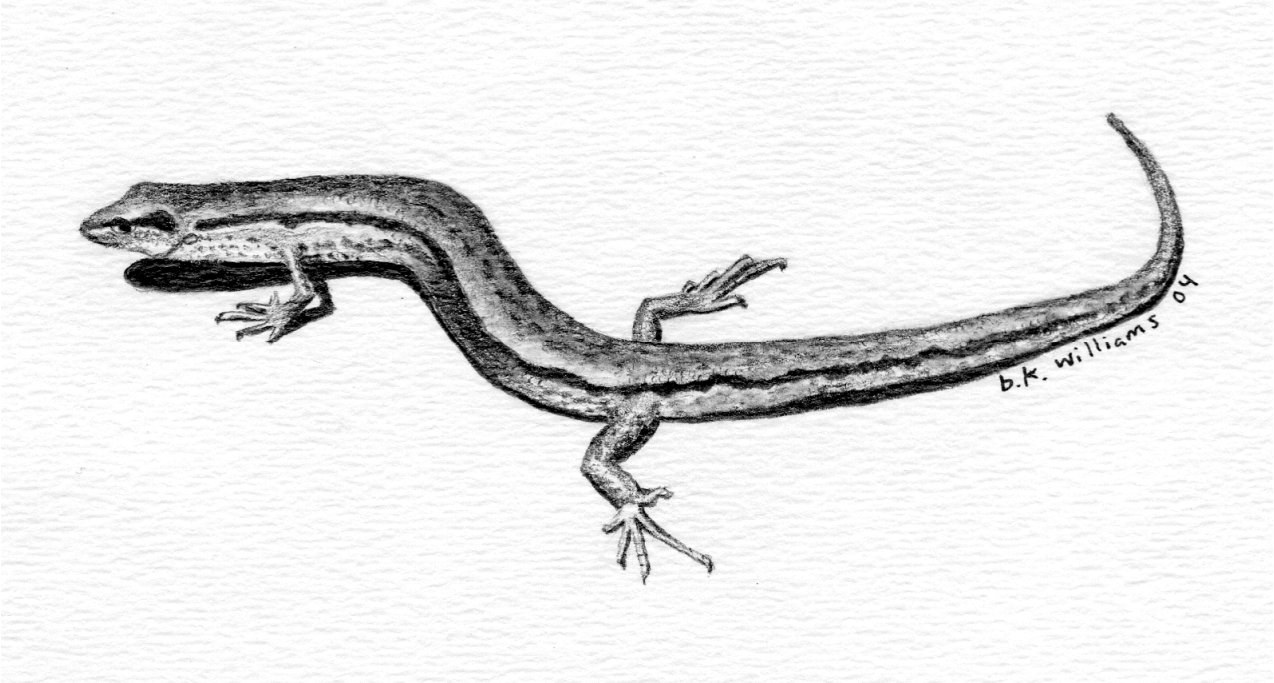
Missouri Herpetological Association



Newsletter

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MISSOURI HERPETOLOGICAL ASSOCIATION NEWSLETTER NO. 17

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Cover art: *Scincella lateralis* by Bethany Williams. The type specimen of *Scincus lateralis* (USNM 3152) was collected by S.W. Woodhouse on the "banks of the Mississippi River below Cape Girardeau, [Cape Girardeau, Co.] Missouri." Thomas Say (1823) in Edwin James, comp, Account of an Expedition from Pittsburg to the Rocky Mountains performed in the years 1819 and '20, by the order of the Hon. J.C. Calhoun, Sec'y of War, under the Command of Maj. Stephen H. Long. Carey & Lea, Philadelphia. Vol. 2: 1-5, 1-442.

INTRODUCTION

The Seventeenth Annual Meeting of the **Missouri Herpetological Association** was held 25-26 September 2004 at the Squaw Creek National Wildlife Refuge in Holt County, Missouri. This organization is designed to provide herpetologists in Missouri and surrounding states with an opportunity to meet and exchange ideas regarding current efforts in research and other professional activities. High on the list of priorities is to provide students, involved in research at either the graduate or undergraduate level, (1) the chance to interact with senior herpetologists, and (2) an outlet to present, in a semi-formal setting, the results of their labors.

This newsletter is the result of a decision made at the inaugural meeting to provide a means of publicly acknowledging papers presented at this and subsequent annual meetings. Further, the newsletter will inform the herpetological community of new distribution records of Missouri's herpetofauna, additions to the bibliography dealing with the state herpetofauna and provide an outlet for the publication of short notes dealing with the natural history of Missouri amphibians and reptiles.

ANNOUNCEMENTS

18th Annual Meeting of the Missouri Herpetological Association

The 18th Annual Meeting of the **Missouri Herpetological Association** will be held on 24-25 September 2005 at the **Reis Biological Station**, Crawford County, Missouri. A "call for papers" and registration materials will be sent in mid-July. For more information please contact **Jeff Briggler** at:

Missouri Department of Conservation
P.O.Box 180
Jefferson City, MO 65102-0180
(573) 751-4115
E-mail: briggj@mdc.mo.gov

Wanted

We are still in need of artwork for future cover illustrations. Any species native to the state is acceptable; however, species described from Missouri type specimens and state species of conservation concern are particularly desirable. The species described from Missouri type specimens that haven't appeared on past covers are: *Typhlotriton spelaeus*, *Eurycea longicauda melanopleura*, *Nerodia fasciata confluens*, *Carphophis vermis*. Anyone wishing to contribute drawings for future issues can send submissions to **Richard Daniel** at:

Division of Biological Sciences
114 Lefevre Hall
University of Missouri
Columbia, MO 65211
E-mail: danielr@missouri.edu

MHA on the Net

The Association has an official site on the Internet. Point your browser to http://www.moherp.org/ to find copies of current and past publications and to view photos and information from the 2004 meeting. Send ideas, suggestions, comments, and content to the Webmaster (webmaster@moherp.org).

Abstracts of Papers Presented at the 17th Annual Meeting of the Missouri Herpetological Association

Squaw Creek National Wildlife Refuge
25-26 September 2004

REPRODUCTIVE BIOLOGY AND STRESS OF CAPTIVITY IN MALE BROWN TREESNAKES (*Boiga irregularis*) ON GUAM

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This study was designed to describe the reproductive biology of a sample of wild caught brown treesnakes and to determine the effect of increased food intake (nutrition) on the development of the testis and sexual segment of the kidney, and on sperm storage in the vas deferens in captive males. The wild snakes were trapped and preserved within 24 hours, in December, 1999 from a snake trap line in northern Guam. In the nutrition experiment adult snakes were matched for snout-vent length and separated into three groups. Groups 1 and 2 were fed a high calorie diet for 8 and 4 weeks, respectively. Group 3 males received a low calorie diet and were preserved at 7 weeks. In the wild sample all snakes above 1035 mm snout-vent length were undergoing spermatogenesis, had well developed sexual segment of the kidney, and had sperm stored in the vas deferens. In all experimental groups, spermatogenesis and development of the sexual segment of the kidney was inhibited, and in most snakes sperm were absent from the vas deferens. Blood levels of stress hormones (i.e. corticosterone) and reproductive hormones (androgens) were not measured, however, a study of plasma corticosterone levels in brown treesnakes indicates that the stress of captivity causes an increase in plasma levels of corticosterone, which may disrupt reproductive hormones and shut down the reproductive cycle.

A REPORT ON A SPECIES OF ECTOPARASITE ON THE GROTTO SALAMANDER (*Typhlotriton spelaeus*) IN TUMBLING CREEK CAVE, TANEY COUNTY, MISSOURI

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A small, flattened worm was noticed on a rock in the stream during a visit to Tumbling Creek Cave (TCC) on June, 2001. This specimen was examined, photographed, and released. The appearance and behavior of the specimen resembled that of an ectoparasitic monogene. A larval Grotto Salamander (*Typhlotriton spelaeus*) was found in a bait trap during studies on crayfish movements in TCC on December 15, 2003. We observed six ectoparasitic worms on the salamander. They were located near the gills, armpits, and along the side of the salamander. Four specimens were collected and brought back live to the laboratory. They were photographed and fixed according to standard parasitological techniques. Examination of the specimens revealed the presence of hooks and suckers on a posterior opisthaptor. The specimens have been identified as belonging to a species of *Sphyranura*. This is the first record of a specimen of this genus infecting grotto salamanders.

TRACE FROM THE PAST: HERPETOFAUNA DISCOVERIES

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In 1854, P.R. Hoy, M.D. was employed by the Smithsonian Institution to explore and document the plant and animal communities in western Missouri. Although Dr. Hoy describes many plant and animal species, the focus of this presentation was to investigate the herpetofauna discoveries. His travels embarked on the ship Honduras on April 13th from St. Louis and ended on June 1st in Lexington. During this trip, Dr. Hoy and companions spent the majority of their shore excursions surveying tributaries within the Booneville and Lexington areas, bottomlands of Chillicothe, and prairies near Harrisonville in Cass County. Twenty-three species of amphibians (7 anurans) and reptiles (10 snakes and 6 turtles) were observed. The anurans mainly consisted of *Rana* species with an interesting notation that wood frogs were abundant in Cooper County. Although the party turned over a world of logs, no salamanders were observed. This should not be surprising since only two species of salamanders (eastern tiger salamander and small-mouthed salamander) are currently known to occur in this part of the state and survey timing was not appropriate for these species. At the time of this survey, some of the snakes and turtles encountered were not known to science. However, Hoy provided interesting stories of the climbing abilities of black rat snakes, spirited chases with racers, feeding behavior of a timber rattlesnake, and the great escape of some turtles. Although after Lewis and Clark adventures, Dr. Hoy was most likely the second contributor to the knowledge of Missouri's amphibians and reptiles.

(POSTER) AMPHIBIAN POND SELECTION: AN INQUIRY BASED STUDY - II. TADPOLE DATA -TWO YEARS

Anne Cafer[1], Eric Shuford[1], Jordan Lippman[1], Lynnette McGuire[1], Robert D. Aldridge[2], Donald A. Kangas[3], J. and Michael Jones[4].
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The purpose of this part of the project is to determine if there are significant differences in the number of tadpoles between the three pond treatments: 3 pond with fish, 3 with bullfrog tadpoles and, 3 control ponds. In the first two years of this study American toads (*Bufo americanus*) were the first to breed in the ponds. Tadpoles of this species were first observed in late April (2004) to early May (2003). The number of toad tadpoles in the three pond treatments was not statistically different for several weeks. In the June sample American toad and gray treefrog (*Hyla versicolor*) tadpoles were present. In both years, significant differences in the number of tadpoles were observed in mid to late June. In the July samples, the vast majority of the tadpoles were treefrogs of the *Hyla versicolor* complex and Cricket frogs (*Acris crepitans*). In most of the samples tadpoles were absent from the fish treatment ponds. In 2003 we suggested that the difference in the number of tadpoles in the fish ponds in the May samples compared to the later samples was be due to the type of fish present in the ponds. By mid-June, the number of goldfish had diminished, so on June 16 (2003), we stocked the fish ponds with bluegill sunfish (*Lepomis macrochirus*) obtained from a nearby pond. However, the data for 2004 in which all the fish ponds contained sunfish, the data were very similar. We therefore conclude that predation on tadpoles, and not adult selection of non-fish containing ponds account for the difference in the number of these between the pond treatments.

THOSE NUMEROUS, BEAUTIFUL, DIVERSE, AND "CRAZY" COLOR MORPH REPTILES IN THE BIG BEND CHIHUAHUAN DESERT COUNTRY OF SOUTHWEST TEXAS

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Big Bend National Park, in southwestern Texas, was established in 1944 and consists of over 801,163 acres (1,252 square miles) in the Chihuahuan Desert. The herpetofauna is diverse and spectacular, but one must look for these animals in the proper place at the right time. Most species are nocturnal and retreat underground into burrows, rocky crevices, or under stones during the day to escape heat and dryness.

Eleven species of amphibians and 56 species of reptiles are presently recorded for Big Bend National Park. Five additional species are listed as hypothetical. Unfortunately, a few species have been extirpated and no longer occur in the park because of habitat loss and human abuse. Frogs and toads make up the only group of amphibians (11 species). Snakes make up the largest group of reptiles (30 species), followed by lizards (22 species), and turtles (4 species). Although some species occur throughout the park, others are restricted to specific habitats and life-zones at different elevations. Five species (four species of rattlesnakes and one species of copperhead) are venomous.

The diversity of extreme, beautiful, color morphs for certain reptilian species becomes almost unbelievable in this Chihuahuan Desert of southwest Texas. The reasons for such extreme color morphism are speculative; many other deserts do not express such extreme color morphism in its reptiles. Multiple color morphs discussed are: Trans-pecos Rat Snake (*Bogertophis subocularis*), Gray-banded Kingsnake (*Lampropeltis alterna*), Ground Snake (*Sonora semiannulata*), Blackhood Snake (*Tantilla rubra cucullata*), Mottled Rock Rattlesnake (*Crotalus lepidus lepidus*), Texas Banded Gecko (*Coleonyx brevis*), Reticulated Gecko (*Coleonyx reticulatus*), and Roundtail Horned Lizard (*Phrynosoma modestum*).

THE STATUS OF LESSER ANTILLEAN IGUANAS (*Iguana delicatissima*) ON ST. EUSTATIUS, WITH NOTES ON SAURIAN HERBIVORY

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Lesser Antillean Iguana populations are in danger of extirpation due to stochastic events, human population growth and accompanying habitat destruction and degradation, predation by introduced mammalian predators, competition with introduced mammalian herbivores, exploitation for food, and, on some islands, hybridization with introduced Green Iguanas (*Iguana iguana*). Past estimates of iguana population size on St. Eustatius were "about 300" and "fewer than 300" individuals. Using hours searched per iguana seen and focusing on seven habitat zones, we generated the following estimates: The Quill crater: 0, slopes of The Quill: 30–60, foothills around The Quill: 0, Island Estates: 63–126, Smoke Alley cliffs: 10–50, foothills of the Northern Hills: 0, and Northern Hills: 174–404, for an estimate of total population size of ~275–650 animals, with a "best guess" of ~ 425 individuals. Support for our higher estimate includes anecdotal evidence (reports from residents, sightings reported to the St. Eustatius National Parks, etc.), evidence of reproduction (Smoke Alley cliffs and Island Estates), release of captive animals (Smoke Alley cliffs), much lower time per sighting in Northern Hills than previously reported, suggestions that iguanas become difficult to find in periods after hurricanes (such as those that prevailed during previous surveys), and suggestions of lower hunting pressure. However, ongoing conservation concerns include infrastructural improvements affecting habitat quality, degradation of habitat by goats, cattle, burros, and invasive plants (e.g., Mexican Creeper, *Antigonon* sp.), ownership disputes over Northern Hills, ongoing predation by humans and feral or domestic cats and dogs, and lax enforcement of laws.

No means of effectively quantifying herbivorous foraging behavior exists. Based on videotaped observations of feeding and notes on feeding in *Iguana delicatissima* and other iguanid lizards, we developed an herbivorous foraging index (HFI) with "gorging" (eating everything within reach before moving to a new location) and "grazing" (taking only a few bites before moving to another location) at

extremes. Relevant data include: number of feeding stops, number of bites taken per stop, duration of each feeding episode, distance moved, and the individual's snout-vent length (to standardize distances, allowing comparisons of animals of different sizes). On a scale of 0–1, the HFI provides a measure of how individuals (or species) forage under certain conditions. A wide range of values for few individuals of one species suggests that herbivorous lizards readily adjust feeding strategies.

ASSESSMENT OF INTER- AND INTRA-SPECIFIC GENETIC VARIATION BETWEEN MASSASAUGA RATTLESNAKE SUBSPECIES VIA MICROSATELLITE ANALYSIS

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Initially, the goal of this research was to investigate genetic variation between three possible subpopulations of the Eastern Massasauga Rattlesnake, *Sistrurus catenatus catenatus*, at Squaw Creek National Wildlife Refuge in Mound City, Missouri. Since September of 2003 when this project began, debate has arisen about the validity of the identification of these reptiles. First, it was believed to house the Eastern Massasauga, but after much deliberation, others are coming around to the idea that these rattlesnakes could be the Western Massasauga, *Sistrurus catenatus tergeminus,* or possibly that of a hybrid like those found at Pershing State Park. Unfortunately, morphological differences between the subspecies are scant, so visual examination may not be the most accurate means of identification. In order to determine a more definitive method for classification, we have initiated a molecular genetics test in hopes of establishing a viable protocol for proper classification of Eastern, Western and hybrid populations of massasauga rattlesnakes. This protocol will then be used to classify populations at Squaw Creek as well as any unknown populations for verification purposes as Eastern, Western or hybrid massasaugas. Another main goal of this research is to assess the genetic stability three possible meta-populations of massasauga rattlesnakes at Squaw Creek National Wildlife Refuge (SCNWR). We would like to know if the populations at SCNWR are viable, if these groups interbreed, and how genetically healthy are they when compared to other established populations of massasaugas.

HERPETOLOGICAL SURVEY AT FORT LEONARD WOOD MILITARY BASE, FORT LEONARD WOOD

Lisa Lehnhoff
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We performed a general survey at Fort Leonard Wood Military Installation for threatened and endangered amphibian and reptiles using drift fence, terrestrial time searching, and general road cruise methods to determine species present at the installation. After 2,006 drift fence trap nights at 34 sites, the following number of species was captured: 3 toads, 10 snakes, 5 frogs, 3 skink, 1 newt, 3 lizards, 3 salamanders, and 1 turtle. Terrestrial time searches occurred at 19 locations each month with a total of 110 man-hours. Eleven snake, 7 frog, 3 skink, 4 turtle, 2 toad, 3 lizard, and 3 salamander species were found. Road cruises occurred between dusk and 3:00 am on both rainy and dry evening. After 68 man-hours, 5 snake species, 4 frog and 2 toad species were found. The only threatened species captured during this survey were 2 ringed salamanders.

NON-BREEDING SEASON MOVEMENTS AND IDENTIFICATION OF OVERWINTERING SITES OF THE GRAY TREEFROG (*Hyla versicolor*)

Jarrett R. Johnson and Raymond D. Semlitsch.
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Widespread fragmentation of terrestrial habitat has increased the need to understand core habitat requirements of organisms that undergo seasonal migrations such as pond breeding amphibians. Current research indicates that most pond-breeding amphibians spend much of their lives in terrestrial habitat at some distance from breeding sites. However, past studies have focused primarily on activities during the breeding season to define amphibian habitat requirements. These studies do not include movements and activities that occur away from aquatic breeding habitat that may be important aspects of a species' life history. We monitored movement of treefrogs through terrestrial habitat adjacent to breeding ponds using mark-recapture techniques in artificial arboreal refugia. Additionally, a subset of individuals captured in pipe-trap refugia were implanted with radiotransmitters and followed to overwintering sites. We found that movement and the use of arboreal rufugia varies temporally, as well as in response to environmental conditions such as temperature, humidity, and rainfall. Furthermore, average migration distances differed between males, females, and juveniles. Most radiotracked individuals were ultimately located in overwintering sites at or below ground level following periods of nearby arboreal retreat use. Our results indicate that treefrogs may travel distances greater than 200 m away from breeding sites between breeding seasons to reach overwintering sites. Appropriate arboreal foraging and terrestrial overwintering microhabitat are important variables to consider when defining non-breeding season habitat use of gray treefrogs. We suggest that accurate estimates of core habitat requirements for amphibians include non-breeding season movement distances and location of overwintering sites in addition to an understanding of habitat utilized by amphibians during the breeding season to fully protect amphibian populations.

CHORUSING BEHAVIOR OF THE BIRD-VOICED TREEFROG, *Hyla avivoca*

Carlos César Martínez Rivera and Carl Gerhardt
Division of Biological Sciences, University of Missouri, Columbia, MO 65211

Frog choruses are dynamic, socially complex environments varying in the density and spatial arrangements of individuals, and are focal points for sexual selection, where males interact to obtain and maintain calling sites, and females locate and choose mates mainly on the basis of their calls. Surprisingly, the factors influencing the onset of choruses and choice for the location of these aggregations have been studied very little. During April-July 2004, I conducted three acoustic playback experiments to test the role of acoustic signals on (1) the seasonal, and (2) daily onset of chorus formation and (3) on the choice of the chorusing location in *Hyla avivoca*. In the first two experiments, I selected pairs of choruses in three locations and alternated a speaker or no-speaker treatment to each, broadcasting synthetic advertisement calls to simulate a small chorus of calling frogs before the breeding season (experiment 1) or earlier in the evening during breeding season (experiment 2). On the third experiment, I simulated a chorus in a new area adjacent to where the chorus usually forms. The playbacks induced males to join the simulated chorus earlier than normal, when compared to the no-speaker treatments, indicating that calls influence the timing chorus formation. Males did not settle in the simulated chorus and aggregated at the "traditional" area where the chorus usually forms, suggesting that calls have no effect on the choice of chorus location. I discuss my results in terms of the various chorus formation models and highlight the need for more data to further investigate the evolutionary background of male aggregative behavior in sexually displaying animals.

REPRODUCTIVE ECOLOGY OF AN URBAN POPULATION OF SMALL-MOUTHED SALAMANDERS (*Ambystoma texanum*): YEAR THREE

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[2]Department of Biological Sciences, Arkansas State University, Jonesboro, AR 72467
[3]Department of Biological Sciences, Southern Illinois University, Edwardsville, IL 62026

This is the third year of our ongoing study of the reproductive ecology of the small-mouthed salamander, *Ambystoma texanum*. We completely enclosed a small (250 m^2), ephemeral, man-made pond on the campus of Missouri Valley College with a drift fence and pit-fall traps in early February 2002 and continued to monitor the fence daily throughout the breeding seasons. In this paper we compare the 2002, 2003, and 2004 field seasons. A total of 649 (369 males, 280 females) adult salamanders entered the pond over three seasons. We collected the first salamanders on 20 February 2002, 12 March 2003, and 28 February 2004, which was prior to the pond filling with water on 20 April 2002 and 17 April 2003; however, the pond filled prior to the 2004 breeding season on 10 December 2003. Most (39%) of the breeding adults arrived at the pond from the north and west, although substantial year-to-year variability in entry direction was observed. Residential areas, the MVC campus, and a small wooded area are to the north of the pond. Sex ratio was highly male biased in 2002 and 2003 (1.8:1; 3.0:1), with male numbers remaining nearly identical (N=86 & 88) and females decreasing between the two years (N= 47 & 29); in contrast, the sex ratio in 2004 was 1:1 (194 males, 205 females). In 2002 we documented only 5 juveniles leaving the pond before the pond dried on 3 July. In 2003 no juveniles emerged before the pond dried on 27 June. We captured 452 juveniles emerging from the pond in 2004 before it dried on 30 June. The spring and summer of both 2002 and 2003 were extremely dry; the pond filled late (well after the normal breeding season) and dried early. However, for the 2004 breeding season the pond filled on 10 December 2003 and held water until 30 June.

BEHAVIORAL AND METABOLIC RESPONSES OF THE SOUTHERN RED-BACKED SALAMANDER (*Plethodon serratus*) TO PREDATORY STIMULI: INFLUENCE OF BODY SIZE

Nathan Windel and Alicia Mathis.
Department of Biology, Southwest Missouri State University, Springfield, Missouri 65804

In its natural habitat, visual cues are often limited for *Plethodon serratus*, so chemoreception is probably important for detection of predators. We conducted experiments examining the effect of chemical stimuli from predatory ring-necked snakes on the foraging behavior and metabolic rates of *P. serratus*. In both studies, individual salamanders were exposed to substrate cues from ring-necked snakes, five-lined skinks (non-predator control), and dechlorinated water (blank control). In the foraging study we also examined the response of *P. serratus* to airborne cues. Foraging success was measured by the latency to first strike and the number of foraging strikes during the 5 minutes following exposure to the stimuli. In the metabolic study, metabolic rates were calculated using % oxygen consumed, measured by constant volume respirometry, before and after exposure to the stimuli. Salamanders showed reduced foraging activity and longer latency to strike in the presence of predatory substrate cues in comparison to the controls, but neither variable was significantly influenced by exposure to airborne cues. Metabolic rates for smaller salamanders (<0.6 g) were significantly affected by the stimulus treatments, with the greatest increase in metabolic rates in the snake treatment. Larger individuals (0.6-1.3 g) showed no significant difference in metabolic rates among treatments. Our findings suggest that salamanders reduce foraging activity in the presence of predatory stimuli, which may reduce their chances of being detected. In contrast to the behavioral responses, metabolic responses were dependent on body sizes. The failure of larger salamanders to exhibit changes in respiration rate following exposure to the predatory stimuli may be because large salamanders are less vulnerable to gape-limited predators. Large salamanders also may be reluctant to flee in the face of predation because they are likely to be territory owners and loss of territories might have serious fitness consequences.

NEW HERPETOLOGICAL RECORDS FROM MISSOURI FOR 2004

Richard E. Daniel[1], Brian S. Edmond[2] and Jeffrey T. Briggler[3]

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The following list represents new county records accumulated or brought to our attention since the publication of Johnson (2000), Daniel and Edmond (2000, 2001) and Daniel *et al*. (2002, 2003). Publication of these records extends our knowledge of the amphibians and reptiles native to Missouri. In addition, recipients of this list have the opportunity to update checklists and distribution maps. Finally, the publication of this list allows us to acknowledge the contributions of the many individuals who have provided information or specimens.

The specimens listed below represent the first reported occurrence of the species within a given county and are based on catalogued voucher specimens or photographs deposited in a public institution. Distribution records are presented in the standardized format of Collins (1989): common and scientific name, county, specific locality (unless withheld for species of special concern), legal description of locality, date of collection, collector(s), institution and catalogue number where the specimen is deposited.

The following acronyms indicate the institutional collections where specimens reported in this note have been deposited: APSU- Museum of Zoology, Austin Peay State University, Clarksville, TN; UMC- Dean E. Metter Memorial Collection, University of Missouri, Columbia, MO. Unless otherwise indicated, all distribution records are documented by post-metamorphic/hatchling fluid preserved specimens.

We would like to extend our appreciation to W. Becker, S. Doherty, E. East, P. Frese, B. Hadley, T. Johnson, R. Krager, F. Martinez, T. Nagel, T. Pettinelli, N. Pieroni, J. Ridings, and B. Williams for generously providing information or specimens included in this note.

AMPHIBIA: CAUDATA

SPOTTED SALAMANDER
Ambystoma maculatum

Douglas Co.: Grundy Conservation Area (S20 T26N R17W); 29 February 2004; B. Edmond (UMC 7711-7712).

McDonald Co.: Rt. EE, 2.0 mi. W Lanagan (S27 T22N R33W); Fall 1997; K. Lohraff, J. Briggler (color print, UMC 643P).

Wright Co.: Panther Hollow Rd., 1.5 air miles SSE Cedar Gap (S27 T28N R16W); 29 February 2004; B. Edmond (color print, UMC 614P).

SMALLMOUTH SALAMANDER
Ambystoma texanum

Lawrence Co.: Co. Rd. 2040, 0.2 mi. W Jct. MO 97 (S23 T29N R28W); 19 February 2004; B. Edmond (UMC 7690).

TIGER SALAMANDER
Ambystoma tigrinum

Dent Co.: White River Trace Conservation Area (S20 T34N R7W); 8 June 2004; J. Briggler, R. Rimer, R. Chapman (color slide, UMC 653P).

Lawrence Co.: Paris Springs Conservation Area (S29 T29N R25W); 28 February 2004; B. Edmond (color print, UMC 623P).

Newton Co.: George Washington Carver National Monument (S7 T26N R31W); July 2000; F. Martinez (larva; color photo, UMC 620P).

HELLBENDER
Crptobranchus alleganiensis

Ripley Co.: Current River (T24N R1E); 27 August 2004; J. Briggler, D. Mayer, S. Paes (color print, UMC 678P).

CENTRAL NEWT
Notophthalmus viridescens

Greene Co.: Little Sac Woods Conservation Area (S30 T31N R22W); 11 April 2004; B. Edmond (UMC 7760).

CAVE SALAMANDER
Eurycea lucifuga

Howell Co.: Billyclub Cave (S16 T25N R16W); 18 October 2004; J. Briggler, R. Rimer, S. Rimer (color print, UMC 672P).

AMPHIBIA: ANURA

FOWLER'S TOAD
Bufo fowleri
Polk Co.: Rt. W, 0.6 mi. E Jct. S-29th Rd. (S28 T32N R24W); 4 March 2004; B. Edmond (UMC 7716).

GREAT PLAINS NARROWMOUTH TOAD
Gastrophryne olivacea
St. Clair Co.: Rt. TT, 0.5 mi. E Weaubleau Creek (S36 T38N R25W); 16 May 2004; R. Krager, G. Pinson, G. Pinson, J. Pinson (UMC 7755).

SPRING PEEPER
Pseudacris crucifer
Gentry Co.: ~11.0 air miles NE Albany (S1 T64N R30W); 6 April 2004; P. Frese (color print, UMC 611P).
Greene Co.: Rt. H at Jct. Rt. KK (S17 T30N R21W); 3 March 2004; B. Edmond (UMC 7713).
Linn Co.: Mussel Fork Conservation Area (S24 T57N R18W); 11 March 2004; J. Briggler, T. Nagel (UMC 7749).

SOUTHERN LEOPARD FROG
Rana sphenocephala
Knox Co.: Spur Rt. V, 1.05 mi. E Jct. Rt. V (S9 T63N R10W); 13 September 2003; R. Daniel (color slide, UMC 590P).

WOOD FROG
Rana sylvatica
Ripley Co.: Little Black Conservation Area (S7 T24N R3E); 4 March 2004; J. Briggler, R. Rimer, S. Pacs, D. Dees (UMC 7751-7752).
Shannon Co.: Sunklands Conservation Area (S1 T30N R6W); 12 March 2004; J. Briggler, R. Rimer (larvae/metamorphs, UMC 7756).

REPTILIA: LACERTILIA

BROADHEAD SKINK
Eumeces laticeps
Texas Co.: Mark Twain National Forest (S9 T33N R10W); 18 May 2004; T. Smith (color slide, UMC 654P).

MEDITERRANEAN GECKO
Hemidactylus turcicus
St. Louis Co.: 125 Weldon Parkway, Maryland Heights (T46N R5E); 16 October 2003; D. Galloway (APSU 17482) (Bufalino 2004).

WESTERN GLASS LIZARD
Ophisaurus attenuatus
Gentry Co.: MO 169, 1 mi. N King City (S28 T61N R32W); 24 April 2004; J. Casey (UMC 7758).

PRAIRIE LIZARD
Sceloporus consobrinus
Douglas Co.: Shannon Ranch Conservation Area (S7 T26N R12W); 19 October 2004; J. Briggler, R. Rimer, S. Rimer (color print, UMC 673P).

GROUND SKINK
Scincella lateralis
Howell Co.: Co. Rd. 430, 5.3 air miles NW West Plains (S11 T24N R9W); 6 March 2004; D. Hobbs (UMC 7661).
Linn Co.: Mussel Fork Conservation Area (S24 T57N R18W); 13 April 2004; J. Briggler, E. Forbes, J. Pepper (UMC 7750).

REPTILIA: SERPENTES

OSAGE COPPERHEAD
Agkistrodon contortrix
Wright Co.: Crisptown Rd, 0.75 mi. W Jct. Rt. AF (S5 T31N R13W); 3 June 2004; T. Johnson (color photo, UMC 621P).

WESTERN WORM SNAKE
Carphophis vermis
Texas Co.: Paddy Creek Rd, 1.6 mi. S Jct. Slabtown Rd (S20 T33N R10W); 16 May 2004; B. Edmond (UMC 7741).

EASTERN YELLOWBELLY RACER
Coluber constrictor
Christian Co.: Mark Twain National Forest, Chadwick Motorcycle Area (S34 T26N R20W); 4 October 2003; S. Ince, B. Ince, B. Edmond (color slide, UMC 553P).

GREAT PLAINS RATSNAKE
Elaphe emoryi
Camden Co.: Ha Ha Tonka State Park (S11 T37N R17W0; 17 October 2004; R. Krager, G. Pinson, G. Pinson, J. Pinson (color photo, UMC 732P).

PRAIRIE KINGSNAKE
Lampropeltis calligaster
Christian Co.: Metzeltein Rd, 0.4 mi. S Jct. MO 14 (S19 27N R23W); 26 October 2004; B. Edmond (color print, UMC 700P).

Clark Co.: US 61, 0.8 mi. S Jct. Rt. F/Z (S9 T63N R6W); 13 September 2004; E. East (UMC 7799).
Morgan Co.: MO 52, 1.25 mi. W Jct. Rt. AA (S21 T42N R16W); 23 October 2003; R. Daniel (UMC 7787).
Texas Co.: US 63 (S3 T29N R10W); 18 October 2004; J. Briggler (UMC 7818). Lebanon Rd., 0.3 mi. S Jct. Rt. H (S20 T29N R9W; 17 October 2004; B. Edmond (color print, UMC 690P).

SPECKLED KINGSNAKE
Lampropeltis getula
Macon Co.: US 63, 2.05 mi. S Jct. Rt. DD (S4 T57N R14W); 8 May 2004; R. Daniel (UMC 7640).
Texas Co.: MO 137, just S Jct. Rt. P (S29 T32N R8W); 10 October 2004; J. Briggler (color print, UMC 667P).

RED MILK SNAKE
Lampropeltis triangulum
Callaway Co.: 1.9 air miles S Holts Summit (S1 T44N R11W); 27 September 2003; W. Becker (color print, UMC 671P).
Ozark Co.: Mark Twain National Forest, Glade Top Trail (S4 T24N R16W); 25 April 2004; R. Krager, G. Pinson, G. Pinson, J. Pinson (color photo, UMC 731P).
Wright Co.: Crisptown Rd., 0.75 mi. W Jct. Rt. AF (S5 T31N R13W); 15 October 2004; J. Briggler, T. Johnson (color print, UMC 675P).

EASTERN COACHWHIP
Masticophis flagellum
Lawrence Co.: Rt. M, 0.2 mi. N Jct. MO 96 (S26 T29N R26W); 19 September 2004, R. Daniel (UMC 7740).
Wright Co.: MO 5 X Shady Rd (S28 T31N R15W); 17 September 2004; R. Daniel (UMC 7738).

ROUGH GREEN SNAKE
Opheodrys aestivus
Pulaski Co.: Crown Rd., 2.2 mi. SW Jct. MO 28 (S3 T36N R11W); 7 September 2004, R. Daniel (UMC 7735).

BROWN SNAKE
Storeria dekayi
Benton Co.: Big Buffalo Creek Conservation Area (S12 T41N R20W); 23 October 2004; R. Daniel (UMC 7789).
Carroll Co.: Co. Rd. 230 X Co. Rd. 381 (S10 T53N R21W); 22 October 2004; R. Daniel (UMC 7786).
Saline Co.: Co. Rd. 116 X Co. Rd. 119 (S25 T52N R20W); 22 October 2004; R. Daniel (UMC 7785).
Texas Co.: MO 181 (S35 T28N R11W); 18 October 2004; J. Briggler (UMC 7817).

FLATHEADED SNAKE
Tantilla gracilis
Jasper Co.: 1.0 air mile NW Prosperity (S21 T28N R32W); 9 July 2003; F. Martinez (color photo, UMC 721P).
Madison Co.: Millstream Gardens Conservation Area (T33N R5E); date unknown; R. Thies (color print, UMC 718P).

WESTERN RIBBON SNAKE
Thamnophis proximus
Henry Co.: Rt. DD, 1.3 mi. N Jct. MO 7 (S8 T42N R27W); 31 October 2004; B. Edmond (color print, UMC 699P).
Knox Co.: Co. Rd. 369, 0.5 mi. W Jct. Rt. E (S4 T60N R10W); 15 September 2004; R. Daniel (color slide, UMC 662P)

COMMON GARTER SNAKE
Thamnophis sirtalis
Dallas Co.: Jugtown Rd., 0.4 mi. (S34 T36N R18W); 6 September 2004; R. Daniel (UMC 7736).

WESTERN EARTH SNAKE
Virginia valeriae
Lewis Co.: 6.1 air miles SE Monticello (S18 T61N R6W); October 2003; J. Lay (UMC 7638).
Marion Co.: Co. Rd. 230, 0.9 mi. W Jct. MO 168 (S21 T58N R6W); April 2003; E. East (color print, UMC 670P).

REPTILIA: TESTUDINES
WESTERN SPINY SOFTSHELL
Apalone spinifera
Knox Co.: S. Fabius River at Co. Rd. 399 (S8 T60N R10W); 25 May 2004; R. Daniel (UMC 7684).
Montgomery Co.: Prairie Fork X Co. Rd. 283 (S16 T47N R6W); 31 May 2004; R. Daniel (UMC 7684).

COMMON SNAPPING TURTLE
Chelydra serpentina
Stone Co.: MO 76, 0.3 mi. E Jct. Rt. Y (S33 T24N R23W); 26 October 2004; B. Edmond (UMC 7807).

WESTERN PAINTED TURTLE
Chrysemys picta
Clinton Co.; US 169, 0.05 mi. S Jct. Rt. Z (S14 T54N R33W); 11 May 2003; B. Edmond (color slide, UMC 502P).
Jasper Co.: Center Creek, 1.1 air miles SE Johnstown (S24 T28N R32W); May 2000; F. Martinez (color photo, UMC 720P).
Maries Co.: US 63, 0.2 mi. SW Gasconade River (S2 T39N R9W); 4 September 2004; R. Daniel (color slide, UMC 661P).
Miller Co.: US 54, 2.9 mi. S Cole Co. line (S T42N R14W); 7 September 2004; R. Daniel (color slide, UMC 664P).
Shannon Co.: Co. Rd. Y-317 (S19/20 T26N R4W); 19 September 2004; B. Hadley (color print, UMC 619P).

COMMON MAP TURTLE
Graptemys geographica
Crawford Co.: Huzzah Creek (S31 T38N R2W); 6 October 2004; J. Briggler, E. Forbes (color print, UMC 669P)
Montgomery Co.: Loutre River X Co. Rd. 198 (S8 T48N R6W); 16 April 2004; R. Daniel (color print, UMC 608P).

ALLIGATOR SNAPPING TURTLE
Macrochelys temminckii
Oregon Co.: Eleven Point River (T22N R2W); 9 October 2004; J. Ridings (color print, UMC 676P).

COMMON MUSK TURTLE
Sternotherus odoratus
Pulaski Co.: Big Piney River (S5 T34N R10W); 3 August 2004; J. Briggler, K. Lohraff (color print, UMC 616P).
Texas Co.: Big Piney River at Boiling Springs Access (S24 T32N R10W); 17 July 2004; R. Daniel (UMC 7722).

THREE-TOED BOX TURTLE
Terrapene carolina
Chariton Co.: Rt. O, ~5.0 air miles NE Keytesville (S12 T54N R18W); 10 August 2004; S. Doherty (color print, UMC 714P).

RED-EARED SLIDER
Trachemys scripta
Crawford Co.: Huzzah Creek (S25 T38N R3W); 5 October 2004; J. Briggler, E. Forbes (color print, UMC 668P).
Madison Co.: Castor River, 3.7 air miles S Marquand (S10 T31N R8E); August 2001; N. Pieroni (UMC 7728).
Polk Co.: Pomme de Terre Lake, Adonis Access (S9 T35N R22W); 6 June 2004; B. Edmond (color print, UMC 615P).

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Natural History Notes

REDISCOVERY OF THE DUSTY HOG-NOSED SNAKE (*Heterodon nasicus gloydi*) IN MISSOURI

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Dusty hog-nosed snakes (*Heterodon nasicus gloydi*) were known to occur in loose, sandy prairie areas of southeastern Missouri. With limited natural prairie habitat remaining and lack of records in over 40 years, this species was classified as extirpated by the Missouri Department of Conservation (MDC).

On 19 May 2004, a dusty hog-nosed snake was captured by Bob Gillespie (Natural History Regional Biologist, MDC) and Scott Kelley (Assistant Natural History Biologist, MDC) on a 0.90-hectare size remnant sand prairie in Scott County. This xeric sand prairie community is surrounded by fencerows of post oaks and blackjack oaks adjacent to a small old-field community with an associated trailer park. The majority of the sand prairie community in the area has been destroyed for agriculture. This specimen was photographed, marked (scale clips), measured (48 cm) and released at the original site of capture. Scale clips were retained as future genetic materials. Since the rediscovery of this species in Missouri, dusty hog-nosed snakes have been reclassified as extant and listed as critically imperiled. With increased survey efforts and restoration of sand prairies, hopefully additional individuals and viable populations will be discovered.

Photograph by Jim Rathert

NEW SIZE RECORDS FOR THREE SPECIES OF MISSOURI AMPHIBIANS

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Edmond and Daniel (2001) presented the most recent compilation of maximum size records for Missouri amphibians and reptiles. We present here three records of amphibians collected during 2004 that exceed the previously published size maxima. All specimens were killed in a 15% aqueous solution of MS-222 and measured prior to fixing in 10% formalin. Body sizes were taken to the nearest mm using standard measurement techniques for anurans (snout-vent length), and salamanders (total length) given by Conant and Collins (1998). All three specimens have been deposited in the Dean E. Metter Memorial Collection, University of Missouri-Columbia.

A female *Hemidactylium scutatum* was collected by the senior author in the Mark Twain National Forest, 16.6 km W of Vida, in Phelps Co., Missouri on 23 March 2004. The specimen (UMC 7662) had a total length (TL) of 9.1 cm. The state record given by Edmond and Daniel (2001) was 8.1 cm (TL).

On 15 June 2004, the junior author collected a female *Hyla versicolor* at the Thomas Baskett Wildlife Area, 6.7 km E Ashland, in Boone Co., Missouri. The specimen (UMC 7709) had an SVL of 6.2 cm. This specimen exceeded the previous state size record (SVL= 5.7 cm) reported by Edmond and Daniel (2001) and the species size record (SVL= 6.0 cm) reported by Conant and Collins (1998).

Earlier size maxima compilations combined *Bufo fowleri* with *B. woodhousii* (Powell et al.1982, Powell 1994). Recently, the taxonomic relationship of the *B. woodhousii* complex was reevaluated and *B. fowleri* was elevated to full species (Sullivan et al. 1996). In their compilation of size maxima, Edmond and Daniel (2001) separated these taxa, but incorrectly applied the former size record to *B. woodhousii*.

On 17 July 2004 the senior author collected an exceptionally large *Bufo fowleri* (UMC 7725) in the Missouri River bottoms, 10.6 km SW Ashland, in Boone Co., Missouri. The specimen had a SVL= 9.7 cm. This specimen exceeds the previous largest known specimen from St. Clair Co., Missouri (SVL= 9.6 cm) and the species record (SVL= 9.5) given in Conant and Collins (1998).

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FALL BREEDING OF THE SOUTHERN LEOPARD FROG (*Rana sphenocephala*) IN CENTRAL MISSOURI.

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Southern leopard frogs (*Rana sphenocephala*) range from southern New York to southern Florida, West to central Texas and North to western Kansas (Conant and Collins 1998). In the southern portion of its range, they are believed to be capable of breeding year-round (Mount 1975, Dundee and Rossman 1989), while in the northern potion of the range a single early spring breeding season is more typical (Phillips et al. 1999, Minton 2001, Johnson 2000). Caldwell (1986) reports that even in the warm climate of the southern states, the majority of *R. sphenocephala* breeding occurs during two periods, early fall (Sept. – Oct.) and winter (Nov. – Mar.). Caldwell (1986) further postulates that the winter period of

breeding activity shifts later in the year in populations of *R. sphenocephala* outside of the southern states, and may be completely absent at the northern edge of its range.

Numerous reports of a bimodal (spring and fall) period of breeding activity have been observed in more northerly locations. Caldwell (1986) states that fall breeding occurs in Kansas but gives no localities. In Illinois, fall breeding during September has been documented by Petzing and Phillips (1999) in Pulaski County, Wright and Wright (1949) in Richland County, and Ruben (1968) in Clark County. Wright and Wright (1949) also report fall breeding in Greene County Indiana, and Minton (2001) supports their report with anecdotal accounts of fall breeding choruses in Indiana. Furthermore, Rubin (1968) reports two distinct tadpole size classes in March in Vigo County Indiana and postulates that they result from both spring and fall oviposition events. Trauth et al. (2004) report a brief fall breeding period in Arkansas, which is collaborated by McCallum et al. (2004) in Craighead, Poinsett, and Arkansas Counties. In Missouri, Johnson (2000) describes the period of *R. sphenocephala* breeding as mid-March to early May, but adds that in some years they may also breed during the autumn.

Here I present data regarding late-summer breeding activity of *Rana sphenocephala* in artificial ponds during the course of an unrelated study of gray treefrog (*Hyla versicolor*) populations. These data are the first published observations of fall breeding of *R. sphenocephala* in the northwest portion of its range. The study site consists of 20 plastic cattle tanks (8ft D) set into the ground at the Thomas Baskett Wildlife Research Area in Boone County Missouri. Monitoring of ponds occurred nightly during the treefrog breeding season (April – June), daily during emigration of juvenile treefrogs (July – September), and sporadically during the winter months (October – March), from Fall 2002 to Summer 2004.

I observed egg masses during the fall in each of the years in which I monitored the experimental breeding ponds. During 2002, leopard frog eggs were recorded on 21 August and 26 August in two separate ponds. The following year, egg masses were observed on 13 August 2003. In each case, the ponds in which the eggs were laid also contained several adults and many metamorphosing juvenile *R. sphenocephala* that most likely hatched from eggs laid during the spring. Egg masses resulting from spring breeding activity at these ponds were observed on 19 April 2003 and 23 April 2004, with metamorphosing individuals first recorded on 6 August 2003. Late-stage *R. sphenocephala* larvae were collected on 15 March 2004, and metamorphosing juveniles were observed on 23 April 2004.

These data regarding Spring-breeding *R. sphenocephala* correspond with published reports regarding breeding activity and larval period in Missouri. Johnson (2000) reports that eggs laid from March – May hatch in about two weeks, and emigration of metamorphosed juveniles occurs from mid-June to late-July after a larval period of several months. My observations of Fall breeding activity of *R. sphenocephala* suggest that the larval period may be more than twice as long during the winter months, presumably from lower food availability and lower temperatures resulting in reduced growth rates. McCallum et al. (2004) suggest that fall breeding of *R. sphenocephala* may depend on heavy late summer rainfall events. While this may be true for highly ephemeral breeding sites, fall breeding may be a much more common occurrence in more permanent fishless ponds (such as those monitored in this report) irrespective of rainfall. As additional anecdotal information is published regarding Fall-breeding of *R. sphenocephala*, the need for more in-depth studies regarding the genetic and evolutionary consequences of such a bimodal breeding pattern becomes apparent.

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ADDITIONS TO THE BIBLIOGRAPHY OF REFERENCES ON THE HERPETOFAUNA OF MISSOURI

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The following is a list of references dealing with the biology of amphibians and reptiles from Missouri that have been brought to my attention since the publication of Johnson (2000), Powell and Daniel (2000), and Daniel (2001, 2002, 2003). Readers are requested to notify the author of any additional references that should be included in future compilations.

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ADDENDUM: HERPETOLOGICAL THESES AND DISSERATIONS FROM WASHINGTON UNIVERSITY IN ST. LOUIS

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