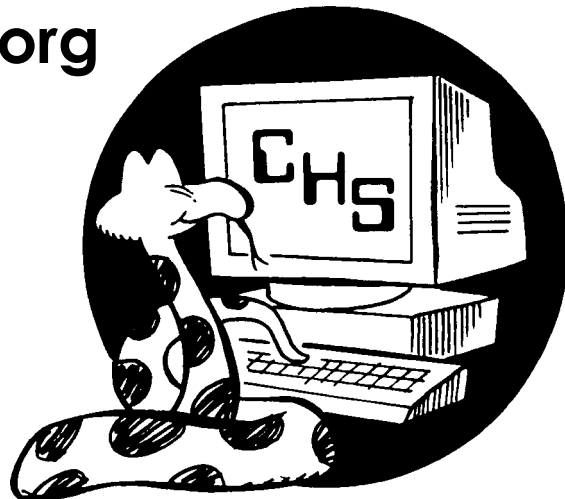
Month	Description of Contestants
September 2003	Rescued and adopted herps
October 2003	Bearded dragons
November 2003	Tortoises
December 2003	Python species that do not exceed 8' in length
January 2004	Herps from South America
February 2004	Herps from Africa
March 2004	Amphibians of the world
April 2004	Beginner herps
May 2004	Herps from Madagascar

Next time you surf the WorldWide Web, crawl, run, slither, slide, jump, or hop over to the CHS web site!

www.chicagoherp.org

You'll find:

- **Announcements**
- **CHS animal adoption service**
- **CHS events calendar & information**
- **Herp news**
- **Herp links**
- **Meeting/guest speaker information**
- **Photos of Illinois amphibians & reptiles**
- **Much, much more!**



Chicagoherp.org is accepting applications for banner advertisements or links from herpetoculturists and manufacturers of herp-related products. Visit the site and contact the webmaster for details on how you can sponsor CHS!

UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, September 24, at the Peggy Notebaert Nature Museum, Cannon Drive and Fullerton Parkway, in Chicago. **Jessi Krebs**, supervisor of reptiles and amphibians at the Henry Doorly Zoo in Omaha, Nebraska, will present a program entitled “Research, Conservation and Husbandry of Hellbenders and Giant Salamanders.” Jessi is a founding member of the Cryptobranchid Interest Group, which is supported by the American Zoo and Aquarium Association. He is also involved with the Puerto Rican crested toad recovery project and several other herp-related conservation and research projects.

At the October 29 meeting **Geoffrey G. Sorrell** of Waverly, Alabama, will speak on the “Population Ecology of the Eyelash Viper, *Bothriechis schlegelii*, in Western Panama.” His study was partially funded by a Chicago Herpetological Society grant last year.

The regular monthly meetings of the Chicago Herpetological Society are held at Chicago's newest museum—the **Peggy Notebaert Nature Museum**. This beautiful new building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meetings are held the last Wednesday of each month, from 7:30 P.M. through 9:30 P.M. Parking is free on Cannon Drive. A plethora of CTA buses stop nearby.

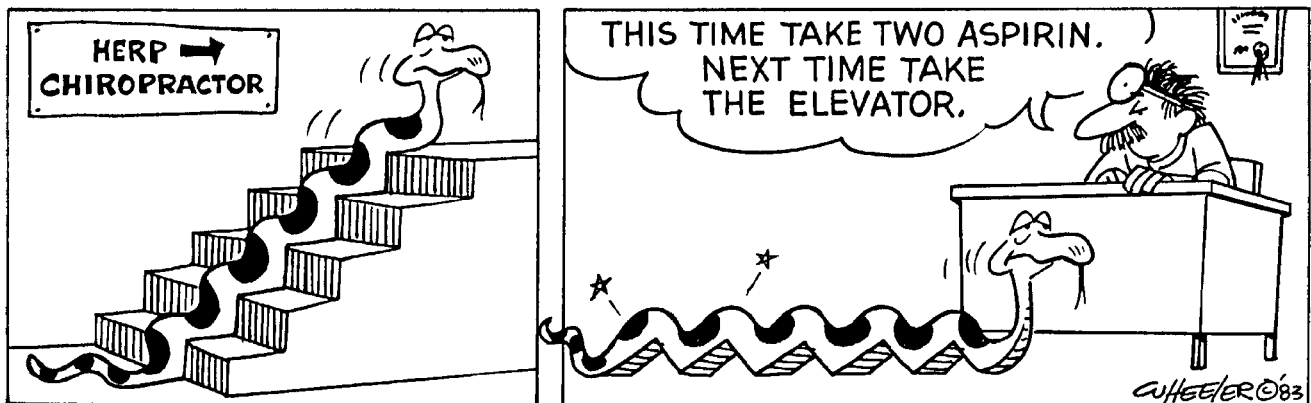
Board of Directors Meeting

Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? If so, mark your calendar for the October 17 board meeting, to be held at the North Park Village Administration Building, 5801 North Pulaski Road, Chicago. To get there take the Edens Expressway, I-94, and exit at Peterson eastbound. Go a mile east to Pulaski, turn right and go south to the first traffic light. Turn left at the light into the North Park Village complex. At the entrance is a stop sign and a guardhouse. When you come to a second stop sign, the administration building is the large building ahead and to your left. There is a free parking lot behind the building.

The Chicago Turtle Club

The monthly meetings of the Chicago Turtle Club are informal; questions, children and animals are welcome. Meetings normally take place at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Parking is free. For more info call Lisa Koester, (773) 508-0034, or visit the CTC website: <http://www.geocities.com/~chicagoturtle>.

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