seasonal staff at BBNWR whose perserverance and dedication has made our efforts successful. We owe a special debt of gratitude for the technical support provided by K. A. Phelps. BBNWR field personnel were partially supported by the U.S. Army Corps of Engineers, Norfolk, Virginia. We thank J. Geiger, D. Stewart, and J. Robinette for helpful comments on earlier drafts of the manuscript.

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NATURAL HISTORY NOTES

Instructions for contributors to Natural History Notes appear in Volume 29, Number 1 (March 1998).

CAUDATA

AMBYSTOMA OPACUM (Marbled Salamander). **ALBINISIM**. Herein we report three partially albino *Ambystoma opacum* larvae. Two were discovered from the same vernal pool in Tiverton, Newport County, Rhode Island, USA (BD, JB) during 1988. A third specimen was found during March 1997 from a vernal pool in Lyme, Connecticut, USA (HG).

On 31 March 1988, an albino *A. opacum* larva (46 mm TL) was captured in 16.5 cm of water at 1535 h. The ambient temperature was 13.5°C; water temperature was 12°C. A second albino larva (50 mm TL) was captured on 6 May 1988 in 30.5 cm of water at 1200 h; ambient temperature and water temperature were 15.5°C and 14.5°C. This specimen was photographed at the capture site and released.

The coloration of both living animals appeared identical. Alive, the larval integuments were transparent with a yellowish cast; eyes appeared normally pigmented except that the pupils were pink, and the visceral organs, major blood vessels, and developing cranium were clearly visible through the integument. The external gills were flushed orange-red from blood. Preserved, the first larva appeared chalky-white with a slight hint of its former yellowish cast. This animal was catalogued in the American Museum of Natural History (AMNH 130240). Using definitions from Harris (1970. Bull. Maryland Herpetol. Soc. 6:21–22), both specimens were partial albinos, possessing integumentary xanthophores and orbital melanophores.

On 27 March 1997, another albino *A. opacum* larva was discovered in a vernal pool in Lyme, Connecticut. The coloration of this specimen was similar to that of the Tiverton larvae except the gills were yellowish and showed no red coloration from its blood, the eyes were slightly darker yellow than the integument, and most of the tail musculature was devoid of color and appeared white. The animal was placed in a jar, photographed, and returned to the pool. Color slides of this larva were sent to AMNH.

Albinism in *A. opacum* has been documented twice previously, once from Maryland (Harris, *op. cit.*) and once from Mississippi (Dyrkacz 1981. SSAR Herpetol. Circ. No. 11). To our knowledge, this is the first documentation of albinism for *A. opacum* in New England.

We thank Dr. Wang Yong and Charles W. Painter for their comments on this manuscript.

Submitted by **BOB DEEGAN**, 97 Raymond Street, Fairhaven, Massachusetts 02719, USA, **JOHN BERKHOLTZ**, Franklin Park Zoo, Children's Zoo, 1 Franklin Park Road, Boston, Massachusetts 02121, USA, and **HANK GOLET**, 5-1 Binney Road, Old Lyme, Connecticut 06371, USA.

GYRINOPHILUS PORPHYRITICUS (Spring Salamander). **COLORATION**. Although many *Gyrinophilus porphyriticus* spend much time underground, making use of subterranean springs and caves (Bishop 1947. Handbook of Salamanders. Comstock, Ithaca, New York. 535 pp), albinism has been reported in only one population (Brandon and Rutherford 1967. Am. Midl. Nat. 78:537–540; Dyrkacz 1981. SSAR Herp. Circ. 11). On 1 May 1997 in Chenango County, New York, USA, we found an albino (leucistic) larval *G. porphyriticus* (66 mm SVL, 50 mm TL) at the emergence of an underground spring ca. 550 m elev. The individual had a completely pigmentless integument, gills pink with hemoglobin, and normally pigmented eyes. A total of 15 larvae and adults, all normally pigmented, were found at the same site over a 15 day period. The specimen is deposited in the SUNY Cortland Bowers Natural History Museum (97-101PKD).

Submitted by **CARMEN FERRIERO**, **SCOTT MILLER**, **MATTHEW CHAPMAN**, and **PETER K. DUCEY**, Department of Biological Sciences, State University of New York at Cortland, Cortland, New York, 13045 USA.

PLETHODON HUBRICHTI (Peaks of Otter Salamander). **ALBINISM**. Albinistic and leucistic salamanders in the genus *Plethodon* have been recorded for *P. cinereus* (Harris 1968. Bull. Maryland Herpetol. Soc. 4:57–60; Pauley 1974. Redstart 41:104), *P. dorsalis* (Thurow 1955. Copeia 1955:62–63), *P. glutinosus* (Piatt 1931. Copeia 1931:29), and *P grobmani* (reported as *P. glutinosus*, Highton 1956. Copeia 1956:75–93).

On 26 May 1996, we found a leucistic, gravid, adult female *P. hubrichti* (53 mm SVL, 111 mm total length, 1.9 g) in the George Washington and Jefferson National Forest, 960 m, 7.0 km SE Arcadia (79°33'55", 37°29'38"), Botetourt County, Virginia, USA (Fig. 1). Integumentary pigment was completely lacking, although she had normally pigmented eyes. She was found in a six-year-old clearcut of striped maple (*Acer pennsylvanicum*) and red oak (*Quercus ruber*) saplings. We maintained the female in captivity to obtain reproductive data but despite efforts to induce feeding, she died about 10 weeks after capture. This is the first record of the leucistic phase of albinism in this endemic Blue Ridge Mountains species. The specimen is catalogued in the Virginia Museum of Natural History (VMNH 8086).

FIG. 1. Leucistic albino *Plethodon hubrichti*.

Submitted by **MICHAEL S. HAYSLETT**, 923 Euclid Avenue, Lynchburg, Virginia 24501, USA, **GORDON L. WILSON**, Department of Biology, Liberty University, Lynchburg, Virginia 24506, USA, and **JOSEPH C. MITCHELL**, Department of Biology and School of Continuing Studies, University of Richmond, Richmond, Virginia 23173, USA.

TARICHA TOROSA TOROSA (Coast Range Newt). **PREDATION**. On 20 July 1996 at the Santa Rosa Plateau Ecological Reserve, Riverside County, California, USA, we obtained a 194 mm SVL adult male bullfrog (*Rana catesbeiana*). Examination of its stomach contents revealed two predaceous water beetles (Dytiscidae) and a recently ingested, 76 mm SVL, adult male, *T. t. torosa*. The newt was deposited at the California Academy of Sciences (CAS 203181).

From 30 June–23 September 1997 at Ledson Marsh, Annadel State Park, Sonoma County, California, 3 adult and 2 larval *T. t. torosa* were flushed from the stomachs of an adult male and 3 adult female *R. catesbeiana* 183, 180, 141, and 122 mm SVL. In all cases, the skin of the adult newts had been digested. Other prey items included 3 subadult Pacific treefrogs (*Hyla regilla*) and one dragonfly nymph (Aeshnidae).

Bullfrogs have been poisoned by ingesting northern rough-skinned newts (*Taricha granulosa granulosa*) in Oregon under both experimental and wild conditions (Brodie 1968. Copeia 1968:307–313). These observations presumed that since bullfrogs were recently introduced into the American West and did not co-evolve with Pacific newts (*Taricha* spp.), they have not had sufficient time to develop any resistance to the potent toxins found in all life stages of *Taricha*. Our observations provide evidence that adult bullfrogs consume both larval and adult *T. t. torosa* in the wild, and naturalized bullfrogs may indeed have acquired some resistance to tetrodotoxin.

Our thanks to Robin Wills, Scott Principil, and Gary Bell for assistance in the field, and to Galen B. Rathbun and Norman J. Scott, Jr. for reviewing the manuscript. Permission to collect specimens was granted under California Department of Fish and Game permits issued to the authors. The Nature Conservancy allowed the use of facilities on the Santa Rosa Plateau Ecological Reserve.

Submitted by **MARK R. JENNINGS**, U.S. Geological Survey, Biological Resources Division, California Science Center, Piedras Blancas Field Station, P.O. Box 70, San Simeon, California 93452-0070, USA, and Research Associate, Department of Herpetology, California Academy of Sciences, Golden Gate Park, San Francisco, California 94118-9961, USA; and **DAVID COOK**, Biology Department, Sonoma State University, 1801 E. Cotati Avenue, Rohnert Park, California 94928-3613, USA.

TARICHA TOROSA (California Newt). **PREDATION**. Members of the genus *Taricha* are known to contain toxic skin secretions and terrestrial forms have few predators (Stebbins and Cohen 1995. A Natural History of Amphibians. Princeton Univ. Press. Princeton, New Jersey. 316 pp).

On 15 July 1997 at 1500 h along a first order stream in the Santa Monica Mountains, Los Angeles County, California, USA, we found a ringneck snake (*Diadophis punctatus* 48 cm TL, 40 cm SVL) swallowing a *T. torosa* (7.8 cm TL, 3.8 cm SVL). The head and forelimbs of the newt were entirely consumed with only the hindlimbs and tail protruding. When we picked up the snake it was lethargic and did not attempt to move. We were unsure if the snake's behavior was defensive or a reaction to the newt toxins. The snake was collected and returned to the laboratory where it remained lethargic. The next morning (15 h later) the snake had regurgitated the newt. The snake's behavior appeared normal and the newt was dead. Based on these observations it is unclear if *T. torosa* are a regular part of the diet of *D. punctatus*. However, *D. punctatus* apparently attack *T. torosa* and a percentage of these attacks likely result in mortality for the newts either because of consumption or capture.

Submitted buy **LEE B. KATS, JEFF A. GOODSELL, NICOLE MATTHEWS, CATHY BAHN**, Natural Science Division, Pepperdine University, Malibu, California 90263, USA, and **ANDREW R. BLAUSTEIN**, Zoology Department, Oregon State University, Corvallis, Oregon 97331, USA.

ANURA

HYLA AVIVOCA (Bird-voiced Treefrog). **AMPLEXUS and OVIPOSITION**. Compared to most other North American *Hyla*, little is known about the life history of *Hyla avivoca*, with most data collected from chorusing males. The non-vocal females are seldom observed, and previously reported observations on oviposition (Hellman 1953. Publ. Res. Div. Ross Allen's Rept. Inst. 1:61–74; Trauth and Robinette 1990. Bull. Chicago Herpetol. Soc. 25:218–219; Volpe et al. 1961. Copeia 1961:340–349) were of females of amplexing pairs collected in the wild that later oviposited in the lab or in collecting containers. Herein I report observations of amplexus and oviposition in two pairs of *H. avivoca* in nature.

The first observation took place on 24 May 1997 at Bell Pond, Johnson Co., Illinois, USA (T13S R4E SW/4 Sec. 11). Air temperature was 20°C with light but steady rain. At 2211 h a female was observed approaching a male calling on a limb of a pumpkin ash (*Fraxinus tomentosa*) ca. 1.7 m above water and 3 cm from the trunk. The tree was in clear water 8 cm deep. The female ascended the tree and when she reached the male (at 2215 h) she reached out with one hand and touched him on a hind limb. The male immediately turned toward her, climbed onto her, and clutched her in axillary amplexus. As the male was mounting and for several minutes afterwards, he emitted a call that sounded like the breeding call, but which had a more "raspy" sound (possibly because he was unable to fully inflate his vocal sac). The pair remained on the perch until 2227 h when they descended the tree head first. At 2235 h when the pair reached the water, the female paused and remained still until 2241 h then she turned and oriented so that her head faced up the tree with her cloaca ca. 1 cm above the water. She then backed into the water until the posterior third of her body and half of the male's body were submerged. Oviposition began immediately. The female arched her back and released one or both hind limbs from their grip on the tree trunk and appeared to close both eyes each time a cluster of eggs was laid. The first cluster of six eggs sank slowly to the substrate. Additional clusters of 3–9 eggs were laid at 1–4 min intervals over the next 40 min and I estimated 150–180 eggs were laid. Most sank slowly to the pond substrate of dead leaves and formed one mass, but at least three clusters adhered to the trunk of the tree between the water surface and substrate. This observation ended at 2324 h with the pair still amplexed and ovipositing.

The second observation began at 2110 h on 3 July 1997 at Reevesville Swamp, Pope Co., Illinois, USA (T13S R5E NW/4 Sec 31). A female was observed ascending the stem of a reed (*Phragmites* sp.) near another on which a male was calling ca. 1.3 m above the water. She paused when the male stopped calling

and rapidly climbed the reed she was on, or moved closer when the male resumed calling. By 2117 h the female had reached the base of the leaf where the male was perched. When she stepped onto the leaf the male oriented toward her, then climbed onto her (head first) and clasped her in axillary amplexus. The male continued to call (though the calls sounded more raspy than before) until 2123 h. The pair remained in place until 2132 h when the observation was interrupted. By 2140 h the female had descended to within 0.3 m of the water and climbed onto a low buttonbush (*Cephalanthus occidentalis*) branch in contact with the reeds where amplexus began. The female continued to descend the branch until she reached the water at 2147 h. She continued on the branch until her body (behind the shoulders) was submerged (only the posterior third of the male was submerged). The water was fairly clear, ca. 0.2 m deep over a substrate of mud, and covered by a thick mat of duckweed (mostly *Lemna* sp.) thus making oviposition difficult to observe. At 2153 h the female released her hind limb grip, thrust her head and cloaca upwards, and deposited an egg cluster. This behavior was repeated four times by 2205 h when I attempted to determine if eggs were sinking by gently scooping up or pushing duckweed from behind the frogs. One cluster of three eggs adhered to the *Cephalanthus* branch, but no others were seen. I ended the observation at ca. 2210 h. During subsequent visits on 6 and 10 July, three and seven *H. avivoca* tadpoles were collected from well shaded water in the interior of the same *Phragmites* thicket. Despite repeated attempts, no *H. avivoca* tadpoles were seen in an adjacent sunlit pond with scattered cattail (*Typhus* sp.) and *Cephalanthus* stands (where *H. cinerea* and *Acris crepitans* tadpoles were abundant), nor in a shaded cypress (*Taxodium distichum*)-tupelo (*Nyssa aquatica*) swamp where many male *H. avivoca* were heard calling previously.

I thank R.A. Brandon for reading a draft of this manuscript.

Submitted **by MICHAEL REDMER**, Department of Zoology, Southern Illinois University at Carbondale, Carbondale, Illinois 62901-6501, USA.

HYLA CHRYSOSCELIS (Gray Treefrog). **HIBERNACULA.** On 14 December 1996, ca. 15 km NE Fredericktown, Knox County, Ohio, USA, at a site composed predominantly of sugar maple (*Acer saccharum*), I unearthed a *Hyla chrysoscelis* from its apparent hibernaculum. This specimen was found 30.2 cm from the base of a sugar maple that was joined with another at its base. Both litter and soil were carefully raked out from the base of the tree in a circular fashion for one meter. Another *H. chrysoscelis* was discovered on the south side of the same tree 57 cm from the base. Leaf litter depth varied from 3.5–7 cm. The frogs were located 2.5 and 5.0 cm beneath the soil surface. Air temperature was ca. 4°C and the soil was not frozen. The leaf litter and soil around the base of eight additional trees were investigated in a similar manner and three more *H. chrysoscelis* were discovered. All were found in the soft, loose soil, but not in any of the numerous rodent tunnels at the bases of the trees. The total area examined was ca. 200 m^2.

In all cases the specimens were found in situations above the frostline. *Hyla chrysoscelis* is a freeze-tolerant species, known to survive temperatures less than 3°C and shows blood glucose concentration and dehydration levels that are similar to *H. versicolor* (Costanzo et al. 1992. Copeia 1992:565–569). Based upon this information it should not be surprising to find *H. chrysoscelis* during the winter months in shallow hibernacula as noted in this observation.

Submitted by **GARY BURKHOLDER**, Department of Biology, Mt. Vernon Nazarene College, Mt. Vernon, Ohio 43050, USA.

HYPEROLIUS TUBERILINGUIS (Tinker Reed Frog). **OVIPOSITION.** Nest building behavior in frogs appears to have evolved independently in at least five families: Rhacophoridae, Myobatrachidae, Leptodactylidae, Hylidae, and Hyperoliidae (Haddad et al. 1990. J. Herpetol. 24:225–226; Duellman and Trueb 1994. Biology of Amphibians, Johns Hopkins University Press, Baltimore, Maryland). Few reports describe the details of nest construction and few data exist on the breeding behavior of the largely African family Hyperoliidae. *Hyperolius tuberilinguis*, a widely distributed species throughout the eastern coastal plain from Kenya to KwaZulu-Natal, South Africa (Pallet and Passmore 1988. Bioacoustics 1:13–23), deposits its eggs in a nest constructed of egg jelly attached to emergent vegetation. Rose (1962. The Reptiles and Amphibians of Southern Africa, Maskew Miller, Cape Town) described the nest as "a mass of very sticky, crystal clear jelly attached to the stalks (of plants) about five inches above the water." Wager (1986. Frogs of South Africa. Delta Books, Craighall) and Poynton and Broadley (1987. Ann. Natal Mus. 28[1]:161–229) make similar observations but add that the size of the nest is ca. 35 x 50 mm. The process of oviposition and nest construction has not been observed (Passmore and Carruthers 1995. South African Frogs: a Complete Guide, Witwatersrand University Press / Southern Books, Johannesurg). Herein we report on the behavior associated with oviposition and nest construction in *H. tuberilinguis*.

On 10 February 1997, four amplexing pairs of *H. tuberilinguis* were observed at Wits Pond, Twinstreams Farm, Mtunzini, KwaZulu/Natal (28°51'S; 31°46'E), South Africa, between 2200 h and 0300 h. The first pair formed at ca. 2220 h, the second and third at ca. 2330 h. The fourth pair was not observed forming. Oviposition and nest construction were observed in two of these pairs. The first pair initiated oviposition by 2300 h on a leaf of *Hibiscus diversifolius* 210 mm above the water. The second pair deposited an egg mass at the base of an emergent *Typha capensis* 20 mm above the water.

Oviposition involved the pair positioning themselves heads up on the leaf. The female grasped the edges of the leaf with both fore- and hind-limbs. Males did not help with the grasping of the leaf. An initial egg mass was laid with only the male appearing to push the eggs against the leaf with his hind-limbs. Oviposition took 25 min. for the first pair and 23 min. for the second, with egg masses measuring 37 x 31 mm and 44 x 39 mm.

Both pairs left the egg masses when oviposition was complete and returned ca. 6–7 m to the water. One pair remained half-submerged in the water for 50 min, the second pair remained half-submerged for 65 min. Both pairs then returned to the previously laid egg masses. During this entire period the male and female remained in amplexus. Upon reaching the egg mass the pairs proceeded to deposit more egg jelly on the egg mass after a delay of three minutes for the first pair and two minutes for the second. The process of adding egg jelly lasted for 30–40 min. in both pairs. During this time no more eggs were deposited. Both the male and female spread the jelly over the egg mass using their hind-limbs. Only the female appeared to contribute to the production of the jelly. This procedure, of returning to the water and then to the egg mass to deposit more egg jelly, occurred twice in both pairs. The elapsed time from commencement of egg laying until completion of the nest was 190 min. for the first pair and 210 min. for the second. The completed egg masses measured 59

x 55 and 58 x 50 mm. The added egg jelly was clear and extremely viscous. It remained moist until the nest's degeneration, ca. 3 days later, and the subsequent emergence of the tadpoles. The construction of nests by *H. tuberilinguis* appears to be unique in this family. We know of no other published accounts of nest construction for members of the Hyperoliidae, specifically *Hyperolius*.

We thank the Foundation for Research Development for funding and Mondi Forests, South Africa for permission to work on their property.

Submitted by **MERVYN C. MASON** and **NEVILLE I. PASSMORE**, Communication and Behaviour Research Group, Department of Zoology, University of the Witwatersrand, Private Bag 3, P.O. WITS, Johannesburg, 2050, South Africa.

RANA CASCADAE (Cascades Frog). **PREDATION.** *Rana cascadae* is nearly extinct at its southernmost limit—Lassen Volcanic National Park and vicinity, northern California, USA (Fellers and Drost 1993. Biol. Conser. 65:177–181). About 150 km NW of the Lassen area, *R. cascadae* persists at some sites in the Shasta area (pers. obs.; Fellers and Drost, *op. cit.*). One of many hypotheses why amphibians have declined is that novel (non-native) predators harm populations through evolutionarily unprecedented predation (Hayes and Jennings 1986. J. Herpetol. 20:490–509). But little direct evidence exists documenting the presumed predation. Here I present an observation of *R. cascadae* predation that supports the novel predator hypothesis.

On 17 October 1992 I observed an adult *R. cascadae* (ca. 50 mm SVL) jump into Butte Creek at ca. 1765 m elevation on the northeast slope of Mount Shasta volcano. The frog remained motionless on the creek bottom for several seconds, but was seized and eaten by a brown trout (*Salmo trutta*; ca. 200 mm fork length [FL]) as the frog began to swim downstream.

This observation confirms that *S. trutta* will eat *R. cascadae* under natural conditions, and that fish predation threatens adult frogs as well as (presumably) tadpoles (Bradford 1989. Copeia 1989:775–778). Fish do not always decimate *R. cascadae* populations, however, as a simple predation hypothesis might suggest (see Jennings 1996. Status of Amphibians, Sierra Nevada Ecosystem Project: Final Report to Congress, Centers for Water and Wildland Resources, University of California, Davis). A reproductive population of *R. cascadae* persists at Gumboot Lake west of Mt. Shasta City despite the presence of a trout fishery at the lake (pers. obs.; Fellers and Drost, *op. cit.*). For more than 25 years, California Department of Fish and Game has repeatedly stocked ca. 180 mm FL rainbow trout (*Oncorhynchus mykiss*) and brook trout (*Salvelinus fontinalis*) into the lake for sport fishing.

I thank Matt Simons, Brad Shaffer, Michael Rode, and Mark Jennings for assistance. Research was funded in part by The California Nature Conservancy and University of California at Davis.

Submitted by **LEE H. SIMONS**. Shasta Natural History Foundation, 913 Shasta Avenue, Yreka, California 96097-3115, USA.

RANA CATESBEIANA (Bullfrog). **DIET**. *Rana catesbeiana* is known to prey upon a wide range of small vertebrates (Bury and Whelan 1984. U.S. Fish and Wildl. Serv. Publ. 155. U.S. Dept. Interior, Washington, D.C.). Herein I report predation on *Thamnophis atratus hydrophilus*, *Elgaria multicarinata*, *Sceloporus occidentalis*, and *Rana boylii*, species previously unreported as prey. Voucher specimens are catalogued into the California Academy of Sciences (CAS).

On 24 June 1997, I collected a male *R. catesbeiana* (134.1 mm SVL, 298.3 g, CAS 203708) in Cache Creek, Colusa County, California, USA (38°55'29"N, 122°19'54"W) that contained a *Thamnophis atratus hydrophilus* (392 mm SVL, 515 mm total length, 22.7 g, CAS 204236).

On 6 September 1997, I collected a female *R. catesbeiana* (80.7 mm SVL, 59.65 g, CAS 203709) in Bear Creek, Colusa County, California (38°03'24"N, 122°24'41"W) that contained a *Sceloporus occidentalis* (31 mm SVL, 1.5 g, CAS 204238).

On 13 May 1997, I collected a female *R. catesbeiana* (128.8 mm SVL, 288.9 g) in Davis Creek, Yolo County, California (38°53'36"N 122°22'01"W) that contained an *Elgaria multicarinata* (54.8 mm SVL, 2.28 g, with a 9.3 mm tail remnant, CAS 204237). The bullfrog was not retained.

Also on 13 May 1997 at the Davis Creek site, I observed a male *R. catesbeiana* (105 mm SVL, CAS 203633) at 2230 h behaving in a manner consistent with subduing and swallowing moving prey. I hand-grabbed the frog and as I squeezed it for a more secure grasp, the hind feet of another anuran protruded from its mouth. I grabbed the feet and pulled a female *Rana boylii* (45 mm SVL, CAS 203634) from the stomach of the *R. catesbeiana*. The *R. boylii* appeared unharmed and lived until preserved the next morning. The *R. catesbeiana* also contained the partially digested body of another *R. boylii* (CAS numbers pending).

Moyle (1973. Copeia 1973:18–22) inferred that predation by *R. catesbeiana* was a causal factor in the decline and/or disappearance of native ranid frogs, including *R. boylii*, in parts of California. However, he and subsequent authors (Hayes and Jennings 1986. J. Herpetol. 20:490–509; Kupferberg 1997. Ecology 78:1736–1751) who have examined the issue of competition between *R. catesbeiana* and *R. boylii*, offered no direct evidence of predation by *R. catesbeiana* in the field. It is notable that the *R. catesbeiana* that ate the *R. boylii* was smaller than most individuals from a series of adults collected in the watershed (mean = 128.3 mm SVL; range = 81.4–175.7 mm SVL; SD = 22.7 mm; N = 43); thus most adult *R. catesbeiana* present can be assumed capable of preying on *R. boylii*.

I thank Ray Krause of the Homestake Mine and Paul Elliott of the Payne Ranch for access to collecting sites, and Patrick Davis, Roger Hothem, Mark Jennings, and Norm Scott for help collecting specimens. Specimens were obtained under scientific collecting permits issued by the California Department of Fish and Game.

Submitted by **JOHN J. CRAYON**, U.S. Geological Survey, Biological Resources Division, California Science Center, Davis Field Station, c/o Wildlife, Fish, and Conservation Biology, University of California, Davis, California 95616–5224, USA.

ZACHAENUS PARVULUS (Leaf Frog)**. DEFENSIVE BEHAVIOR and COLOR PATTERN**. Certain leaf-litter leptodactylids (e.g., *Proceratophrys appendiculata*) and microhylids (e.g., *Stereocyclops incrassatus*) display a defensive behavior in which they flatten their body and become immobile, thus acquiring a leaf-like body shape. Together with cryptic coloration, this position should help prevent detection by visually oriented predators (Sazima 1978. Biotropica 10:158). Sazima (*op. cit.*) reported similar behavior by *Zachaenus parvulus*, a leptrodactylid frog endemic to the Atlantic Rainforest of SE Brazil. However, because of the restricted number of observations, he provided only scant details. Here we report field observations of the defensive behavior of *Z. parvulus* and include information on color pattern variation in living frogs.

These observations were made at the Atlantic Rainforest area of Ilha Grande (23°11'S, 44°12'W), an island in southern Rio de Janeiro State, southeastern Brazil. On several occasions (N = 14) we observed *Z. parvulus* display the following behavior: when disturbed they jumped 10–15 cm and, just after landing, remained immobile with the forelimbs and hindlimbs fully extended forward and backwards, the extended limbs remaining along the axis of the body with the body flattened against the ground. If touched, individuals remained immobile and maintained this posture even if overturned. This behavior, together with the color pattern, results in individuals resembling a fallen leaf. During another observation, one individual did not display this complete behavioral sequence but only flattened the body against the ground (MASA, pers. obs.).

Lutz (1944. Bol. Mus. Nac. Rio de Janeiro 17:1–66) provided the only information on the color pattern of *Z. parvulus* in life and reported the dorsal color could be greenish, yellowish, light-wine, or brown. Live individuals in the Ilha Grande population have considerable variation in dorsal color pattern. Of 17 individuals examined 6 (35.3%) were beige with dark-gray bands, 5 (29.4%) light gray, 3 (17.6%) orange, 2 (11.8%) dark-gray, and 1 (5.9%) light-green. Preserved individuals lose their original color after a few days in preservative (pers. obs.). The preferred microhabitat of *Z. parvulus* at Ilha Grande is under fallen tree trunks where various colored fungi are common.

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Submitted by **CARLOS FREDERICO D. ROCHA, MONIQUE VAN SLUYS, HELENA G. BERGALLO, MARIA ALICE S. ALVES**, and **DAVOR VRCIBRADIC**, Setor de Ecologia, Instituto de Biologia, Universidade do Estado do Rio de Janeiro, Rua São Francisco Xavier 524, Maracanã, 20550-019, Rio de Janeiro, RJ, Brazil. e-mail (CFDR): cfdrocha@uerj.br.

TESTUDINES

APALONE SPINIFERA (Spiny Softshell) **REPRODUCTION.** Despite considerable data on reproduction in *Apalone spinifera* (reviewed by Ernst et al. 1994. Turtles of the United States and Canada. Smithsonian Institution Press, Washington, D.C. 578 pp.), Iverson (1992. Herpetol. Monogr. 6:25–42) was unable to determine relative clutch mass (RCM) for any species of Trionychidae without having to resort to an estimate. Moreover, he was able to estimate RCM only for the smooth softshell (*A. mutica*). The general absence of information on RCM reflects the difficulty in catching these wary turtles during their nesting forays.

On 10 June 1997, we captured a large female *A. spinifera* just after it had emerged from Stump Lake, a backwater of the Illinois River in Jersey County, Illinois, USA. Despite numerous observations of females at this and other sites, this was the only nesting individual we caught in four years of collecting. Because so little information exists on the relationship between female mass and clutch mass in the Trionychidae, we report details on the female and her clutch.

The female's carapace length was 402 mm measured to the nearest mm with calipers and her gravid mass was 5625 g determined to the nearest 25 g with a spring balance immediately after capture. After injection with oxytocin (Ewert and Legler 1978. Herpetologica 34:314–318), she oviposited 31 nearly spherical eggs over a three day span. The female was retained for another five days and then reinjected. However, she laid no additional eggs and was later released at the collecting site.

The eggs were weighed (nearest 0.01 g) and measured (nearest 0.1 mm) shortly after laying. Average egg mass (mean ± SD, [range]) was 7.92 ± 0.37 g (6.72–8.39 g) and average egg diameter was 24.1 ± 0.55 mm (22.7–25.0 mm). The entire clutch weighed 245.39 g. Relative clutch mass was 4.56% of maternal spent body mass when calculated using the method of Iverson and Smith (1993. Copeia 1993:1–21).

The value of RCM for this turtle was about half that estimated for *A. mutica* (9.03% of maternal spent body mass) by Iverson (*op. cit.*). However, the *A. spinifera* that we studied was much larger than the *A. mutica* (carapace length = ~211 mm, mass = ~819 g) Iverson used to estimate RCM. Iverson (*op. cit.*) found that larger species produce relatively lighter clutches and thus have lower values of RCM than smaller species.

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CARETTA CARETTA (Loggerhead Sea Turtle). **PREDATION.** Birds are well known predators of hatchling sea turtles (Dodd 1988. U.S. Fish Wildl. Serv. Biol. Rep. 88:1–110). On 26 August 1997, a Caretta Research Project team witnessed a great horned owl (*Bubo virginianus*) feeding upon *Caretta caretta* hatchlings at Wassaw National Wildlife Refuge, Georgia, USA. Weather conditions were clear and the air was warm (28°C) and humid. At 2103 h, hatchlings began to emerge from their nest chamber located in a self release hatchery. During this time, an adult *B.virginianus* flew down and began seizing *Caretta* hatchlings. After catching a hatchling, the owl would transfer the loggerhead from its talons into its mouth and fly to a nearby slash pine tree (*Pinus elliottii*) where it would eat the turtle. This process was repeated five times, and each turtle was seized before it emerged from the dune vegetation bordering the high water mark. By 2118 h, the surviving turtles from this nest had reached the sea and the owl had left the hatchery area. On 27 August 1997, between 2240–2300 h, four more *Caretta* hatchlings were caught and consumed by *B. virginianus* (presumably the same individual). The owl's feeding sequence mirrored the previous night's events.

Great horned owls commonly feed upon small reptiles (Ross 1989. Amphibians and Reptiles in the Diets of North American Raptors. Wisconsin Endangered Species Report No. 59). However, sea turtles have not been documented in the diet of *B. virginianus*. Additionally, these observations are of interest because they demonstrate predation in "protected" hatchery areas. The utilization of hatcheries as feeding territories has been documented for raccoons (*Procyon lotor*) and imported fire ants (*Solenopsis invicta*) but not for any type of avian predator (Dodd 1988, *op. cit.*; Moulis 1997. Chel. Biol. Cons. 2:433–436).

Submitted by **MICHAEL G. FRICK**, Caretta Research Project, P.O. Box 661, Tybee Island, Georgia 31328, USA; e-mail: Caretta05@aol.com.

CHELYDRA SERPENTINA (Common Snapping Turtle). **PREDATION.** Since its introduction into North America in the 1930's, the South American fire ant, *Solenopsis invicta*, has spread throughout the southeastern United States. Fire ants have been observed interfering with a nesting turtle (Whiting 1994. Herpetol. Rev. 25:25), and preying on tortoises (Landers et. al. 1980. Herpetologica 36:353–361), alligators, (Allen et al. 1997. J. Herpetol. 31:318–321) and other species of reptiles (Mount et al. 1981. J. Alabama Acad. Sci. 52:71–78). On 19 September 1992, I discovered a nest of *Chelydra serpentina* along the north shore of the Little Cahaba River, ca. 1.7 km upstream from its junction with the Cahaba River, in Jefferson Co., Alabama. Six dead hatchlings were found on or just below the surface of the nest. A large number of fire ants were on and among the hatchling snapping turtles. The nest did not appear to have been disturbed by a vertebrate predator as there was no excavation of soil at the site, and the turtles were intact with no visible injuries. All of the turtles had a prominent plastral yolk sac of an appropriate size for a hatchling, and otherwise appeared to have developed fully and normally. They appeared to have died shortly before their discovery since there was no noticeable odor or other evidence of decomposition. The presence of a large (>30 cm diameter) fire ant mound about 1 m from the nest indicates that the ants were in close proximity to the nest during a substantial segment of the incubation period. A number of empty eggshells and two intact infertile eggs were found at the site, indicating that some hatchlings may have successfully emerged from this nest. I thank Larry Zorns for companionship in the field.

Submitted by **J. STEVEN CONNERS**, Animal Science Department, Miami Metrozoo, 12400 SW 152nd Street, Miami, Florida 33177, USA.

ERETMOCHELYS IMBRICATA (Hawksbill). **PREDATION.** Necropsy of an immature female hawksbill, *Eretmochelys imbricata*, found stranded in the Florida Keys suggest that shark attack was the ultimate cause of death. The turtle had been found stranded at the furthest point south of Old Boca Chica Road on Boca Chica Key in Monroe County, Florida, USA (24°335'N, 81°412'W). It was stored frozen at the Department of Environmental Protection in St. Petersburg, Florida, until the necropsy in February 1997. The necropsy revealed that the turtle was an immature female (66.8 cm SCL). Upon dissection, deep wounds consistent with shark attack were observed. The tail and posterior marginal scutes along the right side of the carapace were missing as a result of the shark bite, and the right rear flipper was severed. Puncture marks from the attack also appeared on the left rear flipper. The bites of the shark penetrated the body cavity through the abdominal muscles. Shark bite marks on the posterior body portion suggest that the turtle may have been hiding under a coral shelf or attempting to flee its predator when attacked (e.g., Bustard 1983. *In* Harless and Morlock [eds.], Turtles: Perspectives and Research, pp. 234–235). The shark bites appeared to have led to an internal infection in the body cavity, evident from necrotic tissue found in the posterior third of the body. The infection of the tissues implies that the proximate cause of death of the animal was the persistant internal infection, rather than the shark attack itself.

Sharks are known predators of hawksbills, but their impact on hawksbill populations is unknown (Witzell 1983. FAO Fish. Sinop. 137, Rome, p. 77). Young (1992. Marine Turtle Newsletter 59:14) reports remains of a "dinner-plate" sized hawksbill found in the stomach of a tiger shark, *Galeocerado cuvier*, in the Miskito Keys. A juvenile hawksbill was recently found in the stomach of *G. cuvier* in the western Atlantic Ocean (Gasparini and Sazima 1995. Herpetol. Rev. 26:34). My observation is notable because of the large size of the attack victim and because the hawksbill appears to have died from the infection following the attack.

Submitted by **LAURA K. ESTEP**, Natural Sciences Collegium, Eckerd College, 4200 54th Avenue South, St. Petersburg, Florida, 33711, USA.

TERRAPENE ORNATA ORNATA (Ornate Box Turtle). **DIET.** There are several reports of *Terrapene ornata* feeding on the carcasses of mammals (Metcalf and Metcalf 1970. Trans. Kansas Acad. Sci. 73:96–117), birds (Blair 1976. Southwest. Nat. 21:89–103), and even other box turtles (Legler 1960. Univ. Kansas Publ., Mus. Nat. Hist. 11:527–669). Here I report the first published observation of an ornate box turtle eating snake carrion. On 13 August 1997, between 1300 and 1400 h, a sudden thunderstorm moved through the area of Valentine National Wildlife Refuge in Cherry Co., Nebraska, USA. Immediately after the storm I was driving east on Hwy 16B spur from the refuge headquarters to Hwy 83, a 13 mile stretch, and I observed numerous DOR and live reptiles on the still wet pavement. In particular, I observed a *T. o. ornata* on the south side of the road chewing on the exposed viscera of a DOR *Thamnophis sirtalis parietalis*. I interrupted this scavening episode when I stopped the car and approached the scene in order to identify the carcass.

I thank Fredric J. Janzen, Brian E. Smith, and Carrie L. Milne for reviewing this note.

Submitted by **JASON J. KOLBE**, Department of Zoology and Genetics, Iowa State University, Ames, Iowa 50011, USA.

TRACHEMYS GAIGEAE (Big Bend Slider). **COURTSHIP BEHAVIOR**. Male courtship in *Trachemys gaigeae* has not been described in detail, although Ernst (1992, Cat. Amer. Amphib. Rept. 538:3) noted that it does not involve foreclaw titillation but rather pursuit from the rear and possible biting by the male. Herein we provide preliminary observations of courtship in captive *T. gaigeae*.

Adult *T. gaigeae* were collected in Socorro and Sierra counties, New Mexico, and Brewster Co., Texas, USA. Three males (137–163 mm straight-line carapace length, SCL) and two females (216 and 224 mm SCL) were maintained in an outdoor artificial pond (610 cm diam. x 78 cm deep) or were housed in pairs for 3–4 days at a time in an aquarium (61 x 37 x 31 cm) for close observation. Total observation time in both the pond and aquarium was ca. 40 h during 1996–97.

Typical pre-courtship behavior exhibited by males in the pond involved trailing of the female along the bottom and cloacal "sniffing." This was quickly followed by the male approaching the female from the front or side (or rarely from above or beneath) with his head and neck fully extended and oriented towards the head of the female. When their heads were <5 cm apart, the male would initiate a rapid, jerky nodding or bobbing motion of his head (2–3 nods/sec). The nodding motion was accompanied by a simultaneous, less-pronounced, side-to-side "wagging" head motion. This

head nodding was done with the mouth closed and without contact between the pair. Male biting or use of foreclaws was never seen during ca. 30 such encounters. Head nodding usually ceased if either turtle surfaced. However, on three occasions involving two different males in the aquarium, we observed the male continue his head-nodding motions up to the water surface as he accompanied a surfacing female. As the head of the male broke the surface, we observed that a thin jet of water was ejected from his nostrils. Although our observations of "nasal squirting" were limited, our impression is that it is directly related to head nodding, but is undetectable when the male is submerged (nasal squirting was never seen during non-courtship activities such as feeding near the surface). Females were generally unresponsive to courting males, although one female gaped and then bit at a persistent male. Males often attempted to mount quiescent females, usually following courtship, but no copulation was ever observed. Observations of head nodding and nasal squirting were made during April–May in the aquarium (water temperature = 20°C); head nodding alone was seen in the pond in January–February (water temperature = 9–15°C). Head nodding and nasal squirting have been previously reported as elements of courtship behavior in neotropical *Trachemys* spp. (Fritz 1990. Salamandra 26:221–245; Seidel and Fritz 1997. Herpetol. Rev. 28:70–72). Based on our observations of *T. gaigeae* and very similar observations by Fritz (1990, *op. cit.*) of "*T. ornata callirostris*," these behavioral elements appear to be analogous to foreclaw vibration in male *T. scripta* (sensu stricto). Additional studies of Mesoamerican sliders, especially those in which snout length is sexually dimorphic, may reveal similar courtship behaviors.

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AMPHISBAENIA

BLANUS CINEREUS (Iberian Amphisbaenian). **DIET**. *Blanus cinereus* is an amphisbaenid, endemic to the Iberian Peninsula, that is often found in sandy, loose soils in Mediterranean type ecosystems (Barbadillo 1987. La Guía de Incafo de los Anfibios y Reptiles de la Península Ibérica, Islas Baleares y Canarias. Incafo, Madrid, 694 pp.; Salvador 1981. *In* W. Böhme [ed.], Handbuch der Reptilien und Amphibien Europas, pp. 227–289. Aula Verlag, Wiesbaden). Like other amphisbaenians, it has subterranean, secretive habits, and thus few data about its biology are available. In recent years, some studies have focused on the feeding habits of this species, reporting a diet consisting exclusively of small invertebrates, mainly adult and larval insects (max. prey size = 29.3 mm), in accordance with its small-medium size (up to 30 cm in total length) (Gil et al. 1993 J. Herpetol. 27:205–209; López et al. 1991. Herpetologica 47:210–218).

On 20 April 1996, at Navas del Rey (Province of Madrid, Spain), we observed, by lifting a stone, an adult *Blanus cinereus* (SVL = 162 mm) swallowing the tail of a juvenile Spanish wall lizard (*Podarcis hispanica*) (SVL = 39 mm). The *P. hispanica* was concealed in a small cavity in the ground, 21 cm away from the *B. cinereus*. Although the initial attack had not been observed, an examination of the juvenile *P. hispanica* revealed an injury to its left thigh. Thus, it is probable that the attack was initially directed to the lizard's hindlimb, resulting in subsequent tail autotomy. In any case, we can conclude that *Blanus cinereus* occasionally preys upon small vertebrates, our observations being the first record describing such predatory behavior.

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LACERTILIA

ANOLIS CAROLINENSIS (Green Anole). **HERBIVORY.** On 13 September 1996 at Bienville Parish, Louisiana, USA (3 km E Kepler Creek Bridge), an *Anolis carolinensis* was observed feeding on a flower of an aster (Asteraceae). At 1030 h, the lizard bit the head of the flower. After 5 s, the lizard withdrew its head from the flower and licked its pollen-covered snout before resuming feeding. This behavior continued for 2 min, after which the lizard left the flower and was no longer observed. No insects were visible at the flower; apparently the lizard was consuming nectar or pollen. The consumption of nectar and pollen by *A. carolinensis* was noted by Bartlett (1995. Reptiles 2:48–65). Nectarivory by *A. carolinensis* from hummingbird feeders was reported by Liner (1996. Herpetol. Rev. 27:78). Nevertheless, consumption of nectar and pollen by this species remains a little known and seldom observed behavior.

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ANOLIS CAROLINENSIS (Green Anole). **SAUROPHAGY.** On 16 September 1996, an *A. carolinensis* (ca. 55–65 mm SVL) was observed feeding on a dead *Sceloporus undulatus* (56 mm SVL). The sequence of events follows. At 0910 h, as the observer approached, an anole fled under a shrub. A dead *S. undulatus* was discovered on the ground <5 cm from the site where the anole had departed. The carcass was intact except for the lack of distal halves of the right fore and hindlimbs.

At 0915 h, the observer moved 10 m away from the *S. undulatus*, and the *A. carolinensis* returned to the carcass. The anole grasped one of the two limb stumps with its jaws and violently thrashed the carcass in the air for 2–3 s. After the thrashing, the anole released the carcass and swallowed, indicating that feeding was taking place. The thrashing and swallowing sequence took place repeatedly during 10 min of observation. Approximately 100 harvester ants (*Pogonomyrmex* spp.) were on the carcass as well, and thus the thrashing may have been an attempt to remove the ants as well as a piece of flesh.

At 1050 h, the anole was still feeding on the carcass. After 5 min, the anole fled under a shrub due to observer disturbance. At 1105 h, the anole had not returned and the carcass was examined. The proximal right fore and hindlimbs were nearly devoid of flesh.

The cause of death and limb amputation of the *S. undulatus* could not be determined. However, because it is unlikely that an *A. carolinensis* is capable of killing an adult *S. undulatus* and biting through its leg bones, it is probable that the cause of death and amputation of the limbs were unrelated to the anole.

Anolis carolinensis is known to consume large caterpillars of a size similar to small *S. undulatus* (T. Jenssen, pers. comm). However, I know of only one occurrence of natural saurophagy by *A. carolinensis* (on *A. sagrei*) (J. Losos, unpubl. data).

I thank Gregg Henderson for identifying the ants and Laurence M. Hardy for critiquing the manuscript.

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ANOLIS CRISTATELLUS WILEYAE (Virgin Islands Crested Anole). **HERBIVORY.** On Guana Island, British Virgin Islands, at 0730 h on October 1997, we watched an adult female crested anole chewing and swallowing the bright yellow flower of *Tecoma stans*, a naturalized ornamental shrub native to Central America as far north as Texas. Lazell and Perry (Herpetol. Rev. 1997. 28:150) report frugivory in this species, but were misinformed about one plant that we reported the anoles to be eating, *Trichostigma octandra*. We take this opportunity to correct that identification to *Rivina humila* (Phytolaccaceae), "blood berry."

We are indebted to Dr. George Proctor for redetermining this species from a patch the anoles were eating in 1996. They were eating its berries from the same patch in 1997.

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CNEMIDOPHORUS HYPERYTHRUS (Orange-throated Whiptail) and ***CALLISAURUS DRACONOIDES*** (Zebra-tailed Lizard). **PREDATION and DIET**. Here, we report predation on *Callisaurus draconoides* by *Cnemidophorus hyperythrus*. On 1 July 1997, while conducting fieldwork at "El Comitán," 17 km N of La Paz, Baja California Sur, México, we observed a male *C. hyperythrus* capturing a lizard. We noosed the whiptail (65 mm SVL, 5.32 g) and identified its prey, a hatchling *C. draconoides*, which was still alive in the predator's mouth. *Cnemidophorus hyperythrus* feeds on termites, spiders and a variety of insects (Asplund 1967. Am. Midl. Nat. 77:462–475; Bostic 1966. Herpetologica 22:23–31). Galina (1994. Estudio comparativo de tres especies de lacertilios en un matorral desértico de la región del Cabo, Baja California Sur, México. Master's thesis, Universidad Nacional Autónoma de México, México City. 81 pp.) examined stomach contents of 126 *C. hyperythrus* collected at "El Comitán" during 1987 and found termites to be the main type of prey. In that study no lizards were registered as prey. However, a hatchling *Uta stansburiana* was found in the stomach of a *C. hyperythrus* from San Diego Co., California, USA (Berrian and Banta 1979. Bull. Maryland Herpetol. Soc. 15:61). Our observation confirms that small lizards form an occasional component of the diet of *C. hyperythrus*.

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CNEMIDOPHORUS TIGRIS, UTA STANSBURIANA (Western Whiptail, Side-blotched Lizard). **ENDOPARASITES FROM MÉXICO.** Endoparasites have been reported from *Cnemidophorus tigris* and *Uta stansburiana* from the USA (Telford 1970. Am. Midl. Nat. 83:516–554; Goldberg et al. 1997. Great Basin Nat. 57:273–277). However, there are no reports of helminths from these lizards in México. The purpose of this note is to report the presence of the nematodes *Skrjabinoptera phrynosoma* and *Thubunaea ctenosauri* in *Cnemidophorus tigris* and *Uta stansburiana* from Chihuahua, México. *Cnemidophorus tigris* (N = 4) and *U. stansburiana* (N = 6) were collected 10 km N Laboratorio del Desierto, Mapimí Biosphere Reserve (26°50'N, 103°49'W), Chihuahua, México in 1990. Lizards were fixed in 10% formalin and preserved in 70% ethanol. They were deposited in the herpetology collection of the Instituto de Ecología, A.C., Centro Regional Durango, Durango, México. Upon dissection, nematodes were found in the stomachs of these lizards. Each nematode was placed in a drop of glycerol on a glass slide and identified. Prevalence (number infected individuals divided by number of individuals examined) of *S. phrynosoma* was 50% for *C. tigris* and 67% for *U. stansburiana;* prevalence of *T. ctenosauri* was 50% for *C. tigris* and 33% for *U. stansburiana.* Mean intensity (mean number parasites per infected host) for *S. phrynosoma* was 14.0 in *C. tigris* and 2.5 in *U. stansburiana;* for *T. ctenosauri,* 22.0 in *C. tigris* and 1.5 in *U. stansburiana.* Selected nematodes were placed in vials of alcohol and deposited in the U.S. National Parasite Collection, Beltsville, Maryland: *C. tigris* (*S. phrynosoma* USNPC 87782, *T. ctenosauri* USNPC 87783); *U. stansburiana* (*S. phrynosoma* USNPC 87784, *T. ctenosauri* USNPC 87785).

Skrjabinoptera phrynosoma was originally described (Ortlepp 1922. Proc. Zool. Soc. Lond. pp. 999–1107) from nematodes obtained from *Phrynosoma cornutum* and *P. solare* that died in the London Zoological Garden. It has been found in *C. tigris* in California (Telford 1970, *op. cit.*); however, *U. stansburiana* is a new host record. *Thubunaea ctenosauri* was originally described from *Ctenosaura pectinata* from Aguamilpa, Nayarit, México (Moravec et al. 1997. J. Helm. Soc. Washington 64[2]:240–247). *Cnemidophorus tigris* and *U. stansburiana* are new host records for *T. ctenosauri*.

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CRICOSAURA TYPICA (Cuban Night Lizard). **ENDOPARASITES.** *Cricosaura typica* is known only from Granma Province and Santiago de Cuba Province, Cuba (Schwartz and Henderson 1991. Amphibians and Reptiles of the West Indies. Descriptions, Distributions, and Natural History. University of Florida Press, Gainesville. 720 pp.). *Skrjabinodon cricosaurae* was originally described from *Cricosaura typica* (Barus and Coy Otero 1974. Vest. Csk. Spol. Zool. 38[1]:1–12) and is the only helminth known for this host (Coy Otero and Barus 1979. Acta Sc. Nat. Brno 13[2]:1–43). The purpose of this note is to present prevalence and mean intensity data on *S. cricosaurae* in two *C. typica* populations. Twenty-one *C. typica* were collected in February and June 1996 in La Mula, Santiago de Cuba Province, Cuba; ten were collected in April 1996 from Alegría de Pío, Granma Province, Cuba. Lizards were originally fixed in 10% formalin and later preserved in 70% ethanol. The body cavity was opened and the gastrointestinal tract was excised by cutting across the esophagus and rectum. The esophagus, stomach, small intestines, and large intestines were slit longitudinally and examined separately under a dissecting microscope. Each nematode was removed and placed

in a drop of glycerol on a glass slide. Nematodes were identified from these temporary mounts; all were from the large intestine. Lizards were deposited in the herpetological collection of the Centro Oriental de Ecosistemas y Biodiversidad (BIOECO) in Santiago de Cuba, Cuba.

The prevalence (number of infected individuals divided by number of individuals examined) of *S. cricosaurae* (86%, 18/21) in *C. typica* from La Mula was higher than that (80%, 8/10) in *C. typica* from Alegría de Pío, although not significantly different (Chi-square = 0.16, $P > 0.05$). Also, the mean intensity (mean number parasites per infected host) was higher (5.3 ± 6.7 SD, range 1–28) in *C. typica* from La Mula than that (3.3 ± 4.3 SD, range 1–13) in *C. typica* from Alegría de Pío, but there was no significant difference (t-test = 0.93, $P > 0.05$).

We thank Angel Arias and Rolando Viña for assistance in collecting specimens. AFG thanks Israel and Felicia Méndez for hospitality in their house at La Mula.

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ELGARIA KINGII NOBILIS (Arizona Alligator Lizard). **COLORATION.** On 28 June 1995, along Turkey Creek in the Gila Wilderness Area, Grant County, New Mexico, RDJ collected a nearly-patternless *Elgaria kingii* (Fig. 1). The specimen is an adult female, 91 mm SVL and 89 mm tail (regenerated). In life, the dorsal and ventral coloration was solid olive-gray (color 42 in Smithe 1975. Naturalist's Color Guide. Amer. Mus. Nat. Hist., New York) with occasional black flecking laterally. Coloration of the labial scales was normal with contrasting, alternating, black and white scales. This is the first *E. kingii* reported with such abnormal coloration. It is catalogued in the Museum of Southwestern Biology at the University of New Mexico (MSB 59639).

FIG. 1. Nearly patternless female *Elgaria kingii* from Grant Co., New Mexico.

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GALLOTIA CAESARIS (Hierro Canary Island Lizard). **UNUSUAL PREY.** Most lacertids are insectivorous, but there are notable exceptions in *Takydromus* spp. and some of the members of the genus *Gallotia*, which are herbivorous (Arnold 1989. Bull. Br. Mus. Nat. Hist. 55:209–257). These genera have a tricuspid/multicuspid dentition as an adaptation for feeding on plant material. In *Gallotia* spp. the adult diet consists predominantly of flowers, seeds, and fruits, except in *G. atlantica*, which is insectivorous (Molina 1991. Vieraea 20:1–9; Mateo and López-Jurado 1992. Biol. J. Linn. Soc. 46:39–48). However, the stomach contents of a specimen of *Gallotia caesaris* from El Hierro, Canary Island (SVL = 85 mm) included an undigested *Chalcides viridanus* (Scincidae) with a SVL of 57 mm. The presence of a skink as a prey item and its large size are very unusual not only for *Gallotia* spp., but for lacertids in general.

I thank Luis Felipe López-Jurado for donation of the specimen.

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HOLASPIS GUENTHERI LAEVIS (East African Fringe-tailed Forest Lizard). **REPRODUCTION**. Between October 1996 and March 1997, the Cologne Aquarium received 8 adult *Holaspis guentheri laevis* (5 males, 3 females). Locality data were given as Arusha, Tanzania, or Tanzania alone. Sex was determined by comparing the base of the tail (swollen in males) and femoral pores (better developed in males). Ventral body coloration was also found to be a sexually dimorphic character, with males having a bright orange belly; in females it is a faint gray-orange.

Initially, the lizards were housed in groups of multiple males and one female; however, males were soon found to be territorial and aggressive, and were subsequently housed in male/female pairs, or singly.

One pair produced a clutch of two eggs on 14 November 1996. After an incubation period of 54 days one egg hatched. Total length of the hatchling was 50 mm, SVL 25 mm, and mass 0.25 g. Coloration of the hatchling was identical to that of the adults, except for having a totally black ventral surface. Unfortunately, the specimen died one day after hatching. The same pair produced clutches consisting of one egg (on 22 December 1996 and 24 February 1997) and two eggs (5 April 1997). None of these eggs hatched. Clutches of two eggs in this species were reported by Dunger (1967. The Nigerian Field 32(2):117–131).

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IGUANA IGUANA (Green Iguana). **JUVENILE PREDATION.** Green iguanas have been reported to nest communally as an strategy to decrease predation by terrestrial vertebrates (Rand and Dugan 1983. Copeia 1983:705–711). Iguana nests may be preyed upon by several species (Rand and Robinson 1969. Herpetologica 25:172–174). Juveniles may suffer particularly high predation (Greene et al. 1978. J. Herpetol. 12:169–176.).

During the dry season (April–May) of 1988 the emergence of hatchlings in several breeding aggregations was documented at Hato Masaguaral, a cattle ranch in Guárico State, Venezuela (8°34'N, 67°35'W). While systematically patrolling the breeding

TABLE 1. Predators documented preying on iguanas or with iguana remains in the stomach. Numbers with an asterisk represent events where predators were seen chasing, stalking, or holding pieces of iguana tail. Frequencies marked with an "f" denote more than 10 predation events. *Piaya cayana* was observed on two occasions with unidentified lizard embryos in an advanced stage of development. Predation by *Crocodylus* occurred in outdoor enclosures.

	Size I	Size II	Size III
REPTILES			
Alligatoridae			
Caiman crocodilus		1	
Crocodilidae			
Crocodylus acutus		1	
Crocodylus intermedius		1	1
Boidae			
Eunectes murinus		2	1
Colubridae			
Chironus sp.		1*	
Teidae			
Ameiva ameiva	4	1	
Cnemidophorus sp.	1		
Tupinambis sp.	1*	1	
BIRDS			
Accipitridae			
Buteo albicaudatus	3		
Buteo magnirostris	6		
Buteogallus urubitinga	f	3	1, 1*
Elanoides fortiscatus	1		
Elanus leucurus	1		
Gampsonyx swainsonii	1		
Geranospizia caerulencens	1		
Heterospizia meridionalis	f		
Parabuteo unicintus	1	1	
Ardeidae			
Ardea cocoy		1	
Casmerodius albus	1		
Tigrisoma sp.	1		
Cuculidae			
Crotophaga ani	1*		
Crotophaga mayor	1		
Piaya cayana	2		
Falconidae			
Falco femoralis	f		
Falco sparverius	f		
Milvago chimachima	1		
Polyborus plancus	f		
Icteridae			
Icterus icterus	4		
Tyrannidae			
Pitangus sulphuratus	2*		
Tytonidae			
Tyto alba	1		
MAMMALS			
Canidae			
Canis familiaris			6
Cerdocyon thous	f	1	1
Cebidae			
Cebus nigrivitatus		1	1
Felidae			
Felis pardalis			1
Felis domesticus	f		
Procyonidae			
Procyon cancrivorus	1		

aggregations, incidents of predation on iguana hatchlings were recorded. Patrols were conducted 0800–0930 h and 1630–1800 h for a total of 51 h of observations in 17 days. Other incidental predation events also were recorded, along with stomach contents of road-killed predators on the highway. Prey were classified into three size categories, based upon estimated SVL: Size I <180 mm, Size II 180–239 mm, and Size III ≥240 mm (Rivas, unpubl.).

Table 1 lists species of vertebrates observed preying on iguanas, along with size class of prey and relative frequency of predation. Birds were the most frequent predators (22 species), followed by reptiles (eight species), and mammals (six species). Predation pressure by mammals could, however, be underestimated due to their secretive and nocturnal habits.

The period between the first and last egg hatched was 14 days. During this time, ca. 4800 hatchling iguanas emerged from 120 nests into a dune of ca. 8 ha. This synchrony of hatching produced an invasion of young iguanas into the area. High encounter rate may account for the high number of predation events we observed.

These data suggest that juvenile iguanas suffer heavy predation from birds. This may explain the cryptic behavior of juveniles in tree tops, where they remain motionless for long periods, synchronizing their movements with the canopy wind (Henderson 1974. Herpetologica 30:327–332), as well as the juveniles' habit of sleeping in burrows (Brust 1985. Amer. Zool. 25:7A).

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OPHISAURUS VENTRALIS (Eastern Glass Lizard). **NOCTURNAL ACTIVITY.** Glass lizards (*Ophisaurus*) are diurnal (Behler and King 1995. National Audubon Society Field Guide to North American Reptiles and Amphibians. Chanticleer Press, New York. 743 pp.), and to our knowledge there are no records of nocturnal activity. Here we report nocturnal activity in *O. ventralis* in the Apalachicola Lowlands of the Florida panhandle.

On 4 July 1997 at 2325 h, an *O. ventralis* was found AOR on SR 67, 1.2 mi. N NFR 107, Liberty Co., Florida, USA (UF Color Slide 109634). Earlier that day it rained continuously from ca. 1600–2000 h. Glass lizards are good burrowers and spend much of their time below ground (Conant and Collins 1991. A Field Guide to Reptiles and Amphibians of Eastern and Central North America. 3rd ed., Houghton Mifflin Co., Boston, Massachusetts. 450 pp.). As a result, one explanation for this unusual nocturnal behavior might include the lizard retreating from extremely damp soil to drier habitat.

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TILIQUA RUGOSA (Sleepy Lizard). **MATING BEHAVIOR and NECROPHILIA.** Sleepy lizards are large (30 cm SVL), long-lived skinks from southern Australia. They form monogamous male-female pairs for up to 8 weeks before mating in late spring, and usually choose the same partners in successive years (Bull 1988. Behav. Ecol. Sociobiol. 23:45–49). Since 1992, we have been locating radio-tagged individuals daily during the pairing season (September–December) at a site near Mt. Mary in the mid-north of South Australia (33°55'S, 139°20'E). Adult mortality is very low (Bull 1995. Aust. J. Ecol. 20:393–402). However, on 28 October 1997, at 0930 h, a radio-tagged female was found dead. It appeared that, during the previous afternoon, her head became caught as she tried to crawl through tangled fencing wire, and, exposed to the afternoon sun, she died from hyperthermia. This female was first tagged in 1995 and had been recorded with the same male partner in each of the three years 1995–1997. That male partner was by the side of the dead female when she was discovered. We removed the female from the wire and placed her close by. That evening the male lizard refuged under a bush ca. 5 m from his mate. On 29 October 1997 at 0920 h the male was ca. 60 m from the female. The following observations of the male and his dead mate commenced at 1605 h on that day, when the female had probably been dead for 48 h. The male approached the female, moving towards her head. He walked directly up to her and stopped in a face-to-face position with her, ca. 10 cm from her snout. He remained in this position for 4 min. He then moved forward to within 3 cm of her and began tongue flicking towards her snout for a further 2 min. The male then remained stationary in the snout-to-snout position with the female for 6 min. before placing his snout under the snout of the female and tongue flicking again for 30 s. He then moved directly backwards 5–6 cm, then forwards in a small arc until he reached the left flank of the female. Once there he began gently nudging the female's side with his snout, while continuing to tongue flick. This continued for 1 min., after which the male moved toward the female's back leg, tongue flicking. The tongue flicking continued as the male moved forward again towards middle of the body. He then nudged the front leg, moved away 2–3 cm, walked to the female's back leg and once again tongue flicked this for ca. 15 s. The male then moved off and refuged under a bush 88 m away. The observed interaction between the male and his dead partner lasted 17 min. Six days later, the male was again observed ca. 10 m from the dead female.

We interpreted this interaction as a component of the pair bond that forms between male and female lizards during the spring, and an indication of the strength of the bond. The male still recognized cues from his partner, and remained with her, apparently attempting to elicit normal behavior from her, 48 h after her death. Live pairs use tongue flicking and chemical signals to maintain a close physical association over much of the spring (Bull et al. 1993. Herpetologica 49:294–300). There has been one previous observation in this species (Sharrad et al. 1995. W. Aust. Nat. 20:33–35) where a male was attempting to mate with a road-killed female, although the previous history of that pair was not known.

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UMA EXSUL, UMA PARAPHYGAS (Fringe-toed Sand Lizard, Chihuahua Fringe-toed Lizard). **ENDOPARASITES.** The fringe-toed sand lizard, *Uma exsul,* is known only from Coahuila, México; the Chihuahua fringe-toed lizard, *Uma paraphygas* is known only from Coahuila and Chihuahua, México (Adest 1977. Copeia 1977:47–52). There are no reports of endoparasites from these hosts. The purpose of this note is to report the presence of the nematode *Skrjabinoptera phrynosoma* in *Uma exsul* and *U. paraphygas*. *Uma exsul* (N = 4) was collected 8 km S Emilano Zapata, Coahuila, México in 1992; *Uma paraphygas* (N = 6) was collected 10 km N Laboratorio del Desierto, Mapimí Biosphere Reserve, Chihuahua, México. Lizards were preserved in 10% formalin and later stored in 70% ethanol. They were deposited in the herpetology collection of the Instituto de Ecología, A.C., Centro Regional Durango, Durango, México. Nematodes were removed from the stomachs of these lizards. Each was placed in a drop of glycerol on a glass slide and identified as *Skrjabinoptera phrynosma.* Prevalence (number infected individuals divided by number of individuals examined) was 100% for both *U. exsul* and *U. paraphygas.* Mean intensity (mean number parasites per infected host) was 4.5 ± 2.7 SD, range = 1–7 for *U. exsul* and 7.5 ± 2.2 SD, range = 5–10. Selected specimens of *Skrjabinoptera phrynosoma* were placed in vials of ethanol and deposited in the U.S. National Parasite Collection, Beltsville, Maryland: *U. exsul* (USNPC 87650);*U. paraphygas* (USNPC 87649) and in Colección Nacional de Helmintos, Instituto de Biología de la Universidad Nacional Autónoma de México: *U. exsul* (CNHE 3202); *U. paraphygas* (CNHE 3203). *Skrjabinoptera phrynosoma* has previously been found in *U. notata* and *U. scoparia* from California (Telford 1970. Am. Midl. Nat. 83:516–554) and other species from México: *Phrynosoma braconnieri, P. taurus* (Goldberg and Bursey 1991. Southwest. Nat. 36:365–368), *P. douglasii, P. solare, Sceloporus spinosus* (Caballero 1937. Ann. Inst. Biol. Univ. Nac. Auton. Mex. 8[1– 2]:189–200) as well as 11 other North American lizard species (see Goldberg and Bursey, *op. cit.*) plus 14 lizard species from Cuba (see Baker 1987. Mem. Univ. Newfoundland, Occas. Pap. Biol. 11:1– 325). The finding of *S. phrynosoma* in *U. exsul* and *U. paraphygas* are new host records.

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VARANUS EXANTHEMATICUS (Bosc's Monitor). **PREDATION.** On 17 June 1997 at 1535 h we found a burrow in a field of cassava at Bui Camp (8°00'N, 2°15'W), close to Bui National Park, Ghana, that showed signs of use by a young Bosc's monitor (*Varanus exanthematicus*). When we returned at 0630 h the following morning there were signs that a snake had entered the burrow. The burrow was excavated and found to contain an African garter snake, *Elapsoidea guentheri* (602 mm SVL, 44 mm tail, 97 g without prey) that regurgitated a juvenile *V. exanthematicus* (199 mm SVL, 11 mm tail, 32 g). Although we have long suspected that snakes (particularly of the genus *Naja*) are important predators on young monitor lizards, this is the first direct proof of predation by snakes that we have found. Lenz (1995. Zur Biologie und Okologie des Nilwarans, *Varanus niloticus*, im Gambia, Westafrika. Mertensiella 5. 256 pp.) records predation on an adult *V. exanthematicus* by *Python sebae* in The Gambia.

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SERPENTES

ARIZONA ELEGANS (Glossy Snake). **DIET.** On 21 June 1997, we excavated an adult female *Arizona elegans* (567 mm SVL, 93 mm TL, 87 g; Fig. 1) from a burrow in sandy soil of the shinnery oak (*Quercus havardii*) habitat 14.8 km S, 18 km W Hobbs, Lea County, New Mexico, USA (32°33.845'N, 103°19.395'W). This snake was maintained in a cooler until it was sacrificed and preserved on 23 June. Dissection of the stomach yielded an adult Ord's kangaroo rat (*Dipodomys ordii*) (124 mm body length, 67 g). Both the snake and prey were weighed and measured after being fixed in 10% formalin and stored in 55% isopropyl alcohol. The prey was 77% of the total weight of the snake. During the three days from the time of capture to the time the specimen was preserved, the girth of the snake became visibly smaller, suggesting the possibility of a larger prey/predator percentage. The snake and prey were deposited in the University of New Mexico Museum of Southwestern Biology, Division of Herpetology (MSB 60802).

FIG. 1. Adult female *Arizona elegans*, indicating relative size of ingested prey, an Ord's kangaroo rat.

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CORONELLA GIRONDICA (Southern Smooth Snake). **DIET**. The ecology of European smooth snakes is poorly documented because of their secretive behavior. Of the two species, *Coronella girondica* is more saurophagous than *C. austriaca*. *Coronella girondica* preys mainly on lizards and juvenile snakes, but mammals and arthropods are occasionally taken (Agrimi and Luiselli 1994. Vie Milieu 44:203–210; Galán in press. *In* Ramos [ed.], Fauna Iberica. Vol. Reptiles. MNCN-CSIC, Madrid). Neither of the published works on the diet of *C. girondica* makes reference to predation on birds, which are occasionally taken by *C. austriaca*. (Rugiero et al. 1995. Herpetol. J. 5:316–318). During July 1996 in the Natural Park of Sanabria (Zamora Province, Spain; UTM: 29TPG813655) at an altitude of 1605 m and at dusk (1930 h), we observed an adult *C. girondica* in a dunnock (*Prunella modularis*) nest that had been constructed at the bottom of a shrub. In the snake's coils was a dunnock chick, which the snake was swallowing. After ten minutes the chick was finally devoured. Three other chicks remained in the nest while the parents flew nearby emitting cries of alarm. Smooth snakes may have a constraint on the size of their prey because they cannot unhinge the lower jaw, perhaps forcing the selection of small or elongated prey such as lizards (Dusej 1993. *In* Böhme [ed.], Handbuch der Reptilien und Amphibien Europa. Band 3/1. Schlangen [Serpentes], pp. 247–264. Aula Verlag, Wiesbaden). Our observation of a bird in the diet of *C. girondica* is the first recorded for this species and indicates that chicks or small birds can also be captured. We thank P. Galán and J. M. Pleguezuelos for their comments on the text.

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ELAPHE JANSENI (Celebes Black-tailed Ratsnake). **MAXIMUM SIZE.** Records indicate that *Elaphe janseni* commonly reaches a total length of 170–180 cm, and occasionally as much as 200 cm (Schulz 1996. A Monograph of the Colubrid Snakes of the Genus *Elaphe* Fitzinger. Koeltz Scientific Books, Havlickuv Brod, Czech Republic. 439 pp.). A female in the University of Colorado Museum of Natural History (UCM 59364), acquired from central Sulawesi, Indonesia, in November 1997, considerably exceeds those dimensions, measuring 237.4 cm total length (54.2 cm tail length). Although these measurements are impressive, Schulz (*op. cit.*) regards *Elaphe taeniura friesi* of Taiwan as the largest member of the genus, reaching a maximum length of 270 cm.

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EUNECTES MURINUS (Green Anaconda). **DIET.** The diet of *Eunectes notaeus* was described by Strussman (1994. Stud. Neotr. Fauna Envir. 28:157–168), but little is known about the food habits of *E. murinus* in the wild. During February 1996, during an ecological study of crab-eating foxes (*Cerdocyon thous*) in Emas National Park, central Brazil, a fox fitted with a radio-collar was eaten by an anaconda on the shore of the Rio Formoso. The snake stayed at the capture site for two days (as detected by telemetry data), then swam the 5 m-wide river and entered a gallery forest. We located this anaconda 30 days later, 200 m from the capture site, basking in a marsh. We captured and held the snake in an enclosure until the following day, when it regurgitated the collar and the remains of the fox. After regurgitating the fox remains, the snake measured 3.15 m (total length), 45 cm maximum circumference, and weighed 15 kg. The fox, when originally captured, weighed 7.5 kg. This is the second record of an anaconda preying on a crab-eating fox in the Park. On another occasion, A. M. da Cruz and park rangers observed an anaconda (ca. 4 m total length) eating a crab-eating fox on the bank of the Rio Formoso. In addition, two anecdotal observations of anacondas eating crab-eating foxes have been reported by local inhabitants on farmlands

that surround Emas National Park. Crab-eating foxes spend much time foraging in marsh habitats (Brady. 1979. *In* Eisenberg [ed.], Vertebrate Ecology in the Northern Neotropics, pp. 161–171. Smithsonian Inst. Press, Washington, D.C.), behavior which may expose them to frequent anaconda predation.

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MASTIGODRYAS BIFOSSATUS (Jararaca do Banhado). **TAIL BREAKAGE.** In reptiles, partial loss of the tail may result from two distinct mechanisms: intravertebral rupture (involving both neural control and late tail regeneration), or intervertebral rupture (without neural involvement or tail regeneration). The former occurs widely in lizards (Etheridge 1967. Copeia 1967:699–721), whereas the latter is common in amphisbaenids (Gans 1978. Trans. Zool. Soc. Lond. 34:347–416) and snakes (Mendelson 1992. Herpetologica 48:448–455; Savage and Crother 1989. Zool. J. Linn. Soc. 95:335–362). Both types of tail autotomy may function as antipredator mechanisms (Henderson 1984. *In*: Seigel et al. [eds], Vertebrate Ecology and Systematics: A Tribute to Henry S. Fitch, pp. 185–194. Museum of Natural History, University of Kansas, Lawrence, Kansas; Mendelson, *op. cit.*).

Here we present data on frequencies and characteristics of tail breakage in 119 museum specimens of *Mastigodryas bifossatus* from diverse localities in Brazil. We examined both young and mature specimens of *M. bifossatus*, housed at Instituto Butantan (IB), São Paulo; Museu de Ciências e Tecnologia da Pontifícia Universidade Católica do Rio Grande do Sul (MCP), Porto Alegre; Museu de Ciências Naturais da Fundação Zoobotânica do Rio Grande do Sul (MCN), Porto Alegre; and Linha de Pesquisa em Herpetologia da Pontifícia Universidade Católica do Rio Grande do Sul (LPH), Porto Alegre. For each specimen with a broken tail we recorded the number of remaining subcaudals (SC), sex, and snout-vent length (SVL).

Tail breakage in *M. bifossatus* occurred between SC 32 and 98. It was most common (33.3%) between SC 81 and 90, and rarest (3.7%) between SC 41 and 50. In females, the number of remaining subcaudals ranged from 32–93 (N = 24). For males, this range was 35–98 (N = 30). There were no sex-related differences in the ratio of broken to intact tails ($X^2 = 0.81$).

Among the 119 specimens, 46.7% showed tail loss. In specimens with intact tails, tail length was 31–41% of SVL in females (N = 15, SVL > 600 mm) and 34–44% of SVL in males (N = 16, SVL > 600 mm). For specimens with incomplete tails, tail length was 15–35% of SVL in females (N = 10, SVL > 600 mm), and 10–43% in males (N = 13, SVL > 600 mm). We conclude that *M. bifossatus* can be included among those species of snakes having a high frequency of broken tails. Despite high frequencies of tail breakage, well-defined breakage sites or sex-related breakage patterns are apparently lacking in this species.

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MICRURUS FRONTALIS (Coral Snake). **MALE COMBAT.** Combat rituals have been observed in numerous snake genera, including several elapids (Shine 1994. Copeia 1994:326–346). One explanation for such behavior is male-male competition for access to reproductive females (Bogert and Roth 1966. Amer. Mus. Novit. 2245:1–27; Kelleway 1982. Br. J. Herpetol. 6:225–230).

Micrurus frontalis is an elapid whose reproductive behavior is largely unknown. We report the first observation in the field of a combat ritual between two male *M. frontalis* (SVL = 875 and 836 mm). On 12 April 1994 (ca. 1230 h) in Santa Rita city (29°51'S, 51°16'W), Rio Grande do Sul, Brazil, the snakes were found sheltered under rocks. They were aligned horizontally with their bodies and tails interwined and their heads raised slightly (Fig. 1). The two males kept their heads side by side while moving foward and trying to hover over each other. When captured, one everted the hemipenis. Subsequently, these males were deposited in the Museum Collection of the Museu de Ciências Naturais, Fundação Zoobotânica do Rio Grande do Sul (MCN 11424, 11435).

In addition to our field observation, two captive males were twice observed engaging in a combat ritual in the same season. In every case, the postures were very similar to those of *Austrelapis superbus* (Shine and Allen 1980. Victorian Nat. 97:188–190), but different from those reported for other elapids. The horizontal interwining of the body without vertical posturing of the head and anterior trunk appears similar to the behavior of colubrids such as *Pituophis melanoleucus affinis* (Bogert and Roth, *op. cit.*).

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FIG. 1. Combat ritual between male *Micrurus frontalis*.

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OPHEODRYS AESTIVUS (Rough Green Snake). **EGG PREDATION**. Since its introduction into North America in the 1930's, the South American fire ant, *Solenopsis invicta*, has spread throughout the southeastern United States. Fire ants have been documented to consume the eggs of the lizard, *Cnemidophorous sexlineatus* (Mount et al. 1981. J. Alabama Acad. Sci. 52:66–70). On 3 July 1994, a clutch of nine *Opheodrys aestivus* eggs was discovered beneath a piece of carpet in Leeds, Jefferson Co., Alabama. The eggs appeared normal in size, shape, and shell development and were slightly adherent. Three of the eggs were separated from the clutch and moved indoors for artificial incubation at 22–29°C. The other six were left undisturbed. The three artificially incubated eggs hatched on 10 August. By 12 August, fire ants had built a small mound on the undisturbed eggs, and at least four were oozing clear fluid from tiny punctures. By 23 August two eggs had collapsed and all were removed for examination/artificial incubation. By 29 August all the eggs but one had collapsed. This egg produced a viable hatchling on 30 August. It is probable that the fire ants were directly responsible for the failure of the five eggs to incubate properly. I thank Kurt Buhlmann for a valuable reference.

Submitted by **J. STEVEN CONNERS**, Animal Science Department, Miami Metrozoo, 12400 SW 152nd Street, Miami, Florida 33177, USA.

OXYBELIS FULGIDUS (Green Vine Snake or Bejucillo). **FEEDING.** On 6 June 1996 at ca. 1130 h we encountered an adult (ca. 1.7 m total length) *Oxybelis fulgidus* ca. 1.3 m above the forest floor in the dense understory of second growth forest in the Selva Verde private reserve, Chilamate, Heredia Province, Costa Rica. The snake was draped across three different small trees. It then moved horizontally for about 1 m, turned 180°, and descended at a 30° angle ca. 0.7 m before pausing. From this position the snake moved slowly at first, then rapidly forward and down ca. 0.5 m, striking a large (ca. 9.5 cm SVL) *Ameiva festiva festiva*. The snake seized the lizard by combining forward movement of its body with a rapid strike of its head. The struggling lizard was grasped across the body between the fore and hind legs. Next the snake moved its prey toward the back of its mouth using alternating movements of its upper and lower mandibles, probably envenoming the lizard at this time. During this process the snake moved from its extended downward position to a horizontal position. The alternating movements of the upper and lower mandibles continued, now positioning the lizard, which had stopped struggling, to be swallowed head first. After swallowing the lizard until only 2 cm of the tail protruded from the snake's mouth, it climbed a small tree to a branch that formed an acute angle with the trunk. It lifted its head and ca. 4 cm of its neck over the branch and began to move its body through the narrowest portion of the fork, which was too narrow to permit passage of the lump that was the lizard's body. In this way the lizard was pushed down the snake's esophagus. The snake pushed the bulge ca. 6 cm distally, then stopped moving. The lizard's tail was no longer visible in the snake's mouth. When we left 5 min later, the snake was still poised motionless in the fork of the tree. The observation is noteworthy in that the capture was unusually low (ca. 20 cm) for a species of *Oxybelis* (Henderson and Binder 1980. Milwaukee Publ. Mus. Contr. Biol. Geol. 37:1–38) and the snake appeared to use the tree fork to assist in swallowing the unusually large prey.

We thank Bryan L. Sharp and Gregory J. Colwell for assistance with identification of the snake and its prey. Bruce C. Jayne and A. John Gatz provided helpful comments on the manuscript.

Submitted by **JEFFREY L. NORRIS**, APDO 178-3006, Heredia, Costa Rica, and **EDWARD H. BURTT, JR.**, Department of Zoology, Ohio Wesleyan University, Delaware, Ohio 43015-2370, USA.

THAMNOPHIS MELANOGASTER CANESCENS (Mexican Black-Bellied Garter Snake). **LITTER SIZE**. On 22 July 1995, a gravid female *T. melanogaster canescens* was found in Lake Pátzcuaro (19°32'N and 101°43'W) in the state of Michoacán, México. This lake is 19.75 km in length and 2035 m in elevation. The pregnant snake was measured and weighed, and then its embryos were removed and were individually measured and weighed. The adult female measured 506 mm SVL, 136 mm tail length (TL), weighed 134.6 g, and contained 12 embryos. The measurements of the embryos were: mass (mean ± SE [range]) = 2.21 ± 0.083 (1.44–2.54); SVL = 118.3 ± 1.4 mm (108–128 mm); TL = 37.0 ± 0.8 mm (34–42 mm). This litter size is similar to other females (mean = 12.9 embryos) cited by Ford and Ball (1977. Herpetol. Rev. 8:118).

Submitted by **AURELIO RAMÍREZ-BAUTISTA**, and **MARIO MANCILLA MORENO**, Departamento de Zoología, Instituto de Biología, UNAM, A.P. 70-153, C. U., C.P. 04510, México 20, Distrito Federal, México; e-mail (AR): raurelio@servidor.unam.mx.

GEOGRAPHIC DISTRIBUTION

Instructions for contributors to Geographic Distribution appear in Volume 29, Number 1 (March 1998).

GYMNOPHIONA

LUTKENOTYPHLUS BRASILIENSIS (São Paulo Caecilian). ARGENTINA: MISIONES: 25 de Mayo, Puerto Londero (27°23'S, 54°26'W). September 1947. M. J. Viana. Museo Argentino de Ciencias Naturales, Buenos Aires (MACN 9491). Verified by G. Carrizo. First record for country; extends range 165 km S from nearest previous record at Ciudad del Este, Itaipu, Paraguay (Nussbaum 1986, J. Herpetol. 20:441–444).

Submitted by **TAMARA HEER** and **LLAURA LANARI**, Museo Argentino de Ciencias Naturales, Sección de Herpetología, Avenida Angel Gallardo 470, Buenos Aires, Argentina (e-mail: frida298@yahoo.com).

CAUDATA

AMBYSTOMA CINGULATUM (Flatwoods Salamander). USA: GEORGIA: Miller Co: Willoughby Tract of Mayhaw Wildlife Management Area (31°13'N, 84°47'W). Exact location withheld due to the rarity of the species. 6 March 1998. John B. Jensen. University of Georgia Museum of Natural History (UGAMNH 40092). Verified by M. E. McGhee. First county record. Two larvae were captured in an isolated cypress (*Taxodium ascendens*) pond surrounded by longleaf pine (*Pinus palustris*)/wiregrass (*Aristida beyrichiana*) flatwoods.

Submitted by **JOHN B. JENSEN**, Georgia Department of Natural Resources, Nongame-Endangered Wildlife Program, 116 Rum Creek Drive, Forsyth, Georgia 31029, USA (e-mail: john_jensen@mail.dnr.state.ga.us) and **STEVE A. JOHNSON**, Department of Wildlife Ecology and Conservation, University of Florida, 303 Newins-Ziegler Hall, Gainesville, Florida 32611-0430, USA (e-mail: tadpole@ufl.edu).

AMBYSTOMA TALPOIDEUM (Mole Salamander). USA: GEORGIA: White Co: Smithgall Woods Conservation Center, ca. 2 km ESE jct. of State Rt. Alt. 75 and State Rt. 348. 28 January 1998. John B. Jensen. UGAMNH 40061–63. Verified by M. E. McGhee. First county record and first Georgia record within the Blue Ridge physiographic province (Williamson and Moulis 1994, Savannah Sci. Mus. Publ. 3:1–712). Many paedomorphic adults observed actively breeding in a woodland pool within the Dukes Creek floodplain.

Submitted by **JOHN B. JENSEN**, Georgia Department of Natural Resources, Nongame-Endangered Wildlife Program, 116 Rum Creek Drive, Forsyth, Georgia 31029, USA (e-mail: john_jensen@mail.dnr.state.ga.us).

AMPHIUMA PHOLETER (One-toed Amphiuma). USA: MISSISSIPPI: Jackson Co: Mississippi Sandhill Crane National Wildlife Refuge: SE 1/4 of SE 1/4 Sec. 11, T7S, R8W, 0.2 km W of W boundary of Old Fort Bayou Mitigation Bank, 0.35 km S of I-10, ca. 1.72 km W of I-10 bridge spanning Old Fort Bayou. 14 March 1998. Peter S. Floyd, Sr. Mississippi Museum of Science Collection (MMNS 5409). Verified by D. Bruce Means. Specimen found dead and partly decomposed in a shallow stream bordered by longleaf and slash pine; mat of sphagnum moss present on bank above collection site. Stream drained into cypress tupelo gum swamp ca. 100 m downstream from collection site. Substrate in the stream and swamp is relatively firm and interlaced with roots. First record for the state of Mississippi and westernmost locality for the species (Means 1996, Cat. Am. Amphib. Rept. 622.1–622.2).

Submitted by **PETER S. FLOYD, SR., PETER S. FLOYD, JR.,** and **JONATHAN D. FLOYD**, Mississippi Museum of Natural Science, 111 North Jefferson Street, Jackson, Mississippi 39201, USA.

DICAMPTODON COPEI (Cope's Giant Salamander). USA: WASHINGTON: Skamania Co: Spring Creek National Fish Hatchery, 2 km W of White Salmon River (SW1/4 Sec. 22, T3N, R10E). On 29 March 1998, we collected one neotenic larva (UMMZ 222695–222696) in each of two unbaited minnow-traps set overnight in a spring-fed creek where it emerges from the base of a forested, talus slope. Verified by Lawrence L. C. Jones. Extends the known distribution ca. 25 km E in the Columbia River Gorge (Nussbaum et al. 1983, Amphibians and Reptiles of the Pacific Northwest. Univ. Press Idaho, Moscow. 332 pp.; McAllister 1995, Northwest Fauna 3:81–112).

Submitted by **WILLIAM P. LEONARD**, Washington Department of Ecology, P.O. Box 47775, Olympia, Washington 98504-7775, USA, **LAURA L. TODD**, U.S. Fish and Wildlife Service, 2600 SE 98th Avenue, Suite 100, Portland, Oregon 97266, USA, and **MEGAN A. LEONARD**, 223 Foote Street NW, Olympia, Washington 98502, USA.

ENSATINA ESCHSCHOLTZII (Ensatina). USA: WASHINGTON: Klickitat Co: NW 1/4, NW 1/4, Sec 20, T4N, R10E, 20 m W of road B-1600. 23 April 1998. Suzanne Grayson. UWBM Color Print 2293 (juvenile). Verified by Keith B. Aubry. One adult and one juvenile were found under surface objects in a Douglas-fir forest with a vine maple understory. First county record and first record of this species east of the Cascade Crest in Washington, as indicated by county lines (McAllister 1995, Northwest Fauna 3:81–112).

Submitted by **LAWRENCE L. C. JONES**, USDA Forest Service, Pacific Northwest Research Station, 3625 93rd Avenue SW, Olympia, Washington 98512, USA, and **SUZANNE GRAYSON**, Washington Department of Natural Resources, 713 East Bowers Road, Ellensburg, Washington 98926, USA.

NOTOPHTHALMUS PERSTRIATUS (Striped Newt). USA: GEORGIA: Emanuel Co: Ohoopee Dunes Natural Area (Georgia Department of Natural Resources), ca. 8.2 km WNW Swainsboro (32°36'19"N, 82°25'04"). 24 August 1997. Dirk J. Stevenson and Beth A. Willis. UGAMNH 40086–89. Verified by M. E. McGhee. Larvae collected at isolated, 1.6 ha semi-permanent pond fringed with swamp blackgum (*Nyssa biflora*). Surrounding habitat represented by xeric longleaf pine (*Pinus palustris*)—turkey oak (*Quercus laevis*)—wiregrass (*Aristida beyrichiana*) sandhill. 24 January 1998. Mark A. Bailey, John B. Jensen, Alison J. McGhee, Dirk J. Stevenson, and Keith R. Tassin. UGAMNH 40090–91. Verified by M. E. McGhee. Sixteen adults, including nine perennibranch individuals, were captured (1 perennibranch adult and 1 metamorphic adult preserved). Females (N = 6) averaged 38 mm SVL (range 35–40 mm) and averaged 1.43 g in weight (range 1.19–1.58 g); males (N = 10) averaged 36 mm SVL (range 31–38 mm) and 1.14 g in weight (range 0.66–1.45 g). First vouchered records for this county, and extend known range ca. 48 km WSW of nearest known locality in Jenkins County, Georgia (Williamson and Moulis 1994, Savannah Sci. Mus. Publ. 3:1–

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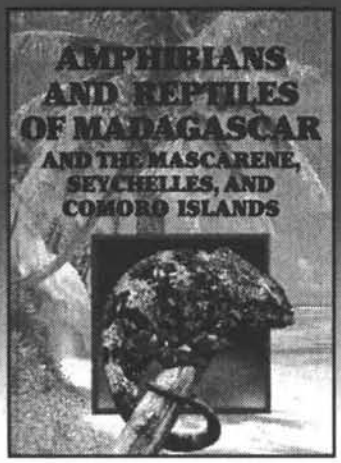

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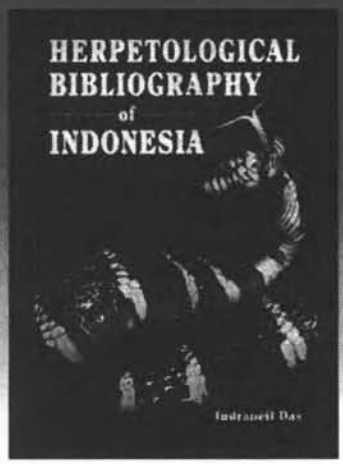

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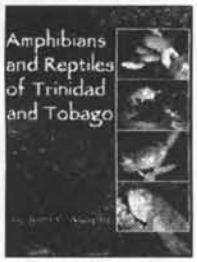

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712). Neill (1951, Ecology 32:764–766) mentioned collecting this species (as *Diemictylus perstriatus*) in Emanuel County, Georgia, but his observations were not supported by museum specimens. On both of the collection dates for our field work, specimens were taken by dipnetting in dense clumps of yellow-eyed grass (*Xyris* cf. *fimbriata*) growing near the pond margin.

Submitted by **DIRK J. STEVENSON**, Directorate of Public Works, Fort Stewart Fish and Wildlife Branch, 1557 Frank Cochran Drive, Fort Stewart, Georgia 31314, USA, **JOHN B. JENSEN**, Georgia Department of Natural Resources, Nongame-Endangered Wildlife Program, 116 Rum Creek Drive, Forsyth, Georgia 31029, USA, and **KEITH R. TASSIN**, The Nature Conservancy, Altamaha River Bioreserve Office, P.O. Box 484, Darien, Georgia 31305, USA.

PLETHODON SERRATUS (Southern Redback Salamander). USA: GEORGIA: CLAYTON CO: Clayton County Water Authority Wetlands Center, 2755 Freeman Road, Hampton. Swamp located 100m SW jct. of Pate's Creek and Freeman Road. Two specimens found on hill between where Turkey Creek and Pate's Creek enter the wetland. 14 February 1998. Stacy Smith. SOCM 0813. Verified by John Jensen. New county record (Williamson and Moulis 1994, Distribution of Amphibians and Reptiles in Georgia. Savannah Sci. Mus. Spec. Pub. 3:1–712).

Submitted by **STACY N. SMITH**, Clayton County Water Authority Wetlands Center, 2755 Freeman Road, Hampton, Georgia 30228, USA.

ANURA

BUFO AMERICANUS CHARLESMITHI (Dwarf American Toad). USA: LOUISIANA: BIENVILLE PARISH: Ridge Road, 3.9 km E Louisiana Rt. 7. AOR. 16 May 1998. John G. Himes and Ty W. Bryan. Louisiana State University in Shreveport Museum of Life Science Collection (LSUS 6992). Verified by Laurence M. Hardy. First parish record (Dundee and Rossman 1989, The Amphibians and Reptiles of Louisiana. Louisiana St. Univ. Press, Baton Rouge. 300 pp.).

Submitted by **JOHN G. HIMES**, Department of Biological Sciences, Box 5018, University of Southern Mississippi, Hattiesburg, Mississippi 39406-5018, USA, and **TY W. BRYAN**, Division of Natural Science, Bossier Parish Community College, 2719 Airline Drive North, Bossier City, Louisiana 71111, USA.

BUFO FERNANDEZAE. ARGENTINA: CÓRDOBA: Barreto (33°20'43"S, 63°18'20"W), temporary pond at Km 148, Ruta Provincial No. 4., 153 m. 26 January 1995. A. L. Martino. Herpetologial Collection of Universidad Nacional de Río Cuarto, Ecología (UNRC-ECO 616–17); 28 January 1998 (in amplexus)—male 43.4 mm, female 46.5 mm, snout-vent length. UNRC-ECO 613–15. All verified by R. Martori. Species previously recorded in eastern part of Córdoba province as *Bufo granulosus fernandezae* (di Tada et al. 1976, Bol. Acad. Nac. Cs. Córdoba 51[3–4]:325–362) and as *Bufo fernandezae* (Cei 1980, Monitore Zool. Ital. N. S. Monog. No 2. 2609 pp.; Lavilla et al. 1992, Asoc. Herpetol. Argentina Serie Divulgación No. 7. 18 pp.; di Tada et al. 1996, pp. 191–213. *In* I. E. di Tada and E. H. Bucher (eds.). Ed. UNRC). Range extension.

Submitted by **ADOLFO L. MARTINO, NANCY E. SALAS**, and **ISMAEL E. DI TADA**, Ecología, Departamento de Ciencias Naturales, Facultad de Ciencias Exactas, Físico-Químicas y Naturales, Universidad Nacional de Río Cuarto, Km 601, Ruta Nacional No. 36, (5800) Río Cuarto, Córdoba, Argentina (e-mail: amartino@exa.unrc.edu.ar).

CTENOPHRYNE GEAYI (Brown Egg Frog). FRENCH GUIANA: COMMUNE DE ROURA: Crique Bagot, foot of the Kwata Mountain (4°32'N; 52°32'W, elev. 10 m). 5 January 1995. Philippe Kok. Institut royal des Sciences naturelles de Belgique (IRSNB 12731). Verified by G. Lenglet. New county record, previously known only from two localities in French Guiana—the Sinnamary River basin (commune de Saint-Elie) and 'Saut Emerillonî, upper Inini River (commune de Maripasoula) (de Massary and Lescure 1998, Revue fr. Aquariol. 25[1–2]:53–57). Extends range ca. 60 km airline SE from the easternmost known locality in French Guiana. Rare species probably due to its secretive habits; the specimen (34.4 mm SVL) was collected by day under dead leaves.

Submitted by **PHILIPPE KOK**, Laboratoire dí Herpétologie, Institut royal des Sciences naturelles de Belgique, 29 rue Vautier, B-1000 Bruxelles, Belgium.

ELEUTHERODACTYLUS LAURASTER (NCN). NICARAGUA: MATAGALPA: Selva Negra, 1300 m elev. (12°59"96'N, 85°54"55'W). March and August 1995, March and April 1996. G. Köhler. July and August 1997. P. Stoldt. Forschungsinstitut und Naturmuseum Senckenberg (SMF 77851, 77853–4, 77233–46, 78229–32). Verified by James R. McCranie. First records for Nicaragua; extends the range ca. 200 km south of the closest known locality in Honduras (Savage et al. 1996, Proc. Biol. Soc. Washington 109:366–372).

Submitted by **GUNTHER KÖHLER**, Forschungsinstitut und Naturmuseum Senckenberg, Sektion Herpetologie, Senckenberganlage 25, D-60325 Frankfurt a.M., Germany.

HYLA CINEREA (Green Treefrog). USA: TEXAS: ARKANSAS CO: Arkansas Wildlife Refuge. 12 April 1986. A. Chaney and party. TAIC 5666. Verified by Steve A. Smith. New county record (Dixon 1987, Amphibians and Reptiles of Texas. Texas A&M Univ. Press, College Station. 434 pp.).

Submitted by **MICHAEL JAMES McCOID**, Department of Biology, Campus Box 158, Texas A&M University, Kingsville, Texas 78363, USA.

HYLA PUNCTATA. BRAZIL: PARANÁ: Diamante do Norte Municipality (ca. 22°40'S, 53°00'W). 5 March 1998. P. S. Bernarde. Museu de História Natural, Universidade Estadual de Campinas (ZUEC 11507, adult male) and Museu de História Natural Capão da Imbuia, Curitiba (MHNCI 3243, adult male). Verified by Ariovaldo A. Giaretta. Original distribution was given as central and north Brazil, the chaco of Paraguay and Argentina, Amazon Basin, upper Orinoco Basin, Guianas, northern Colombia, and Trinidad (Frost 1995, Amphibian Species of the World. Version 2/95. Electronic manuscript, Herpetologists' League). First record for the state of Paraná; extends distribution to southern Brazil. Specimens were found calling in pond in an open area.

Submitted by **PAULO SÉRGIO BERNARDE**, Curso de Pós-Graduação em Zoologia, Departamento de Zoologia, Universidade Federal do Paraná, CP 19020, 81531-990, Curitiba-PR, Brazil; e-mail: bernarde@garoupa.bio.ufpr.br.

PSEUDACRIS CLARKII (Spotted Chorus Frog). USA: TEXAS: HAMILTON CO: Hico City Park. 10 April 1987. Bobby J. Schat. TAIC 5927 (3 specimens). Verified by Steve A. Smith. New county record (Dixon 1987, Amphibians and Reptiles of Texas. Texas A&M Univ. Press, College Station. 434 pp.).

Submitted by **MICHAEL JAMES McCOID**, Department of Biology, Campus Box 158, Texas A&M University, Kingsville, Texas 78363, USA.

RANA AREOLATA AREOLATA (Southern Crawfish Frog). USA: TEXAS: REFUGIO CO: 8.8 km E,& 24 km N Refugio (28°31'6"N, 97°11'43"W). 4 July 1998. James M. Mueller. TCWC 79735 (specimen in ethanol and tissues in Longmire's solution for DNA studies). Verified by James R. Dixon. Collected at 1215 h by hand in grassland prairie dominated by *Spartina spartinae* and *Paspalum* spp. growing on sandy loam soil. Specimen was observed in the open next to northern bobwhite (*Colinus virginianus*) nest one day following 3.5 cm of rain during an unusually dry summer. New county record; westward range extension of ca. 60 km (Dixon 1987, Amphibians and Reptiles of Texas, Texas A&M Univ. Press, College Station. 434 pp.).

Submitted by **JAMES M. MUELLER**, Department of Range, Wildlife, and Fisheries Management, Texas Tech University, Lubbock, Texas 79409, USA.

RANA CATESBEIANA (Bullfrog) USA: COLORADO: CHEYENNE CO: pond on Rush Creek ca. 1.0 mile east of Lincoln County line (N 38 40.301, W 103 10.000). 1 adult taken, 3 juveniles sighted. 25 June 1998. UNC-MNH 1281. Verified by Hobart M. Smith and David Chiszar. First county record (Livo et al. 1996, Herpetological Microbiogeography of Colorado II: Documented and Potential County Records. Publ. Colorado Herpetol. Soc.).

Submitted by **THERESA CHILDERS**, **ENOCH BERGMAN**, **JERRY D. MANZER**, and **STEPHEN P. MACKESSY**, Department of Biological Sciences, 501 20th Street, University of Northern Colorado, Greeley, Colorado 80639, USA.

SYRRHOPHUS MARNOCKII (Cliff Chirping Frog). USA: TEXAS: BANDERA CO: Lost Maples State Natural Area, 8.0 rd km N Vanderpool on FM 187. 10 June 1998. John H. Malone. TCWC 79861–62. Verified by James R. Dixon. County record; fills distribution gap amongst Kendall, Kerr, Real, Medina, and Uvalde counties (Dixon 1987, Amphibians and Reptiles of Texas. Texas A&M Univ. Press, College Station. 434 pp; and Dixon 1996, Texas Herpetol. Soc. Spec. Publ. 2). Specimens were collected during a herpetofaunal inventory for the Texas Parks and Wildlife Department, June–August 1998. All specimens were collected under the authority of State Park Scientific Study Permit 32-98. *Syrrhophus marnockii* was found to be common throughout all canyonlands in the park.

Submitted by **JOHN H. MALONE**, Herpetological Independent Study Group, Texas A&M University, Department of Wildlife and Fisheries Sciences, College Station, Texas 77843, USA.

TESTUDINES

CHELYDRA SERPENTINA SERPENTINA (Common Snapping Turtle). USA: TEXAS: POLK CO: crossing Rt. 190, 0.5 km E Menard Creek bridge and 8.6 km E of city limits of Livingston. 30 January 1998. Robert R. Fleet. Adult male. Verified by Lee Fitzgerald. SFAVM color slides 4892a–c. County record. (Dixon 1987, Amphibians and Reptiles of Texas. Texas A&M Univ. Press, College Station. 434 pp.).

Submitted by **ROBERT R. FLEET** and **FRED C. RAINWATER**, Department of Biology, Stephen F. Austin State University, Nacogdoches, Texas 75962, USA.

ERETMOCHELYS IMBRICATA (Hawksbill). USA: GEORGIA: CAMDEN CO: dead on beach north of Dungeness Crossing, Cumberland Island. 1 June 1998. Carol Ruckdeschel and C. Robert Shoop. Cumberland Island Museum 98.06.01.03. Verified by G. R. Zug. Adult female, 87.5 x 72 cm CCL x W. First specimen from Georgia, although range extends along the Atlantic coast to New England.

Submitted by **CAROL RUCKDESCHEL** and **C. ROBERT SHOOP**, Cumberland Island Museum, P.O. Box 796, St. Marys, Georgia 31558-0796, USA.

KINOSTERNON FLAVESCENS FLAVESCENS (Yellow Mud Turtle) USA: COLORADO: LINCOLN CO: AOR. Rt. 94, 5.2 mi W jct. County Road 43 (near a tributary of Rush Creek; N38 51.035, W103 22.228). 16 June 1998. UNC-MNH Photographs 28–29. Verified by Hobart M. Smith and David Chiszar. First County record (Livo et al. 1996, Herpetological Microbiogeography of Colorado II: Documented and Potential County Records. Publ. Colorado Herpetol. Soc.). This specimen represents a range extension of ca. 65 miles NW from the closest known occurrence on the Arkansas River in Prowers County.

Submitted by **ENOCH BERGMAN**, **JERRY D. MANZER**, **THERESA CHILDERS**, and **STEPHEN P. MACKESSY**, Department of Biological Sciences, 501 20th Street, University of Northern Colorado, Greeley, Colorado 80639, USA.

KINOSTERNON SCORPIOIDES (Scorpion Mud Turtle). BRAZIL: RORAIMA: 4°10'45"N, 61°0'46"W, Km 681 on the Boa Vista-Pacaraima Road. 16 August 1997. William E. Magnusson. Photograph digitalized on CD-ROM deposited in the Reptile Collection of the Instituto Nacional de Pesquisas da Amazónia, Manaus, Brazil (Registration Number 1523). Verified by Richard C. Vogt. Species has been recorded from widespread localities in South America, but the only previous record from the state of Roraima is from the Serra de Lua, ca. 180 km south of our record (Cabrera and Colantonio 1997, J. Herpetol. 31:507–513).

Submitted by **WILLIAM E. MAGNUSSON**, **ALBERTINA P. LIMA**, and **MARIA CARMOZINA DE ARAÚJO**, Coordenação de Pesquisas em Ecologia, Instituto Nacional de Pesquisas da Amazónia, CP 478, 69011-970 Manaus AM, Brazil.

LEPIDOCHELYS OLIVACEA (Pacific Ridley). USA: ALASKA: near Ketchikan, (55°20'N, 131°35'W). June 1991. Dry carapace (81 cm x 60 cm) on beach, confiscated by National Marine Fisheries Service (NMFS) Special Agent Jeff Passer, Sitka, Alaska. Verified by Karen L. Eckert. Carapace, photographs, and NMFS enforcement documents in herpetological collection of NMFS Auke Bay Laboratory (AB92-22), Juneau, Alaska. Other skeletal and soft parts missing at time of discovery, although some skin was still attached to the bones. It is not possible to determine the time or place of death, which may have occurred in Alaska or the carcass may have reached Alaska as flotsam from more southern regions of the eastern North Pacific Ocean. Alaska marine conditions during the late winter and spring of 1991 were slightly cooler than average.

This is the first confirmed *Lepidochelys olivacea* from Alaska and the northernmost record to date. Ketchikan is 913 km north of the previous northern record, Copalis Beach, Washington (Richardson 1997, Washington State Status Report, Olive Ridley Sea Turtle. Washington Dept. Fish & Wildlife, Olympia. 14 pp.). *Lepidochelys olivacea* is the fourth species of marine turtle recorded from Alaska waters.

Submitted by **BRUCE L. WING**, Auke Bay Laboratory, 11305 Glacier Highway, Juneau, Alaska 99801, USA, and **ROBERT PARKER HODGE**, 181 Raft Island, Gig Harbor, Washington 98335, USA.

LACERTILIA

ANOLIS BARKERI (Barker's Anole). MÉXICO: TABASCO: MUNICIPALITY OF HUIMANGUILLO, ca. 1 km W of Carlos A. Madrazo, dirt road to Pedregal River near the border of Veracruz (17°23'N, 93°40'W), 245 m. 25 March 1998. Fernando Mendoza Quijano and Ma. de los Angeles Sánchez Arriola. Colección Nacional de Anfibios y Reptiles, Instituto de Biología, UNAM, IBH 12396 (formerly TP 062, SVL = 45.8 mm, TL = 81.7 mm), a subadult male found in riparian vegetation. First record for state; extends range ca. 56 km NW from the closest known locality in Cascajal, Veracruz (Schmidt 1939, Publ. Field. Mus. Nat. Hist., Zool. Ser. 24[2]:7–9); MUNICIPALITY OF HUIMANGUILLO, ca. 3 km E of Carlos A. Madrazo (17°22'N, 93°39'W), 320 m. 26 March 1998. Fernando Mendoza Quijano. IBH 12397 (formerly TP 065, SVL = 79.2 mm, TL = 116 mm), an adult male found in cloud forest in ravine with small waterfall on leaf litter. Extends distribution at least some 57 km NW from former records in Cascajal, Veracruz. Both specimens verified by Adrian Nieto Montes de Oca.

Submitted by **VÍCTOR HUGO REYNOSO ROSALES, CLAUDIA S. VALDESPINO TORRES**, Colección Nacional de Anfibios y Reptiles, IBUNAM, Apartado Postal 70-153, C.P. 04510, México, Distrito Federal, México, and **FERNANDO MENDOZA QUIJANO**, Instituto Tecnológico Agropecuario No. 6, km 5.5 Carr. Huejutla-Chalahuiyapa, Apartado Postal 94, C.P. 43000, Huejutla de Reyes, Hidalgo, México.

ANOLIS CAROLINENSIS (Green Anole). USA: TEXAS: BANDERA CO: Lost Maples State Natural Area, 8.0 rd km N Vanderpool on FM 187. 4 June 1998. John H. Malone. TCWC 79908. Verified by James R. Dixon. County record (Dixon 1987, Amphibians and Reptiles of Texas. Texas A&M Univ. Press, College Station. 434 pp; and Dixon 1996, Texas Herpetol. Soc. Spec. Publ. 2). Specimen was collected during a herpetofaunal inventory for the Texas Parks and Wildlife Department, June–August 1998. All specimens were collected under the authority of State Park Scientific Study Permit 32-98.

Submitted by **JOHN H. MALONE**, Herpetological Independent Study Group, Texas A&M University, Department of Wildlife and Fisheries Sciences, College Station, Texas 77843, USA, and **WAYNE DAVIS**, Lost Maples State Natural Area, HCO1, Box 156, Vanderpool, Texas 78885, USA.

EUMECES LATICEPS (Broadhead Skink). USA: FLORIDA: HERNANDO CO: Chassahowitzka Wildlife Management Area, 28°38'33"N, 82°35'28"W. 10 July 1995. Kristin N. Wood. UF 109402. Verified by David L. Auth. New county record (Ashton and Ashton 1991, Handbook of Reptiles and Amphibians of Florida. Part 2: Lizards, Turtles and Crocodilians. Revised edition. Windward Publ., Miami. 191 pp.). Collected from a funnel trap in a hydric hammock.

Submitted by **KRISTIN N. WOOD**, Florida Game and Fresh Water Fish Commission, 23212 Lake Lindsey Road, Brooksville, Florida 34601, USA.

HEMIDACTYLUS MABOUIA (Tropical Gecko). USA: FLORIDA: BREVARD CO: I-95 between SR 406 and 405 in Titusville. 13 August 1998. Noah Anderson, Todd Campbell, Bridget Quinn. Louisiana State University Museum of Natural Science (LSU 80027–28). Verified by Brian Crother. New county record; extends range ca. 190 km NE of Glades County. One adult male (SVL = 64 mm) and one gravid female (SVL = 61 mm) collected from hotel walls. Sympatric with *H. turcicus*. Also, *H. garnotii* found in Titusville, but not present with either *H. turcicus* or *H. mabouia* (Meshaka et al. 1994, Herpetol. Rev. 25:165).

Submitted by **CHARLES D. CRISCIONE** and **NOAH J. ANDERSON**, Department of Biological Sciences, Southeastern Louisiana University, Hammond, Louisiana 70402-10736, USA, **TODD CAMPBELL**, Department of Ecology and Evolutionary Biology, University of Tennessee, 569 Dabney Hall, Knoxville, Tennessee 37996-1610, USA, and **BRIDGET QUINN**, 356 West Ogden Street, Girardville, Pennsylvania 17935, USA.

HEMIDACTYLUS TURCICUS (Mediterranean Gecko). USA: TEXAS: BANDERA CO: Lost Maples State Natural Area, 8.0 rd km N Vanderpool on FM 187. 4 June 1998. John H. Malone. TCWC 79911. Verified by James R. Dixon. County record (Dixon 1987, Amphibians and Reptiles of Texas. Texas A&M Univ. Press, College Station. 434 pp; and Dixon 1996, Texas Herpetol. Soc. Spec. Publ. 2). Specimen was collected during a herpetofaunal inventory for the Texas Parks and Wildlife Department, June–August 1998. All specimens were collected under the authority of State Park Scientific Study Permit 32-98. *Hemidactylus turcicus* was found to be established at the campground bathroom and park maintenance area.

Submitted by **JOHN H. MALONE**, Herpetological Independent Study Group, Texas A&M University, Department of Wildlife and Fisheries Sciences, College Station, Texas 77843, USA.

MABUYA HEATHI. BRAZIL: BAHIA: ABROLHOS ARCHIPELAGO (17°58'S, 38°42'W), Sueste Island. 8 March 1995. G. F. Dutra and T. M. Guerra. Museu do Rio de Janeiro (MNRJ 6652–54); 13 April 1997. G. F. Dutra and D. Vrcibradic. MNRJ 6655–59; 15 April 1997. D. Vrcibradic. MNRJ 6660–62; Siriba Island. 17 April 1997. D. Vrcibradic. MNRJ 6663–64. All verified by Paulo E. Vanzolini. Also observed (but not collected) on Redonda Island by G. F. Dutra in 1995. The species is relatively abundant on the archipelago of Abrolhos (except on Santa Barbara, the largest of the four islands, where it is apparently absent), which lies ca. 70 km from the nearest continental coastline. According to previous published data on the distribution of this lizard (Vanzolini et al. 1980, Répteis das Caatingas. Academia Brasileira de Ciencias, Rio de Janeiro. 161 pp.; Peters and Donoso-Barros 1986, Catalogue of Neotropical Squamata. Part II. Lizards and Amphisbaenians. Bull. U.S. Natl. Mus. 297.293 pp.), it ranged from the state of Ceará (type locality Fortaleza, 3°48'S, 38°38'W) to near Salvador (12°50'S, 38°25'W) in Bahia. This is the first published insular record for the species.

Submitted by **GUILHERME FRAGA DUTRA** and **DAVOR VRCIBRADIC**, Pós-Graduação em Ecologia, Departamento de Zoologia, C. P. 6109, Universidade Estadual de Campinas, 13081-970 Campinas, São Paulo, Brazil. *Corresponding address for DV:* Setor de Ecologia, Instituto de Biologia, Universidade do Estado do Rio de Janeiro, Rua S. Francisco Xavier, 524, Maracana, 20550-011, Rio de Janeiro, Rio de Janeiro, Brazil.

SERPENTES

ARIZONA ELEGANS ELEGANS (Kansas Glossy Snake) USA: COLORADO: PUEBLO CO: DOR. Pueblo Reservoir State Wildlife Area, southwest shore access road ~3 mi north of Highway 96 (N:38 16.509, W: 104 48.615). 8 August 1998. UNC-MNH 2235. Verified by Hobart M. Smith and David Chiszar. First County record (Livo et al. 1996, Herpetological Microbiogeography of Colorado II: Documented and Potential County Records. Publ. Colorado Herpetol. Soc.).

Submitted by **ENOCH BERGMAN, MENAN BERGMAN, THERESA CHILDERS, JERRY D. MANZER**, and **STEPHEN P. MACKESSY**, Department of Biological Sciences, 501 20th Street, University of Northern Colorado, Greeley, Colorado 80639, USA.

CROTALUS ATROX (Western Diamondback Rattlesnake). USA: NEW MEXICO: UNION CO: Jimmie Taylor Ranch at Goat Canyon, ca. 14 air mi S, 20 air mi W Clayton; Sec 5/6, T23N, R32E; 36°17.08'N 103°32.59'W. 3 August 1998. Fidel Vital. KU Color Slides 6564–65. Verified by J. E. Simmons. New county record (Degenhardt et al. 1996, Amphibians and Reptiles of New Mexico. Univ. New Mexico Press, Albuquerque. xix + 431 pp.).

Submitted by **CHARLES W. PAINTER**, New Mexico Department of Game and Fish, P.O. Box 25112, Santa Fe, New Mexico 87504, USA.

CROTALUS MOLOSSUS: (Blacktail Rattlesnake). USA: NEW MEXICO: TORRANCE CO: 9.6 mi N U.S. Rt. 60 on USFS Road 422; Priest Canyon, Manzano Mts., border between Secs. 20–21. T4N, R5E. 16 May 1998. Bruce Christman. University of New Mexico Museum of Southwestern Biology (MSB 61130). Verified by A. M. Snyder. New county record (Degenhardt et al. 1996, Amphibians and Reptiles of New Mexico. Univ. New Mexico Press, Albuquerque. xix + 431 pp.).

Submitted by **BRUCE CHRISTMAN**, P.O. Box 180, Jemez Springs, New Mexico 87205, USA, and **CHARLES W. PAINTER**, New Mexico Department of Game and Fish, P.O. Box 25112, Santa Fe, New Mexico 87504, USA.

DRYMARCHON CORAIS EREBENNUS (Texas Indigo Snake). USA: TEXAS: BROOKS CO: no specific locality, but catalogued data includes 'venado camp' which is probably a temporary hunting camp. August 1985. No specific collector. TAIC 5820. Verified by Steve A. Smith. New county record (Dixon 1987, Amphibians and Reptiles of Texas. Texas A&M Univ. Press, College Station. 434 pp.).

Submitted by **MICHAEL JAMES McCOID**, Department of Biology, Campus Box 158, Texas A&M University, Kingsville, Texas 78363, USA.

EPICRATES CENCHRIA ALVAREZI (Argentine Rainbow Boa). BOLIVIA: SANTA CRUZ DE LA SIERRA: San Antonio del Parapetí. July 1986. B. Malkin. Museo Argentino de Ciencias Naturales "Bernardino Rivadavia" (MACN 33023). Verified by Gustavo Carrizo. First record for country.

Submitted by **TOMAS WALLER**, Zavalía 2090 3°B, Buenos Aires, Argentina, CP 1428 (e-mail: tomas@waller.com.ar) and **EMILIO BUONGERMINI P.**, Museo Nacional de Historia Natural del Paraguay, Sección de Herpetología, Caballero 1060, Asunción, Paraguay, CP 1324.

PITUOPHIS MELANOLEUCUS MUGITUS (Florida Pine Snake). USA: FLORIDA: HERNANDO CO: Chassahowitzka Wildlife Management Area, 28°37'03"N, 82°33'23"W. 20 June 1996. Kristin N. Wood. UF 109410. Verified by David L. Auth. New county record (Ashton and Ashton 1988, Handbook of Reptiles and Amphibians of Florida. Part 1: The Snakes. Revised edition. Windward Publ., Miami. 176 pp.). Collected from a funnel trap in mesic flatwoods.

Submitted by **KRISTIN N. WOOD**, Florida Game and Fresh Water Fish Commission, 23212 Lake Lindsey Road, Brooksville, Florida 34601, USA.

REGINA RIGIDA RIGIDA (Glossy Crayfish Snake). USA: FLORIDA: HERNANDO CO: Chassahowitzka Wildlife Management Area, 28°36'32"N, 82°35'58"W. 2 October 1997. Kristin N. Wood. UF 113925. Verified by David L. Auth. New county record (Ashton and Ashton 1988, Handbook of Reptiles and Amphibians of Florida. Part 1: The Snakes. Revised edition. Windward Publ., Miami. 176 pp.). Extends range south along Gulf Coast; collected from a funnel trap in a hydric hammock.

Submitted by **KRISTIN N. WOOD**, Florida Game and Fresh Water Fish Commission, 23212 Lake Lindsey Road, Brooksville, Florida 34601, USA.

RHADINAEA FLAVILATA (Pine Woods Snake). USA: FLORIDA: HERNANDO CO: Chinsegut Nature Center, 28°37'42"N, 82°21'26"W. 28 May 1996. Kristin N. Wood. UF 109409. Verified by David L. Auth. New county record (Ashton and Ashton 1988, Handbook of Reptiles and Amphibians of Florida. Part 1: The Snakes. Revised edition. Windward Publ., Miami. 176 pp.). Collected from a funnel trap in sandhill habitat.

Submitted by **KRISTIN N. WOOD**, Florida Game and Fresh Water Fish Commission, 23212 Lake Lindsey Road, Brooksville, Florida 34601, USA.

SIBON ANNULATUS (Ringed Slug-eater) NICARAGUA: JINOTEGA: Nature Reserve Bosawas: ca. 0.5 km S Pueblo Wiso, 13°59'90"N, 85°19'60"W, ca. 200 m elev. 16 February 1998. G. Köhler and R. Seipp. Forschungsinstitut und Naturmuseum Senckenberg (SMF 78369). Verified by James R. McCranie. First record for Nicaragua; extends the range ca. 400 km north of the closest known locality in Costa Rica (Savage and McDiarmid 1992, Copeia 1992:421–432).

Submitted by **GUNTHER KÖHLER** and **ROBERT SEIPP**, Forschungsinstitut und Naturmuseum Senckenberg, Sektion Herpetologie, Senckenberganlage 25, D-60325 Frankfurt a.M., Germany.

STORERIA OCCIPITOMACULATA OBSCURA (Florida Redbelly Snake). USA: FLORIDA: HERNANDO CO: Chassahowitzka Wildlife Management Area, 28°36'32"N, 82°35'58"W. 27 July 1995. Kristin N. Wood. UF 109408. Verified by David L. Auth. New county record (Ashton and Ashton 1988, Handbook of Reptiles and Amphibians of Florida. Part 1: The Snakes. Revised edition. Windward Publ., Miami. 176 pp.). Collected from a funnel trap in a hydric hammock.

Submitted by **KRISTIN N. WOOD**, Florida Game and Fresh Water Fish Commission, 23212 Lake Lindsey Road, Brooksville, Florida 34601, USA.

THAMNOPHIS SIRTALIS (Common Garter Snake). USA: NEW MEXICO: CHAVES CO: Bitter Lake National Wildlife Refuge, funnel trap on gravel rd between Units 3 & 5; 16.5 air km NE Roswell (jct U.S. Rts. 380 & 285); NE1/4 Sec 9, T10S, R25E, 33°27'38.8" N 104°23'58.4" W. 25 April 1998. Gordon L. Warrick. University of New Mexico Museum of Southwestern Biology (MSB 61103). Verified by D. S. Sias. MSB 61103 is an adult male 365 mm SVL, 120 mm TL. On 24 May 1998 a gravid female 800 mm SVL, 190 mm TL was captured at the same site, photographed, and released (KU Color Slide11257–58). The specimens reported herein are the first to be collected outside of the Rio Grande drainage in New Mexico since those reported by Bundy (1951, Copeia 1951:314) and specimens reported to CWP as Ohio University Vertebrate Collection (OUCV 2640–41) collected during July 1950. Given that specimens had not been

discovered in this area for almost 50 years, the population of *T. sirtalis* in the Pecos River drainage was presumed likely extirpated (Degenhardt et al. 1996, Amphibians and Reptiles of New Mexico. Univ. New Mexico Press, Albuquerque. xix + 431 pp.).

Submitted by **CHARLES W. PAINTER**, New Mexico Department of Game and Fish, P.O. Box 25112, Santa Fe, New Mexico 87504, USA, and **GORDON L. WARRICK** and **WILLIAM R. RADKE**, Bitter Lake National Wildlife Refuge, P.O. Box 7, Roswell, New Mexico 88202, USA.

Distribution Records and Life History Notes for Amphibians and Reptiles in Belize

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The distributions of amphibians and reptiles in Belize have recently been reviewed and summarized in Lee (1996). We herein report additional records and life history data collected from 1993 to 1997. Records were determined based on comparisons with range maps and locality data presented in Lee (1996). Place names correspond to topographical maps issued by the Ordnance Survey, Southampton, England and obtained from the Department of Lands and Surveys, Belmopan, Belize. Voucher specimens or photographs are deposited in the Campbell Museum (CUSC), Clemson University, Clemson, South Carolina, USA.

Bufo marinus (Marine Toad). TURNEFFE ATOLL: Calabash Cay (17°17'N; 87°49'W). 25 February 1997. Steven G. Platt and Thomas R. Rainwater. Verified by Jacob A. Marlin. CUSC 1569. First record for Turneffe Atoll. Not previously reported from any offshore habitat in Belize.

Chelydra serpentina (Common Snapping Turtle). TOLEDO DISTRICT: Agua Caliente Swamp, ca. 2 km N Laguna Village (16°10'N; 88°58'W). 11 June 1997. Steven G. Platt and Thomas R. Rainwater. Verified by Jacob A. Marlin. CUSC 1438. Carapace (length = 39.0 cm) of an adult recently killed by fishermen. Previously recorded from only three sites in Belize, all within 20 km of Agua Caliente Swamp. According to locals *C. serpentina* is common in the swamp and regularly harvested for food. Hunting Cay in the Sapodilla Cay Group (16°07'N; 88°16'W). 7 December 1997. Captured by Belize Defense Force personnel and deposited in the Belize Zoo. Voucher photograph. Verified by Anthony Garel. CUSC 1559. First record from any offshore island in Belize. The nearest populations are on the mainland, ca. 60 km W of Hunting Cay. It is likely the turtle was transported to the island by humans. Hunting Cay is a small (ca. 0.5 km^2) mangrove island with no available freshwater habitat, and is unlikely to support a resident population of *C. serpentina*.

Claudius angustatus (Narrow-bridged Mud Turtle). ORANGE WALK DISTRICT: 3.4 km SE San Felipe Village on San Felipe to Indian Church Road (17°52'N; 88°45'W). 14 August 1993. Steven G. Platt. Verified by William E. Snyder. Voucher photograph. CUSC 1558. District record. Extends range ca. 50 km NE.

Crocodylus acutus (American Crocodile). AMBERGRIS CAY: San Pedro Lagoon, ca. 1.5 km N San Pedro (17°55'N; 87°58'W). 2 October 1996. Steven G. Platt. Verified by Jacob A. Marlin. Voucher photograph. CUSC 1468. Western shoreline, ca. 20 km NW of San Pedro (17°58'N; 87°58'W). 1 November 1996. Steven G. Platt. Verified by Jacob A. Marlin. Voucher photograph. CUSC 1474. Laguna Cantena, ca. 30 km NE of San Pedro (18°09'N; 87°51'W). 28 May 1997. Steven G. Platt. Verified by Jacob A. Marlin. Voucher photograph. CUSC 1476. BELIZE DISTRICT: Belize City, University College of Belize Campus, ca. 2 km E Northern Highway (17°30'N; 88°12'W). 14 January 1997. Steven G. Platt. Verified by Jacob A. Marlin. Voucher photograph. CUSC 1475. Cay Caulker, mangrove swamp adjacent to municipal airstrip, ca. 22 km NE Belize City (17°46'N; 88°02'W). 24 April 1997. Steven G. Platt. Verified by Jacob A. Marlin. Voucher photograph. CUSC 1449. Hicks Cay, northern shoreline, ca. 22 km N Belize City (17°41'N; 88°09'W). 19 July 1996. Steven G. Platt. Verified by Jacob A. Marlin. Voucher photograph. CUSC 1471. Long Cay, interior mangrove swamp, ca. 20 km NE Belize City (17°38'N; 88°04'W). 19 February 1997. Steven G. Platt and Thomas R. Rainwater. Verified by Travis Crabtree. Voucher photograph. CUSC 1472. Maps Cay, ca. 12 km W Belize City (17°30'N; 88°05'W). 27 January 1997. Steven G. Platt. Verified by Jacob A. Marlin. Voucher photograph. CUSC 1470. Northern River Lagoon, ca. 10 km E Maskall Village (17°53'N; 88°13'W). 24 October 1997. Steven G. Platt and Steven Brewer. Verified by Jacob A. Marlin. Voucher photograph. CUSC 1447. Western Lagoon, ca. 6 km NW Gales Point Village (17°16'N; 88°20'W). 18 September 1997. Steven G. Platt. Verified by Jacob A. Marlin. Voucher photograph. CUSC 1469.

The distribution of *C. acutus* in Belize has long been uncertain owing to confusion with the sympatric Morelet's crocodile (*C. moreletii*), and the only previous records were from the Turneffe Atoll (Lee 1996). Our records extend the distribution north ca. 100 km to the Mexican border, and south ca. 120 km to Toledo District. Within this range *C. acutus* is expected on most offshore cays, but appears rare and confined to scattered localities on the coastal mainland. We found no evidence for the occurrence of *C. acutus* in any inland, freshwater habitats (Platt 1996).

Coniophanes schmidti (Schmidt's Striped Snake). ORANGE WALK DISTRICT: Lamanai Outpost Lodge, Indian Church Village (17°46'N; 88°40'W). 28 December 1997. Hong Liu and Steven G. Platt. Verified by Julian C. Lee. CUSC 1564. Previously known in Belize from two specimens collected in the Mountain Pine Ridge, Cayo District. This specimen represents a District record and extends the range ca. 70 km NE of the Mountain Pine Ridge. An intact bird egg was found in the stomach.

Crotalus durissus (Neotropical Rattlesnake). TOLEDO DISTRICT: Southern Highway, ca. 16 km NE Medina Bank Village (16°27'N; 88°37'W). 17 April 1997. Steven G. Platt. Verified by Jacob A. Marlin. CUSC 1440. Logging road ca. 7.1 km SE of Bladen River Bridge, Southern Highway (16°24'N; 88°38'W). 19 April 1997. Steven G. Platt. Verified by Jacob A. Marlin. CUSC 1441. Both specimens were DOR in extensive coastal pine savannas. A partially digested rodent (probably *Sigmodon hispidus*) was found in the stomach of CUSC 1440. These District records are the southernmost for Belize, and constitute a range extension of ca. 70 km S from populations in the Mountain Pine Ridge, Cayo District. BELIZE DISTRICT: ca. 5 km N of Democracia Village (17°22'N; 88°34'W). 21 October 1997. Steven G. Platt. Verified by Jacob A. Marlin. CUSC 1452.

Found in a recently (April 1997) burned pine savanna approximately 1.0 m from an armadillo burrow. Western Highway, ca. 6.4 km W of Hattieville (17°25'N; 88°24'W). 22 August 1997. Steven G. Platt. Verified by Jacob A. Marlin. CUSC 1450. Found in wet coastal savanna dominated by sedges and palms (*Paurotis* sp.). These specimens represent District records and constitute a range extension of ca. 60 km NE from populations in the Mountain Pine Ridge. ORANGE WALK DISTRICT: Lamanai Outpost Lodge, Indian Church Village (17°46'N; 88°40'W). 2 August 1997. Thomas R. Rainwater. Verified by Jacob A. Marlin. CUSC 1450. Extends distribution ca. 30 km SE of August Pine Ridge Village, the previous southernmost record outside of the Mountain Pine Ridge. The habitat at this site consists of second-growth hardwood forest and milpas in various stages of abandonment. Pine savanna is absent, contradicting Fugler's (1960) statement that *C. durissus* in Belize is restricted to savanna habitats. Although Lee (1996) speculated that *Bothrops asper* may competitively exclude *C. durissus* from forested habitats, both species occur at this locality (S. Platt and T. Rainwater, pers. obs.).

Ctenosaura similis (Spiny-tailed Iguana). TURNEFFE ATOLL: beach on Northern Cay (17°29'N; 87°47'W). 4 April 1997. Steven G. Platt and Thomas R. Rainwater. Verified by Jacob A. Marlin. CUSC 1448. First record for the Turneffe Atoll. Common on beach ridges and littoral forest throughout the atoll. Nearest populations are 40 km SE on Half Moon Cay, Lighthouse Atoll.

Leptophis mexicanus hoeversi (Mexican Green Tree Snake). TURNEFFE ATOLL: Calabash Cay (17°17'N; 87°49'W). 15 June 1995. Steven G. Platt. Verified by Jacob A. Marlin. CUSC 1546. Northern Cay (17°29'N; 87°47'W). 25 June 1997. Steven G. Platt. Verified by Jacob A. Marlin. CUSC 1435. *L. mexicanus* was previously reported in the Turneffe Atoll only from Big Cay Bokel (Henderson 1976). We found *L. mexicanus* common in littoral forests throughout the atoll, and both blue (1435) and green (1546) morphs were encountered. The blue morph has not been previously reported, and these individuals exhibit a bright blue dorsum devoid of any markings. Although mistakenly labeled as *Leptophis ahaetulla*, a photograph of both *L. mexicanus hoeversi* morphs collected by SGP on Calabash Cay appears in Garel and Matola (1996). Snakes were observed feeding on *Anolis sagrei*, which are abundant in the atoll.

Tantillita canula (Yucatan Dwarf Short-tailed Snake). ORANGE WALK DISTRICT: Lamanai Outpost Lodge, Indian Church Village (17°46'N; 88°40'W). 16 July 1997. Thomas R. Rainwater. Verified by Julian C. Lee. CUSC 1556. Snake found dead after application of pesticide to ornamental plants. This represents the fourth specimen from Belize. Two specimens were previously collected at Lamanai Archaeological Site, ca. 2 km N of Lamanai Outpost Lodge (Lee 1996).

Thamnophis marcianus (Checkered Garter Snake). ORANGE WALK DISTRICT: Lamanai Outpost Lodge, Indian Church Village (17°46'N; 88°40'W). 25 September 1997. Thomas R. Rainwater. Verified by Jacob A. Marlin. CUSC 1453. District record extending distribution ca. 30 km NW of previous range limit in the Belize District.

Acknowledgments.—Julian C. Lee and John B. Thorbjarnarson are thanked for reviewing early drafts of this manuscript. The assistance of Julian C. Lee, Jacob A. Marlin, Anthony Garel, Travis Crabtree, and William E. Snyder in verifying our identifications was most appreciated. We are grateful to Raphael Manzanero and Emil Cano, Conservation Division, Forest Department, Belmopan for issuing the necessary collecting, research, and export permits. Fieldwork in the Turneffe Atoll was assisted by Coral Cay Conservation and University College of Belize. Further assistance was provided by Hong Liu, Brenda Salgado, Mark and Monique Howells and Lamanai Outpost Lodge, Richard and Carol Foster, William Hasse, Matthew Miller, Bruce and Carolyn Miller, Richard Montanucci, and John Scavo. Stanlee Miller of the Campbell Museum assisted in the preparation and deposition of voucher material. Support for SGP was provided by Wildlife Conservation Society. TRR was supported by Lamanai Field Research Center.

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Distributional Records for Louisiana Amphibians

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The following Louisiana State University Museum of Natural Science (LSUMZ) specimens represent new parish records for Louisiana. Pertinence of records are based on distributional data provided by Dundee and Rossman (1989). Identification of specimens was verified by Douglas Rossman.

Ambystoma maculatum (Spotted Salamander). Richland Parish: 0.7 mi NE Rayville. Larry Wilson. LSUMZ 42531. 11 September 1965. Sabine Parish: Bayou Toro at LA 392. Jack Deshotels, Philip St. Romain, Mark Staton. LSUMZ 60050. 16 August 1973.

Ambystoma opacum (Marbled Salamander). Concordia Parish: 1 mi S Clayton. Larry Wilson, A. Romano. LSUMZ 25211–25213. 2 March 1965. St. Martin Parish: 4 mi N of I-10 on Whiskey Bay exit. Mike Kirton. LSUMZ 60312–13. 1 February 1975. West Baton Rouge Parish: 7–9 mi W Port Allen. D. May, E. Armstrong, Lawrence Binford, Burt Monroe, Jr. LSUMZ 6735–38. 14–25 February 1962. 6 mi N Port Allen. G. Schaefer. LSUMZ 17538. 4 April 1964. 6 mi E Rosedale. James Hebrard, John O'Neill. LSUMZ 17907, 18609. 22 February 1967.

Ambystoma talpoideum (Mole Salamander). Ascension Parish: 2.5 mi E, 0.8 mi S of Galvez. LSUMZ 59523. F. Marabella. December 1997.

Ambystoma texanum (Smallmouth Salamander). Iberia Parish: between Loreauville and Lake Fausse Pointe. Todd Lewis. LSUMZ 57534–35. March 1996. Vernon Parish: 1.9 mi N jct Louisiana 464 and Louisiana 111. Larry Wilson. LSUMZ 42240–41. 19 February 1966.

Amphiuma means (Two-toed Amphiuma). East Baton Rouge Parish: Camp Istrouma, Indian Mound. Jeff Boundy, Steve Shively. LSUMZ 59692–93. 17–19 June 1998.

Amphiuma tridactylum (Three-toed Amphiuma). Ascension Parish: 2.5 mi E, 0.8 mi S of Galvez. LSUMZ 59528. J. Boundy. 27 March 1998.

Desmognathus conanti (Spotted Dusky Salamander). Red River Parish: 10 mi NNE Coushatta on Louisiana 788. Larry Wilson. LSUMZ 28084. 18 December 1966.

Eurycea quadridigita (Dwarf Salamander). Iberville Parish: 6 mi WNW Rosedale. Larry Wilson. LSUMZ 51816. 31 December 1964.

Hemidactylium scutatum (Four-toed Salamander). Ascension Parish: 2.5 mi E, 0.8 mi S of Galvez. LSUMZ 59524. F. Marabella and J. Faggard. 17 March 1998.

Necturus maculosus (Common Mudpuppy). Evangeline Parish: 0.5 mi N Dossman at Bayou Cocodrie. Howard Dupre. LSUMZ 62954. 8 January 1976.

Notophthalmus viridescens (Eastern Newt). Madison Parish: 0.2 mi E Indian Lake on Spur Louisiana 577. LSUMZ 23947. 3.7 mi W U.S. 65 on Spur Louisiana 577. R. Van den Bold. LSUMZ 37785. 24 April 1971.

Plethodon kisatchie (Kisatchie Slimy Salamander). Catahoula Parish: tributary of Sugar Creek, T10N, R5E, NW quarter S21. Steve Shively. LSUMZ 58297. 19 March 1997.

Plethodon mississippi (Mississippi Slimy Salamander). Ascension Parish: 2.5 mi E, 0.8 mi S Galvez. Jeff Boundy, Frank Marabella. LSUMZ 58248. 18 February 1997. LSUMZ 58256. Frank Marabella. January 1997.

Siren intermedia (Lesser Siren). Ascension Parish: 2.5 mi E, 0.8 mi S Galvez. Frank Marabella. LSUMZ 58253. 16 February 1997. Iberville Parish: Nicholson Drive, ca. 11 mi SE Baton Rouge. Robert Claire. LSUMZ 37785. May 1979.

Eleutherodactylus planirostris (Greenhouse Frog). St. Bernard Parish: Louisiana 300, 1.5 mi E Louisiana 46 at Reggio. Steve Karsen. LSUMZ 59096. 1 November 1997. St. John the Baptist Parish: 100 Vicknair Place, east side of LaPlace. Steve Karsen, Jeff Boundy. LSUMZ 58208. 3 February 1997.

Gastrophryne carolinensis (Eastern Narrowmouth Toad). East Carroll Parish: Transylvania, Mississippi River levee. Douglas Rossman. LSUMZ 23952–54. 24 April 1971.

Hyla avivoca (Bird-voiced Treefrog). Tensas Parish: Tensas Bayou at Fool River. Steve Shively. LSUMZ 57192–95. 27 July 1995.

Hyla cinerea (Green Treefrog). West Baton Rouge Parish: 6 mi W Port Allen. G. Schaefer. LSUMZ 15481–82. 4 April 1964. Rosedale Road. Larry Wilson, A. Romano. LSUMZ 15483, 51575. 7 April 1964. Louisiana 415 between Louisiana 76 and US 190. Larry Wilson. LSUMZ 41405. 2 March 1966. Rosedale Road. Larry Wilson. LSUMZ 41985. 2 March 1966. 5.0 mi S Port Allen, 0.5 mi W of Louisiana 1. Jeff Wilkinson. LSUMZ 49491–93. 14 February 1990. 4 mi E Rosedale. Edmund Keiser. LSUMZ 66316. 26 April 1965. Louisiana 76, near parish line. Edmund Keiser. LSUMZ 66325. 26 April 1965.

Hyla gratiosa (Barking Treefrog). West Feliciana Parish: 0.7 mi W Louisiana 66 on Highland Road, Sec. 89. Randy Vaeth, Jim McLean. LSUMZ 36929. 23 June 1978.

Pseudacris feriarum (Upland Chorus Frog). Ascension Parish: 2 mi E Geismar. E. Hastings. LSUMZ 6134. 15 February 1953.

Acknowledgments.—Thanks are due Harold Dundee for investigating several questionable records in the Tulane University collection.

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BOOK REVIEWS

Amphibians in Decline: Canadian Studies of a Global Problem, edited by David M. Green. 1997. Society for the Study of Amphibians and Reptiles. Herpetological Conservation 1. 338 pp. Softcover. US $39 + $3 shipping & handling. ISBN 0-916984-40-0.

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This comprehensive book is an impressive collection of individual papers covering the broad scope of current research (all papers include research post 1990) related to amphibian declines in Canada. It was a pleasure to read the book as the breadth of content and methodologies used gives the reader a complete overview of the extent of research involved in trying to understand the current status of Canadian amphibians. Unfortunately, this made me realize that the work over the past seven years is only the tip of the iceberg and an enormous amount of research is necessary to resolve this complex problem, involving many species and many potential causes (known and unknown).

As mentioned in the foreword, this book is a collection of papers on research developed and presented in isolation. Consequently, it is not a coordinated effort aimed at documenting and understanding amphibian declines at a national scale. This problem is also evident in other countries and may result partly from the geographical isolation of research institutes. Research should reflect a communal concern to resolve a national problem and should be coordinated at either a species or subject level. Wildlife managers should focus on determining the current status of populations, and research teams on resolving specific hypotheses to explain observed declines (i.e., natural population dynamics, disease, UV, radiation etc.) coordinated at a species level (rather than political boundaries). The message from this book is clear, the problem is immense and scientists must work together to examine specific hypotheses and replicate research among species and across latitudinal boundaries.

The first chapter presents a good example of the broad surveys needed to assess the factors influencing the distribution and abundance of amphibians. This study allows us to evaluate the biological factors determining species distributions (i.e., the presence/absence of fish), the stochastic nature of species distributions and, when replicated over many years, allows assessment of the status of species on a regional scale. This is exactly what is urgently needed to assess amphibian populations throughout the world. The following chapters (2–6) present intensive studies on the population dynamics of particular species at given localities, providing a basis for understanding amphibian population dynamics at the population level. Chapter 7 presents a fine example of metapopulation dynamics, and dispersal characteristics among populations. This information is crucial for managing species in fragmented landscapes. The broad survey result, presented in Chapter 8, provides a good example of using calling survey data (albeit for a single species) for rapid assessment of population numbers compared with historical data to determine population declines.

The potential role of conservation genetics is presented in Chapters 9, 10 and 28. Their application is clearly lacking from research to date and field ecologists should collaborate with

geneticists (for example, providing the toe-clips from population studies) to utilize the advantages of population genetics. In Chapters 11 (three papers), 12, 13 and 14, a variety of methods are used to assess the status of amphibian populations in particular provinces. Calling surveys are used to identify species-habitat relationships in agricultural landscapes in Chapter 15, and a good evaluation of the technique is presented in Chapter 16. The use of artificial covers for assessing salamander populations is evaluated in Chapters 17 and 18 and a method for sub-sampling aquatic frogs is presented in Chapter 19 (see discussion below). Potential impacts of forestry activities are described in Chapters 20 and 21, followed by an assessment of the potential impacts of global warming and increased UV radiation on amphibian populations in Chapter 22. The potential changes in amphibian populations at four ponds resulting from changes in water acidity is presented in Chapter 23. Experimental analyses of herbicides and pesticides on egg and larval survival are assessed in Chapter 24, followed by an assessment of agriculture on amphibian deformities (potentially related to herbicide/pesticide residues) in Chapter 25. The role of disease in amphibian declines is well reviewed in Chapter 26. Chapter 27 presents an alternative view on larval surveys and the use of chemical control for introduced species.

The final chapter provides a good overview of the problems associated with assessing amphibian populations and the important distinction between "population size" and "population numbers". The stochastic nature of amphibian populations makes the former difficult to interpret without long term data. The latter (as presented in Chapter 1) is more appropriate for rapid assessment of population status. Finally, a summary of the current status of each species (within each province) is presented in Appendix 1, a suitable basis for management and conservation agencies. The declines are generally attributed to direct anthropological causes yet declines are prevalent in western Canada where human populations are less concentrated.

The large number of authors with a wide range of experience make this book a significant contribution to our understanding of amphibian biology. Many provide excellent examples of methodology and experimental design, however the range of experience of the authors results in some papers lacking rigorous scientific integrity. As for any journal article the reader must consider the experimental design, the results obtained, and the limits on the conclusions reached. In several cases substantial results were overlooked in the discussion, or conclusions are presented without data to support them. One frequent limitation in experimental design results from surveying less than five populations (sometimes within a single waterbody) that may not represent broad patterns for a species. This may result from the limitations imposed by working with endangered species for which only a few sites may be available, but should be avoided whenever possible.

Surprisingly, this book contains little evidence of frog declines in Canada (although see Appendix 1 for species accounts) and no evidence of declines in any of the salamanders. Predicted causes for amphibian declines result from a complex suite of potential (habitat modification, pesticides and herbicide pollution, etc.), postulated (global climate change, disease, acid rain, etc.), and unexplained causes (Chapter 8).

These potential causes are most likely acting independently (although several factors may be acting at the same time) upon each species in each province. Observed declines are associated with habitat destruction, fragmentation and degradation (Appendix 1, however, see Chapter 8). Fortunately, appropriate management actions can be instigated (e.g., forestry regulations, planning urban and agricultural expansion) as political action is clearly the only way to mitigate these anthropogenic effects. The predicted influence of global warming and increased UV radiation on amphibian assemblages once again reminds us of the need for all countries to ensure they are doing everything possible to reduce the local emissions responsible for changing the global environment.

For biologists working on unexplained declines in relatively pristine areas (e.g., eastern Australia, the Rocky Mountains of North America, Central America, and the Andes or Atlantic Forest regions of South America) this volume provides little insight into determining the cause of these declines. Contrary to the conclusion of this book, I believe the fundamental cause of these declines may still be global, however I agree that the primary way of determining the cause of declines will ultimately depend on research at the local scale.

Reflections on several important points raised in this volume include:

1) The sheer amount of research needed is a daunting task and priorities based on rapid assessment are urgently required. A good initiative is presented by Kristiina Ovaska (Chapter 22). However, in her model, the conservation status for each species was included as an independent variable. To create a predictive model that will identify which species are susceptible to global change, current conservation status could be used as the dependent variable. The resulting model would identify the species characteristics which are significantly associated with population declines, also a list of species predicted to be most susceptible to the proposed global changes could be generated.

2) Large-scale surveys are required to document population declines (e.g., Chapters 1, 8, 12, 15, 16, 17, 18 and 28), however, surveys were often restricted to individual species or habitats (water bodies) and/or provincial-political boundaries. Determining species priorities will greatly assist this forbidding task.

3) The variety of methodologies presented provides useful techniques but each contains inherent biases that must be considered in their interpretation and hence application. Adequate surveying often requires species-specific survey techniques. For example, the survey methods in Chapter 1 only sampled species that reproduce in permanent ponds, calling surveys on road transects (Chapters 14–16) only detect vocal species from ponds and not stream-dwelling species, and the use of artificial covers is only effective for some species of salamanders and not others (Chapters 17 and 18). The transect survey method in Chapter 19 may be effective, however no comparison is made with alternative methods. Research on appropriate methodologies would be more productive if compared with alternative methods either in the same place at the same time, or with published results from other studies (e.g., Chapter 16). Alternatively, a single methodology could have been used to compare their efficiency at answering certain ecological questions.

4) Broad scale surveys are urgently required to determine the current status of all species at the "population number" scale (e.g., Chapter 1). Intensive mark-recapture studies provide important baseline data on how individual populations fluctuate (Chapters 2–6), however, they are of limited benefit as they rarely differentiate between immigration, emigration, birth, and mortality. The labor-intensive fieldwork required obtaining this detailed information on population dynamics limits the scope of these studies to a few sub-populations (at the pond or stream level). Sites of high abundance are usually chosen, and without adequate replication across the distribution of the species, these studies do not provide information at the species level. For example, the dynamics of a sub-population will not represent a species if it is a "sink" population. Subsequently, intensive mark and recapture

studies contribute little to our understanding of population declines. However as stated in the editor's final chapter, they will provide valuable information on the dynamics of amphibian populations that may be extremely useful in identifying the cause of a population decline.

Finally, I cannot agree with the conclusions of Chapter 27, supported in the final chapter by Green, suggesting that larval surveys are "largely inapplicable to monitoring the health or persistence of a population." First, there are no data presented to support this contention. The complex life-history of amphibians makes it difficult to pinpoint the most important life stage for population regulation (e.g., Chapter 5). Clearly combined survival at all stages (embryo, larval, juvenile, and adult) influence population size. Studies on population dynamics and regulation must consider all life-history stages.

Several papers presented in this book demonstrate the value of larval surveys (Chapter 1). In the study by Green (Chapter 5), the number of calling males in any year could not be related to the number in the previous year, suggesting that the adult population is regulated by larval recruitment. Unfortunately, larval abundance was not monitored in that study and the role of larval recruitment as a crucial stage in the life-history of this species could not be assessed. Clearly, to understand the "population demographics" of any amphibian species, both larval and adult populations must be considered.

Regarding the question of "population number" the presence of larvae represents the likelihood of reproductive success and hence would be a better indicator of population persistence than the presence of adults. While this may vary for a few ephemeral pond-breeding species (where larval mortality may reach 100 %), most species in Canada appear to breed in more permanent water bodies and larvae are present for extensive time periods (some overwintering). The results of Chapter 7 also demonstrated the value of larval surveys. In that study the presence of adults did not reflect reproductive success as only one pond produced metamorphs (i.e., source vs sink populations). This study demonstrates that the mobility of adults makes adult population estimates difficult to interpret (as mentioned above). Furthermore, tadpole surveys can be useful when searching for remaining populations of species that have significantly declined, particularly for species with a cryptic adult life stage (e.g., *Taudactylus* species in Australia).

Monitoring both larval and adult stages allows us to assess the relative importance of any water body to the success/survival of the species (Chapter 1). For "population number" long-term monitoring of any life-history stage can be surveyed and all are suitable as indices of population status. Larval surveys are often much easier to employ, and are not subject to the immediate climatic effects that limit the activity of adults to certain conditions or particular times of year.

In summary, the book is a credit to the editor, it has an ample scattering of black and white photos that allow overseas readers to visualize the species they are reading about and there are few typographical errors. Reading the book in its entirety provokes constructive thoughts on this global phenomenon and clearly provides insight into appropriate methodologies and direction for future research. The reasonable price and invaluable contents of this book make it a must for anyone interested in amphibian declines.

Amphibians of Iran, by M. Baloutch and H. G. Kami. 1995. Tehran University Publications (no. 2250), Tehran. Softcover, 177 pp. In Farsi (Persian), with Latin taxonomic names and authors' names in Roman type. Price not known.

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Mohamad Baloutch of the University of Tehran is the dean of Iranian herpetologists and has introduced the current generation of Iranian students to field biology and natural history. Haji Gholi Kami is one of those former students, now at the University of Gorgan, who is working on amphibians. Their book has been created, apparently, primarily as a guide to amphibiology generally and to the Iranian amphibian fauna specifically for their students.

The first 65 pages cover the biology and taxonomy of amphibians worldwide, drawing information and illustrations from older standard sources, such as Dickerson, 1969, Goin et al. (1978), Porter (1972), Terentjev and Chernov (1949), Thorn (1969), and others. Topics covered include development and metamorphosis, temperature and hibernation, voice, habitat and biocoenosis, life cycles, food, behavior, reproduction, field and museum techniques and brief treatments of taxa, including orders, suborders, and families. Important biological and herpetological terms are followed by the English term in parentheses, presumably as an aid to students reading the Western literature, and one section is devoted to the definition of important terms of external anatomy used in the descriptions and keys.

The remainder of the book deals with the Iranian amphibian fauna and draws upon most of the important primary literature of Iranian and Southwest Asian amphibians as well as upon the experience of the authors. The species accounts include information on natural history, habitat, and distribution, as well as descriptions of the taxa. Keys to all taxonomic levels are included. The bibliography includes 17 titles in Farsi (in Arabic script) and 81 titles in Western languages (in Roman script).

Most of the errors that I noticed are due to typesetters unfamiliar with taxonomic conventions (e.g., capitalization, here and there, of specific and subspecific epithets). The photographs and some other illustrations have not printed well. The authors have followed Eiselt and Schmidtler (1973) and Anderson (1985) in including *Bufo arabicus* Heyden, 1827, as a subspecies of *Bufo viridis*, whereas Balletto et al. (1985) have shown that this name applies to a different toad of the Arabian peninsula (see also Leviton et al. 1992).

Of what interest is a book in Persian designed for Iranian students to readers of *Herpetological Review*, apart from herpetological bibliophiles who feel compelled to collect all such esoterica? For herpetologists interested in Southwest Asia the book provides a complete list of the Iranian amphibian fauna, but more important, the only existing spot distribution maps for each species (although names of localities are not provided). Thus, while I would hardly recommend that all herpetologists seek out this book, it should probably be in the collections of museum departments of herpetology and in the libraries of large research universities.

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Genitalstrukturen und Paarungsbiologie bei squamaten Reptilien, speziel den Platynota, mit Bemerkungen zur Systematik, by Thomas Ziegler and Wolfgang Böhme. 1997. *Mertensiella* 8 (Deutschen Gesellschaft für Herpetologie und Terrarienkunde). 210 pp. Softcover. DM 68- (approx. US $35), half price for DGHT members. ISBN 3-9801929-7-0.

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This monograph on squamate genital structure is the eighth in the *Mertensiella* series, published as a supplement to the more well-known (at least to North Americans) journal *Salamandra*. Previous issues in the series have included primarily edited works on Palearctic amphibians and reptiles and on varanid biology. This treatise expands on earlier work by the authors on the morphology of the hemipenes and the recently described and named hemiclitores of squamate reptiles, especially varanids and their relatives. It also examines the evolutionary and developmental implications of the copulatory organs and their relationship to mating.

The book begins by providing a historical overview of the study of genital morphology and an introduction to cloacal structure and function. The platynotan lizards are introduced with respect to paleontology, distribution, and general characteristics. The materials and methods section is especially valuable as it outlines methods for the preparation of the hemipenes, hemiclitores, and hemibacula. If inappropriately or incompletely everted, many of the structures of potential interest and systematic use may be obscured or uninterpretable. Significantly, it is possible to evert hemipenes of preserved material, allowing researchers to retrieve data from most museum specimens.

As part of their review of copulatory structures Ziegler and Böhme examined *Lanthanotus borneensis*, both living species of *Heloderma*, and 37 of 47 *Varanus* species. The male and female genital organs are described for each species and line drawings or photographs illustrate many of these structures, including the mineralized hemibacula and their female homologues, the hemibaubella. As Böhme has long argued, these structures, especially the hemipenes, are remarkably complex and provide a potential wealth of characters for both functional and phylogenetic analysis. In one of the more controversial interpretations of their study, the authors recognize female choice as the major factor involved with the evolution of such hemipenial complexity.

Hemiclitores are widespread in the Iguania, Gekkota, Amphisbaenia, Serpentes, and Scincomorpha, as well as the Anguimorpha. This will come as a surprise to many herpetologists and has some direct implications for reptile husbandry, as traditional methods of probing may incorrectly identify females with large hemiclitores as males. The female organs appear to represent rudimentary versions of the male genitals that are characterized by smaller size, a lack of a mineralized internal skeleton, and a simplified surface morphology. The authors include some developmental data to support this interpretation and also assess within taxon variability in both hemipenes and hemiclitores (it is minimal).

The authors document a general conservativeness across varanid lizards with respect to genital morphology, but have identified autapomorphies of these organs which they use to erect a new subgenus, *Soterosaurus*, for *Varanus salvator*. Although the value of recognizing such monotypic subgenera may be questioned, they have also identified other genital characters that appear to support the monophyly of previously recognized subgenera of monitors. Perhaps most importantly, features of squamate genitals appear to be useful in alpha systematic studies and may provide evidence of multiple taxa masquerading under a single name.

The monograph is illustrated by 117 figures and 14 pages of color plates. The majority of these illustrations are informative and contribute materially to the text, however some photographs of lizards *in copulo* are probably superfluous and one figure (Plate 1, Fig. E) appears to be missing and has been replaced by a duplicate of the figure intended for Plate 2, Fig. E. The bibliography includes over 400 references, including the majority of papers dealing with the structure, function, and development of the copulatory organs of squamates.

This contribution will be of considerable use to those interested in varanid biology, squamate reproductive morphology, and intersexual homology. However, all squamate systematists will find the techniques of hemipenial eversion valuable and most morphologists will be intrigued by the fact that the complexity of the hemiclitores and associated structures have gone unappreciated for so long. An English summary and bilingual figure captions should make the majority of this valuable work accessible to even non-German readers and the reasonable price (especially for DGHT members) makes this an affordable addition to most herpetological libraries.

Amphibians and Reptiles of the Great Lakes Region, by James H. Harding. 1997. University of Michigan Press, Ann Arbor. xvi +378 pp. Cloth US $42.50 (ISBN 0-472-09628-1) Paper US $19.95 (0-427-06628-5).

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Amphibians and Reptiles of the Great Lakes Region is the newest addition to the Great Lakes Environment series from the University of Michigan Press. The series covers a variety of natural history topics dealing with the Great Lakes Basin. Like other books in the series, this book's emphasis is on the recognition and general distribution of all species of amphibians and reptiles in the region. This is a plus for using the book as part of the series, but has some limitations.

The book is organized into three sections: introduction, species accounts, and resources and references. The most unique part of the book is the introduction. In it, Harding details the effects of glaciation on the distribution, evolution, and life history of the amphibians and reptiles found in the region. This is the only book I have seen that explains this important part of ecological and evolutionary history in an easy-to-read manner.

The species accounts make up the majority of the book. The accounts cover all the species of the Great Lakes drainage including peripheral species such as the bog turtle, ravine salamander, slender glass lizard, and short-headed garter snake. The accounts are divided into: Description, Confusing Species, Distribution and Status, Habitat and Ecology, Reproduction and Growth, and Conservation. There is a range map and at least one color photo of each species.

The maps in the book are standardized with the rest of the books in the series; they are centered on the Great Lakes Basin, so most states are only partially covered. Wisconsin and Michigan are the only states that are completely included. The maps are not intended to be exact locality maps, but some of the maps are very imprecise, especially at the periphery. The green snake and Blanding's turtle mapped distributions, for example, are too wide ranging in Minnesota. The photos, however, are uniformly good and clearly show diagnostic features of each species.

The one aspect of the book with which I have the biggest problem is the lack of citations, a fault I have seen in some other recent herp guides. I understand this book is intended to be a general guide, but the back cover does state that this is an essential guide for the professional and private enthusiast. I found myself wanting to know where some of the facts came from. I was also a little concerned with the use of the terms "possibly," "probably," and "may" to describe longevity, size, and other natural history items. Unfortunately, these unsubstantiated "facts" may be cited by others. One example is in the Blanding's turtle account, in which Harding states "... it seems possible that a few individuals may reach the century mark." The oldest known *Emydoidea blandingii* has been reported at 77 years. I can see the day when Harding (1997) will be cited as the source for the longevity record for this species. Caution is in order in such matters.

The conservation section provides information on current threats to the species and some suggestions on how they can be corrected. This will be very useful for wildlife managers and conservation planners.

The last section of the book contains resources and references, including a complete bibliography. I would have liked to see the state herp books from the Great Lakes states in a separate listing or at least highlighted. The inclusion of state wildlife and conservation agency addresses is useful for persons interested in state conservation and regulation issues.

Amphibians and Reptiles of the Great Lakes Region is a good field guide for the region. Many of the states included in the Great Lakes drainage currently do not have an amphibian and reptile guide, and this book will be extremely useful in those areas. The generalist will find that the book will stand alone, while the professional will want, or need, to use it in conjunction with more detailed individual state sources of information. In either case it will be used extensively by herpetologists and conservationists in the Great Lakes Region.

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