FURTHER RECORDS OF THE ECOLOGY AND DISTRIBUTION OF AMPHIBIANS AND REPTILES IN THE MIDDLE WEST

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Introduction and Acknowledgments

The present contribution is the result of frequent field expeditions in the area drained by the Mississippi River and its tributaries, with special reference to work carried on during the collecting season of the year 1934. Through the courtesy of Dr. Alexander Wetmore, Director of the United States National Museum, a grant was extended from the funds of the Smithsonian Institution to support the project in the Lower Mississippi Valley during the summer of 1934 and especially valuable records have been secured in Arkansas and Louisiana. Most of the specimens reported here have been deposited in the collection of the United States National Museum.

The area covered by this report includes sections of Arkansas, Colorado, Illinois, Indiana, Iowa, Kansas, Louisiana, Michigan, Minnesota, Missouri, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wisconsin; but the major portion deals with the herpetology of Arkansas, Kansas, Louisiana, and Oklahoma.

Students of Southwestern College, friends and correspondents who have collected specimens discussed herein, are listed alphabetically as follows: Harry Albrecht, Phil Antrim, Elmer P. Cheatum, Bertha L. Danheim, David Garrett, Albert A. Heinze, Dorothy Boyer Heinze, Luther Hoyle, Frances McGill, Malcolm V. Parker, Cornelius R. Rogers, Otrys Sanders, Wallace Schaefer, and Hobart M. Smith. Mr. Hoyle and Mr. Rogers served as field assistants during the expeditonal work in Arkansas and Louisiana in June and July, 1934, where they rendered excellent service.

Before presenting the list of species, I wish to take this opportunity to express my appreciation to Mr. Guy Amsler, Secretary of the Arkansas Game and Fish Commission; to Mr. Robert S. Maestri, State Fish and Game Commissioner of Louisiana; and to Mr. W. G. Strong, State Fish and Game Warden of Kansas, for permits to seine in the waters under their respective jurisdictions while collecting the amphibians and reptiles reported here. The Arkansas and Louisiana permits were obtained through Dr. Alexander Wetmore of the Smithsonian Institution.

(311)
List of Species

SALAMANDERS

Amphistoma opacum (Gravenhorst)

Marbled salamanders were found in moist situations either in the woods under rotted logs or at old logging sites under pieces of lumber around saw dust piles. An individual taken in Montgomery County, Arkansas, on June 4, had obscure white spots and a body length of 32 mm., while two examples found in a wooded swamp near Waverly, Louisiana, on June 22 had body lengths of 31 and 40 mm., respectively.


Amphistoma tigrinum (Green)

Miss Danheim collected the tiger salamander at La Salle, La Salle County, Illinois, on June 6, 1933; and Mr. Rogers took an electrocuted individual at Lake City, Barber County, Kansas, on September 1, 1934. The unfortunate salamander involved in this case had come into contact with a wire fence during a rain. Water had caused a short circuit to develop in a metal covered building to which the fence was attached. The salamander quivered for a long time after its experience, but it never regained consciousness.

Plethodon glutinosus (Green)

Slimy salamanders were discovered in rotting logs at the border of a sylvan streamlet near Crystal Springs, Garland County, Arkansas, on June 4, 1934. They were also taken in a similar situation 9 miles east of Mt. Ida, Montgomery County, Arkansas, on the same day, where a young individual that was 28 mm. in length showed only small, non-fungiform spots on the sides.

Plethodon Ouachitae Dunn and Heinze

A small salamander was secured under a log near a spring at the base of the mountains 6 miles northwest of the settlement of Rich Mountain (and just east of the state line), Polk County, Arkansas, on June 3, 1934. The markings on the sides were not well developed, so I doubtfully refer the specimen to this very close relative of glutinosus.

Eurycea bislineata cirrigera (Green)

A larval long-tailed salamander was obtained in a shallow gravel-bottomed woodland streamlet below the opening of a mountain spring 2 miles south of Forum, Madison County, Arkansas, on June 22, 1934. The middorsal area showed two rows of black dots, but the bars on the tail were relatively indistinct. The body length was 20 mm.

Eurycea quadridigitata quadridigitata (Holbrook)

Four-toed salamanders of this subspecies were collected under logs and
boards in moist wooded plots near old saw mill sites in Louisiana at Doyle Springs 11 miles northwest of Jena, La Salle Parish (June 15, 1934); and 4 miles southwest of Many, Sabine Parish (June 16, 1934).

Desmognathus fuscus auriculatus (Holbrook)
A dusky salamander from under a log near a streamlet 2 miles east of Minden, Webster County, in northern Louisiana (June 24, 1934), has obscure white spots on the sides and the under surfaces are darkly mottled, so it is referred to auriculatus rather than to brimleyorum.

Desmognathus fuscus brimleyorum Stejneger
Like its relatives fuscus and auriculatus in the Southeast, this subspecies occurs under rocks, logs, and stones in water soaked areas near ponds and streamlets, especially in cooler, more mountainous districts. Specimens from Montgomery County, Arkansas, have dark under surfaces and distinct lateral spots, comparing closely with many examples of auriculatus, but not being especially typical of that form. Atavism between auriculatus and brimleyorum probably occurs in this region (and at other points as well).


Oklahoma—Leflore: Just W. of State line 6 mi. E. Page (June 3, 1934).

Toads
Scaphiopus bombifrons Cope
This spadefoot toad was collected near a pond 1 mile west of Broken Arrow, Tulsa County, Oklahoma, on May 6, 1934.

Scaphiopus hammondii Baird
Mr. Garrett found plains spadefoot toads in Denver, Denver County, Colorado, on July 15, 1932; and Mr. Hoyle took the species 18 miles southwest of Las Cruces, Dona Ana County, New Mexico, on June 22, 1933, at the border of a large permanent pond of water. Hoyle’s specimens were dead when found and since there had been recent rains in this normally arid environment, where yucca and sage brush were the prevailing vegetation, he concluded that they had probably been “drowned by the flood of incoming water and then washed down to the pond.”

Bufo americanus americanus Holbrook
A large watersnake (Natrix erythogaster transversa) that was captured in Polk County, Arkansas, soon regurgitated a living adult of this subspecies, which started to hop away after gaining its freedom. Amplexus was observed in these toads on April 2, in Lincoln County, Oklahoma.

These ornate nocturnal creatures are most often obtained from the road after a rain.

_Bufo cognatus_ Say

This squar little toad was found under a large flat rock in a prairie ledge in a surprisingly dry situation 8 miles northwest of Togo, Major County, Oklahoma, on May 29, 1934.

_Bufo terrestris_ (Bonnaterre)

This southern toad has very high cranial knobs in the more southern part of its range but lower cranial knobs are borne farther north. These northern specimens present a morphological intergradation between _americanus_ and _terrestris_, which are very closely allied and perhaps subspecies derived from a common stock. It is very difficult to distinguish young _terrestris_ with poorly developed, indistinct cranial ridges from like representatives of _woodhousii_ when the two forms occupy a common range. The same difficulty becomes apparent in identifying juvenile specimens of _americanus_ and _woodhousii_ in more northern areas.

_Arkansas_—_Dallas_: Fordyce (June 4, 1934). _Hot Spring_: 2 mi. N. Estes (June 4, 1934). _Newton_: 1 mi. N. Ponca (June 22, 1934).

_Louisiana_—_ Catahoul a_: 2 mi. S.W. Utility (June 15, 1934). _Concordia_: 4 mi. E. Ferriday (June 2, 1934); 5 mi. S.W. Ferriday (June 15, 1934); 1 mi. W. Vidalia (June 2, 1934). _Lincoln_: 1 mi. W. Choudrant (June 22, 1934).

_Bufo valliceps_ Wiegmann

Two young specimens of this form from a wooded tract 3 miles northwest of Gonzalez, Ascension Parish, Louisiana (July 3, 1934), have a body length of 25 mm. When compared with _woodhousii_ of the same size these small _valliceps_ have a much more roughly granular (and even spinose) skin, especially on the back. The cranial crests of _valliceps_ are very sharp and distinct in the adult and they appear at an earlier age in the young.

An adult _valliceps_ was secured near the Louisiana State University Biological Station on Grand Isle, Jefferson Parish, Louisiana, on July 4, 1934.

_Bufo woodhousii_ Girard


The detailed comparison of large numbers of the common "fowleri" of the Southeast with extensive series of "woodhousii" from the Middle West reveals no significant diagnostic differences, so I consider the two populations
as one species under the earliest name *woodhousii*. Statistical data pertaining to this question may be expected to appear elsewhere.

One toe of an adult *woodhousii* was seen sticking out of the mouth of a large bullfrog (*Rana catesbeiana*) in Lincoln County, Oklahoma, on the evening of April 2. On May 6 another adult toad was found in Tulsa County, Oklahoma, in the distended mouth of a giant watersnake (*Natrix rhombifera*).

Young *woodhousii* toads secured in Arkansas on June 8 measured from 10 to 16 mm. in body length, while those taken in the same state on June 24 measured from 14 to 19 mm.


**Missouri**—Vernon: Sheldon (June 22, 1934).

**Nebraska**—Boyd: Lynch (August 2, 1932).


**Frogs**

*Acris gryllus* (Le Conte)

Cricket frogs were singing at night above a sluggish streamlet at Kingston, Arkansas, on June 22, where several pairs were observed in amplexus and egg laying was in progress.


**Illinois**—Kankakee: Sherburnville (June 7, 1933). Will: 3 mi. N. Beecher (June 7, 1933).

**Indiana**—Lake: 3 mi. W. Belshaw (June 7, 1933).

**Iowa**—Hancock: 1 mi. S.W. Klemme (July 23, 1934). Wright: Belmond (July 23, 1934).
Pseudacris nigrita clarkii (Baird)

These little frogs are often found under flat rocks in the prairies of north central Oklahoma during the spring. Records were secured 4 miles west of Lyman (Apr. 11, 1934) and 6 miles northeast of Newkirk (Apr. 29, 1933), in Kay County.

Pseudacris nigrita triseriata (Wied)

This subspecies occurs in both wooded and prairie districts about various bodies of water. Individuals often seek concealment in damp situations beneath rotting logs during the day.

Pseudacris streckeri Wright and Wright

This species may be heard in the spring as it utters its peculiar whistling song about the margins of streams, pools, and ponds. Specimens were collected in Oklahoma 1 mile south of Agra, Lincoln County, (Apr. 2, 1934); and 1 mile west of Broken Arrow, Tulsa County (May 6, 1934).

Hyla cinerea cinerea (Schneider)

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**Hyla crucifera** Wied

Mr. Parker took this frog 2 miles northwest of Monette, Craighead County, Arkansas, on March 17, 1934, where series of small black dots appear on the chest to remind one of the condition found in *Pseudacris nigrita brinleyi* of the eastern coastal plain.

**Hyla versicolor versicolor** Le Conte

The common tree frog was found in amplexus near Ponca, Arkansas, on June 22.


**Louisiana**—Sabine: 4 mi. S.W. Many (June 16, 1934).

**Missouri**—Buchanan: 4 mi. N. Easton (June 3, 1933). Pemiscot: 4 mi. S.W. Bragg City (June 10, 1934).


**Rana areolata** Baird and Girard

Along a marshy streamlet on a state game reserve 3 miles north of Talala, Rogers County, Oklahoma, one of these rare frogs was found sitting among some grass stems in a flooded area on April 1, 1934. Here the water was about a foot deep.

**Rana catesbeiana** Shaw

Bullfrogs are very common about the larger ponds and streams of the Middle West, and they are abundant in the swamps of the lower Mississippi Valley.


**Missouri**—Pemiscot: 4 mi. S.W. Bragg City (June 10, 1934).
**Rana clamitans** Latreille

Green frogs are typical inhabitants of wooded glades where they live in the vicinity of ponds, lakes and streamlets. During the daytime individuals often hide under boards, logs, rocks or other protecting objects above the water line or in valleys moistened by spring seepage.

**Rana palustris** Le Conte

A pickerel frog was secured 3 miles south of Palmyra, Marion County, Missouri, on June 4, 1933.

**Rana pipiens** Schreber

Leopard frogs occur in a wide variety of aquatic habitats in the Middle West, where they frequent roadside ponds and bar pits, sylvan pools, streams and streamlets, river banks, lake margins, marshes, boggy spring-fed areas, and mountain brooks.
ECOLOGY AND DISTRIBUTION OF AMPHIBIANS 319

Nebraska—Jefferson: 2 mi. N.W. Fairbury (Sept. 28, 1933); 5 mi. N.E. Thompson (May 14, 1933).


Gastrophyne carolinensis (Holbrook)

Amplexus was observed in this narrow-mouthed frog near Waters, Arkansas, on June 3. A female collected on this date had a body length of 34 mm.


Gastrophyne olivacea (Hallowell)

This prairie inhabiting narrow-mouthed frog is often taken from under flat rocks in the spring. The present records are from 6 miles southeast of Chillico (Apr. 29, 1933), and 4 miles west of Lyman (Apr. 11, 1934), Kay County, Oklahoma.

Turtles

Sternotherus odoratus (Gray)

Stink-pot turtles were seined from pools in the dried up bed of Silver Creek 11 miles southeast of Winfield, Cowley County, Kansas, on August 31, 1934. Additional specimens were secured from the muck of a drying roadside pool 2 miles southwest of Heavener, Le Flore County, Oklahoma, on June 3, 1934.

Kinosternon flavescens (Agassiz)

Mr. Rogers found six of these musk turtles under a small pile of drift at the edge of a dry pond in drought stricken Barber County, Kansas, on August 13, 1934, where they were buried together with the larger examples on top.


Oklahoma—Woods: 7 mi. W. Carmen (May 29, 1934); Waynoka (May 29, 1934).
Chelydra serpentina (Linne)

The snapping turtles listed below were secured from pasture ponds and prairie streams in Kansas and Oklahoma.


Terrapene ornata (Agassiz)

Ornate box-turtles are often found buried or half concealed in the sand of semi-arid tracts, where they may be dug out with the foot. Farther east they often rest in holes in the ground or in tunnels or depressions under the rocks of the prairie ledges.

Colorado—Prowers: 3 mi. S. Holly (May 27, 1934).


Missouri—Clark: 3 mi. S.W. Milo (June 22, 1934).


Terrapene triunguis (Agassiz)

These three-toed box turtles have habits similar to those of ornata, but they are inhabitants of more wooded districts, where they are apt to seek concealment under boards or logs. At times specimens may be seized from the water with such regular pond and creek inhabiting forms as Chelydra serpentina and Pseudemys elegans, although the primary adaptation of Terrapene triunguis is for terrestrial life.

Missouri—Vernon: Sheldon (June 22, 1934).

Oklahoma—Muskogee: 5 mi. N. Boynton (May 7, 1934); 5 mi. N.W. Haskell (May 7, 1934). Okfuskee: 7 mi. E. Okemah (May 7, 1934); 1 mi. S.E. Paden

1 Observational records of specimens crushed on the road.
ECOLOGY AND DISTRIBUTION OF AMPHIBIANS

(May 7, 1934). PITTSBURG: 1 mi. S.E. Alderson (June 3, 1934); 2 mi. S.E. McAl­
ester (June 3, 1934). TULSA: Tulsa (May 7, 1934).

Chrysemys bellii bellii (Gray)

These painted terrapins are found in pasture ponds and the smaller prairie
streams in the greatest abundance. Specimens were taken in a small pool of
water at the side of a sand-bottomed streamlet 3 miles northeast of Bartlett,
Baca County, Colorado, on May 27, 1934. Others were found imbedded in
the filaments of Spirogyra algae in a pasture stream 2 miles east of Calista,
Kingman County, Kansas, on May 25, 1933; and Dr. Cheatum took an ex­
ample 2 miles southeast of Lerado, Reno County, Kansas, in August 1933.

Pseudemys elegans (Wied)

Seventeen young of this turtle were secured by feeling with the hands on
a mud flat that was covered by less than a foot of water in Le Flore County,
Oklahoma, on June 3, 1934.

Kansas—BARBER: 1 mi. S.E. Lake City (Rogers, August 10, 1934). KINGMAN: 2
mi. E. Calista (May 23, 1934). RENO: 2 mi. S. Lerado (Cheatum, August 1933).

N. Goven (June 3, 1934); 1 mi. E. Wilburton (June 3, 1934). LEFLORE: 2 mi. S.W.
Heavener (June 3, 1934). WASHINGTON: 3 mi. N. Ochelata (May 6, 1934).

Amyda mutica (Le Sueur)

This soft-shelled turtle occurs in the same habitats as spinifera and there
is some suggestion that they may be variants of the same species. Viosca has
recently shown that the supposed differences between Pseudemys elegans and
P. troostii are merely a matter of secondary sexual dimorphism and it is sug­
gested that a study of primary sexual dimorphism or possibly of the mendelian
distribution of the presence or absence of nuchal serration in the mutica-
spinifera stock of Amyda might have taxonomic significance. Small examples
of both mutica and spinifera have been observed, but the serrations of the
latter form become more pronounced with age. No ecological differences in
the general habitat and field behavior of mutica and spinifera are evident in
Kansas.

Mr. Rogers took mutica on a sandbar at the junction of a small creek and
Medicine River, a little less than 5 miles southeast of Lake City, Barber
County, Kansas, on August 30, 1934. The form was taken on a bank of
Salt River just south of Aetna in the same county on April 21, 1934. Also,
on May 25, 1934, an example was secured 6 miles east of Turon, Reno
County, Kansas, in a shallow sand-bottomed, algae-filled pasture streamlet.

Amyda spinifera (Le Sueur)

Mr. Rogers removed representatives of this form from the Medicine River
1 mile south of Lake City, Barber County, Kansas, on May 27, 1934. It was
also taken from a sand-bottomed prairie streamlet 6 miles east of Turon,
Reno County, Kansas, on May 25, 1934; and from an algae-filled pool near
a stream 2 miles northeast of Cheney, Sedgwick County, Kansas, on the
same date.
LIZARDS

Anolis carolinensis Voigt

This beautiful and interesting arboreal species was often found about brush piles and old saw mill sites.

Arkansas—Cleveland: 12 mi. N. Fordyce (June 5, 1934). Columbia: 6 mi. N. Taylor (June 24, 1934).


Crotaphytus collaris (Say)

A young collared lizard was found under a rock in a prairie ledge near Altoona, Kansas, and in trying to escape it jumped into a large spider web from which it was unable to free itself without help.


New Mexico—Eddy: 5 mi. N. Carlsbad (Hoyle, June 28, 1933); 1 mi. S. Carlsbad (August 11, 1934); 20 mi. S. Carlsbad (August 11, 1934). Lea: 9 mi. N. Lovington (Hoyle, July 1, 1933).


Crotaphytus wislizenii Baird and Girard

Mr. Smith found one of these lizards 2 miles east of San Marcial, Socorro County, New Mexico, on August 9, 1931.

Holbrookia maculata maculata Girard

Mr. Hoyle observed one of these lizards in Lea County, New Mexico, as it jumped from a rock and caught a small grasshopper, which it soon started to swallow.


Holbrookia texana (Troschel)

Mr. Hoyle collected this zebra-tailed lizard 27 miles southwest of Lordsburg, Hidalgo County, New Mexico, on June 23, 1933; and Mr. Smith secured a specimen 2 miles east of San Marcial, Socorro County, in the same state on August 9, 1931.

Uta stansburiana Baird and Girard

After sunset on the evening of June 26, 1933, Mr. Hoyle found one of these little lizards on an ant hill actively feeding on small ants 2 miles northeast of La Luz, Otero County, New Mexico. Mr. Hoyle also took this species in New Mexico 3 miles southeast of Mesquite, Doña Ana County (June 21), and 8 miles west of Deming, Luna County (June 22).

Sceloporus undulatus consobrinus Baird and Girard

Spiny swifts from Payne County, Oklahoma, are intermediate in general characters, but they appear to be closer to consobrinus than to undulatus. The lateral stripes are more or less distinct and the dark spots are concentrated on the sides to a noticeable extent.


Sceloporus undulatus undulatus (Latreille)

A female spiny swift of this subspecies secured near Fordyce, Arkansas, was carrying eggs in the coelom on June 5.

Transitional intergradation between this form and the more western consobrinus is evident in Oklahoma where the ranges of the two subspecific populations (which are apparently completely separated farther north) come into contact. Specimens from Creek and Pawnee counties are very near to consobrinus with the lateral stripes varying from a very distinct to a readily discernible condition and often the upper lateral stripe is rather distinct while the lower one is obsolete. The wavy dark brown cross bars on the back are more or less broken and constricted, and in some cases a rather definite tendency for them to concentrate into spots is seen.


Phrynosoma cornutum (Harlan)

On the sunny afternoon of July 1, 1933, Mr. Hoyle found a horned lizard in the shade of a fence near Lovington, New Mexico, where it was eating ants and small beetles that were crawling on a fence post.


Phrynosoma douglassii hernandesi (Girard)

A shorthorn lizard was taken near Albuquerque, Bernalillo County, New Mexico, by G. R. Hepler in 1895 (Mus. Kans. St. Coll.); and Mr. Smith took a specimen in the Sacramento Mountains 4 miles west of Cloudcroft, Otero County, in the same state on August 6, 1931.

Phrynosoma modestum Girard

In 1933, Mr. Hoyle secured this lizard in New Mexico in the flat prairie 7 miles southeast of Roswell, Chaves County (June 28); and near a rock ledge above a lake 5 miles north of Carlsbad, Eddy County (June 28). Mr. Smith found specimens 2 miles east of San Marcial, Socorro County, on August 9, 1931.

Ophisaurus ventralis (Linné)

A joint-lizard was found dead in the road below a prairie ledge 6 miles northeast of Sherman, Major County, Oklahoma, on May 29, 1934.

Cnemidophorus sexlineatus perplexus Baird and Girard

A Sonoran race-runner with a bifurcated tail was collected by Mr. Hoyle at Lordsburg, New Mexico. This specimen had a slate-colored under surface when found and this turned to black in preservatives. The ventral surface of this subspecies is usually yellowish or immaculate.

New Mexico.—CHAVES: 7 mi. S.E. Roswell (Hoyle, June 28, 1933). EDDY: 3 mi. E. Artesia (Hoyle, June 28, 1933). GRANT: 1 mi. W. Sepur (Hoyle, June 23,
1933); 8 mi. W. Separ (Hoyle, June 22, 1933). HIDALGO: Lordsburg (Hoyle, June 22, 1933); 27 mi. S.W. Lordsburg (Hoyle, June 23, 1933). LUNA: 2 mi. W. Cambray (Hoyle, June 22, 1933); 8 mi. W. Deming (Hoyle, June 22, 1933). OTERO: 19 mi. S.W. Alamogordo (Hoyle, June 26, 1933).

*Cnemidophorus sexlineatus sexlineatus* (Linne)

The copulation of the six-lined race-runner was observed in a glade near Arkadelphia, Arkansas, on June 24, 1934.


MISSOURI.—NEWTON: 2 mi. N.W. Wentworth (June 22, 1934).


*Cnemidophorus tessellatus tessellatus* (Say)

Mr. Hoyle collected the desert whiptail lizard in various localities in New Mexico in 1933, where he found specimens dormant and inactive on the cool morning of the rainy day of June 22. One individual discovered in the sand beneath a dried yucca stalk laid on its back as if dead, but when warmed by the hand it gradually developed signs of life.

Leiopholis unicolor (Harlan)

Brown-backed skinks are typical inhabitants of wooded areas. They were frequently observed darting from cover to cover in the forest, or gliding under fallen leaves, between grass stems, beneath pieces of bark, or into brush heaps. Specimens were usually taken about saw dust piles at old logging sites and many were secured while we were turning over logs.


Eumeces anthracinus (Baird)

One of these skinks with no postnasal scale and one postmental plate was secured in a rotted log 3 miles west of Oden, Montgomery County, Arkansas.

Eumeces fasciatus (Linné)

Female five-lined skinks were found coiled about egg clusters in rotted logs or stumps in Columbia County, Arkansas, on June 24, 1934 (5 eggs), and in Nevada County of the same state on the same day (8 eggs, 10 eggs). A young specimen with a body length of 27 mm. was secured on June 16, 1934, in Sabine County, Louisiana.


Kansas.—Wilson: 2 mi. E. Buffalo (April 1, 1934).


Eumeces obsoletus (Baird and Girard)

Sonoran skinks are very numerous in collections from rock ledges in the prairie in the spring, they are occasionally seen during the summer, and they become rare during the fall. This seasonal fluctuation is no doubt correlated.
with the manner of living displayed by the species, which probably retreats to
recesses far under ground as the surface soil dries during the summer.


Snakes

Leptotyphlops dulcis (Baird and Girard)

Mr. Rogers has recently taken this rather rare species in Barber County, Kansas. On August 2, 1934, he found it crossing a sidewalk between two oil stations in the town of Lake City, where the individual was apparently making its way toward the moderately moist sandy soil in a roadside iris bed. The time of capture was just after dark and the specimen was observed under an electric light. Several other examples of the burrowing sand snake were found 2 miles north of Lake City on May 27, 1934.

Farancia abacura (Holbrook)

All of these beautiful snakes to be reported here were found dead on the road or they had been otherwise killed and mutilated by the human inhabitants of wooded districts.

Arkansas.—GREENE: 10 mi. S.E. Paragould (June 11, 1934).


Missouri.—PEMISCOT: 4 mi. S.W. Bragg City (June 10, 1934).

Diadophis punctatus arnyi Kennicott

This subspecies was located in a snake den in Cowley County, Kansas, on March 29, 1934. The den was in a rock pile in a gully near a spring. Here ring-neck snakes were in company with numerous specimens of the larger snakes Elaphe laeta and Coluber constrictor flaviventris.

The use of the condition of the ventral dark spots is a good average criterion for the separation of arnyi from strictogenys, but atavism or orthogenesis in this feature occasionally gives arnyi the single series of black

2 Atavism, in the sense that I use it, means intermittent heredity due to occasional reversion to some former ancestral condition. This phenomenon may explain the presence of ancestral characters in derived stocks.

3 Orthogenesis, in the sense used here, means the tendency for evolution to go forward in one direction, step by step. This phenomenon may explain the occasional occurrence of traits of derived forms in the modern representatives of parent populations (species or subspecies).
ventral dots characteristic of *strictogenys*. Ordinarily *arnyi* has irregular ventral spots which may be regarded as being representative of at least two rows. Specimens of *arnyi* with the ventral coloration of *strictogenys* have been taken recently in Morris County, Kansas, and in Pawnee County, Oklahoma. In the latter locality a ring-neck snake had the 15 scale rows of *strictogenys*, but the high ventral count of 156 caused it to identify as *arnyi*.


**Diadophis punctatus strictogenys** Cope

This ring-neck snake was obtained in a rotted log on a timbered hillside 3 miles west of Oden, Montgomery County, Arkansas, on June 4, 1934. The scale rows were 15 at the middle of the body and the black ventral spots were arranged into approximately a single row.

**Heterodon contortrix** (Linne)

This hog-nosed snake occurs in forest glades and in prairies, where it is most apt to be found in sandy or gravelly habitats.


**Illinois.**—Monroe: Waterloo (Heinze, Mar. 27, 1932).

**Kansas.**—Barber: 4 mi. S. Lake City (Rogers, July 1, 1934).

**Louisiana.**—Ascension: 1 mi. S. E. Sorrento (July 3, 1934).

**Heterodon nasicus** Baird and Girard

This hog-nosed snake occurs in less forested areas than *contortrix*, but it shows the same tendency to select habitats where sand and gravel are present in the surface soil. One specimen was secured as it was crawling along drift about 75 feet above the edge of Lake Lakin in western Kansas; and another was found on a sand bank in the salt marsh area of south-central Kansas.


**Liopeltis vernalis** (Harlan)

Professor E. A. Popenoe took a smooth green snake at Raton Pass in the mountains of Las Animas County, Colorado, in June 1907 (Mus. Kan. St. Coll.).

**Opheodrys aestivus** (Linne)

The rough green snake is a beautiful bush inhabiting species, which occurs in forest glades of the Middle West.
Arkansas.—Pulaski: 9 mi. N. Little Rock (June 5, 1934).


**Coluber constrictor constrictor** Linné

Black racer snakes are agile creatures, which are often encountered on the forest floor as well as in glades and cultivated areas.

Arkansas.—Mississippi: 3 mi. N. Manila (June 10, 1934). Newton: 11 mi. N.W. Lurton (June 6, 1934).


**Coluber constrictor flaviventris** Say

A female blueracer was found dead in the road with eggs exposed from the coelom in Pawnee County, Kansas, on May 26. Young individuals with the initial color pattern were found in a snake den in Cowley County, Kansas, on March 29, in company with *Elaphe laeta* and *Diadophis punctatus arnyi*. The adults were associated with large bullsnakes (*Pitouphis sayi sayi*) in another den on a prairie hillside. The nature of the dens will be discussed below under *Elaphe laeta* and *Pitouphis sayi sayi*.

Mr. Rogers placed a small prairie king snake (*Lampropeltis calligaster*) in a cage with an adult blueracer snake on August 31 and the *Coluber* immediately attacked the smaller snake, swallowing it tail first.


Colorado.—Baca: 3 mi. N.E. Bartlett (May 27, 1934); 2 mi. E. Stonington (May 27, 1934). Prowers: 1 mi. E. Holly (May 27, 1934).


Michigan.—Livingston: 2 mi. S.W. Gregory (July 22, 1934).


**Coluber flagellum flagellum** Shaw

Black whipsnakes are commonly found under flat rocks in prairie ledges in the spring.
Coluber flagellum flavi-gularis (Hallowell)

Prairie whipsnakes are common inhabitants of pastures and cultivated fields where they often hide in rock ledges, in rock piles, or under large fallen signs of tin or wood.

Kansas.—Barber: 1 mi. E. Lake City (Rogers, Aug. 26, 1934); 3 mi. N.W. Lake City (Rogers, Aug. 25, 1934).

Oklahoma.—Alfalfa: 3 mi. E. Carmen (May 29, 1934); Custer: 3 mi. N.E. Butler (May 28, 1934).

Elaphe laeta (Baird and Girard)

A den containing over a dozen of these snakes (young to adult) was located on March 29, 1934, in a ravine 6 miles east of Winfield, Kansas, on a warm day following a cold period. The snake den was at the base of a south slope in a clump of oak trees above a small stream. A spring that flows all year was situated near by and much rock was in evidence. At one point a vertical rock was scaled off to a height of about four feet and many snakes were revealed, including young Coluber constrictor flaviventris and some adults of Diadophis punctatus arnyi in addition to the present species.

Arkansas.—Carroll: 4 mi. W. Green Forest (June 7, 1934).

Kansas.—Cowley: Just N. Rock (May 20, 1934); 7 mi. E. Winfield (April 15, 1934); 6 mi. E. Winfield (March 29, 1934); Ellsworth: 12 mi. N.E. Frederick (April 8, 1934); Marshall: 3 mi. E. Blue Rapids (May 20, 1934); Morris: 1 mi. S.W. Council Grove (April 9, 1934); Wabaunsee: 3 mi. E. Wabaunsee (May 19, 1934).

Oklahoma.—Garfield: 5 mi. S.E. Hunter (May 29, 1934).

Elaphe obsoleta (Say)

A pair of snakes were found dead in the road near Orlando, Oklahoma, on June 2. The smaller specimen was a female in the confinis stage of color pattern ontogeny while the larger one was a male in the black "obsoleta" phase of development. There is apparently no reason why these so-called "subspecies" should be longer recognized as valid.

Arkansas.—Benton: 3 mi. E. Decatur (June 7, 1934); 3 mi. N.E. Gateway (June 7, 1934); Carroll: Just S. Busch (June 7, 1934); Conway: Just W. Morrilton (June 6, 1934); Madison: 2 mi. S. Forum (June 22, 1934); Montgomery: 5 mi. E. Mt. Ida (June 4, 1934); Newton: 4 mi. N. Jasper (June 6, 1934); Pulaski: 3 mi. S.E. Armstead (June 6, 1934); Saline: 11 mi. S. Little Rock (June 5, 1934); Yell: 3 mi. S.W. Plainview (June 8, 1934).

Kansas.—Riley: 2 mi. N. Stockdale (April 9, 1934).

Oklahoma.—Noble: 5 mi. N. Orlando (June 2, 1934); Payne: 6 mi. E. Cushing (May 7, 1934); Tulsa: 3 mi. E. Bixby (May 7, 1934).

Arizona elegans elegans Kennicott

Two of these snakes were found in the road near wheat fields. One was secured 5 miles north of Turon, Reno County, Kansas, on May 25, 1934;
and the other was taken 6 miles northeast of Waynoka, Woods County, Oklahoma, on May 29, 1934.

*Pituophis sayi sayi* (Schlegel)

A bullsnake collected near Preston, Minnesota, showed the following characteristics: 217 ventral scutes, 46 subcaudals, 29 scale rows at the middle of the body, 8 upper labials, 12 lower labials, 42 dorsal saddles of dark color on the body and 12 on the tail.

On the sunny afternoon of March 29 a number of large bullsnakes and several adult blueracers (*Coluber constrictor flaviventris*) were found basking on the south slope of a hill at approximately the military crest. Just below the mass of snakes a hole about three inches in diameter extended straight downward for a distance of over a foot and then it zig-zagged through some buried rocks. While four bullsnakes and three of the more agile blue racers were being captured an uncounted number of snakes made their way into this substantial retreat from which they were not obtained. It is assumed that the snakes had been in this den during the winter.

**Colorado.**—*Prowers:* Arkansas River at Holly (May 27, 1934).


**Minnesota.**—*Fillmore:* 1 mi. E. Preston (July 19, 1934).

**Nebraska.**—*Knox:* 7 mi. N. Crofton (July 17, 1934).


**Lampropeltis calligaster** (Harlan)

As reported above under *Coluber constrictor flaviventris*, a young prairie king snake was swallowed by an adult blueracer near Lake City, Kansas, on August 31. An adult six-lined race-runner (*Cnemidophorus sexlineatus sexlineatus*) was regurgitated from the stomach of a half grown prairie king snake at Lamont, Kansas, on May 19.

**Arkansas.**—*Benton:* 2 mi. N.E. Siloam Springs (June 7, 1934). *White:* 1 mi. N.E. McRae (June 8, 1934).
Lampropeltis getulus holbrooki Stejneger

A medium-sized salt and pepper snake when placed in a cage with a green snake as long as itself, swallowed the latter species (Opheodrys aestivus), head first, according to Mr. Hoyle, who rescued the slender green snake once by pulling it out of the king snake's alimentary canal. About three days later, upon the second attempt the green snake was devoured beyond all hopes of rescue.

Lampropeltis getulus nigra (Yarrow)

This snake was secured 4 miles southwest of Bragg City, Pemiscot County, Missouri, on June 10, 1934.

Lampropeltis triangulum amaura Cope

This coral king snake was crawling at the edge of a cypress swamp in the lower Mississippi Valley 2 miles southwest of Ferriday, Concordia Parish, Louisiana, on June 15, 1934. The red bands tended to approach on the belly but they did not unite ventrally in the individual captured.

Lampropeltis triangulum systipula (Cope)

This coral king snake was collected in a shale bed in the sparsely wooded prairie 1 mile southwest of Council Grove, Morris County, Kansas, on April 9, 1934.

Lampropeltis triangulum triangulum (Lacépède)

A milk snake was captured in a prairie habitat 3 miles northeast of Clinton, in Washtenaw County, Michigan, on July 30, 1931. Another example was found 3 miles southeast of Sylvan, Richland County, Wisconsin, on July 19, 1934.

Rhinocheilus lecontei Baird and Girard

This beautiful species was collected in the semiarid sage brush desert 3 miles north of Elkhart, Morton County, Kansas, on May 27, 1934.

Sonora semiannulata Baird and Girard

These snakes are often found in rather barren prairie sections under rocks in the spring, but they are rarely seen in the summer and the fall.
**Natrix cyclopion** (Duménil and Bibron)

This ornate water snake was found in Louisiana, 1 mile west of Crowley, Acadia Parish, on July 5, 1934; and 2 miles west of Jennings, Jefferson Davis Parish, on the same date.

**Natrix erythrogaster erythrogaster** (Forster)

Red-bellied watersnakes were obtained along the edge of brush-filled stagnant pools in a creek bed 10 miles southeast of Paragould, Greene County, Arkansas, on June 11, 1934; and in a marsh 6 miles north of Golden Meadow, La Fourche Parish, Louisiana, on July 5, 1934.

**Natrix erythrogaster transversa** (Hallowell)

Like true erythrogaster, this snake has no dark markings on the ventral surface in typical specimens. In general scutellation both erythrogaster and transversa often overlap sipedon or agree with it entirely, and since the ventral dark markings in sipedon are obsolescent in some examples other morphological transition may be postulated. While adults of erythrogaster have reddish or copper-colored under parts, those of transversa are always yellowish or immaculate below. The young are practically indistinguishable.

Mr. Rogers found this snake feeding on leopard frogs (*Rana pipiens*) in Barber County, Kansas, on April 7, and a watersnake of this species shot in the head in Polk County, Arkansas, on June 3, regurgitated a living toad (*Bufo woodhousii*) that started to hop away after being released.

**Arkansas.**—Polk: 3 mi. E. Cherryhill (June 3, 1934).

**Kansas.**—Barber: Lake City (Rogers, April 7, 1934); mouth of Sand Creek 2 mi. S.E. Lake City (Rogers, Aug. 15, 1934); 5 mi. N. E. Lake City (Rogers, July 20, 1934). Cowley: 7 mi. N. Wilmot (Apr. 15, 1934). Harper: 1 mi. N. Conwin (April 7, 1934).

**Oklahoma.**—Tulsa: 2 mi. S.E. Alsuma (May 6, 1934).

**Natrix fasciata confluentis** Blanchard

The dorsal saddles of this subspecies tend to become obsolete in the largest individuals, but they are very distinct in the young and even in the ordinary adults. An individual secured near Estes, Arkansas, on June 4, had a toad (*Bufo terrestris*) in its mouth at the time of capture, so two species were taken at once.

**Arkansas.**—Greene: 10 mi. S.E. Paragould (June 11, 1934). Hot Spring: 2 mi. N. Estes (June 4, 1934).


**Natrix grahamii** (Baird and Girard)

A clump of six of these relatively attractive little water snakes was taken in sun-warmed tepid water beneath the overhanging boughs of willow trees at the edge of a large pond 2 miles south of Alsuma, Tulsa County, Oklahoma, on the evening of May 6, 1934. The water was shallow and the snakes were near a brush accumulation and not far from a small hole in the bank,
which presumably led to an underground retreat. All six of the snakes were grabbed at one time.

*Natrix rhombifera* (Hallowell)

This unattractive watersnake is rather inquisitive at times. When an individual retreats into a hole in the ground, a few minutes waiting may be rewarding by one seeing the creature stick its head out of the opening. If the snake believes that the coast is clear it will soon come out into the open in most cases, but upon any disturbance it will beat a hasty retreat.


*Natrix sipedon sipedon* (Linne)

These watersnakes are very common about ponds and streams in the Middle West. They are often found in the same pools as *transversa* and *erythrogaster.* They are probably most active at dusk and dawn, but prowling individuals may be located at almost any hour of the day or night.


*Louisiana.*—*Madison:* 6 mi. E. Tallulah (June 29, 1931).

**Storeria dekayi** (Holbrook)

These little brown wood snakes were secured in Kansas at the base of an old hollow tree stump 4 miles north of Lake City, Barber County, on April 1, 1934 (Rogers); and underneath a rotted log just above the Arkansas River 2 miles northeast of Oxford, Sumner County, on October 14, 1934. Mr. Schaefer took a specimen at Madison, Dane County, Wisconsin, on April 9, 1934.

**Potamophis striatulus** (Linne)

Two of these brown snakes were collected on the east slope of a sparsely wooded tract under flat rocks 1 mile northwest of Milfax, Creek County, Oklahoma, on April 2, 1934. Both examples had 16 scale rows around the middle of the body, not 17 as Blanchard found in his specimens while preparing his key.

**Thamnophis lineatus** (Hallowell)

Kansas specimens of this ribbon snake were taken under flat rocks in prairie ledges 2 miles southwest of Matfield Green, Chase County, on April 9, 1934; and 1 mile northeast of Otto, Cowley County, on May 6, 1934. An additional example was secured 2 miles southeast of Pawnee, Pawnee County, Oklahoma, on April 3, 1934.
Thamnophis marcianus (Baird and Girard)

Mr. Rogers captured this garter snake at the edge of an irrigation ditch in a vegetable garden at Lake City, Barber County, Kansas, on June 25, 1934.

Thamnophis radix radix (Baird and Girard)

This snake is a typical prairie inhabiting species, which often lives in fence rows, sparse woods, gardens, and pastures.

Colorado.—BACA: 3 mi. N.E. Bartlett (May 27, 1934).
Iowa.—CLAY: 3 mi. N. Spencer (July 24, 1934).
South Dakota.—YANKTON: 5 mi. N.E. Utica (July 17, 1934).
Wisconsin.—DANE: Madison (Schaefer, April 9, 1934).

Thamnophis sauritus proximus (Say)

These ribbon snakes are most abundant in extensive marshy areas that are filled with aquatic vegetation, such as reeds and cat-tails. They are often found in the reeds and grasses near shallow, meandering prairie streams as well, especially in the vicinity of those with sandy and gravelly bottoms.

Arkansas.—SALINE: 4 mi. N. Ico (June 5, 1934).
Illinois.—JACKSON: Swallow Hollow (Heinze, May 1, 1932). MADISON: Horseshoe Lake (Heinze, April 24, 1932).
Louisiana.—JEFFERSON DAVIS: 1 mi. S.E. Jennings (July 5, 1934). SAINT MARY: 2 mi. W. Berwick (July 5, 1934).
Oklahoma.—BECKHAM: 1 mi. S. Sayre (May 28, 1934); 4 mi. W. Sayre (May 28, 1934).

Thamnophis sirtalis parietalis (Say)

This form has about the same ecological distribution as radix, but it may be a little more sensitive to lack of moisture in the surface soil than that species. It is, however, not as partial to swampy areas as proximus.


Thamnophis sirtalis sirtalis (Linné)

This eastern garter snake lives in forest glades, yards, rock piles, and other places where protection is afforded. It is much like parietalis in its ecological distribution and behavior.

Illinois.—JACKSON: Swallow Hollow (Heinze, April 24, 1932).
Louisiana.—CONCORDIA: 4 mi. E. Ferriday (July 2, 1934). MADISON: 2 mi. E. Tallulah (June 29, 1931).
Michigan.—LIVINGSTON: 3 mi. S. Howell (July 22, 1934).
Minnesota.—HOUSTON: 3 mi. S.E. La Crescent (July 18, 1934).
Wisconsin.—DANE: Madison (Schaefer, April 9, 1934). VERNON: 5 mi. S.E. Viroqua (July 19, 1934).
Tantilla gracilis gracilis Baird and Girard

In the prairie the sand snake is usually found under rocks in ledges either where there are no trees or in glades, but farther east it occurs in rockless woods, where specimens may be removed from decaying stumps and logs.

Arkansas.—Montgomery: 3 mi. W. Oden (June 4, 1934).


Agkistrodon mokasen mokasen Beauvois

The copperhead snake was taken 5 miles east of Rock, Cowley County, Kansas, on April 16, 1934.

Agkistrodon piscivorus (Lacépède)

This relatively aquatic species was found about the marshes and streams, where it was usually in a position to retreat into drift or holes in the bank. Like many frogs, these snakes are best taken at night with the aid of a flashlight.

Arkansas.—Monroe: 9 mi. S.W. Clarendon (Parker, May 17, 1934).


Sistrurus catenatus catenatus (Rafinesque)

This small prairie rattlesnake was found under a rock in a prairie ledge 1 mile northeast of Otto, Cowley County, Kansas, on May 6, 1934.

Crotalus confluentus confluentus Say

The large prairie rattlesnake was secured in a pasture 3 miles west of Syracuse, Hamilton County, Kansas, on May 27, 1934.

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