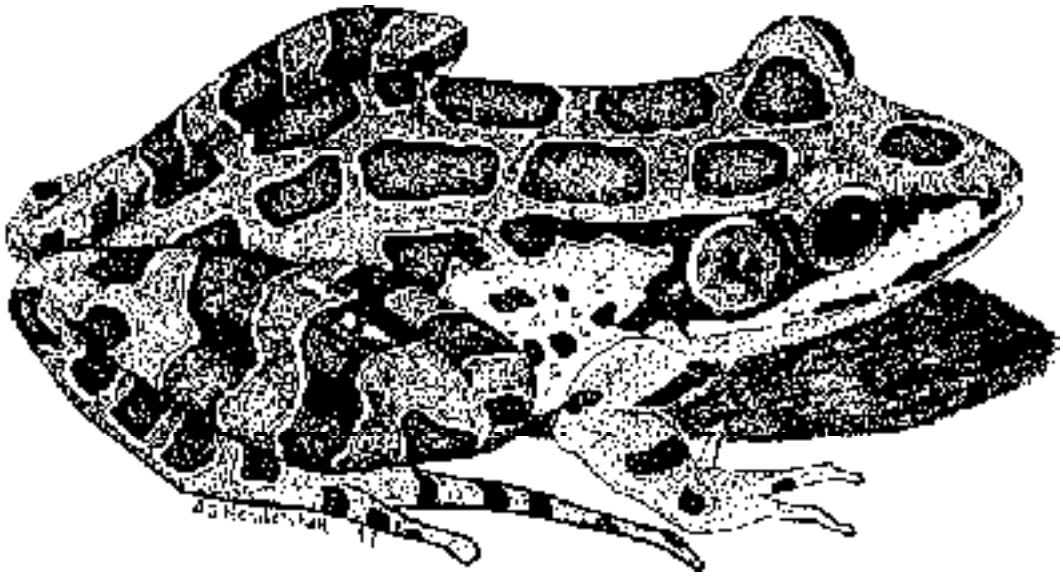
Missouri Herpetological Association



Newsletter

Number 12

1999

MISSOURI HERPETOLOGICAL ASSOCIATION NEWSLETTER NO. 12

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Cover art: *Rana palustris* by A J. Hendershott.

INTRODUCTION

The Twelfth Annual Meeting of the **Missouri Herpetological Association** took place on 25–26 September 1999 at the Lay Field Station near Louisiana, Pike 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 distributional and size records of Missouri's herpetofauna and serve to provide an outlet for the publication of short notes dealing with the state's amphibians and reptiles.

ANNOUNCEMENT

13TH ANNUAL MEETING OF THE MISSOURI HERPETOLOGICAL ASSOCIATION

The 13th Annual Meeting of the **Missouri Herpetological Association** will be held jointly with the **Kansas Herpetological Society** and the **Kansas City Herpetological Society** on 21–22 October 2000 at the **Adam's Mark Hotel** in Kansas City, Missouri.

- **Keynote speakers** will initiate each paper session, with three sessions (two on Saturday and one on Sunday) tentatively planned and an option for a fourth session (on Sunday afternoon) available if demand dictates.
- An **exhibit of native Missouri and Kansas species of amphibians and reptiles** will be available for viewing and photography.
- A **banquet** on Saturday night will feature awards, a speaker, and will be followed by an **auction** of herpetological paraphernalia (books, t-shirts, cages, etc., but no live animals). Beer will be provided at the auction. The auctioneer will be Joe Collins, one of the founding members of the KHS and a featured speaker at the MHA meeting in 1998.

The program will be regularly updated on the KHS webpage (http://eagle.cc.ukans.edu/~cnaar/khs/AnnualMeetingInfo.html).

A "call for papers" and registration packet will be sent in mid-July. Because of the nature of this year's program, advance registration will be necessary in order to make suitable accomodations for the banquet. This notice will also include information on lodging and banquet reservations.

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Abstracts of Papers presented at the Twelfth Annual Meeting of the Missouri Herpetological Association

25 September 1999

EVOLUTION OF MATING SEASON IN RATTLESNAKES (CROTALINAE)

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The western rattlesnake (*Crotalus viridis*) is the most widely distributed rattlesnake in the western United States. The range extends from Mexico to Canada and from the Great Plains to the Pacific Coast. The mating season of *C. viridis* occurs the spring and summer in some regions and in the summer only in others. The object of this study is to compare mating behavior, male-male combat (reproductive behavior), and hypertrophy of the sexual segment of the kidney (SSK) in two geographic regions at roughly same latitude (ca. 36 N). Two geographic regions were compared, snakes primarily from New Mexico (*C. v. viridis*) and snakes from the southern half of California (*C. v. helleri* and *C. v. oreganus*). The seasonal onset and course of spermatogenesis was similar in the two populations. The seasonal occurrence of the reproductive behaviors and hypertrophy of the SSK differed dramatically. In *C. v. helleri* and *C. v. oreganus* two peaks of behavior and hypertrophy of the SSK occurred, one in the spring and a second in the summer, whereas in *C. v. viridis* the reproductive behavior and development of the SSK occurred only in the summer. Since the SSK is hypertrophied in response to androgens the reproductive behaviors are correlated with elevated plasma androgen levels.

LATENT EFFECTS OF THE AQUATIC ENVIRONMENT: SIZE AND OVERWINTER SURVIVAL OF JUVENILE FROGS

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Studies on amphibians with complex life cycles have focused on what occurs in the aquatic environment. What happens when juveniles leave the pond and migrate into the terrestrial environment is still something of a mystery, primarily because experimental manipulations in the terrestrial habitat have been relatively rare. The impetus of this study was to understand how strongly the larval environment influences overwinter mass and survival in anurans by looking at the effects that larval density and larval exposure to a sublethal pesticide (carbaryl—a neurotoxin). Six to eight frogs (*Rana sphenocephala, R. blairi, R. clamitans,* and *Bufo woodhousei*) from the same larval treatment were placed in small field enclosures (1 x 2 m) after metamorphosing from experimental ponds during 1996–1998. All anurans were captured after overwintering to determine mass and survival. This study demonstrates that it may be relatively easy to overwinter metamorphs in small field enclosures—for small numbers of metamorphs, large expansive and expensive pens may not be necessary. Frogs in this study more than double their size, in some cases they were more than 10 times larger than the size at which they were

introduced—consequently, food resources apparently were ample. Additionally, some density effects do persist in the terrestrial environment, particularly in regard to survival—smaller individuals were less likely to overwinter successfully. However, size at collection was not significantly different from larval density treatments. This suggests that metamorphs maybe able to compensate for initial small size by foraging. No robust latent chemical effect was evident, which suggests that, at least for the parameters measured, the chemical exposure is trivial after leaving the larval environment. Yet, for *R. clamitans*, mass at collection was reduced when larvae were exposed to sublethal levels of carbaryl. This could indicate that latent effects might exist for some species; however, more studies are needed to determine the validity of this effect.

HERPETOFAUNAL MONITORING AND FIRE MANAGEMENT AT CHILTON CREEK PRESERVE

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No abstract submitted.

PRELIMINARY OBSERVATIONS ON POPULATION CHARACTERISTICS AND GROWTH OF THE LESSER SIREN

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Most aspects of the ecology of Lesser Sirens (*Siren intermedia*) are poorly known. We conducted a mark/recapture study from March 1998–May 1999 at Mingo National Wildlife Refuge to examine activity and growth rates of Lesser Sirens. Peak captures of both adults and juveniles were during the breeding season of January–March. We did not capture any individuals smaller than 120 mm TL. Average TL of juveniles (<220 mm TL) declined in March and possibly indicated seasonal movements by juveniles. Adult males were significantly larger in TL than adult females. Home ranges of adults overlapped considerably and were highly variable in size, ranging from 3–190 m^2. Maximum distance between captures did not differ significantly for males and females. Our future studies will concentrate on movement and habitat use by using radio-tracking techniques.

PREY AVAILABILITY AND UTILIZATION BY *ARISTELLIGER COCHRANAE* FROM NAVASSA ISLAND, WEST INDIES

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Dietary niche breadths indicated that *Aristelliger cochranae* is a dietary generalist/opportunist, albeit less so than other West Indian geckos that have been studied. Qualitative differences existed between the diets of males and females collected in pendant palm fronds (*Thrinax morrisii*). Females generally contained more, larger, and presumably higher energy foods than males—which we assumed was necessary to offset the high costs of

reproduction. Despite the relatively broad niche breadths (0.72 in males, 0.52 in females), geckos did not consume available prey in a random fashion, overlap between available prey and that consumed by geckos was 0.18. Spiders were taken in disproportionate numbers, presumably because they are soft-bodied and more readily digested than, for example, beetles and roaches. Ants were also taken in large numbers, presumably because of abundance. The largest prey items taken were conspecific eggs and hatchlings, all by females that contained ovidudtal eggs. These may represent the highest energy source available in the palm-frond microhabitat, and may be responsible for the low dietary overlap between males and females (0.28).

SEXUAL DIFFERENTIATION IN THE SPINY SOFTSHELL (*APALONE SPINIFERA*)

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In turtle species with TSD (temperature-dependent sex determination), delaying sexual differentiation as long as possible is advantageous. Since the turtle *Apalone spinifera* has GSD (genetic sex determination), I hypothesized that it will sexually differentiate sooner than TSD species. Staging criteria and sexual differentiation specific to this species are sought for adequate comparison. Staging criteria were found by gross examination under a dissecting microscope. Gonads were examined by histological sectioning procedures and measured with image analysis software. Novel staging criteria are described from stages measured with image analysis software. Novel staging criteria are described from stages 13–26, and another method of staging is shown to have limited applicability across taxa. Trends are seen between gonadal length and sex, stage, and incubation temperature. Histological examination identifies the stage of sexual differentiation at 19. Although sexual differentiation takes place at about the same stage as in other turtles (18–20), the fact that *A. spinifera* has GSD means that this differentiation is irreversible at this stage.

DIFFERENCES AMONG MALE GREEN TREEFROGS ADOPTING ALTERNATIVE MATING TACTICS

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In many species of anuran amphibians, males adopt alternative behavioral tactics to obtain matings. In the green treefrog (*Hyla cinerea*), males primarily produce acoustic signals to attract females and ward off other males. Males adopting the alternative satellite tactic do not produce acoustic signals, position themselves close to another calling male, and attempt to intercept and mate with females attracted to that calling male. The two mating tactics probably do not yield equal fitness payoffs. In a conditional strategy, different tactics with unequal fitness payoffs are adopted in individuals of different competitive ability or in different environmental circumstances. Two key characteristics of a conditional strategy are that: (1) tactics involve a "decision" and (2) tactic decisions are made relative to some aspect of the individual's status. The goal of my research is to elucidate some of the factors that lead males to switch mating tactics. Last summer, I looked for differences among males adopting the two mating tactics. I

found that satellite males are significantly shorter (snout-vent length, tibia length) and lighter than the calling males they parasitize (single factor ANOVA, $p < 0.05$). Also, satellite males were in significantly poorer condition than calling males according to two ratio condition indices (mass/(tibia length)^3, mass/tibia length). Calling males with and without associated satellites did not differ in any of these measures. I also compared differences in call characteristics among different males. Because females express a preference for males with lower call frequencies and call frequency is tightly correlated with male body size, I had expected to see that satellite males have significantly higher frequency calls than the parasitized callers. However, an exciting preliminary result shows parasitized callers had a lower mean call frequency than the nearest calling male that was not parasitized, indicating that satellites may prefer to parasitize males that are more likely to attract females.

COMPARATIVE OVARIAN DYNAMICS OF THE BRAZILIAN RAINBOW BOA (*EPICRATES CENCHRIA CENCHRIA*) AND THE BALL PYTHON (*PYTHON REGIUS*)

J.E. Martin de Camilo [1,2*] and C.S. Asa [2]
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Little is known about the physiological changes that occur during the reproductive season for most tropical reptiles. We compared the basic reproductive physiology of two species of constrictors, the Ball Python and Brazilian Rainbow Boa. These two species differ in reproductive modes, being oviparous and viviparous, respectively. Ultrasound was used as a diagnostic tool to quantify ovarian dynamics over the length of the reproductive cycle for eight females of each species. Cyclic ovarian changes of oogenesis are a continuum ranging from nonvitellogenic oocytes, early vitellogenic oocytes, late vitellogenic oocytes, ovulated ovum, and post-ovulatory events. Ultrasonographic appearance of the vitellogenic process, i.e., oocyte maturation, is similar in oviparous and viviparous species until post-ovulation. After fertilization, oviparous species develop a shell, acquisition of which is followed by oviposition. In contrast, viviparous species support complete embryonic development in the oviduct without shell deposition. Ultrasound enabled the assessment of viviparous embryonic developmental stages for the production of a timeline. This noninvasive technique allowed us to determine oocyte dynamics over the reproductive season providing insight into the timing of reproductive events. The ability to accurately access the ovarian cycle allows for the application of assisted reproductive techniques such as artificial insemination.

EFFECTS OF HUNGER AND PREDATION RISK ON THE FORAGING BEHAVIOR OF THE GRAYBELLY SALAMANDER, *EURYCEA MULTIPLICATA*

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We examined the effects of predation and hunger levels on foraging behavior of adult neotenic Graybelly Salamanders, *Eurycea multiplicata*. Hungry and satiated salamanders were exposed to chemical stimuli from a predatory fish, a sculpin (*Cottus carolinae*), and two nonpredatory species, the Golden Redhorse Fish (*Moxostoma erythrurum*) and tadpoles of leopard frogs (*Rana sphenocephala*). Latency to attack prey was significantly lengthened in the

presence of chemical stimuli from prey regardless of hunger levels, but hungry salamanders had shorter latency times than satiated salamanders. We found no significant interaction between hunger and threat levels. In addition, salamanders distinguished between chemical stimuli from predatory and nonpredatory fishes; responses to nonpredatory fish and tadpole stimuli were not significantly different. In summary, Graybelly Salamanders can (1) recognize sculpin as predators based solely on chemical cues, (2) distinguish between chemical stimuli from predatory and nonpredatory fish, and (3) adjust their foraging behavior according to both hunger and predation risk.

NATURAL HISTORY OF *LEIOCEPHALUS SEMILINEATUS* FROM HISPANIOLA

Sonya E. Nelson[1], Barb L. Banbury[2], Roland A. Sosa[3], Robert Powell[4]

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We examined diet, habitat use, and behavior (focal animal observations, escape behavior, and activity period) of *Leiocephalus semilineatus* from two sites in the República Dominicana. *Leiocephalus semilineatus* is found in dry scrub forest with the larger *L. schreibersii* and *Ameiva lineolata*, an actively foraging teiid of approximately the same size. *Leiocephalus semilineatus* spent most of the time motionless followed by interacting, moving, and feeding. Lizards were active from 0730 to sundown. Mean cloacal temperature was 36.0 ± 0.4˚C (n = 21, 31.7–39.3˚C) and did not differ significantly from those of the other two species. Reproductive condition of collected specimens was examined and no correlation was found between snout-vent length (SVL) and egg, follicle, or testis size. *Leiocephalus schreibersii* and *L. semilineatus* from the Puerto Alejandro site exhibited sexual size dimorphism, which is positively correlated with SVL. Diets included primarily invertebrate material and did not differ significantly between the three species.

HABITAT USE OF THE NORTHERN WATER SNAKE (*NERODIA SIPEDON*) IN A SOUTHWESTERN MISSOURI LAKE

Timothy C. Roth and Brian D. Greene

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Radiotelemetry has facilitated vast improvements in snake ecology by providing an unbiased way to consistently relocate monitored individuals. Advances in the areas of spatial patterns and habitat use are particularly evident. The Northern Water Snake, *Nerodia sipedon*, occupies many aquatic habitats throughout the eastern United States. We studied the habitat use of *N. sipedon* in a lentic environment in southwestern Missouri during May–October 1998. In this system, snakes were almost exclusively associated with littoral zone habitats. Discriminant function analyses comparing structural and climatic habitat variables at snake-selected and randomly determined locations indicated selection by snakes for specific habitat features. Snakes preferred sites with high moisture content and dense herbaceous cover. Although all individuals were closely associated with emergent vegetation, each sex tended to occupy different parts of the littoral zone. Females utilized more open areas farther from shore with deeper water and warmer

climatic conditions than males. Females also had significantly higher body temperatures than males. We suggest that reproductive condition of females (all were gravid) motivated their use of warmer microhabitats by providing optimal thermal conditions during gestation.

PRELIMINARY RESULTS FROM AN EXPERIMENTAL INVESTIGATION OF GENETIC STRUCTURE AND OPTIMAL OUTCROSSING IN GRAY TREEFROGS

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We investigated population genetic structure and optimal outcrossing by performing a series of intra- and interpopulation crosses of gray treefrogs (*Hyla versicolor*). Female treefrogs from a local site (Boone Co., MO) were crossed with males from the same population and with males from nine other populations located at distances of 2–5 km, 50 km, and 100 km. We determined survivorship, time to metamorphosis, and size at metamorphosis of offspring, which were raised individually under high and low food regimes in the lab. Preliminary results have indicated significant effects of distance, population, and parentage in explaining variation in fitness among offspring. We have found no evidence of inbreeding depression or of a simple distance effect such as the optimal outcrossing distance observed in some plant species. Interpopulation crosses experienced higher mortality than intrapopulation crosses, which may indicate outbreeding depression due to local adaptation and genetic differentiation among treefrog populations on a relatively small spatial scale.

GENETIC VARIATION AND A FITNESS TRADEOFF IN THE TOLERANCE OF GRAY TREEFROG (*HYLA VERSICOLOR*) TADPOLES TO THE INSECTICIDE CARBARYL

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One of the major unanswered questions in the study of global amphibian declines is why only some species or populations suffer declines. A possible explanation is that species and populations vary in the genetic basis of their tolerance to environmental stress such as chemical contamination. The presence of genetic variation in fitness traits of amphibians is essential for persistence of species populations through survival and successful reproduction in contaminated environments. We tested for the presence of genetic variation in the tolerance of amphibian larvae to the insecticide carbaryl using Gray Treefrog tadpoles (*Hyla versicolor*). We also assessed whether tolerance of tadpoles is negatively associated with larval performance traits directly related to adult fitness, thereby providing a test of the "cost of tolerance" hypothesis. Our results demonstrated significant variation in tolerance of tadpoles to the insecticide carbaryl within a single population of *Hyla versicolor*. Our maternal half-sib design indicated that maternal effects are less important than genetic effects in explaining this variation in tolerance. Our results also indicated the presence of a fitness tradeoff with tolerance to the chemical carbaryl being negatively correlated, or traded off, with survival of tadpoles reared in the field in

the absence of the chemical. Knowledge of genetic tradeoffs with tolerance under realistic environmental conditions will be important for predicting the rate of adaptation and potential for persistence of species. Finally, the partitioning of environmental and genetic variation in tolerance to chemicals is critical to identifying which species are most susceptible, the amount of genetic variance present, the potential for adaptation to contaminants, and the presence of fitness tradeoffs. Such information is necessary to clearly understand the persistence of populations and, ultimately, the processes leading to species declines.

PHYLOGENETIC RELATIONSHIPS OF THE SPECIES OF NEOTROPICAL HORNED FROGS, GENUS *HEMIPHRACTUS* (ANURA: HYLIDAE: HEMIPHRACTINAE), BASED ON EVIDENCE FROM MORPHOLOGY

Christopher A. Sheil,[1] Joseph R. Mendelson III,[2] and Helio R. da Silva[3]
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The phylogenetic relationships among the species of the Neotropical genus *Hemiphractus* (Hylidae: Hemiphractinae), including a species only recently described, is presented. Parsimony analysis of forty-eight morphological and behavioral characters resulted in a single hypothesis of relationships. This hypothesis provides a framework for a discussion of the biogeography and evolution of several characters among members of this genus.

COMPARATIVE TOEPAD MORPHOLOGY IN CHORUS FROGS (*PSEUDACRIS*): A SEMI-ARBOREAL, TERRESTRIAL, AND FOSSORIAL SPECIES

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No abstract submitted.

AMPHIBIANS OF GERMANY

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A photographic survey of the native amphibians of Germany and an introduction to their basic biology.

NEW AND PREVIOUSLY UNREPORTED RECORDS OF AMPHIBIANS AND REPTILES IN MISSOURI FOR 1999

Richard E. Daniel,[1] Brian S. Edmond,[2] and Tom R. Johnson [3]

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The new county and maximum size records listed below are those accumulated or brought to our attention since previous updates (Johnson and Powell 1988; Powell 1994; Powell *et al.* 1989, 1990, 1991, 1992, 1993a, 1993b, 1994, 1995, 1996, 1997; Powell and Daniel 1997; Daniel *et al.* 1998) of the records reported by Johnson (1987). In addition, several previously unreported records were obtained from institutional collections. Those specimens believed to represent valid current or historical distribution records are reported here.

Publication of this list allows us to acknowledge the contributions of the many individuals who have provided information or specimens. In addition, recipients of this list have the opportunity to update checklists, range maps and listings of size maxima. Finally, the publication of these records extends our knowledge of amphibians and reptiles native to Missouri.

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. New 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, date of collection, collector(s), catalogue number and institution where the specimen is deposited. If the record was published elsewhere, the citation is given.

New maximum size records are presented in the standardized format of Johnson and Powell (1988) and represent specimens larger than previously reported by Powell (1994) or subsequent updates (Powell *et al.* 1995, 1996, 1997, Daniel *et al.* 1998). Sizes are expressed in both metric and English units; however, the metric value is the more precise measurement. Size records must be documented by a catalogued voucher specimen that is deposited in an institutional collection.

The following acronyms indicate the institutional collections where specimens are deposited: BWMC—Bobby Witcher Memorial Collection, Avila College, Kansas City, MO; HCG—Audio Tape Library, University of Missouri, Columbia, MO; KU—University of Kansas, Lawrence, KS; MVZ—Museum of Vertebrate Zoology, University of California, Berkeley, CA; NWMSU—Northwest Missouri State University, Maryville, MO; SMSU—Southwest Missouri State University, Springfield, MO; UMC—University of Missouri, Columbia, MO; WJCTC—William Jewell College, Liberty, MO.

We would like to extend our thanks to the following individuals who generously provided information or access to specimens: D. Ford, P. Frese, C. Gerhardt, R. Powell, B. Schuette, J. Simmons, G. Smith, and L. Trueb.

NEW COUNTY RECORDS

Amphibia: Caudata

SPOTTED SALAMANDER
Ambystoma maculatum
Callaway Co: Little Dixie Conservation Area (S23 T48N R11W), 20 March 1999, coll.—R. Daniel (egg mass, UMC 6585).
Webster Co: Compton Hollow Conservation Area (S10 T29N R19W), 1 March 1998, coll.—Paul W. Frese (color photograph, UMC 122P); Rt. B, 0.25 mi. S Jct. CR 452 (S7 T28N R19W), 5 March 1999, coll.—B. Edmond (UMC 6586).

SMALLMOUTH SALAMANDER
Ambystoma texanum
Polk Co: Near La Petite Gemme Prairie (S25 33N R23W), 15 May 1999, coll.—P. Frese (color slide of metamorph, UMC 160P).
St. Clair Co: 8 mi. NE Osceola (S12 T39N R26W), 26 April 1939, coll.—unknown (KU 89082).

LONGTAIL SALAMANDER
Eurycea longicauda
Gasconade Co: Canaan State Forest, 3.2 km NE Bland (S5 T41N R6W), 5 April 1983, coll.—unknown (KU 194967).
Ralls Co: 2.5 mi. NW Lock & Dam 22 (S7 T56N R3W), 26 September 1999, coll.—B. Edmond (UMC 6736-6738).

CAVE SALAMANDER
Eurycea lucifuga
Gasconade Co: Canaan Conservation Area, 3.2 km NE Bland (S5 T41N R6W), 5 April 1983, coll.—unknown (KU 194970).

RED RIVER MUDPUPPY
Necturus louisianensis
Dunklin Co: ditch at Kennett (S35 T19N R9E), 27 November 1909, coll.—unknown (KU 89895).
Texas Co: Jack's Fork River SW of MO 17 near VFW Camp (S35 T28N R7W), 30 June 1998, coll.—R. DiStefano, S. Barnes, C. Williams, S. Banks, J. Decoske and M. Malleran (UMC 6838).

MUDPUPPY
Necturus maculosus
Phelps Co: Gasconade River, 0.125 mi. SW Rt. D (S24 T37N R10W), 23 October 1999, coll.—G. Sivertson (UMC 6340).

WESTERN LESSER SIREN
Siren intermedia
Scott Co: 3.8 mi. W of Diehlstadt (S25 T27N R14E), 25 February 1986, coll.—W. Pflieger (UMC 6761).

Amphibia: Anura

AMERICAN TOAD
Bufo americanus
Schuyler Co: Chariton River at MO 136 (S33 T66N R16W), 17 September 1986, coll.—unknown (KU 211209–11).

FOWLER'S TOAD
Bufo fowleri
Camden Co: (S29 T38N R17W). 18 May 1962, coll.—I. Hirano (WJCTC 6302) (Smith and Johnson 1999).

COPE'S GRAY TREEFROG
Hyla chrysoscelis
Carter Co: Freemont (S3 T26N R2W), 13 April 1974, coll.—H.C. Gerhardt (audio recording, HCG 56: 4–10).
Crawford Co: Reis Biological Station (S36 T38N R2W), 15 May 1992, coll.—H.C. Gerhardt (audio recording, HCG 148: 1).
Jefferson Co: Rt. C, 1.9 mi. N Jct. Rt. Y (S2 T40N R3E), coll.—H.C. Gerhardt (audio recording, HCG 151: 9).
Oregon Co: Rt. AA ca. Alton (C. Grooding farm) (T24N R3/4W), 30 June 1989, coll.-M. Ptacek (KU 223133–53).
Ozark Co: Rt. CC, 3 mi. W Howell Co. line (S15 T24N R11W), 28 June 1989, coll.—M. Ptacek (KU 223375).

Phelps Co: Rt. K (S12/13 T38N R6W), 27 June 1989, coll.—M. Ptacek (KU 223124–32).
Saline Co: Grand Pass Conservation Area (T52N R22W), 13 June 1988, coll.—M. Ptacek (KU 223117–23).
Shannon Co: Rt. KK, 0.75 mi. W MO 19 (S3 T31N R5W), 17 July 1992, coll.—H.C. Gerhardt (audio recording, HCG 157: 1–11).
Webster Co: Rt. A, just N Jct US 60 (S25/26 T9N R18W), 22 May 1989, coll.—H.C. Gerhardt (audio recording, HCG 118: 5–15).

GRAY TREEFROG
Hyla versicolor
Barry Co: Rt. TT, 3.0 mi E Jct. MO 39 (S9 T25N R25W), 5 June 1992, coll.—H.C. Gerhardt (audio recording, HCG 152: 7, 152: 9).
Ozark Co: Rt. CC, 3 mi. W Howell Co. line (S14 T24N R11W), 28 June 1991, coll.—M. Ptacek (KU 222854–65)
Saline Co: 0.6 mi. E Van Meter State Park (S24 T52N R22W), 20 May 1992, coll.—H.C. Gerhardt (audio recording, HCG 148: 9).
Webster Co: Rt. A, just N Jct US 60 (S25/26 T9N R18W), 22 May 1989, coll.—H.C. Gerhardt (audio recording, HCG 118: 16).

SPRING PEEPER
Pseudacris crucifer
Dade Co: Niawathe Prairie Conservation Area (S14 T32N R28W), 29 March 1999, coll.—P. Frese, H. Frese, A. Sullivan and S. Sullivan (color slide, UMC 132P).

WESTERN CHORUS FROG
Pseudacris triseriata
Dade Co: Niawathe Prairie Conservation Area (S14 T32N R28W), 29 March 1999, coll.—P. Frese, H. Frese, A. Sullivan and S. Sullivan (color slide, UMC 131P).
Polk Co: La Petite Gemme Prairie Conservation Area (S25 T33N R23W), 18 April 1999, coll.—P. Frese and H. Frese (color slide, UMC 129P).
Stone Co: Marvel Cave, 1 June 1950, coll.—R.C. Stebbins (MVZ 53703).

CRAYFISH FROG
Rana areolata
Jasper Co: MO 171, 5 May 1962, coll.—M. Armstrong (WJCTC 821) (Smith and Johnson 1999).

PLAINS LEOPARD FROG
Rana blairi
Ralls Co: 2.5 mi. NW Lock & Dam 22 (S7 T56N R3W), 26 September 1999, coll.—B. Edmond (UMC 6739).

BULLFROG
Rana catesbeiana
Howard Co: Davisdale Conservation Area, 5.5 airmiles E of New Franklin (S29 T49N R15W), 10 May 1999, coll.—R. Daniel (larvae, UMC 6606); US 40, 1.3 mi. E Jct. MO 5 (S34 T49N R16W), 27 June 1999, coll.—R. Danel and J. Daniel (UMC 6637).
Putnam Co: Rebel's Cove Conservation Area (S32 T67N R16W), 17 September 1986, coll.—unknown (KU 211236).
Scotland Co: 1.5 mi. SE Gorin (S21 T64N R10W), 16 September 1986, coll.—unknown (KU 211233).

GREEN FROG
Rana clamitans
Audrain Co: Littleby Creek at Rt. J (S23 T52N R8W), 26 September 1999, coll.—M.E. Gifford (BWMC 6600).
Franklin Co: Spring Creek at Kratz Spring (S4 T41N R2W), 4 September 1932, coll.—D.A. Boyer and A.A. Heinze (MVZ 28063).
Laclede Co: CR OO-888, 1.75 mi. E Rt. OO (S8 T34N R17W), 16 October 1999, coll.—R. Daniel and B. Edmond (color slide, UMC 186P).

Lewis Co: Deer Ridge Conservation Area, 8 mi. N of Lewiston (S19 T62N R8W), 12 April 1996, coll.—E.D. Hooper (KU 223888).
Montgomery Co: 2.3 airmiles WSW of Danville (S27 T48N R6W), 3 April 1999, coll.—R. Daniel, B. Edmond and B. Maltais (UMC 6603).
Osage Co: Maries River, Bernard Bruns MDC Access (S25 T43N R10W), 3 August 1999, coll.—R. Daniel (larvae, UMC 6654).
Scotland Co: 1.5 mi. SE of Gorin (S21 T64N R10W), 16 September 1986, coll.—unknown (KU 211237–40).

PICKEREL FROG
Rana palustris
Howell Co: Eleven Point River at Rt. W (S11/12 T25N R7W), 4 September 1976, coll.—unknown (KU 179054).

SOUTHERN LEOPARD FROG
Rana sphenocephala
Randolph Co: Thomas Hill Reservoir (S19 T55N R15W), 28 August 1999, coll.—R. Daniel (UMC 6680).

Reptilia: Squamata (Lacertilia)

SIX-LINED RACERUNNER
Cnemidophorus sexlineatus
Cedar Co: 32 km W Humansville (T35N R27/28W), 20 May 1966, coll.—unknown (KU 176641–42).
Clay Co: Shoal Creek at Wabash RR (S7 T50N R32W), 5 July 1950, coll.—L.J. Gier (WJCTC 1591) (Smith and Johnson 1999).
Clinton Co: Hufft Farm (S17 T54N R30W), 5 May 1962, coll.—G. Newton (WJCTC 6196) (Smith and Johnson 1999).

FIVE-LINED SKINK
Eumeces fasciatus
Morgan Co: (S9 T40N R18W), 21 April 1962, coll.—A. Miller (WJCTC 6256) (Smith and Johnson 1999); 9.6 km S Gravois Mills (T40N R17W), 3 August 1962, coll.—unknown (KU 176570–71).

NORTHERN PRAIRIE SKINK
Eumeces septentrionalis
Gentry Co: Rt. U, 5.8 airmiles NE Gentry (S8 T64N R32W), 19 June 1997, coll.—D.A. Easterla and D.D. Sleep (NWMSU 4021) (Easterla and Sleep 1999).
Worth Co: CR 84, 2.8 airmiles SW Oxford (S35 T65N R33W), 1 August 1997, coll.—D.D. Sleep (NWMSU 4020) (Easterla and Sleep 1999).

BROADHEAD SKINK
Eumeces laticeps
McDonald Co: US 71 (S36 T23N R33W), 24 April 1998, coll.—J.S. Parmerlee (UMC 187P).

SLENDER GLASS LIZARD
Ophisaurus attenuatus
Butler Co: CR 426 (S13 T25N R4E), date-unknown, coll.—S. Hudson (UMC 6839).
Callaway Co: Whetstone Creek Conservation Area, 2 mi. NW Williamsburg (T48/49 R7W), 10 June 1986, coll.—J.W. Grace (KU 218652).
Iron Co: Taum Sauk State Park (S5/8 T33N R3E), 11 September 1999, coll.—B. Schuette (color slide, UMC 147P).

GROUND SKINK
Scincella lateralis
Audrain Co: CR 751, 1.6 mi. S Jct. MO 19 (S25 T50N R7W), 10 October 1999, coll.—R. Daniel (UMC 6721).
Clay Co: (S34 T52N R31W), 13 May 1967, coll.—F. Johannsen (WJCTC 1729) (Smith and Johnson 1999).
Jackson Co: Blue River Glades (S14 T48N R33W), 18 May 1999, coll.—E.M. Kessler (BWMC 6602).

Reptilia: Serpentes

COPPERHEAD
Agkistrodon contortrix
Atchison Co: Locality unknown, 11 May 1935, coll.—unknown (KU 189080).

COTTONMOUTH
Agkistrodon piscivorus
Hickory Co: Little Niangua River (S14 T37N R20W), 7 July 1983, coll.—B. Yates (UMC 6770).

WESTERN WORM SNAKE
Carphophis vermis
Clay Co: (S34 T52N R31W), 13 May 1967, coll.—F. Johannsen (WJCTC 1707) (Smith and Johnson 1999).

TIMBER RATTLESNAKE
Crotalus horridus
Montgomery Co: Danville Conservation Area (S6 T47N R5W), 8 October 1995, coll.—B. Edmond (color slide, UMC 016P).

RINGNECK SNAKE
Diadophis punctatus
Warren Co: Lost Creek Rd, 5.0 mi. N Jct. MO 94 (S15 T46N R3W), 27 October 1999, coll.—R. Daniel (UMC 6750).

GREAT PLAINS RATSNAKE
Elaphe emoryi
Montgomery Co: Danville Conservation Area (S6 T47N R5W), 3 April 1999, coll.—B. Maltais and D. Clark (color photograph, UMC 123P).

BLACK RATSNAKE
Elaphe obsoleta
Dade Co: MO 39 ca. Greenfield (T31N R26/27W), 27 May 1983, coll.—R. Fleeman (KU 218657); Rt. E, 1 mi E of Niawathe Prairie (S13 T32N R28W), 19 June 1999, coll.—P. Frese (color slide, UMC 146P).

Laclede Co: Miami Dr., 0.15 mi. W Jct. Fleming Rd. (S10 T34N R17W), 16 October 1999, coll.—R. Daniel (UMC 6749).

EASTERN HOGNOSE SNAKE
Heterodon platirhinos
Clinton Co: 2 mi. W Holt (S27 T54N R31W), 27 September 1998, coll.—P. Iske (NWMSU 4025) (Easterla and Sleep 1999).
Hickory Co: Pomme de Terre Lake (S35 T37N R22W), 3 May 1964, coll.—A. Lewis (WJCTC 1228) (Smith and Johnson 1999).
Ralls Co: 4 mi. S of Hannibal at Monkey Run, 1 August 1982, coll.—unknown (KU 195022).
Ray Co: SE Taitsville, 18 May 1965, coll.—unknown (KU 176748).

SPECKLED KINGSNAKE
Lampropeltis getula
Barton Co: Prairie State Park (S16 T32N R33W), 16 October 1998, coll.—Paul W. Frese and Aaron Sullivan (color slide, UMC 093P).
Greene Co: Ritter Spring City Park (Springfield), 1 May 1999, coll.—B. Edmond (UMC 6723).

*SMOOTH GREEN SNAKE
Liochlorophis vernalis
Audrain Co: 3 mi. E Haig (S36 T51N R8W), 8 August 1960, coll.—unknown (KU 83101-83103).
Cass Co: 2 mi. N Drexel (S30 T43N R33W), 23 April 1957, coll.—unknown (KU 83100).

*GREEN WATER SNAKE
Nerodia cyclopion
Dunklin Co: St. Francis River, 4 mi. W Cardwell (S8 T16N R7E), 23 April 1961, coll.—unknown (KU 82394).

* **Historical record.** This species is currently classified as extirpated within the state by the Missouri Department of Conservation.

PLAINBELLY WATER SNAKE
Nerodia erythrogaster
Clay Co: Cooley Lake (S2 T51N R30W), 1968, coll.—J. Littleford (WJCTC 1839) (Smith and Johnson 1999).

BROADBANDED WATER SNAKE
Nerodia fasciata
Ripley Co: Sand Ponds Conservation Area (S35 T22N R4W), 12 April 1984, coll.—T.R. Johnson (KU 218667).

DIAMONDBACK WATER SNAKE
Nerodia rhombifer
Clay Co: Old Missouri River Channel (S28 T51N R31W), 15 May 1965, coll.—J. Bean (WJCTC 1464) (Smith and Johnson 1999).

NORTHERN WATER SNAKE
Nerodia sipedon
Chariton Co: Swan Lake NWR (S8 T55N R20W), 27 May 1999, coll.—R. Daniel and J. Daniel (UMC 6618); Sterling Price Community Lake (S17 T52N R17W), 26 September 1999, coll.—M.E. Gifford (BWMC 6596).
Howell Co: Eleven Point River at Rt. W (S11/12 T25N R7W), 28 June 1975, coll.—unknown (KU 195521-525)
Morgan Co: 13.3 km E Cole Camp, 8 May 1966, coll.—unknown (KU 176839).
St. Francois Co: MO 67, 8.9 km S West Farmington Exit (S2 T35N R5E), 22 August 1966, coll.—unknown (KU 176856).

ROUGH GREEN SNAKE
Opheodrys aestivus
Cole Co: Jefferson City (T44N R11/12W), 20 May 1983, coll.—unknown (KU 195033).
Hickory Co: Pomme de Terre Lake (S35 T37N R22W), 3 May 1964, coll.—M. Wood (WJCTC1236) (Smith and Johnson 1999).
Randolph Co: Rudolf Bennitt Conservation Area (S35 T52N R14W), 23 September 1999, coll.—R. Daniel (UMC 6701).

BULL SNAKE
Pituophis catenifer
Dade Co: US 160, 0.6 mi E Jct. Rt. M (S9 T30N R25W), 18 September 1999, coll.—B. Edmond (color slide, UMC 152P).
St. Louis: near confluence of Missouri and Mississippi Rivers, date unknown, coll. unknown (frozen tissues, MVZ 226247).

BROWN SNAKE
Storeria dekayi
Audrain Co: Littleby Creek at Rt. J (S23 T52N R8W), 26 September 1999, coll.—M.E. Gifford (BWMC 6599); CR 133, 0.3 mi. S Monroe Co. line (S36 T53N R12W), 30 September 1999, coll.—R. Daniel (UMC 6704).
Chariton Co: DOR Swan Lake NWR (S2 T55N R21W), 1 May 1999, coll.—R. Daniel and D. Clark (UMC 6600).
Gasconade Co: Rt. Y, 9.6 km NW Owensville (S15 T42N R6W), 15 October 1980, coll.—unknown (KU 195035).
Monroe Co: CR 870, 1.3 mi. E Jct. Rt. C (S30 T54N R10W), 30 September 1999, coll.—R. Daniel (UMC 6706).
Pettis Co: Kemp Rd. at US 65 (S22 T47N R21W), 9 October 1999, coll.—R. Daniel (color slide, UMC 158P).
Randolph Co: CR 204, 0.6 mi. E Jct. CR 161 (S29 T53N R14W), 12 October 1999, coll.—R. Daniel (UMC 6748).
Ray Co: Just N Orick (S14 T51N R29W), 31 May 1963, coll.—unknown (KU 176916).

REDBELLY SNAKE
Storeria occipitomaculata
Audrain Co: CR 751, 1.4 mi. S Jct. MO 19 (S25 T50N R7W), 29 August 1999, coll.—R. Daniel (color slide, UMC 128P).
Monroe Co: 5 mi. E Paris (S7 T54N R9W), 19 May 1988, coll.—M. Sweet and R. Chenhall (KU 218661).

WESTERN RIBBON SNAKE
Thamnophis proximus
Audrain Co: CR 751, 1.4 mi. S Jct. MO 19 (S25 T50N R7W), 10 October 1999, coll.—R. Daniel (UMC 6720).
Chariton Co: Sterling Price Community Lake (S17 T52N R17W), 26 September 1999, coll.—R. Powell (BWMC 6598).
Cedar Co: El Dorado Springs, Camp Galilee (T36N R26W), 6 May 1962, coll.—unknown (KU 176939).
Clay Co: Cooley Lake (S2 T51N R30W), 20 May 1967, coll.—G. Beets (WJCTC 1711) (Smith and Johnson 1999).
Monroe Co: CR 857, 0.1 mi. N Jct. Rt. AA (S5 T53N R10W), 30 September 1999, coll.—R. Daniel (UMC 6707).
Randolph Co: CR D661, 0,15 mi. N Jct. CR 261 (S17 T52N R14W), 23 September 1999, coll.—R. Daniel (UMC 6702).

PLAINS GARTER SNAKE
Thamnophis radix
Clay Co: near old channel Missouri River (S28 T51N R31W), 8 May 1965, coll.—J. Bean (WJCTC 1470) (Smith and Johnson 1999).

RED-SIDED GARTER SNAKE
Thamnophis sirtalis
Chariton Co: Sterling Price Community Lake (S17 T52N R17W), 26 September 1999, coll.—R. Powell (BWMC 6597).
Monroe Co: CR 900, 1.45 mi. E Long Branch (S29 T53N R10W), 30 September 1999, coll.—R. Daniel (UMC 6705).

LINED SNAKE
Tropidoclonion lineatum
Cass Co: Belton (T36N R33W), 26 June 1962, coll.—unknown (KU 177004).
Ray Co: (S32 T53N R29W), 29 April 1962, coll.—J. Eddington (WJCTC 6341) (Smith and Johnson 1999).

ROUGH EARTH SNAKE
Virginia striatula
Cedar Co: El Dorado Springs, Camp Galilee (T36N R26W), 5 May 1962, coll.—unknown (KU 177011).
Morgan Co: 9.6 km S Gravois Mills (S18 T40N R17W), 26 May 1967, coll.—unknown (KU 177016).

WESTERN EARTH SNAKE
Virginia valeriae
Callaway Co: CR 1041, 0.2 mi. E. Jct CR 1051 (S23 T49N R7W), 10 October 1999, coll.—R. Daniel (UMC 6719).

Reptilia: Testudines

COMMON SNAPPING TURTLE
Chelydra serpentina
Phelps Co: CR 7550, 0.5mi NNE Jct. Rt. AA (S8 T36N R9W), 14 August 1999, coll.—R. Daniel and B. Edmond (UMC 6670).
Wayne Co: Mingo NWR (T27N R8E), 10 April 1999, coll.—P. Frese, L. Solberg and A. Sullivan (color slide, UMC 130P).

PAINTED TURTLE
Chrysemys picta
Audrain Co: CR 112, 0.1mi E Jct. CR 133 (S36 T52N R12W), 11 July 1999, coll.—R. Daniel (UMC 6642).
Moniteau Co: Plowboy Bottoms Conservation Area (S23 T47N R14W), 24 July 1999, coll.—R. Daniel (UMC 6648).
Randolph Co: Rt. B, 0.9 mi. E MO 3 (S11 T52N R16W), 26 September 1999, coll.—R. Powell (BWMC 6601).

MAP TURTLE
Graptemys geographica
Benton Co: 12.8 km S Cole Camp (S32 T42N R20W), 2 July 1963, coll.—unknown (KU 177137-8).

FALSE MAP TURTLE
Graptemys pseudogeographica
Callaway Co: Mokane Rd., 0.25mi SE Jct. Hibernia Ln. (S15 T44N R11W), 13 August 1999, coll.—R. Daniel (UMC 6661).
Howard Co: Franklin Island Conservation Area (S36 T49N R315W), 15 August 1999, coll.—R. Daniel and J. Daniel (UMC 6674).
Lewis Co: Sugar Creek at Benjamin (S23 T62N R7W), June 1958, coll.—unknown (KU 88735).
McDonald Co: Elk River at Noel (S15 T21N R33W), April 1945, coll.—unknown (KU 88745).
Madison Co: Castor River at Allbright (S36 T31N R7E), date unknown, coll.—unknown (KU 88746).
Moniteau Co: Plowboy Bottoms Conservation Area (S23 T47N R14W), 24 July 1999, coll.—R. Daniel (UMC 6649).

MUSK TURTLE
Sternotherus odoratus
Greene Co: Springfield Conservation Nature Center, Lake Springfield (S16/21 T28N R21W), 23 June 1999, coll.—D. K. Ford (SMSU 2479).
Lincoln Co: Cuivre River State Park, 22 April 1997, coll.—B. Schuette (color slide, UMC 175P).

THREE-TOED BOX TURTLE
Terrapene carolina
Howard Co: Rt. Y, 0.5mi S Jct. CR 138 (S11 T51N R14W), 17 May 1999, coll.—R. Daniel (UMC 6612).

RED-EARED TURTLE
Trachemys scripta
Cole Co: Smoky Waters Conservation Area (S12 T44N R10W), 25 August 1999, coll.—R. Daniel (UMC 6677).
Howard Co: Franklin Island Conservation Area (S36 T49N R16W), 15 August 1999, coll.—R. Daniel and J. Daniel (UMC 6673).
Moniteau Co: Plowboy Bottoms Conservation Area (S23 T47N R14W), 24 July 1999, coll.—R. Daniel (UMC 6647).
Osage Co: Painted Rock Conservation Area (S14 T42N R11W), 29 July 1999, coll.—R. Daniel and J. Daniel (UMC 6651).
Phelps Co: CR 7550, 0.5mi NNE Jct. Rt. AA (S8 T36N RR9W), 14 August 1999, coll.—R. Daniel and B. Edmond (UMC 6671).

NEW MAXIMUM SIZE RECORDS

NORTHERN PRAIRIE SKINK
Eumeces septentrionalis
Worth Co: CR 84, 2.8 airmiles SW Oxford (S35 T65N 33W), 1 August 1997, coll.—D.D. Sleep (NWMSU 4020). SVL = 8.6 cm (3.4 in), TL = 15.0 cm (4.2 in) (incomplete tail). The previous record (NWMSU 4015), SVL = 7.5 cm/TL = 20.3 cm, remains the maximum reported total length for the state.

NORTHERN FENCE LIZARD
Sceloporus undulatus
Boone Co: Ashland WLA (T46N R11W), 23 June 1978, coll.—M.E. Clawson (UMC 6785). SVL = 7.4 cm (2.9 in), TL = 12.7 cm (5.0 in).

COPPERHEAD
Agkistrodon contortrix
Wayne Co: Markham Spring Rec. Area (USFS) (S23 T27N R4E), 3 September 1999, coll.—R. Daniel and B. Edmond (UMC 6688). SVL = 80.9 cm (31.85 in), TL = 93.0 cm (36.61 in).

ROUGH GREEN SNAKE
Opheodrys aestivus
Randolph Co: Rudolf Bennitt Conservation Area (S35 T52N R14W), 23 September 1999, coll.—R. Daniel (UMC 6701). SVL = 50.2 cm (19.76 in), TL = 78.3 cm (30.83 in).

THREE-TOED BOX TURTLE
Terrapene carolina
Howard Co: Rt. Y, 0.5 mi. S Jct. CR 138 (S11 T51N R14W), 17 May 1999, coll.—R. Daniel (UMC 6612). Carapace length =15.5 cm (6.1 in).

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NOTES

A NOTE ON REPRODUCTION IN THE MIDLAND BROWN SNAKE (*STORERIA DEKAYI WRIGHTORUM*)

Bruce Schuette
Cuivre River State Park, Troy, MO 63379

On 8 April 1999 a Midland Brown Snake (*Storeria dekayi wrightorum*) was caught on the main park road in Cuivre River State Park, Lincoln County, Missouri by Ronnie King. On 11 July the snake gave birth to 14 young. The female measured SVL = 280 mm and TL 350 mm. Neonates measured SVL 65–71 mm (= 68 mm), TL 82–95 mm (= 89 mm). All snakes were subsequently released.

RECORDS OF REPTILES FROM NORTHWESTERN MISSOURI, INCLUDING COUNTY RANGE EXTENSIONS FOR THE NORTHERN PRAIRIE SKINK (*EUMECES SEPTENTRIONALIS*)

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and

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Prior to 31 May 1992, the Northern Prairie Skink was known in Missouri from only a single specimen taken in timbered rocky habitat north of Kansas City in Platte County in 1949 (Anderson 1965). Johnson (1987) considered this species to be of "questionable occurrence" in Missouri. During May and June 1992, Easterla and Meadows (1993) discovered this species on the vast grasslands (mostly virgin prairie) of the Dunn Ranch in northern Harrison County near the Iowa border. In fact, during a one-day herpetological survey of this area in June 1992, they found this skink to be the most common herptile.

On 17 June 1997, Rod and Diane Runde captured on their farm in Worth County a subadult Northern Prairie Skink by a grain bin in their yard beside their home. This skink was given to the authors for confirmation of its identity. The yard is beside a pond, an old shed, barn, and chicken house and is characterized by many loose boards on the ground, scattered piles of hay, and much open pastureland and grassland. The Runde farm is located by following HW 46 south of Parnell 0.6 mi, east on HW W 1.4 mi, south on gravel road 1.4 mi to a T-junction, then east (left) for 1 mi to the house on the right (west) side of the road.

On 19 June 1997, the authors visited the Runde farm from 0900–1130 h to look for skinks. Unfortunately, the weather was cloudy and windy and a light rain was falling. Regardless, we found six skinks, all around the Runde home; two were under boards, two under piles of hay, and two under bark at the base of a dead tree. No skinks were in the open (perhaps because of the weather). We were unsuccessful in searching adjacent open pasturelands and grasslands, although Mr. Runde has seen up to six or seven skinks earlier in these areas, but on hot, sunny days. Evidently, the skinks use holes in the ground in the open pastures where cover is sparse. Although not virgin, the grassland is of high quality, as indicated by observations of birds such as Sedge Wrens, Bobolinks, and Grasshopper Sparrows. Based on our limited survey, the Northern Prairie Skink seemed to be the most common herptile at the Runde Farm. Other species identified that day (all single specimens) were Eastern American Toad (*Bufo americanus*), Woodhouse's Toad (*B. woodhousii*), a hybrid toad, Blanchards's Cricket Frog (*Acris crepitans blanchardi*), Gray Treefrog (*Hyla* sp.), Bullfrog (*Rana catesbeiana*), and Red-sided Garter Snake (*Thamnophis sirtalis parietalis*).

On 1 August 1997, Sleep investigated a pig pen in Gentry County, where Rod Runde earlier had seen a Northern Prairie Skink. Sleep was successful in capturing one large adult male under hay outside the fenced pen. This location is south from Parnell on HW 46 0.6 mi, east on HW W 4.4 mi, and south on HW U 5.7 mi on the south side of the road. Sleep also observed one Eastern Yellow-bellied Racer (*Coluber constrictor flaviventris*) and two unidentified juvenile snakes.

These Worth and Gentry county sites are isolated from the Dunn Ranch Harrison County locality and are perplexing in their occurrence due to their isolation and habitat. During the summer of 1997, the authors investigated unsuccessfully many other surrounding areas with apparently favorable habitat for this skink (grassland with abundant cover of boards, logs, etc.). We even visited a number of abandoned and crumbled farm houses where boards and logs were abundant and where we flipped thousands of pieces of cover. Some of these unproductive sites appeared to be better habitat than the Runde farm, where we observed nothing unique. Obviously, we still do not understand much about the ecology of this species in Missouri.

Because the Worth and Gentry county sites are near Nodaway County, we spent considerable time, unsuccessfully, in this county searching sites that seemed ideal. During the same summer, Rod Runde did report seeing several skinks while haying a field in Worth County several miles from the Runde farm. Our visits were unsuccessful in finding any skinks in this field.

The Runde farm consists of 355 acres (235 acres of pasture and grassland with cool season grasses). Shockingly, Mr. Runde, in over 30 years of farming on this acreage, had never noticed skinks before 1 June 1997. Undoubtedly, the CRP program has helped grassland habitats return to northwestern Missouri. Today, with less bare, plowed, and cultivated ground, and more grassland cover, we might reasonably expect this Missouri (relict?) skink to be slowly increasing in numbers and expanding its range from several tiny surviving and endangered populations. Regardless, this skink did not suddenly occupy the Runde farm in a single year (e.g., subadults were observed). However, skinks are very secretive and perhaps they were not observed by Mr. Runde until 1997 when a large population was present.

As a postscript, during our skink investigations, we were informed by Bernard Runde that he had, in the early 1980s, observed several small bright green snakes in his hayfield. He has seen none since. His farm is adjacent and south of the Rod Runde farm. Our efforts to find green snakes were unsuccessful.

The following Northern Prairie Skinks were preserved and are deposited in the Northwest Missouri State University Vertebrate Collections (with the exception of NWMSU 4019, which was deposited at the University of Kansas Natural History Museum): NWMSU 4019, subadult, SVL 53 mm, TL 181 mm (tip of tail broken), Worth Co., 17 June 1997; NWMSU 4020, adult male, SVL 86 mm, TL 150 mm (tip of tail missing), Worth Co., 19 June 1997; NWMSU 4021, adult male, SVL 82 mm, TL 161 (tail partly regenerated), Gentry Co., 1 August 1997.

On 27 June 1997, at 1030 h, Easterla observed a subadult Ornate Box Turtle (*Terrapene o. ornata*) crossing HW 111 approximately 4.5 mi north of Forest City, Holt County. Unfortunately, the turtle was hit by a car (DOR) before Easterla could turn around and retrieve it. At this location, HW 111 is bordered on to the east by loess hills grassland and on the west by cultivated fields in the Missouri River floodplain. Johnson (1987) listed this species as statewide (except for the southeastern corner). We believe the species has been extirpated from northwestern Missouri with the exception of the scattered grasslands of the loess hills in Holt County, where a sparse population is barely surviving. During 35 years in northwestern Missouri, the senior author has observed this species only one other time, also in Holt County. During May, in the late 1960s, Easterla observed one adult in the loess hills

cemetery approximately 1 mi south of Mound City. We know of only one other record for the area; on 18 June 1997, Rodney Green (pers. comm.) observed a large adult on Little Tarkio Prairie (virgin prairie), approximately 8 mi NNW Mound City, also in Holt County. Undoubtedly, habitat loss is the primary culprit responsible for the decline of this grassland turtle in northwestern Missouri. With the exception of scattered patches of grassland on the loess mounds along the eastern border of the Missouri River floodplain, plowed/cultivated fields now replace the original upland prairie landscape—"progress" continues. The DOR specimen was preserved and deposited in the Northwest Missouri State University Vertebrate Collections as NWMSU 4023.

On 22 February 1998, Ben Russell captured a very large female Lined Snake (*Tropidoclonion lineatum*), 2–3 mi NE Grant City, Worth County. The snake was basking in the sun on a stump at noon. Snout-vent length was 339 mm and TL 388 mm (15.25"). This specimen was preserved and deposited in the Northwest Missouri State University Vertebrate Collections as NWMSU 4022.

On 27 September 1998, Pat Iske found an adult Eastern Hognose Snake (*Heterodon platirhinos*) on a concrete patio beside a house 2 mi W Holt, Clinton County. This specimen represents a new county record. The specimen was preserved and deposited in the Northwest Missouri State University Vertebrate Collections as NWMSU 4025 (SVL 490 mm, TL 614 mm).

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ADDITIONS TO THE BIBLIOGRAPHY OF AMPHIBIANS AND REPTILES IN MISSOURI

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Following is a list of references addressing the biology of amphibians and reptiles in Missouri which have been brought to my attention since the publication of Powell (1998) and earlier updates since the publication of Johnson (1987). Readers are requested to notify the author of any additional publications that should be included in future lists.

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