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## Vertebrate Prey of Selected Arkansas Snakes

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### Introduction

All snakes are carnivorous and often represent the dominant predatory species in food chains of terrestrial and aquatic communities. Snake food habits, feeding behavior, and trophic ecology have been extensively documented (Mushinsky, 1987). Food lists on the dietary preferences of North American snakes can be found in virtually any study on snake ecology. Snakes often eat a variety of vertebrate prey (often including snakes themselves [e.g., see appendix in Greene, 1988]); vertebrates constitute the principal component of the diet in 95 of 116 snake species (82%) reported by Mushinsky (1987). Only recently has the snake diet literature begun to emphasize foraging theory and the interrelationships between predator and prey (see review by Arnold, 1993).

Research on vertebrate prey of Arkansas snakes is limited to mostly anecdotal accounts (e.g., Trauth, 1982; Byrd et al., 1988; Trauth and Cochran, 1991) compared to the food habits information amassed for snakes typically inhabiting the southcentral United States. These diet data are summarized or referenced in the snake life histories of Wright and Wright (1957) or in recent herpetological textbooks (e.g., Ernst and Barbour, 1989; Ernst, 1992), in annotated state bibliographies (Texas—Dixon, 1987; Oklahoma—Carpenter and Krupa, 1989), in state herpetological books (Louisiana—Dundee and Rossman, 1989; Missouri—Johnson, 1987), and in various natural history studies conducted on snakes in states adjacent to or near Arkansas (e.g., see studies by Klimsta in Illinois and by Fitch in Kansas as cited in Smith [1961] and Collins [1993], respectively).

In the present study, we documented vertebrate prey of several Arkansas snake species through the dissection of museum specimens. Our primary objective was to generate new information on the food habits of several snake species found within the state. A dietary study such as ours contributes to an understanding of the following: 1) a snake's habitat choice, 2) variation in annual and seasonal food consumption, 3) ontogenetic dietary shifts, 4) competition for available food resources, and 5) geographic differences in selected food. Finally, our food habits study represents a preliminary list for these snakes in Arkansas and adds to a database of knowledge on their life history.

### Material and Methods

We analyzed the stomach contents of 14 species and subspecies of snakes collected in Arkansas and housed in the Arkansas State University (ASU) herpetological collection. A total of 510 specimens, most of which were collected over a 10-year span (1984-1993), was examined. The alimentary tract of each specimen was entered via a midventral incision; many of these animals had previously been necropsied to determine their reproductive condition (Trauth et al., 1994). Snout-vent length (SVL) and sex were recorded for all dissected snakes (as well as for some of the prey species). All prey items (including, in some cases, invertebrates) were placed in plastic bags or glass jars filled with 70% ethanol, retained as voucher specimens, and deposited in the ASU herpetological collection. For convenience, each species was grouped according to adult body size, mode of reproduction, and familial rank (see Trauth et al., 1994). A majority of the snake specimens utilized to compile Table 1 was collected during spring months (March - May). Common and scientific names of snakes followed Conant and Collins (1991).

### Results and Discussion

**Small Oviparous Colubrid Species.**—The northern scarlet snake, *Cemophora coccinea copei*, is well known for its egg-eating habits (see Mushinsky, 1987; Trauth, 1993). Of the 18 specimens examined, we found lizard eggs (and/or eggshells) in three individuals (17%). One specimen had consumed six eggs, whereas the other two contained three and five eggs. In all cases, the eggs appeared to be those of the six-lined racerunner (*Cnemidophorus sexlineatus*).

**Medium-sized Oviparous Colubrid Species.**—Ernst and Barbour (1989) summarized the literature on food habits of the eastern hognose snake (*Heterodon platirhinos*). Although toads of the genus *Bufo* are favorite prey in this species, we found toads in only four of 78 animals (5%). Trauth (1982) reported the consumption of spotted salamanders (*Ambystoma maculatum*) from a snake collected near Yellville in Marion County.

The diet of the red milk snake (*Lampropeltis triangulum sypila*) was reviewed by Williams (1988). We found

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Table 1. Vertebrate prey items from the stomachs of 10 species of snakes collected in Arkansas. Abbreviations for snake species are followed by the total number of stomachs examined (in parentheses). *Thamnophis p. proximus* - TPP (77); *Masticophis f. flagellum* - MFF (36); *Lampropeltis getula holbrooki* - LGH (84); *L. c. calligaster* - LCC (28); *L. triangulum sypila* - LTS (39); *Elaphe o. obsoleta* - EOO (66); *Coluber constrictor priapus* - CCP (46); *Aghistrodon c. contortrix* - ACC (87); *A. piscivorus leucostoma* - APL (66); *Sistrurus miliarius streckeri* - SMS (19). Snake species listed in this table have more than one type of prey item; see text for additional details and remarks.

	CCP	EOO	LTS	LCC	LGH	MFF	TPP	SMS	ACC	APL
Class Osteichthyes										
Order Perciformes										
Family Centrarchidae										
<i>Lepomis cyanellus</i>										X
Unidentifiable sunfish										X
Class Amphibia										
Order Caudata										
Family Ambystomatidae										
<i>Ambystoma maculatum</i> larva							X			
Family Plethodontidae										
<i>Desmognathus brimleyorum</i>					X					
Order Anura										
Family Bufonidae										
<i>Bufo</i> sp.							X			
Family Hylidae										
<i>Acris crepitans blanchardi</i>							X			
<i>Hyla cinerea</i>							X			X
<i>Hyla versicolor/chrysocelis</i>							X			
Unidentifiable hylid sp.							X			
Family Ranidae										
<i>Rana utricularia</i>	X									X
Family Microhylidae										
<i>Gastrophryne carolinensis</i>										X
Class Reptilia										
Order Sauria										
Family Phrynosomatidae										
<i>Sceloporus undulatus hyacinthinus</i>						X		X		
Family Scincidae										
<i>Eumeces fasciatus</i>	X		X						X	
<i>Eumeces laticeps</i>	X						X			
<i>Scincella lateralis</i>	X		X		X	X		X		
Unidentifiable <i>Eumeces</i>	X				X	X				
Family Teiidae										
<i>Cnemidophorus sexlineatus viridis</i>			X			X				
<i>C. s. viridis</i> eggs						X				
Order Serpentes										
Family Colubridae										
<i>Coluber constrictor priapus</i>					X					
<i>Diadophis punctatus</i>					X			X		
<i>Nerodia rhombifer</i>										X
<i>Nerodia erythrogaster flavigaster</i>										X
<i>Opheodrys aestivus</i>						X				
<i>Sloveria occipitamaculata</i>	X									
<i>Thamnophis s. sirtalis</i>					X					
Unidentifiable colubrid snake	X									
Snake eggs					X					
Class Aves										
Order Passeriformes										
Family Icteridae										
<i>Agelaius phoeniceus</i>		X								
Class Mammalia										
Order Rodentia										
Family Muridae										
<i>Microtus ochrogaster</i>		X		X						
<i>Microtus pinetorum</i>				X	X				X	X
<i>Mus musculus</i>									X	
<i>Neotoma floridana</i>				X						
<i>Ochrotomys nuttalli</i>						X				
<i>Oryzomys palustris</i>										X
<i>Peromyscus leucopus</i>									X	X
<i>Peromyscus maniculatus</i>	X									
<i>Sigmodon hispidus</i>									X	
Unidentifiable rodent						X				
Order Lagomorpha										
Family Leporidae										
<i>Sylvilagus floridamus</i>	X									
Order Insectivora										
Family Soricidae										
<i>Cryptotis parva</i>				X					X	

only lizards species (Table 1) in three specimens (8%). One of the prey items (*C. sexlineatus*) was not mentioned in the listing of natural foods by Williams (1988), although this species was reported by Knight and Collins (1977) in a milk snake from Kansas.

**Large Oviparous Colubrid Species.**--Clark (1949) and Fitch (1963a) provided the most detailed studies on food habits of the black rat snake (*Elaphe obsoleta obsoleta*); the investigations were conducted in Louisiana and Kansas, respectively. Both studies found mammals and birds to be the most abundant prey. We found voles, mice, rabbits, and red-winged blackbirds in 6% of our sample of mostly adult snakes.

The speckled kingsnake (*Lampropeltis getula holbrooki*) consumes a variety of vertebrates but usually prefers reptiles and especially reptilian eggs. A summary of prey species is shown in Table 1. We found three specimens (850, 1205, and 829 mm in SVL, respectively) whose stomachs contained 1, 2, and 10 snake eggs. One immature adult female (705 mm in SVL) collected in Clark County had eaten a Quachita dusky salamander; this may represent the first record for this prey item in the speckled kingsnake. A speckled kingsnake was observed eating a hognose snake (*H. platirhinos*) in Searcy County (G. L. Harp, pers. comm.); copperheads (*Aghkistrodon contortrix*) have been taken by captive snakes. Thirteen percent of our sample contained vertebrate prey.

The food preferences of the prairie kingsnake (*L. c. calligaster*) have been reviewed by Ernst and Barbour (1989); mammals represent the most common prey. Only mammals (shrews, voles, and juvenile woodrats) were found in the stomachs of five specimens (18%). One of us (SET) observed predation on *C. sexlineatus* by a juvenile prairie kingsnake in eastern Oklahoma (Trauth, 1983).

The southern black racer (*Coluber constrictor priapus*) is an opportunistic feeder, preying on a diversity of vertebrates as well as invertebrates. Among the most common vertebrate prey in our specimens were lizards (skinks) and snakes. Skinks were found in 24% of stomachs examined. However, invertebrates (crickets and grasshoppers) were also found in 24% of specimens. Fitch (1963b) summarized food for all subspecies of *C. constrictor* throughout its range in North America. Our study revealed similar prey items compared to other subspecies reported from different geographic regions.

Although Mushinsky (1987) made no reference to the food habits of the eastern coachwhip (*Masticophis flagellum flagellum*), Carpenter (1958) briefly reported on this species from Oklahoma. He found lizards and birds in the diet. Lizards were the primary prey, being found in all specimens containing food remains (33%). *Cnemidophorus sexlineatus* was the most common prey species. We have observed coachwhips on several occasions hunting for colored lizards (*Crotaphytus collaris*) in rock quarries and on

cedar glades in Arkansas.

**Medium-sized Viviparous Colubrid Species.**--Amphibians represented the only food group recorded for two species of *Thamnophis* in our study. Prey of the eastern garter snake (*Thamnophis sirtalis sirtalis*) consisted only of toads (*Bufo* sp.) in the present study. Predation by this species on wood frogs (*Rana sylvatica*) was mentioned by Trauth et al. (1995). The western ribbon snake (*T. p. proximus*) consumed salamander larvae and anurans (Table 1). Only eight stomachs (10%) contained food remains. Ernst and Barbour (1989) surveyed the diet literature on these two species. Clark (1974) found that amphibians represented 92% of the diet in *T. p. proximus*.

**Small Viperid Species.**--The diet of the western pigmy rattlesnake (*Sistrurus miliarius streckeri*) consisted of reptiles (lizards and snakes). Food items were found in 4 of 19 stomachs (21%) examined in this study (Table 1). Trauth and Cochran (1991) reported a predatory interaction between this species and a four-toed salamander (*Hemidactylium scutatum*) in Garland County.

**Medium-sized Viperid Species.**--A variety of small rodents (Table 1) represented the only prey group found for the southern copperhead (*Aghkistrodon contortrix contortrix*). Nine percent of the stomachs contained food items. Woodland voles (*Microtus pinetorum*) were the most common mammal. Fitch (1960) provided a detailed summary on the food habits of copperheads.

We found fish, anurans, small mammals, and snakes as food items (Table 1) for the western cottonmouth (*A. piscivorus leucostoma*). In one instance, a cottonmouth (651 mm in SVL) was collected along a rice field near Newport, Jackson County, in the process of consuming a previously-killed and decapitated yellowbelly watersnake (770 mm in SVL). This type of scavenging has been previously reported in this species (Berna and Gibbons, 1991). Fifteen percent of the stomachs we examined contained prey items. Burkett (1966) provided a detailed listing of vertebrate prey in this species from studies conducted in states surrounding Arkansas.

**Large Viperid Species.**--Ernst (1992) furnished a comprehensive list of prey for the timber rattlesnake (*Crotalus horridus*). We examined eight specimens; one stomach contained two young gray squirrels (*Sciurus carolinensis*).

In summary, vertebrate food items of 14 species and subspecies of snakes were examined. The snake samples included medium-sized to large forms (both terrestrial and aquatic, but excluded *Nerodia* species). The samples comprised 10 genera (*Aghkistrodon*, *Cemophora*, *Crotalus*, *Coluber*, *Elaphe*, *Heterodon*, *Lampropeltis*, *Masticophis*, *Sistrurus* and *Thamnophis*) in two families (Viperidae and Colubridae). We found 34 different species of vertebrate prey. Anurans were the dominant prey of two species of *Thamnophis* and in *H. platirhinos*. Lizards were the domi-

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nant food items in *M. flagellum*, *L. triangulum sypila*, *Coluber* (*C. constrictor priapus*), and *S. miliarius streckeri*. The ground skink (*Scincella lateralis*) was the most utilized reptilian prey item. Snakes predominated in the diets of *Lampropeltis* (*L. getula holbrooki*) and *A. piscivorus leucostoma*, but were also found in *M. flagellum* and *C. constrictor priapus*. Mammals were obtained mostly in *L. c. calligaster*, *E. o. obsoleta* and *A. contortrix*; voles led as the dietary preference of these snakes. Reptilian eggs were found in the stomachs of *Cemophora* (*C. coccinea*), *L. g. holbrooki* and *M. flagellum*.

The food habits data presented herein represent a preliminary listing for these snakes; future studies would benefit by incorporating more snake species and by addressing invertebrate prey as well. Studies of ecoregional variation in dietary habits of snakes within Arkansas are currently being undertaken.

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## Literature Cited

- Arnold, S.J.** 1993. Foraging theory and prey-size-predator-size relations in snakes. Pp. 87-115, *In Snakes: ecology and behavior*. (R.A. Siegel and J.T. Collins, eds.), McGraw-Hill, Inc. New York. xvi + 414 pp.
- Berna, H.J. and J.W. Gibbons.** 1991. *Agkistrodon piscivorus piscivorus*. Diet. Herpetol. Rev. 22:130-131.
- Burkett, R.D.** 1966. Natural history of the cottonmouth moccasin, *Agkistrodon piscivorus* (Reptilia). Univ. Kansas Publ. Mus. Nat. Hist. 17:435-491.
- Byrd, W., E. Hanebrink and W. Meshaka.** 1988. Food, feeding behavior, sex ratios and measurements of three species of water snakes (*Nerodia* spp.) collected from northeastern Arkansas. Bull. Chicago Herpetol. Soc. 23:55-57.
- Carpenter, C.C.** 1958. Reproduction, young, eggs and food of Oklahoma snakes. Herpetologica 14:113-115.
- Carpenter, C.C. and J.J. Krupa.** 1989. Oklahoma herpetology: an annotated bibliography. Univ. Oklahoma Press, Norman, vii + 258 pp.
- Clark, R. F.** 1949. Snakes of the hill parishes of Louisiana. J. Tennessee Acad. Sci. 24:244-261.
- Clark, D.R., Jr.** 1974. The western ribbon snake (*Thamnophis proximus*): ecology of a Texas population. Herpetologica 30:372-379.
- Collins, J.T.** 1993. Amphibians and reptiles in Kansas. 3rd ed. Univ. Kansas Mus. Nat. Hist. Publ. Edu. Ser. No. 13:1-397.
- Conant, R. and J.T. Collins.** 1991. A field guide to reptiles and amphibians of eastern and central North America. Houghton Mifflin Co., Boston, 450 pp.
- Dixon, J.R.** 1987. Amphibians and reptiles of Texas with keys, taxonomic synopses, bibliography, and distribution maps. Texas A&M Univ. Press, College Station, 434 pp.
- Dundee, H.A. and D. A. Rossman.** 1989. The amphibians and reptiles of Louisiana. Louisiana State Univ. Press, Baton Rouge, xi + 300 pp.
- Ernst, C.H.** 1992. Venomous reptiles of North America. Smithsonian Institution Press, Washington, D.C. ix + 236 pp.
- Ernst, C.H. and R.W. Barbour.** 1989. Snakes of eastern North America. George Mason Univ. Press, Fairfax, VA, vii + 282 pp.
- Fitch, H.S.** 1960. Autecology of the copperhead. Univ. Kansas Mus. Nat. Hist. 13:85-288.
- Fitch, H.S.** 1963a. Natural history of the black rat snake (*Elaphe o. obsoleta*) in Kansas. Copeia 1963:649-658.
- Fitch, H.S.** 1963b. Natural history of the racer *Coluber constrictor*. Univ. Kansas Publ. Mus. Nat. Hist. 15:351-468.
- Greene, H.W.** 1988. Antipredator mechanisms in reptiles. Pp. 1-152, *In Biology of the Reptilia*, Vol. 16, Ecology B, Defense and life history (C. Gans, ed.), Alan R. Liss, Inc., New York, xi + 659 pp.
- Johnson, T.R.** 1987. The amphibians and reptiles of Missouri. Missouri Dept. Cons., Jefferson City, xi + 368 pp.
- Knight, J.L. and J.T. Collins.** 1977. The amphibians and reptiles of Cheyenne County, Kansas. Report St. Biol. Surv. Kansas 15:1-18.
- Mushinsky, H.R.** 1987. Foraging ecology. Pp. 302-334. *In Snakes: ecology and evolutionary biology* (R.A. Siegel, J.T. Collins, and S.S. Novak, eds.), Macmillan Publ. Co., New York. xiv + 529 pp.
- Smith, P.W.** 1961. The amphibians and reptiles of Illinois. Bull. Illinois Nat. Hist. Surv. 28:1-298.
- Trauth, S.E.** 1982. *Ambystoma maculatum* (Ambystomatidae) in the diet of the hognose snake, *Heterodon platyrhinos* (Colubridae) from northern Arkansas. Southwest. Nat. 27:230.
- Trauth, S.E.** 1983. *Lampropeltis calligaster*. Predation. Herpetol. Rev. 14:74.
- Trauth, S.E.** 1993. Enlarged posterior maxillary teeth in the scarlet snake, *Cemophora coccinea* (Serpentes: Colubridae), using scanning electron microscopy. Proc. Arkansas Acad. Sci. 47:157-160.
- Trauth, S.E. and B.G. Cochran.** 1991. *Hemidactylium scutatum*. Predation. Herpetol. Rev. 22:55.
- Trauth, S.E., M.E. Cartwright, J.D. Wilhide and D.H. Jamieson.** 1995. A review of the distribution and life history of the wood frog, *Rana sylvatica* (Anura: Ranidae), in north-central Arkansas. Bull. Chicago

Herpetol. Soc. 30:46-51.

**Trauth, S.E. R.L. Cox, Jr., W.E. Meshaka, Jr., B.P. Butterfield, and A. Holt.** 1994. Female reproductive traits in selected Arkansas snakes. Proc. Arkansas Acad. Sci. 48:196-209.

**Williams, K.L.** 1988. Systematics and natural history of the American milk snake, *Lampropeltis triangulum*. Milwaukee Publ. Mus., Milwaukee, Wisconsin. x + 176 pp.

**Wright, A.H. and A.A. Wright.** 1957. Handbook of snakes of the United States and Canada. Comstock Publ. Associates, Cornell Univ. Press, Vol. 1, xviii + 564 pp; Vol. 2, ix + 565-1105 pp.