

A KEY TO THE
AMPHIBIANS AND REPTILES OF KANSAS

A THESIS
SUBMITTED TO THE DEPARTMENT OF
EDUCATION AND THE GRADUATE COUNCIL OF THE KANSAS STATE
TEACHERS COLLEGE OF EMPORIA IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE

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MAY, 1935

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ACKNOWLEDGEMENT

The writer wishes to express his indebtedness to Dr. J. W. Breukelman, Head of Biology and Geology Department, Kansas State Teachers College of Emporia, who has aided materially in the successful completion of this work. It was he who suggested this problem, and gave freely of his time and advice during the writing.

To
Evelyn

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INTRODUCTION

It has been the desire of the writer to present an analytical, non-technical key and description of the amphibians and reptiles most commonly found in Kansas. An attempt has been made to eliminate all technical words, phrases, and characters, and it is hoped that this work may be suitable for use by high school teachers and pupils who have had no training in Herpetology. Available analytical studies of this type are based on technical characters such as scale counts, characters discernible only from dissection, and structural characteristics that are not easily found without considerable acquaintance with the scientific terminology. In so far as possible, these things have been eliminated from this work to make it more suitable for popular use.

The major problem in this work was to examine carefully the available descriptions, and the actual specimens to find one obvious, simple character that would set each animal apart from all others. Finding the character to be used, and finding the easily understood term to describe that character were the two most difficult problems in this work. In each instance the scientific name has been included to aid in further checking of the specimens if

so desired.

From available sources, lists of amphibians and reptiles were compiled, and all names checked with Stejneger and Barbour's, Check List of North American Amphibians and Reptiles,¹ thereby establishing an authority and a consistency for all names used throughout the work. The list of amphibians used was collected from many sources, and checked against Hobart Smith's, "Amphibians of Kansas",² The list of reptiles used was also collected from many sources, and was checked with Taylor's, "Snakes of Kansas",³ and Burt's, "Some Distributional and Ecological Records of Kansas Reptiles".⁴ In some instances specimens were included upon the suggestions of Dr. J.W. Breakefield and Allen Downs.

In a few cases, specimens reported by Taylor and Burt were not included in this work because there is some

¹ Stejneger and Barbour, Check List of North American Amphibians and Reptiles. (Cambridge, Harvard University Press, 1935) Third Edition.

² H.M. Smith, "The Amphibians of Kansas" in The American Midland Naturalist (University of Notre Dame Press) 1934. vol. XV.

³ E.H. Taylor, "A Revised Check List of the Snakes of Kansas" in University of Kansas Science Bulletin (K. U. Press, 1929) vol. 19 No. 5.

⁴ C.E. Burt, "Some Distributional and Ecological Records of Kansas Reptiles" in Transactions of Kas. Academy of Science. Vol. 36. 1933.

question among the authorities as to the exact classification of some species. For example it is most difficult to distinguish between Lampropeltis triangulum gentilis and Lampropeltis triangulum snyderi, and there is some question as to whether they should be separated or not. For all practical purposes, the variety name is not important, so in this work it has been omitted. One snake has been included in this work which has not to the present time been taken in Kansas, but has been taken in counties of Oklahoma and Missouri that border Kansas, so there is no valid reason for the Water Moccasin not being in Kansas. This species has been included for the convenience of the people living in counties bordering Oklahoma and Missouri.

Colors and other common characters of the amphibians and reptiles vary so greatly that it is impossible to construct a key on these characters that will be absolutely infallible. One key could not cover all the variants among these animals. For example, many of the adult snakes never lose their juvenile markings; Black-snakes sometimes show the dark brown blotches of the young.

From this problem have arisen several others pertaining to the study of amphibians and reptiles in this area. The most important of these is a study of Kansas

as a transition, area between species. Eastern and western varieties of Sistrurus, Lampropeltis, and Tantilla are found in this area. A study of this kind would be a definite contribution to Herpetology, as it would clear up many points as to variants found here.

HOW TO USE THE KEYS

With the animal to be identified in hand, turn to page one to the "Preliminary Key". Each key in this work is constructed on an alternative basis: one of each pair of statements being true, or applying to the animal in question, the other statement does not apply. In every case, choose the correct statement, and follow the dotted line following each statement, to the right-hand margin where a number is given. This number refers to the same number on the left-hand margin of the page. Always choose the true statement, follow it to the right margin of the page where will be found the number of the next pair of statements pertinent to the particular animal in question. By following these numbered statements there will be found one instance in which instead of a number at the right-hand margin, there will be the name of the animal being identified.

For example: turning to the "Preliminary Key", and assuming that the animal to be identified has scales; reading statement one (1) the reader is referred to statement two (2). This statement gives the reader two more choices ; eyelids present, or eyelids absent. Assuming that the animal has no eyelids, the key imm-

mediately shows that the animal is a snake, and gives the page where will be found the detailed descriptions of the most common snakes found in Kansas. Turn to page twenty (20) as indicated by the "Preliminary key", and repeat the same procedure as to reading this key to the snakes. Number one (1) of this key gives the alternative of a pit, or no pit, between the eye and nostril. Assuming there is no pit, the number at the right-hand margin of the page opposite the statement "No pit between eye and nostril" refers the reader to number six (6). Follow the numbers on the left margin of the pages to number six (6). The two statements numbered six give the alternatives of the nose being turned up or not. Taking for example that the nose is turned up, the number following that statement refers to number seven (7). The statements following number seven tell the reader to examine the belly of the animal, and to note the color of the central part. If this part of the belly is dark, or black, the animal is the Western hog-nosed snake. The scientific name is given to be used in further checking if the reader desires to do so. Following the name of the animal is a page number, on which page will be found a detailed description of the animal. This is to aid in checking.

PRELIMINARY KEY TO THE AMPHIBIANS AND REPTILES
FOUND IN KANSAS

1. Body covered with scales or large shell. 2
 No scales or shell on body. . . Amphibia. 3

2. Body with scales.
 Eyelids present. . . Lizards. . . . (page 2)
 Eyelids absent. . . Snakes. . . . (page 20)
 Body with large hard shell. . Turtles (page 66)

3. Tail present. Salamanders. . . (page 77)
 Tail absent. Frogs and Toads. (page 87)

SECTION I.

LIZARDS

LIZARDS

1. Four legs present.
- Legs absent. Glass snake,
 Ophisaurus ventralis
 (Liars) pg.5

2. Head having large spines.Horned toads.
- Head without large spines.

3. One row of spines on margins of body, horns small.
 Ornamented horned toad,
 Phrynosoma douglassi orna-
 tissimum (Girard) pg.6
- Two rows of spines on margins of body, horns large.
 Texas horned toad,
 Phrynosoma cornutum
 (Harlan) pg.7

4. Ear opening present.
- Ear opening absent. Spotted lizard,
 Holbrookia maculata macul-
 (Girard) pg.8

5. Well defined neck with a wide head.
- Collared lizard,
 Crotaphytus collaris coll-
 aris (Say) pg.9
- Neck not well defined.

6. Scales on belly abruptly larger than scales on back
 and sides. Scales on belly in eight longitudinal
 rows. Six-lined race-runner, pg.
 Cnemidophorus lineatus (Li
- Scales on belly not much larger than those on sides

7. Free part of longest hind toe equal to length of head. Sceloporus. 8
- Free part of longest hind toe not equal to length of head. 9
8. Wavy dark-brown cross bars on back and sides.
 Fence lizard,
Sceloporus undulatus
 (Audouin) pg.11
- Cross bars on back restricted to small dark-brown spots; scales on belly show small ridges.
 Yellow-banded lizard,
Sceloporus undulatus
 Grayii (Baird and Girard) pg.12
9. Lower eyelid transparent in center; ears large and vertical.
 Ground lizard,
Leiolopisma laterale (Cope) pg.14
- Lower eyelid scaled, with no transparent spot; body noticeably shiny.
 Rattlesnake. 10
10. Scale rows on sides run parallel to rows on back. 11
- Scales rows on sides run diagonally.
 Sonoran skink,
Xantusia obsoletus (Baird
 and Girard) pg.14
11. Back with seven or more narrow light stripes and nine or more dark bands.
Xantusia multivirgatus
 (Hallowell)
 Many-lined skink, pg.15
- Back with fewer light stripes and dark bands. 12

* Variety not recognized by Stejneger and Barbour.

12. Body blackish with five prominent light lines, the center stripe forks on the head.
Five-lined skink, PG. 16
Eumeces fasciatus (Linne)

Body with four prominent light lines, four faint lines, or none.

13. Body with two prominent light lines, and two broad dark bands on sides. .Black-banded skink, PG. 17
Eumeces septentrionalis
(Baird)

Body with two light lines on each side, prominent or not, these bordering a broad dark band of solid color; lines may be absent.

14. Lines absent; cheeks red. Eumeces fasciatus (Linne)
(This is the aged adult in last stage of development)

Lines present; general coloration dark.

15. Scales of wide band on center of back with perceptible light and dark areas; not uni-color.
Eumeces fasciatus (Linne)
(This is intermediate stage of development)

Scales of wide band on center of back without light and dark areas; band black to brown.
Coal skink,
Eumeces anthracinus pg. 18
(Baird)

LIZARDS

GLASS SNAKE

Ophisaurus ventralis (Linne)

Coloration:

Back olive, brown, or black; several dots of green within each scale. Spots form lines on neck. Spots may blend together to form lines on sides and back. Head speckled with same bright color. Belly uniform greenish-white.

Structure:

Body slender, long and snake-like. No legs. Has eyelids and ear openings. Scales on belly smooth and overlapping. Scales on back in ring-like rows.

Size:

Adults:

total length.	27 inches
length of tail.	17½ "
greatest diameter.	5/8 "
width of head.	5/8 "
length of head.	1 5/8 "

Largest specimen examined by Ditmars measured thirty-seven inches in length.

Habits:

May break off its tail when captured; will regenerate another tail in time. Very ordinary lizard having no legs.

ORNAMENTED HORNED TOAD

Phrynosoma douglassii ornaticissimum (Girard)

Coloration:

Pattern vivid. Two rows of dark spots, one on either side of back. May be margined with yellow.

Structure:

Head spines rudimentary or small. One row of short spines on margins of body. Body flattened. Head and neck nearly same width. Snout pointed.

Size:

Adults:

total length.	5 1/8 inches
length of tail.	1 1/8 "
width of body. . . . .	.2 3/8 "

Habits:

All varieties of P. douglassii demonstrate ability to change color to match soil of habitation in general. Ditmars reports some specimens with white spots on pinkish background. Markings on back very often resemble lichens growing on rock. Horned toads produce living young; when first born, encased in transparent shell or envelope which they soon break. Live entirely on insect life. Inhabit very hot, dry regions. Catch their food as true toads do by protruding their sticky tongue to catch the insect, never bite, and tame easily.

TEXAS HORNED TOAD

Phrynosoma cornutum (Harlan)

Coloration:

Vivid light stripe down center of back. A dark blotch on each side of nape. Three dark, rounded spots on each side of back, usually bordered in rear with narrow crescent of bright yellow. Three dark bands on top of head; beneath eyes, three wider bands. Belly yellow with numerous dark round spots.

Structure:

Head spines large. Two central horns rounded and directed sharply upward. Three successively larger horns on each temple. On each side of central region of chin, a single row of enlarged scales. Scales on belly may be slightly ridged. Two rows of small spines on margins of body. Very stout, round body.

Size:

Adults:

total length.	6 inches
length of tail.	1 7/8 "
width of body.	2 3/8 "
length central horns.	7/16 "

Habits:

A spiritless animal when caught and handled. Hardy in captivity if given sunshine, and some sand to lie on.

SPOTTED LIZARD

Helbrookia maculata maculata (Girard)

Coloration:

Pale brown, yellowish, or gray. Two rows of dark blotches on back, these bluntly triangular and pointing toward tail. A pair of black blotches on each side of belly. Less distinct dark blotches on sides

Structure:

Differs from closely allied genera by absence of external ear disks; entirely enclosed by fold in the skin. Limbs well-developed, with long slender toes. Tail flat at base; greater part round.

Size:

Adults;

total length.	4 $\frac{1}{2}$	inches
length of tail.	2	"
width of body.	11/16	"
width of head.	$\frac{1}{2}$	"

Habits:

Very active; capable of climbing rocks and trees, but spends most of time on ground. Generally found in dry, rocky situations, and dart away with bewildering speed when disturbed. Food consists of insect prey, usually beetles and grubs. Valuable allies of man in this respect.

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COLLARED LIZARD

Crotaphytus collaris (Say)

Coloration:

Color highly variable; may be yellowish, pale-gray, or bright-green. Scattered over back and sides, many white or yellow dots. Behind head, two wide black bands separated by white or yellowish space. Throat often deep orange. Black, double collar more prominent in males than females; bars of collar rather thin in female.

Structure:

Body elongate; hind legs long. Head wide at rear margin; neck well defined. Tail long and tapering to point at tip.

Size:

Adults;
total length. 12 inches
length of tail. $2\frac{1}{2}$ "
width of body. $1\frac{1}{2}$ "
width of head. $1\frac{1}{4}$ "

Habits:

Pugnacious, greedy, and very active. Cannibalistic, eats lizards and small snakes; also eats blossoms of flowers and tender leaves. When alarmed, dashes away on hind feet--only lizard in Kansas to make use of hind legs in running, others run on four feet. Bright, hardy as captive. They bite, but bite not dangerous.

SIX-LINED RACE RUNNER

Onenodophorus sexlineatus (Liane)

Coloration:

Dark brown with six bright yellow stripes on back, ending at tail. Broad, brownish band on center of back to tail. Stripes on sides may run on to tail for 1/5 its length.

Structure:

Slender in shape. Muzzle blunt. Tail a notable character--very long and tapering; may be as much as three times length of body. Body cylindrical. Scale rows on tail run around that appendage.

Size:

Adults:

total length.	. . . . .	9 $\frac{3}{4}$	inches
length of tail.	. . . . .	7	"
width of head.	. . . . .	.7 / 16	"
length of head.	. . . . .	$\frac{3}{4}$	"

Habits:

Frequent dry, open places where they may bask in the hot sun. One of most common lizards of the southwest. Very fast in running from danger. Human eye perceives only a blur of a young, dusky specimen running on ground. Stops so abruptly that it appears to vanish.

FRENCH-LIZARD

Sceleporus undulatus undulatus (Latreille)Coloration:

Gray; sometimes brown, or greenish with narrow wavy black cross bands on back. An indistinct, paler band on each side of back. Scales moderately bristling. Males may have black blotch under chin, and two bluish blotches on belly. Underside of female shows no blue.

Structure:

Most specimens have head scales strongly wrinkled--rugose. Neck constricted, and smaller than head. Belly scales smooth. Rather large plates on front portion of head.

Size:

Adults;

total length.	. . . . .	5 $\frac{1}{2}$	inches
length of tail.	. . . . .	2 $\frac{2}{3}$	"
width of body.	. . . . .	$\frac{5}{8}$	"
width of head.	. . . . .	$\frac{9}{16}$	"

Habits:

Found in dry, sandy areas. Eat insect life found in decaying bark. Has faculty of shedding its tail when caught by it. Captives, timid and hardy in dry cage with plenty of sunlight. Eggs small; $\frac{3}{8}$ to $\frac{1}{2}$ inch long; oval, covered with very thin shell. May be hatched in damp Sphagnum moss, requires six to eight weeks for incubation.

YELLOW-BANDED LIZARD

Sceloporus undulatus thayerii (Baird and Girard)*Coloration:

Two yellow bands, one on each side of back, about ten scale rows apart. On each side, a series of narrow undulating Vs, the angle pointing toward head. Males usually have two bluish patches on throat, and one blue patch on either side of belly. Male with rear half of chin, and thence to shoulder, black. Sides dusky.

Structure:

In all respects very closely resembles S. u. undulatus. Plates on head much larger than scales on body. Scales on sides smaller than scales on back. Scales on back and rump about equal. Belly scales smooth, with rough margins. Small point on rear edge of each scale.

Size:

Adults:

total length.	. . . . .	5 $\frac{1}{2}$	inches
length of tail.	. . . . .	2 $\frac{7}{8}$	"
width of body.	. . . . .	$\frac{2}{3}$	"
width of head.	. . . . .	$\frac{9}{16}$	"

Habits:

Inhabits hot dry areas. Hardy in captivity.

* Variety not recognized by Stejneger and Barbour.

GROUND LIZARD

Leiolopisma laterale (Say)Coloration:

Reddish olive above, sometimes bronzed or greenish. Two light stripes on sides, one runs through the eye. Belly, yellowish-white. Back may show minute dots. On each side of bronze area down back, a dark band.

Structure:

Diminutive, elongate, cylindrical with minute legs. Tail long, almost as thick as body at its basal third.

Size:

Adults:

total length.	. . . . .	3 inches
length of tail.	. . . . .	1 5/8 "
diameter of body.	. . . . .	1/4 "

Habits:

Very secretive; leads burrowing life. Large numbers found under bark of decaying trees. When uncovered, display considerable agility, half running, half wriggling in a series of rapid, laterale undulations. Undulating movements assist greatly in locomotion, as the legs are too short to be of much use. These small lizards somewhat resemble salamanders. If caught by tail, it will break its tail and run off.

SONORAN SKINK*

Hemiscis obsoletus (Baird and Girard)Coloration:

Adult light yellowish or reddish blue. Each scale with a dusky border. May have general reddish or tan cast. Young of this species, black with tip and sides of chin white. Five faint white lines on back. Faint spots on sides of neck.

Structure:

Legs short. Body cylindrical. Head broad and depressed. Tail about same length as body.

Size:

Adults:
 total length. 11 inches
 length of tail. 5 "

Habits:

Secretive in habits. Generally found under rocks in semi-arid areas.

* It is well to use caution in handling this skink because the bite may draw blood. Their first impulse is to escape, but when caught in the hand, they turn and bite, hanging on by their powerful jaws so that the entire weight of the animal can be supported by the jaws.

MANY-LINED SKINK *

Muncos multivirgatus (Hallowell)Coloration:

Broad, central olive band, on back bordered with five dark brown, and four pale olive stripes. First and fourth of dark stripes the widest. General color pale olive, green, or gray. Belly lighter. Every row of scales striped with brown and the background color. Scales on tail and legs edged with brown.

Structure:

Body cylindrical. Body little over three times length of hind leg. Head short, convex. Ear small, circular. Legs far apart. Head height as broad.

Size:

(Measurements no available) A moderate sized skink, Total length about seven inches.

Habits:

As all other skinks, secretive; found under rocks in rather dry country. Moves very fast when surprised, and hard to catch.

* All skinks are rather vicious little animals when being handled. They do not tame easily, but eat rather well in captivity. It is well to wear leather gloves when handling them.

FIVE-LINED SKINK

Eumeces fasciatus (Linne)

Coloration:

Highly variable. Adults dull olive or greenish. Head may be brick-red in very late stages. Belly whitish. Three stages in the coloring of this skink are:

1. Black above, including head, with five equidistant narrow whitish stripes.
2. White line in center more prominent than other two. White lines gradually become divided into spots rather than lines. Head becomes reddish and wider.
3. Stripes on sides and dusky band obliterated. Head swelling more and more. Body becoming greenish, or reddish olive. Belly white. Head as broad as ~~high~~.

Structure:

Body cylindrical. Legs rather short. Tail one and one-fourth times in body. Hind legs applied twice forward, reach a little beyond ears.

Size:

Adults:

total length.	9 inches
length of tail.	4 1/2 "
greatest diameter.	3/4 "
width of head (temples)	1 1/16 "

Habits: Secretive, found under rocks in dry areas.

BLACK-BANDED SKINK

Eumeces septentrionalis (Baird)Coloration:

Background color light, olive-green above with two white stripes bordering a black one. Belly greenish-white; more yellow under chin. A white line passing above ear.

Structure:

Body and neck cylindrical; stout. Scales on head rhomboidal in shape. Head small, conical in shape, depressed.

Size:

(Figures not available--moderate sized.)

Habits:

Lives in decaying wood of trees. Eats ants and beetle grubs. Strictly diurnal, seeking hiding place when sun sets. Has been known to feed on bird eggs, and wood-mice. All skinks can twist off the tail when firmly grasped by it. An unusual habit among lizards seems prevalent among skinks and that is lying in circular position when under rocks or bark of trees. The female thus protects her eggs. She lays three or four eggs at a time. Female remains partly coiled around eggs until immediately prior to hatching. She refuses all food during this time.

COAL-SKINK

Hemeces anthracinus (Baird)

Coloration:

Highly variable, going through several stages.
Young: Lustrous black on sides and exterior surface of hind legs. Belly greenish-blue. Under-surface of tail bluish.
Adult: Dark olive-green above with two well defined white lines on each side. Line passes through eyes.

Structure:

Body and head depressed. Head quadrangular and reddish. Form elongate and cylindrical. Hind leg applied twice forward reaches to middle of neck

Size:

Adults;
 total length. 6 inches
 length of tail. 2 inches
 diameter of body. $\frac{1}{2}$ "

Habits:

Same as the other skinks. Secretive, and diurnal in habits. Eats insects and larval forms.

SECTION II.

SNAKES

SNAKES

1. Deep pit between eye and nostril. . Pit Vipers. . . . 2
 No pit between eye and nostril. 6

2. No rattles on tail. . . . Agkistrodon. 5
 Rattles on tail. Rattlesnakes. 3

3. Top of head with small scales. . . Crotalus. 4
 Top of head with large plates. . . Sistrurus
 Background color grayish-brown. Large rich-brown
 blotches bordered with white on back; blotches on
 sides smaller. . . . Massasauga,
 Sistrurus catenatus cate-
 natus (Rafinesque) pg. 27
 Background color pale yellowish-gray. Blotches
 rather small. . . . Edwards Massasauga,
 Sistrurus catenatus ed-
 wardsii (BaIRD and Girard)
 pg. 28

4. Tail dark to black. Pattern on back of dark, double
 chevron-shaped bands. Timber rattlesnake,
 Crotalus horridus (Linne)
 pg. 29
 Tail with brown, or indistinct bands. Light stripe
 from behind eye to point above angle of mouth. . . .
 Prairie rattlesnake,
 Crotalus confluentus con-
 fluentus (Say) pg. 30

5. Chestnut-brown on back with dark mottling. Head with
 slight copper tinge. Copper-head,
 Agkistrodon mokasen (Beau-
 vois) pg. 31

Dull olive, or brownish above. Paler on sides; indistinct wide blackish lines on sides. Upper lip scales yellow with three dark bars on lower ones on each side of mouth.
 Water moccasin (Cotton-mouth)
Agkistrodon piscivorus
 (Lacépède) PG. 32

6. End of nose not noticeably turned up. 8
 End of nose turned up, and ridge on top. 7

7. Central part of belly yellowish, or greenish.
 Common hog-nosed snake,
Heterodon contortrix
 (Linne) PG. 33

Central part of belly black, or quite dark.
 Western hog-nosed snake,
Heterodon nasutus (Baird
 and Girard) PG. 34

8. Back with cross-bars, spots, or longitudinal stripes.. 10
 Back even-colored.

Back blue, or slate color. Stomach yellow.
 Blue-racer,
Coluber constrictor flaviventris (Say) PG. 35

Back black. Throat white.
 Pilot black snake,
Blaspe obsoleta obsoleta
 (Say) PG. 36

Back lead-black. Ring of yellow or orange around neck.
 Ring-necked snake,
Diadophis punctatus
arnyi (Kennicott) PG. 37

Back purplish-black, Belly pink.
Worm snake,
Carpophis amoenus vermis
(Kennicott) pg.38

Back, tan to brown. Large snake, over one-foot to
eighteen inches. . Whip snake,
Coluber flagellum flagellum
(Shaw) pg.39

Back tan. Small snake; less than one foot.
Miter snake,
Tantilla gracilis (Baird
and Girard) pg.40

Back green. 9

9. Scales on top of back show small ridges (keels).
Keeled green snake,
Ophedrys aestivus
(Linnae) pg.41

Scales on top of back without ridges (smooth).
Smooth green snake,
Liopelepis vernalis
(Harlan) pg.42

10. Back with cross-bars or blotches. 11

Back with longitudinal stripes.
Small red bars, or spots between stripes. Three
stripes, yellowish.. Red-sided garter snake,
Thamnophis sirtalis par-
letalis (Say) pg.43

Black spots between stripes run together to form
two black lines on tail.
De Kay's snake,
Storeria dekayi
(Holbrook) pg.44

Center stripe orange or red. Side stripes greenish-yellow. . . . Western ribbon snake,
Thamnophis sauritis proximus (Say) pg. 46

Belly white or yellow with two rows of black spots. . . . Striped swamp snake,
Tropidoclonion lineatum (Hallowell) pg. 46

Stripes on sides with black border on lower edges. Back brown. Belly lighter. . . . Graham's water snake,
Natrix grahami (Baird and Girard) pg. 47

Dark brown or black spots between stripes. Stripes do not run together on tail. . . . Plains garter snake,
Thamnophis radix (Baird and Girard) pg. 48

One faint, light-yellow stripe down back. Belly bright-red. Yellow spot behind head, and one on either side of head. . . . Red-bellied snake,
Storeria occipito-maculata (Storer) pg. 49

11. Scales with ridges. (keeled). . . .

Scales without ridges. (smooth). . . .

12. Anal plate divided. . (see figure, page 65) . . .

Anal plate not divided. . (see figure page 65) . . . Bull snake,
Pituophis sayi sayi (Schlegel) pg. 50

13. Brown bar from eyes across head. . Elaphe. . . .

Two elongated blotches from top of head to neck, forming irregular U. Background color ashy-gray. Blotches of rich brown on back bordered with narrow black line. Belly yellowish-white with dull gray blotches.

Emory's coluber,
Elaphe laeta (Baird and Girard) pg. 51

Forward part of belly white with gray spots; rear portion of belly uniform dark gray.

Chicken snake,
Elaphe obsoleta confinis (Baird and Girard) pg. 52

Grayish or brownish. One foot or less in length. Saddles of black or brown on back.

Pilot black snake, (Young)
Elaphe obsoleta obsoleta (Say) pg. 53

No brown bar across head from eyes. 14

14. Dark blotches on back and sides. Semi-circular orange spots on stomach.

Common water snake,
Natrix sipedon sipedon (Linne) pg. 54

No orange semi-circular spots on belly. Black bands on back. 15

15. Black lines on back form chain outlining diamond shaped areas of background color.

Diamond-backed water snake,
Natrix rhombifera (Hallowell) pg. 55

Dark brown blotches on back alternate with blotches on sides.

Blotched water snake,
Natrix transversa (Hallowell) pg. 55

16. Anal plate divided. . (see figure page. 65) 19

Anal plate not divided. . (see figure page 45). . . 17

17. No red in pattern on back. 18

Red in pattern.

Alternating red and black blotches. Black extends farthest down sides. Many scales may be orange with red centers, or red with black centers. .

Le Conte's snake,
Rhincheilus lecontei (Baird and Girard) pg. 57

Black bands bordering red blotches tend to meet on belly. Black borders of red blotches separated by dirty yellow or gray.

Red king snake,
Lampropeltis triangulum (Baird and Girard) pg. 58

18. Dark color with yellow, green, or white spot in center of each scale. Salt and pepper snake,

Lampropeltis getulus
helbrooki (Stejneger) pg. 59

Brownish-gray with dark brown, black-bordered blotches on back and sides. Usually a band across and one lengthwise on head.

Blotched king snake,
Lampropeltis calligaster (Harlan) pg. 60

19. No red in pattern. 20

Red in pattern.

Head black, except snout. Snout orange or red. Small black cross-bands on back.

Banded-ground snake,
Seneca semiannulata (Baird and Girard) pg. 61

20. Background color dark olive. Rhomboidal blotches on back from head to tail. Blotches about nine scales wide and two to four scales long. Throat and chin white. Top of head with faint mottled appearance. . . .

Young blue-racer,
Coluber constrictor
flaviventris (Say) pg. 62

Two dark lines in center on lower jaw. Top of head not mottled or spotted-nearly solid color. Front edge of head-plates, light; progressively darker to rear edge. Dark band, 2 or 3 scales wide immediately behind head. . . .

Young coach-whip,
Coluber flagellum fla-
gellum (Shaw) pg. 62

SNAKES

MASSASAGUA

Bisturnus ostenatus ostenatus (Rafinesque)Coloration:

Grayish brown. Series of large, rich-brown blotches on back, these faintly bordered with white. On each side of body, three series of smaller blotches; lower series extends over edges of scales on belly. Tail ringed above with dark brown, alternating with background color. Belly dull gray, marbled with black, or entirely black.

Structure:

Top of head with nine large plates. Generally a small snake. Scales show small ridges. (keels) Small pit between eye and nostril.*

Size:

Adults:

total length.	26	inches
length of tail.	2 1/8	"
greatest diameter.	1 1/8	"
width of head.	1/2	"

Habits:

Lives in swamp regions, or on plains near water.

*Bite may kill man. Do not handle.

EDWARD'S MASSASAUGA*

Sistrurus catenatus edwardsii (Baird and Girard)Coloration:

Paler ground color than S. c. catenatus. Yellowish ground color, and small spots. Spots on sides indistinct. Narrow band of chestnut-brown from front and top of head passes over eyes to neck. Yellowish stripe from angle of mouth to nostril. Snout and upper jaw yellow. Lower jaw and chin mottled with yellow and brown. Unless observer has S. c. catenatus and S. c. edwardsii for comparison, they can not be distinguished by person other than expert.

Structure:

Slightly smaller in diameter than S. c. catenatus.

Size:

Adults:

total length.	26	inches
length of tail.	2 1/8	"
greatest diameter.	1	"
width of head.	2	"

Habits:

Found in slightly more arid regions than S. c. catenatus.

* Kansas may be a transition area between these two Massasaugas as both varieties are found here. Gloyd has definitely indentified both, taken from Kansas.

TIMBER RATTLESNAKE

Crotalus horridus (Linne)

Coloration:

Most familiar phase a sulphur-yellow with dark brown or black cross-bars., these usually wavy , or sharply pointed at rear. Bars sometimes broken into series of three spots, or blotches. Tail generally black.

Structure:

Body stout. Head heart-shaped. Scales show small ridges. Large oval shield covers region above each eye. Front part of top of head covered with small scales, or plates, rest of head definitely scaled.

Size:

Adults;

total length.	44 inches	
length of tail.	$2\frac{2}{3}$	"
diameter of body.	$1\frac{5}{8}$	"
width of head.	$1\frac{3}{8}$	"

Habits:

Prefers to bask in sun on rocky ledges, or often found in caves. Each winter they come to same place to hibernate. Most docile species of rattlesnake in U.S. Feeds on small vertebrates.*

* The bite is deadly, so do not handle.

PRAIRIE RATTLESNAKE

Crotalus confluentus confluentus (Say)Coloration:

Greenish-yellow or olive. Row of large, well separated blotches of brown on back. Row of less distinct blotches on sides. Blotches on back have a narrow dark margin, and outside this, a narrow margin of white or yellow. Near tail, blotches fade into transverse bands. A dark band from beneath center of eye to angle of mouth. This band bordered in front and behind with yellow stripes, front stripe narrow. Plates over eyes marked with two white, or yellow lines running together at outer edge of plate.

Structure:

Moderate size, more slender than other rattlesnakes.

Size:

Adults;*		
total length.	30 $\frac{1}{2}$	inches
length of tail.	2 $\frac{1}{2}$	"
greatest diameter.	1 $\frac{1}{2}$	"
width of head. . . . .	.1 $\frac{1}{2}$	"

Habits:

A vicious reptile; never actually attacks.

* Largest specimen measured by Ditmars was six feet long. Very dangerous.

COPPERHEAD*

Akistrodon mokasen (Beauvois)Coloration:

Hazel brown, copper, or bronze color above. Large cross-bands of chestnut brown on back. Bands narrow on back and widen on sides; from above the bands resemble hour-glasses. Belly pinkish-white, with row of large dark spots on each side. From side view, bands give appearance of blunt Y's, the stems pointed upwards. Bands may be broken on back. All bands darker on borders. Head usually paler than body, often giving the Copper color--hence the name Copper-head. Upper lips lighter than top of head, line of intersection between the two colors begins behind eye and extends to angle of mouth. Ground color may vary through brown to gray, but pattern tends to remain same. Color of tongue unique among snakes, red at base and white at forked portion.

Structure:

Moderate in size, slender. Scales strongly ridged; most scales on underside of tail in one row. Head decidedly heart-shaped.

Size:

Adults:

total length.	33	inches
length of tail.	4 $\frac{1}{2}$	"
diameter of body. . . . .	.1 $\frac{1}{2}$	"
width of head.	1	"

* One of most dangerous pit-vipers.

WATER MOCCASIN

Akistrodon piscivorus (Lacépède)Coloration:

Dull olive, or brownish above. Paler on sides. Wide, indistinct black bands on sides, bands enclose areas of background color, and some dark blotches. Upper lip plates yellow. Dark band from angle of mouth to eye, above this, a pale streak. Top of head dark, often black. Chin and lower lips yellow with three dark bars on lip plates on either side of mouth. Young: Pale reddish-brown, with bands of rich dark brown. All bands narrowly marked with white. Half-grown: greenish, or chestnut brown. Barring very distinct.

Structure:

Body stout. Head, chunky and distinct from neck. Large shields project over tops of eyes giving a scowling appearance. Tail tapers abruptly from body. Scales of body strongly ridged.

Size:Adults:

total length. . . . .	.48	inches
length of tail.	$7\frac{1}{2}$	"
diameter of body.	$2\frac{3}{8}$	"
width of head.	$1\frac{1}{2}$	"

Habits:

To present time, not found in Kansas. A dangerous reptile.

COMMON HOG-NOSED SNAKE

Heterodon contortrix (Linne)Coloration:

Yellow, brown, or reddish. Irregular pattern of large dark brown or black blotches on back from neck to base of tail. On tail, blotches form half-rings. Blotches on sides alternate with those on back. Edges of scales on sides of belly spotted with black. Central portion of belly yellowish or greenish. Head uniform brown, or yellowish-brown. A dark across head slightly in front of eyes. Behind eyes, a broken band from which radiate two others extending to neck where they widen, forming two large blotches.

Structure:

Thick body. Triangular, flat head; nosed turned up. Tail short.

Size:

Adults;

total length.	. . . . .	28	inches
length of tail.	. . . . .	4 $\frac{1}{2}$	"
greatest diameter.	. . . . .	1 $\frac{1}{4}$	"
width of head.	. . . . .	1	"

Habits:

Sometimes called "Puff-adder" due to habit of expanding ribs, and assuming somewhat of a "Cobra" attitude. A great bluffer. Harmless, and never bites.

WESTERN HOG-NOSED SNAKE

Heterodon nasicus (Baird and Girard)

Coloration:

Large area of black on central portion of belly. Pale brown, or yellow on back. Closely set dark blotches on back and sides. Blotches round in shape. Blotches on sides alternate with those on back. Head paler than back. Head strongly marked with bands of rich brown arranged thus: two bands across across top of head, another extends from eye to angle of mouth; wide blotch of same color on each temple; between these blotches a short, dark bar.

Structure:

Snout strikingly turned-up. Scales strongly ridged. Body noticeably stout.

Size:

Adults;

total length.	25 $\frac{1}{2}$	inches
length of tail.	2 $\frac{1}{2}$	"
greatest diameter.	7/8	"
width of head.	3/4	"

Habits:

Will strike rather viciously but with mouth closed, never bites. Harmless, and economically beneficial. When excited, or surprised, will turn on its back and feint death.

BLUE RACER.**Coluber constrictor flaviventris (Say)****Coloration:**

Bluish green, pale olive, or dark olive above. Belly pale yellow, chin and throat lighter. Generally only two colors, bluish-green above, and bright yellow on belly.

Structure:

Slender, whip-like. Long, tapering tail.

Size:

Adults;
 total length. 48 inches
 length of tail. 12 "
 greatest diameter. 1 "
 width of head. 1 "

Habits:

Very quick in moving. Harmless, although has been known to faint attack on man. Sometimes runs with head one or two feet above ground. Name of Blue racer derived from great speed. Becomes fairly tame in captivity, but not hardy. Found in rather dry, open habitat.

* This snake does not thrive well in captivity; Specimens under writers observation seem to have died without evidence of cause.

PILOT BLACK SNAKE*

Elaphe obsoleta obsoleta (Say)Coloration:

Lustrous black above. When skin distended, edges of scales show narrow white borders. Skin between scales may be brick-red. Upper portion of head black. Upper lip plates white, chin and throat white. Forward part of belly white, and blotched with gray. On rear portion of belly, white fuses into gray. In bright light, the black on back may appear rich brown, with four dark bands extending length of body.

Structure:

One of largest of species. Quite stout of body and head rather square in outline, flat at snout. Scales feebly ridged. Entire body smooth and glossy in appearance. Easily confused with Black-racer.

Size:

Adults:

total length.	66 $\frac{1}{2}$	inches
length of tail.	11 $\frac{1}{2}$	"
greatest diameter.	1 $\frac{1}{2}$	"
width of head.	1 $\frac{1}{2}$	"

Habits:

Found in same places as poisonous snakes. Harmless, and valuable.

* Specimen taken by J.W. Breukelman measured 69 inches.

RING-NECKED SNAKE

Diadophis punctatus arnyi (Kennicott)Coloration:

Back gray-black. Ring of orange or yellow around neck. Crown scarcely darker than back. Belly yellow, thickly and irregularly spotted with black; spots extending some distance on underside of tail. Head, beneath, spotted with black, spots smaller than those on belly. Ring on neck about two scales wide.

Structure:

Form slender, head small, and distinct from body.

Size:

Adults;
 total length. 13 inches
 length of tail. $2\frac{7}{8}$ "
 greatest diameter. $\frac{5}{16}$ "
 width of head. $\frac{5}{16}$ "

Habits:

Very secretive, hiding under rocks, loose decaying bark of fallen trees. Seldom seen in daytime, prowls at night. Has been found in ant-hills. Omnivorous, feeds on worms, and small salamanders. Occasionally eats lizards and snakes. Eggs contain large embryos, and hatch in about one-half time usually taken by snake eggs to hatch. Eggs may be curved, and have thin shell.

WORM SNAKE

Carphephils amoenus nasuta (Kennicott)Coloration:

Purplish-black above. Belly pinkish or yellowish-flesh color.

Structure:

A small snake; moderately stout with opalescent scales. Head not distinct from neck. Snout pointed. Eyes very small.

Size:

Adults:

total length.	9 $\frac{1}{2}$	inches
length of tail.	1 $\frac{3}{4}$	"
greatest diameter.	$\frac{1}{2}$	"
width of head. . . . .	.7/32	"

Habits:

Abundant in many areas, but not often seen. Sometimes seen in wooded areas after rains. Size and color make it hard to see. Lives in ground. Deposits small number of eggs during latter part of July. Young are quite large at hatching in comparison to size of adult snake, but small compared to adult earthworm. Feeds largely on earthworms, and insect grubs. In captivity, it always tries to secrete itself, and does not live long, captive. Very mild tempered--won't bite.

WHIP SNAKE

Coluber flagellum flagellum (Shaw)Coloration:

Tan to brown on back; lighter on tail. Scales generally mottled. Darkest tint near tip of scales. Belly yellowish to dirty white. Forward one-fifth may show blotches of brown. End of each scale shows spotting with brown. Has a "braided" appearance.

Structure:

Slender, and quite long. Scales smooth. Tail about one-fourth total length. Snake very fast when moving.

Size:*

Adults:		
total length.	. . . . .	84 inches
length of tail.	. . . . .	20 $\frac{1}{2}$ "
greatest diameter.	. . . . .	1 $\frac{1}{2}$ "
width of head.	. . . . .	.91 "

Habits:

Prefers open country to wooded areas. Very fast in moving. Harmless snake, but resents being handled., will strike, but bite is not dangerous.

* Probably largest snake in Kansas. Figures given are of large specimen.

MITER SNAKE

Tantilla gracilis gracilis* (Beird and Girard)

Coloration:

Uniform greenish-brown above. Belly lighter. Head darker than back. Back usually tan; head black.

Structure:

Body slender; head flat, and not distinct from body. One, single large plate in front of eyes. Poisonous to very small creatures--has grooved fangs in rear of jaw.

Size:

Adults:

total length.	. . . . .	9	inches
length of tail.	. . . . .	1 5/8	"
greatest diameter.	. . . . .	3/16	"
width of head.	. . . . .	.3/16	"

Habits:

Very secretive; burrows in ground. Feeds on insects and small animals which it can poison with its tiny fangs. Cannot bite man because it cannot open its mouth far enough to pierce skin with fangs in back of jaw.

* Variety not recognized by Stejneger and Barbour.

KEELED GREEN SNAKE*

Ophedryx aestivus (Linne)

Coloration:

Uniform bright green above. Belly, immaculate white to whitish-yellow.

Structure:

Slender in form. Tail tapers gradually. Scales on top of back show ridges, scales on sides and belly smooth.

Size:

Adults;
 total length. 33 inches
 length of tail. 12 $\frac{1}{2}$ "
 greatest diameter. 7/16 "
 width of head. 3/8 "

Habits:

A tree climbing species, often found in underbrush and low trees. Very inoffensive in habits. Gentle, and doesn't bite. Feeds on insects. As most arboreal snakes, it protrudes the tongue without spreading the fork. Tongue pale-flesh color. Very well camouflaged by green color.

* Specimens noted by writer were very tame, and gentle. Never offering to strike.

SMOOTH GREEN SNAKE

Liopehtis vernalis (Harlan)

Coloration:

Uniform green above. Belly greenish-white. Lips show same color as undersurface. Newly hatched specimens show dull olive above.

Structure:

More stout than Ophedryx sensitiva. Tail not long. Scales smooth with satiny lustre.

Size:

Adults:

total length.	. . . . .	15 $\frac{1}{2}$	inches
length of tail.	. . . . .	.5 $\frac{1}{2}$	"
greatest diameter.	. . . . .	$\frac{1}{4}$	"
width of head.	. . . . .	$\frac{1}{4}$	"

Habits:

Feeds on lizards, (very small) and insects, and insect larvae. Prefers larva of waterpillars. Very gentle, harmless; does not show anger when handled. Lives in open country. Prowls in grass, or low bushes. When surprised, crawls to grass to hide. Eggs found under flat stones near hedges surrounding meadows. Eggs elongated; covered with very thin shell; shell dents under pressure of fingers. Usually about twelve eggs in one bunch. Eggs adhesive. Embryo may be seen through shell.

RED-SIDED GARTER SNAKE

Thamnophis sirtalis parietalis (Say)Coloration:

Wide, yellow stripe down center of back; one narrower yellow stripe on either side. Variety distinct owing to fusing of black spots between center stripe and side-stripes. Usually brick-red bars on sides. Central stripe may be yellow, greenish, or red. Area between side stripes and center stripe may be brown. Side stripes may come in contact with red bars, giving wavy appearance to center stripe, and bars. Belly, dull olive, slate, green, or dull gray. Chin paler.

Structure:

Body moderately stout. Scales show ridges.

Size:

Adults;

total length.	25 $\frac{1}{2}$	inches
length of tail. . . . .	.6 $\frac{1}{2}$	"
greatest diameter.	5/8	"
width of head.	9/16	"
length of head.	1 1/8	"

Habits:

Last snake to hibernate in fall, and first to appear in spring. Likes to bask in sun on warm, rocky ledges. Tames easily in captivity. harmless and feeds on small fish.

DE KAY'S SNAKE

Storeria dekayi (Holbrook)Coloration:

Chestnut, or grayish brown. Streak of paler tint on back bordered with black dots. On tail, black dots form two blackish lines. Belly pinkish-white. Young with grayish ring on neck.

Structure:

Small size, body moderately stout. Scales strongly ridged. Eyes large. Young distinguished from ring-necked snakes by having heavily ridged scales.

Size:Adults:

total length.	12 $\frac{1}{2}$	inches
length of tail.	2 $\frac{1}{2}$	"
diameter of body.	$\frac{1}{4}$	"
width of head.	$\frac{1}{4}$	"

Habits:

Very secretive. Hides among loose stones, flat rocks. Ventures out in late afternoons. Feeds largely on earthworms, and slugs. In wild state, feeds on beetles, especially the larvae. Gives birth to from twelve to twenty young in each litter.

WESTERN RIBBON SNAKE

Thamnophis sauritis proximus (Say)Coloration:

Three vividly defined light lines on back; one in center, and one on either side. Center stripe deep orange-yellow; side stripes pale greenish-yellow. Beneath side stripes a streak of black, or dark brown. Belly immaculate greenish-white. Background color dark brown or black.

Structure:

Body and tail elongate, slender. Tail more than one-third total length. Head distinct from neck, elongate, depressed. Scales strongly ridged, and notched at tip. When skin stretches, numerous short white lines visible.

Size:

Adults;

total length.	30 $\frac{1}{2}$	inches
length of tail.	8 $\frac{1}{2}$	"
greatest diameter.	5/8	"
width of head.	1 $\frac{1}{2}$	"
length of head.	2	"

Habits:

Very quick in moving. Lives near water, and swims. Dives to bottom when frightened. Captive specimens hardy. Feeds on frogs and fish.

STRIPED SWAMP SNAKE

Stepidoleon lineatum (Hallowell)Coloration:

Grayish-brown, whitish, or yellowish stripe down center of back, bordered with black dots on each side. On second and third rows of scales is similar stripe, though not so distinct. Belly white or yellow, with two rows of black spots.

Structure:

Rather small, form moderately stout; tail short; head small, pointed and same size as neck. Eye small. Scales strongly ridged. From above, resembles Garter snakes, but distinguished by black spots on belly.

Size:

Adults;

total length	14	inches
length of tail.	$\frac{13}{16}$	"
greatest diameter.	$\frac{3}{8}$	"
width of head.	$\frac{5}{16}$	"
length of head.	$\frac{1}{2}$	"

Habits:

Secretive. In captivity, hides under rocks, or anything available, most of the time. Found along rivers, under rocks and sod. Sometimes in decaying wood, under bark of decaying trees.

GRAHAM'S WATER SNAKE

Natrix grahami (Baird and Girard)Coloration:

Back uniformly dark brown, may have indistinct light band down center. Broad band of yellow on sides covering first three rows of scales. Yellow stripe on sides bordered below with black. For short distance behind head, yellow band wider than elsewhere. Yellow extends to head, and upward to eyes. Belly yellowish, and usually a black stripe down center of belly.

Structure:

Scales moderately ridged. Tail tapers rapidly. Has general appearance of being rather flattened.

Size:

Adults:

total length.	25	inches
length of tail.	$\frac{4}{5}$	"
diameter of body.	$\frac{5}{8}$	"
width of head.	$\frac{7}{16}$	"
length of head.	$\frac{3}{4}$	"

Habits:

Agile and timid. Frequents rivers and ponds. Found under decaying logs, flat rocks, near streams. Fairly hardy in captivity.

PLAIN GARTER SNAKE

Thamnophis radix (Baird and Girard)

Coloration:

Dark brown, olive or black above. Three distinct yellow stripes, one down center of back, one on either side. Center stripe rich yellow. Side stripes paler. Two rows of dark brown or black spots between the stripes. Belly greenish. black spots on edges of each belly-plate. Upper lip plates yellow, heavily margined with black.

Structure:

Resembles common garter snake in form; distinguished by side stripe being on third and fourth rows of scales, on common garter snake, side stripe on second and third rows. Form rather robust, tail less than one-fourth total length.

Size:

Adults:

total length.	32	inches
length of tail.	6 $\frac{1}{2}$	"
greatest diameter.	$\frac{1}{2}$	"
width of head.	$\frac{1}{2}$	"
length of head.	1 $\frac{1}{8}$	"

Habits:

Inhabits both dry and swamp areas. Found along streams, ; when surprised will dive under water and remain for long periods. Feeds largely on fish. Gives birth to about twelve young.

RED-BELLIED SNAKE

Storeria occipito-maculata (Storer)Coloration:

Chestnut brown, or grayish above. Streak of paler hue down back. Belly bright-red, bordered with slate-gray on edges of plates covering belly. Head slightly darker than body. Yellow spot behind head; one on either side of neck.

Structure:

Scales ridged. Muzzle broad, eyes large.

Size:

Adults:

total length.	10	inches
length of tail.	2 $\frac{3}{16}$	"
diameter of body.	$\frac{1}{2}$	"
width of head.	$\frac{3}{16}$	"
length of head.	$\frac{5}{16}$	"

Habits:

Very similar to De Kay's snake in actions. Hides under flat rocks, and in loose dirt, ventures out in late afternoons. Feeds on earth-worms and soft-bodied beetle larva, also garden-slugs. Gives birth to from eight to twelve young; each about three inches long at birth.

BULL SNAKE

Pituophis sayi sayi (Schlegel)Coloration:

Background color, rich orange-yellow, or reddish-yellow. Row of large, dark brown or black, square blotches down back. Series of smaller blotches on sides. With body distended, color of skin matches that of scales. Head dark yellow, with dark brown, or black bar across top, in front of eyes. Another bar from eyes to angles of mouth. Lip plates bordered with black. Belly yellow, with row of black spots on each side.

Structure:

Large, and rather stout in form. Snout pointed; head large in proportion to size of snake.

Size:

Adults;*

total length.	57 $\frac{1}{2}$	inches
length of tail.	7 $\frac{3}{4}$	"
diameter of body.	1 $\frac{1}{2}$	"
width of head.	1	"
length of head.	1 $\frac{5}{8}$	"

Habits:

Eats eggs, rabbits, rats, and birds.

* Measurements are of average size adult. Known to attain length of nine feet; and six inches in diameter.

EMORY'S COBUBER

Elaphe laeta (Baird and Girard)Coloration:

Ashy-gray with rich brown, or olive-brown blotches. Blotches narrowly margined with black. Smaller series of blotches on sides and beneath this, a still smaller series. Belly dull-white to yellowish with dull-gray blotches. From behind eye, dark band extends by angle of mouth to neck. Dark bar across head in front of eyes. Two elongated blotches from head to neck.

Structure:

Smallest of North American Elaphe. Slender body. Ridges on scales very minute, only few rows on top of back ridged.

Size:

Adults:

total length.	48	inches
length of tail.	$7\frac{1}{2}$	"
greatest diameter.	$1\frac{1}{8}$	"
width of head.	1	"
length of head.	$1\frac{1}{2}$	"

Habits:

Not vicious, and tames easily. Feeds on young rats and mice -- sometimes young birds. Often found in trees. Does not offer to bite often. Coils as if to strike, but doesn't.

OHI OKEN SNAKE

Elaphe obsoleta confinis (Baird and Girard)

Coloration:

Pale-gray with large dark-brown saddles on back. These blotches long on neck, sending out narrow branches from their corners; thus assuming an H-shaped formation. Series of small blotches on either side of body, and a smaller series below this. Numerous scales show white edges when skin distends. Head dotted with black on dark-gray background. Dark band across head in front of eyes. Another band from eye to angle of mouth. Lips white, bordered with black. Eye silvery.

Structure:

Rather slender; head squarish in outline, short, wide. Snout narrow, projecting beyond lower lip.

Size:

Adults:

total length;	. . . . .	57½	inches
length of tail.	. . . . .	11	"
greatest diameter.	. . . . .	1 1/8	"
width of head.	. . . . .	1	"
length of head.	. . . . .	.12	"

Habits:

Closely related to, and greatly resembles Emory's coluber. Lives in same habitat. Inoffensive in habits, tames easily.

BLACK SNAKE

(Young)

Elaphe obsoleta obsoleta (Say)Coloration

Grayish or brownish; boldly marked with saddles of black or brown. Saddles may not entirely disappear with age.

Structure:

Slender. Tapering tail.

Size:

Under eighteen inches.

Habits:

Same as adult.

COMMON WATER SNAKE

Natrix sipedon sipedon (Linne)Coloration:

Pale reddish, or brownish. Crossed by wavy dark brown bars on forward portion of body. Bands broad on back causing it to appear dull brown in color. Bands narrow on sides separating wide areas of background color. On latter part of body bands break into blotches, making definite series of blotches. Series of blotches on sides of rear portion of body alternate with blotches on back. Belly spotted with orange colored semi-circles.

Structure:

Closely resembles the Water Moccasin. Scales show ridges. Four rows of teeth in upper jaw; two of these in center, rear portion; two rows on sides.

Size:

Adults:

total length.	. . . . .	42 inches
length of tail.	. . . . .	.8 inches
diameter of body.	. . . . .	1 3/8 "
width of head.	. . . . .	.1 "
length of head.	. . . . .	1 5/8 "

Habits:

Hostile. Does not tame readily. Hardy in captivity.

DIAMOND-BACKED WATER SNAKE

Matrix rhombifera (Hallowell)Coloration;

Brown, or olive. Chain of black markings down back, enclosing diamond-shaped areas of background color. Black widest at junction of two "diamonds". From lower angle of each "diamond", band of black two scales wide, runs down side of body. Belly yellow; edges of plates on belly blotched with dark brown; character more pronounced on latter portion of body.

Structure;

Large; stout in form. Head distinct from neck. Lip plates protruding, and swollen giving mean appearance to snake. Eyes well forward toward snout. Scales ridged.

Size;

Adult;

total length.	49	inches
length of tail.	10	"
diameter of body.	$1\frac{3}{4}$	"
width of head.	$1\frac{1}{4}$	"
length of head.	$2\frac{1}{2}$	"

Habits;

Vicious looking. Mean of disposition; does not tame. Feeds on frogs and fish. Has fondness for climbing trees. When catching fish, swims about with mouth wide open.

BLOTCHED WATER SNAKE

Natrix transversa (Hallowell)

Coloration:

Blotches on back and sides, dark brown. Blotches on sides alternate with those on back for the entire length of snake. Blotches on back separated by narrow bands of background color, about one scales row wide. Blotches on sides separated by areas of brownish, or olive, wider than blotches. Belly yellow; base of each belly-plate clouded with brown or black.

Structure:

More slender than N.s. sipedon, but moderately stout. Head broad behind, and tapers forward; flattened above.

Size:

Adults:

total length.	32 inches
length of tail.	6 "
diameter of body.	1 1/2 "
width of head.	1 1/2 "
length of head.	1 1/2 "

Habits:

Easier to tame than most water snakes. Less vicious than other water snakes. Feeds mostly on fish, frogs, and toads.

LE CONTE'S SNAKE

Rhinocyllus lecontei (Baird and Girard)Coloration:

Alternating red and black blotches on back; red blotches nearly square, black extends farther down sides than red. Some scales on lower part of sides may be red with black centers. The paler (square) blotches on back may be deep orange with brick-red dot in center. Some may be black with brick-red half-rings. Belly white or yellow with black blotches on ends of plates.

Structure:

Single plates under tail identifies this snake.

Size:

Adults:

total length.	. . . . .	24	inches
length of tail.	. . . . .	3 3/8	"
greatest diameter.	. . . . .	1/2	"
width of head.	. . . . .	1/2	"
length of head.	. . . . .	1/2	"

Habits:

Constricts its prey to kill it. Feeds on small rodents, lizards, and young of other snakes. Young produced from eggs.

RED KING SNAKE

Lampropeltis triangulum (Baird and Girard)Coloration:

Red bands above, bordered with black. Black usually encircling body as pairs of rings. Between rings, an area of dirty-yellow color. From above and sides, snakes have ringed appearance. Entire top of head usually black with exception of snout which is red. Color highly variable. No small alternating blotches on sides.

Structure:

Snout pointed. Moderately slender, cylindrical in shape. Small head, not distinct from neck. Scales smooth with enameled appearance.

Size:

Adults:
 total length. 28 inches
 length of tail.4 "
 greatest diameter. $\frac{1}{2}$ "
 width of head. $\frac{1}{2}$ "
 length of head. $\frac{7}{8}$ "

Habits:

Generally secretive, prowling under loose stones or bark. Vicious in attitude. Strikes often, with intent to bite. Does not eat readily in captivity.

SALT AND PEPPER SNAKE

Lampropeltis getulus holbrooki (Stejneger)Coloration:

Dark olive to black. Each scale with light center. Spot on each scale whitish-yellow. Belly yellow with large black blotches. On sides, spots on scales cover most of scale. Skin between scales brown. Scales on sides and top of head have light spots. Lip plates yellow, with black at junctions.

Structure:

Spotted snake. Body stout and cylindrical; retains uniform thickness length of body. Head small, slightly distinct from neck. Scales smooth.

Size:Adults:

total length.	42 inches	
length of tail. . . . .	.5	W
greatest diameter. . . . .	.3	W
width of head. . . . .	.3	W
length of head. . . . .	.1	H

Habits:

Gentle and easy to tame. Fairly hardy in captivity. Rather shy. Tends toward cannibalism, also eats small rodents and birds.

BLOTCHED KING SNAKE

Lampropeltis calligaster (Harlan)

Coloration:

Pale-grayish brown with series of dark-brown blotches on back, eight to ten scales wide and two to three scales long. Alternating row of smaller blotches on sides, and smaller row of blotches at edges of belly scales. Belly yellowish, with square black blotches in center of plates. Dark band across forward portion of head. Arrow-shaped mark covers rear and central portion of head. Dark band from angle of mouth to eye. Usually two parallel bands on neck extending to base of head.

Structure:

Blotches quite distinct. Body moderately stout. Head elongate, little distinct from neck; rather flat. Scales wide. Tail short.

Size:

Adults:

total length.	46	inches
length of tail.	6 $\frac{1}{2}$	"
greatest diameter.	2	"
width of head.	9/16	"
length of head. . . . .	.1	"

Habits:

Feeds on small rodents, birds and lizards. Less addicted to cannibalism than some king snakes.

BANDED GROUND SNAKE

Seneca semiannulata (Baird and Girard)Coloration:

Red or deep orange above. Black cross-bands extending downward nearly to belly-plates. Head black with exception of snout which is red, or orange. Belly white. Black markings on tail form complete rings around tail.

Structure:

Eye small; diameter contained twice in length of snout. Tail contained about four and two-fifths times in total length. A small, slender snake.

Size:

Adults:

total length.	10 $\frac{1}{2}$	inches
length of tail.	2 $\frac{1}{8}$	"
greatest diameter.	$\frac{1}{4}$	"
width of head.	$\frac{1}{4}$	"
length of head.	$\frac{1}{2}$	"

Habits:

Secretive and rarely found. Lives under rocks and in small holes in ground. Very few reported from Kansas.

BLUE RACER

(Young)

Coluber constrictor flagiventris (Say)Coloration:

Background color dark olive. Succession of rhomboidal, dark blotches from head to tail. Blotches about nine scales wide, four or five scales long; separated by lighter intervals; these narrower along back and widen towards belly. Edge of each scale absolutely lighter than center. Dark centers of scales may produce effect of spotting. On top of back, margins of blotches narrowly darker; margins of intervals lighter than on sides. Belly greenish-white; each belly plate with from two to four dark spots on edges. Top of head yellowish-gray. Sides of head white. Lip plates white. Plates behind eyes tinged with blue and spotted with brown.

Structure:

Slender. Tail long.

Size:

Specimens over eighteen inches loose blotching.

Habits:

Same as adult.

COACH WHIP

(Young)

Coluber flagellum flagellum (Shaw)Coloration:

Belly decidedly blotched. Back crossed by rather indistinct dark bars eight or nine scales wide, and half a scale high. Dark color on skin between scales. Bases of scales dark. Tendency toward striping on sides; one light brown stripe on outer edge of belly plates. Another, interrupted, yellow stripe at junction of belly scales and scales of sides. Striping not conspicuous. Dark shades of sides may be tinged with reddish.

Structure:

Slender. Tail long in proportion to body. Head narrow.

Size:

Specimens over eighteen inches in length lose cross-bars.

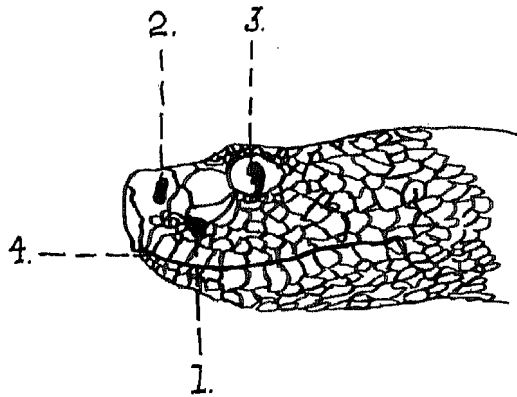


FIG. I

- 1. Pit
- 2. Nostril
- 3. Eye
- 4. Mouth

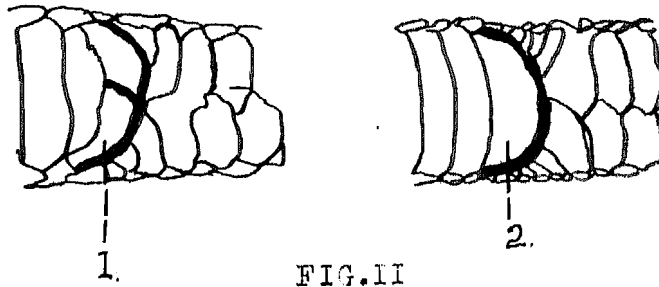


FIG.II

- 1. Divided Anal-plate
- 2. Undivided Anal-plate

SECTION III.

TURTLES

TURTLES

1. Row of horny ridges or spines on top of tail.
 Common snapping turtle,
 Chelydra serpentina (Linne)
 pg. 68
- No horny ridges on top of tail; tail short. 2
2. Hind feet with only three toes.
 Three-toed box turtle,
 Terrapene trianguis
 (Agassiz) pg. 69
- Hind feet with four toes. 3
3. Upper shell black with numerous yellow spots. Center
 of lower shell yellow with large dark blotches
 touching outer edge of shell, not meeting in
 center. Blandings semi-box turtle,
 Emys blandingii (Holbrook)
 pg. 70
- Upper shell dark brown to black with long yellow
 streaks. 4
4. Both upper and lower shells with yellow streaks on
 dark background. Painted box turtle,
 Terrapene ornata (Agassiz)
 pg. 71
- Upper and lower shells not marked alike. 5
5. Each section of lower shell with two parallel dark
 spots running longitudinally to long axis of
 turtle. Bells terrapin,
 Chrysemys bellii bellii
 (Gray) pg. 72
- No parallel blotches on sections of lower shell. 6

6. Yellow spots behind eyes having yellow stripes
leading to yellow spots over temples.
Texas terrapin,
Pseudemys texana (Baur)
pg. 73
- No yellow spot behind eyes. 7
7. Bright red spot behind eyes leading to back of head. .
Cumberland terrapin,
Pseudemys elegans (Wied)
pg. 74
- No red spot behind eyes. 8
8. Two yellow stripes on each side of head, one below,
and one above eyes. . Common musk turtle,
Sternotherus odoratus
(Latreille) pg. 75
- Single yellow, black bordered stripe on both sides
of head; stripes run through eyes. 9
9. Lower shell immaculately white. Yellow border on
upper shell with numerous black rings on back. . .
Spiny soft-shelled turtle,
Amyda spinifera (Le Sueur)
pg. 76

TURTLES

COMMON SNAPPING TURTLE

Chelydra serpentina (Linne)Coloration:

Upper shell dull olive, or dark brown with little or no markings. Lower shell dull yellow. Upper portion of head quite dark. Upper-surfaces of legs and tail also dark; lower surface of these members, yellowish.

Structure:

Upper shell sharply serrated in rear. Three blunt, broken ridges rising as tubercles at rear margins of shields through which they pass. Upper shell gets smoother with age. Under-surface of tail covered with large plates.

Size:

Adults;*			
length of upper shell.	. . . . .	23	inches
width of upper shell.	. . . . .	10 $\frac{1}{2}$	"
length lower shell.	. . . . .	8 $\frac{1}{2}$	"
width lower shell.	. . . . .	11	"

Habits:

A water turtle, lives in slow-running, muddy rivers. Vicious.

* been known to weigh 40 pounds.

THREE-TOED BOX TURTLE

Terrapene triunguis (Agassiz)

Coloration:

Dull olive above with obscure yellowish markings. Occasional specimens may be darker and show yellow markings more plainly. Head brownish with obscure markings.

Structure:

Upper shell highly arched and globular with blunt, distinct ridge down center. Edge of upper shell curved slightly upward.

Size:

Adults:

Height of combined shell.	2 $\frac{1}{2}$	inches
length of carapace.	5 $\frac{1}{2}$	"
width of upper shell.	4 $\frac{1}{2}$	"
length of lower shell.	5 $\frac{1}{2}$	"
width of head.	1 $\frac{1}{2}$	"

Habits:

When limbs, head drawn into shell, the turtle is completely protected. Burrows into soft mud to hibernates over winter; found as deep as two feet under ground. Eggs ovoidal, covered with thin, hard shell. Buried in earth or under fallen leaves. The very young are rarely found. Lives to great age. Food consists largely of vegetable matter, berries, earthworms, and insect larvae.

BLANDINGS SEMI-BOX TURTLE

Emys blandingii (Holbrook)Coloration:

Upper shell black with numerous pale-yellow, or whitish spots. Lower shell yellow in center, with large black blotches about the yellow area. Top of head black with many small yellow dots. Chin and throat immaculate yellow.

Structure:

Upper shell arched high, and globular. Upper shell smooth except in very young specimens. Front and hind feet broadly webbed. Head cylindrical with sharp notch in upper jaw. Neck very long.

Size:

Adults:

length, upper shell.	7 $\frac{1}{2}$ inches
width, " "	5 "
length, lower shell.	7 $\frac{1}{8}$ "
height combined shell.	2 $\frac{1}{2}$ "

Habits:

A water turtle that sometimes likes to wander on land. Feeds on tender plant-shoots, berries, and insect larvae when on land. Also eats earthworms, small fishes, tadpoles, and young frogs. Very timid, withdrawing into shell when handled.

PAINTED BOX TURTLE

Terrapene ornata (Agassiz)Coloration:

Upper shell dark brown or black, with moderately broad, radiating, yellow lines. Lower shell bright yellow, but so suffused with dark brown that it looks like the upper shell. Head dark with large yellow or reddish spots on sides and dots of same color on top; neck banded with same color.

Structure:

Upper shell broad and globular. Distinctly flattened on area of central row of shields, and has no ridge down center. Four claws on hind feet.

Size:

Adults:

height combined shell. . . . .	. 2 $\frac{1}{2}$	inches
length, upper shell.	4 $\frac{1}{2}$	"
width, upper shell.	4	"
length, lower shell.	5	"
width of head. . . . .	.1	"

Habits:

Vegetarian in feeding to some extent; known to eat few earthworms, beetle-grubs, and small frogs.

BELLS TERRAPIN

Chrysemys bellii bellii (Gray)Coloration:

Upper shell dark olive or brown. Shields on shell may be narrowly margined with black. Two, parallel, dark blotches on each section of lower shell; these running longitudinally. Throat may be striped with yellow.

Structure:

Upper shell rather flat and smooth. Top of shell traversed by vein-like lines.

Size:

Adults:

length, upper shell. . . .	5 1/2	inches
width, upper shell. . . .	4 1/2	"
length, lower shell. . . .	5 1/2	"
total width. . . .	3 1/2	"
width of head. . . .	1	"

Habits:

Frequents borders of ponds, brooks, or rivers. Water turtles, and excellent food. Many sold each year in eastern markets for food. Many pond turtles cannot feed unless under water.

TEXAS TERRAPIN

Pseudemys texana (Baur)Coloration:

Yellow longitudinal spot behind eye; behind this, a yellow line, ending in a long longitudinal spot above temples. From lower, rear portion of eye a yellow line appears, sending a branch upward in front of ear, and continues behind on neck. Three strong yellow and some slender yellow stripes on lower surface of neck.

Structure:

Shell flat, not deeply furrowed. Upper jaw notched in center with rounded tooth on each side.

Size:

Adults:

total length (upper shell)	5 $\frac{3}{4}$	inches
width of upper shell	4 $\frac{1}{2}$	"
length, lower shell	5 $\frac{1}{2}$	"
width, lower shell	3 $\frac{1}{2}$	"
width of head	1	"

Habits:

Lives about pools and streams. An edible form.

CUMBERLAND TERRAPIN

Pseudemys elegans (Wied)Coloration:

Dull olive, or brown; generally the latter. Brown or darker color on upper shell has whorled appearance. Back shows some yellow markings, but faint. Lower shell yellow, densely clouded with black or dark brown. Top and sides of head with crowded pale greenish-yellow lines; from eye to base of head, a broad band of rich crimson.

Structure:

Dull ridge on top of upper shell. Rear border of upper shell notched. Head rather large.

Size:

Adults:

length, upper shell.	. . .	10 inches
width, upper shell.	. . .	7 $\frac{1}{2}$ "
length, lower shell.	. . .	9 $\frac{1}{2}$ "

Habits:

Very hardy as captive. Eat chopped fish and meat. Green vegetables thrown on top of water readily taken. Large numbers found in markets as they are edible. On market, known as "sliders". In wild state, feeds on small fish, tadpoles, and tender shoots of water-plants.

COMMON MUSK TURTLE

Sternotherus odoratus (Latreille)Coloration:

In young specimens, upper shell dull olive or brown; shields showing narrow black margins. Old specimens dull lusterless brown; usually coated with moss. Lower shell dark yellow or brown.

Structure:

Upper shell narrowly oval, and arched. Young specimens show strong ridge on upper shell; disappears with age. Lower shell narrow, and much shorter than upper. Head large with tapering, conical snout. Feet broadly webbed.

Size:

Adults;

length, upper shell. . . .	3 $\frac{1}{2}$	inches
width, upper shell. . . .	2 $\frac{1}{2}$	"
length, lower shell. . . .	2 $\frac{3}{4}$	"
width of head. . . .	.7/8	"

Habits:

Frequents slow running streams, and muddy rivers. Pugnacious, biting when handled. Seldom leaves water except to deposit eggs. Emits disagreeable odor when handled; characteristic of Musk turtles. Crawls on bottom of stream searching for food.

SPINY SOFT-SHELLED TURTLE

Amyda spinifera (La Saur)Coloration:

Dull olive, with narrow yellow border internally margined with black on upper shell. Numerous black rings scattered over back of young. Lower shell immaculately white. Head olive. Yellow, black-bordered stripes extending forward from neck through eye to unite with stripe from other stripe at base of snout. Legs olive, spotted and marbled with black.

Structure:

Conical, spiny tubercles on front margin of upper shell. Upper shell rather soft. Lower shell very soft.

Size:Adults:

length, upper shell.	14 inches
width, upper shell.	12 "
length lower shell.	10 "
length tail.	3 $\frac{1}{2}$ "
width of head.	1 $\frac{1}{2}$ "
weight.	7 $\frac{1}{2}$ lbs.

Habits:

Seldom seen because lives entirely in water of muddy streams, or ponds. Eats fish, frogs, and tadpoles.

SECTION IV.

SALAMANDERS

SALAMANDERS

1. Four toes on each foot. External gills on neck. . . .
 Mud-puppy,
Necturus maculosus maculosus
 (Rafinesque) PG-79
- Five toes on front feet. No external gills. . . . 2
- 2: Small ridges on head. Tail, fin-like above and
 below. No vertical grooves on sides.
 Eastern newt,
Triturus viridescens louis-
lanensis* (Weltersdorff)
 PG-80
- Small ridges on head absent. Grooves in skin on
 sides. 3
3. Blind. 16-17 vertical grooves in skin on sides. .
 Ozarks blind salamander,
Typhloriton spelaeus
 (Stejneger) PG-81
- Not blind. 4
4. Eye longer than its distance from snout. Brownish
 band over top of head and tail. Light on sides
 and belly. 20 vertical grooves in skin on sides. .
 Brown striped salamander,
Burycea multiplicata (Cope)
 PG-82
- 13-14 vertical grooves in skin on sides. 5

* Variety name not recognized by Stejneger and Barbour.

5. Two close-set rows of dark spots down back. Tail about twice as long as body. Tail not barred with color. . . . Yellow striped salamander, Haryessa melanopleura (Cope) pg. 83
Background color brown to black. 6
6. No distinctly outlined spots on back. Belly with spots about size of eye. Texas salamander, Ambystoma texanum (Matthes) pg. 84
Spots circular. Belly immaculate. 7
7. Eleven vertical grooves in skin on sides. Circular orange-yellow spots on head, body, and tail. Background color bluish to black. Spotted salamander, Ambystoma maculatum (Shaw) pg. 85
Head flattened, broad. Brownish to steel-gray with whitish blotches on sides and back; blotches not crossing center of back. Tiger salamander, Ambystoma tigrinum (Green) pg. 83

MUDPUPPYNecturus maculosus maculosus (Rafinesque)Coloration:

Blackish to light brown. Obscurely speckled with white. Dark, poorly defined somewhat circular blotches on back and sides. Dark line from tip of snout through eyes to gills.

Structure:

Head broad, somewhat flattened. Eyes small; lidless. Feathery external gills; three in number on each side of neck. Distinct fold of skin on each side of lower jaw. Tail compressed from sides. Groove down center of back.

Size:

Adults; Measurements of large specimen.
 head and body length. . . . 7 inches
 length of tail.8 $\frac{1}{2}$ "
 greatest head width. . . . 1.3 $\frac{3}{8}$ "

Habits:

Prowls at night. Does not hibernate, and may be found in shallow pools in winter. In water, will snap at anything moving. A thick mucous secretion frequently emitted when handled, or irritated. Bite not poisonous, but painful. Eats eggs of game fish. Flesh white, and edible. Generally found in muddy streams which afford ample hiding for animal and its eggs.

EASTERN NEWT

Triturus viridescens louisianensis (Wolterstorff)Coloration:

Undersurfaces uniformly white with black spots. Back, light-olive with numerous black spots; spots small and irregularly arranged. Spots on tail larger, and indistinct; blackish. Spots less numerous on head. Legs show spotting similar to that of back.

Structure:

No external gills. Fifth finger not more than half the length of fourth. Skin on top and sides of head porous, especially about snout. Head somewhat pointed. Fingers, 2-5-3-4 in order of increasing length.

Size:

Adults:

head and body length.	. . . . .	$1\frac{1}{2}$	inches
length tail.	. . . . .	$2\frac{2}{5}$	"
width of head.	. . . . .	$\frac{1}{2}$	"

Habits:

Active year around unless intensely cold winter. Favor pools fed by perennial springs. May be seen during daytime swimming or floating on water. Food of adult consists of insects, tadpoles, worms, and molluscs. Outer skin frequently shed; sometimes swallowed after being shed.

OSARKS BLIND SALAMANDER

Typhloriton spelaeus (Stejneger)

Coloration:

Dark above, so thickly-set with white spots that has appearance of being grayish-white. Belly white. Upper surface of limbs, tail, and head similar to upper surface of body.

Structure:

Eyes minute, hidden under eyelid. Snout swollen; upper lip swollen below nostrils. Lips with small nipple-like structures.

Size:

Adults:
 head and body length. 5 $\frac{1}{2}$ inches
 length of tail. 2 $\frac{1}{2}$ "
 width of head. 1 "

Habits:

Tend to find deep, cool spots in rivers. Found among algae and moss at bottom of water. In some areas, found in caves where no sunlight enters, no caves near where salamanders found in Cherokee county, Kansas.

BROWN STRIPED SALAMANDER

Buryosa multiplicata (Cope)Coloration:

General color, gray. Brownish band extending over top of head and tail. Sides and belly light.

Structure:

20 vertical grooves on sides. Snout swollen. Upper lip swollen below nostrils. Hind part of lower eyelid with groove into which upper eyelid fits.

Size:

Adults:
 head and body length. . . . 1 inches
 length of tail. . . . 1 1/16 "
 width of head. . . . 1/8 "

Habits:

Breeding habits not known. Exists only in regions of caves and springs. Adults live in caves, and larvae develop in springs of cool water. Adults thouroughly water forms. Caves dark, but this form has well developed eyes.

YELLOW-STRIPED SALAMANDER

Eurycea melanopleura (Cope)Coloration:

Broad, pale, cadmium-yellow stripe down back, bordered by definite blackish area. Black area may be dispersed with cadmium-yellow. Double series of black or very dark spots on yellow line down back. Top of head same color as back, with irregular black spots on it. Black bands on sides of body extend to rear portion of eyes. Rear of head finely stippled with black. Tail colored much the same as body, without spots down center. No bars on sides of tail. Belly, cadmium-yellow, interspersed with white.

Structure:

Head not flattened. Eyes large; eyelids terminating at rear under transverse fold of skin. Outline of head from above, rounded. 13-14 vertical grooves on sides.

Size:

Adults:

head and body length.	$1\frac{3}{8}$	inches
length of tail.	$\frac{5}{8}$	"
width of head.	$\frac{3}{8}$	"

Habits:

Found under rocks at edges of pools and streams.

TEXAS SALAMANDER

Ambystoma texanum (Matthes)

Coloration:

Background color, dark brown to black. Back with variable number of grayish spots of indefinite outlines, sometimes so numerous as to almost cover entire back. Belly with lighter spots having more definite outlines; spots about size of eye.

Structure:

Head short, rounded. Minute pores scattered over skin. Lower jaw extending slightly forward of upper jaw. Tail compressed from sides. Toes, 1-5-2-3-4 in order of increasing length. Toes not webbed.

Size:

Adults: (large specimen)

head and body length.	. . .	5 1/2 inches
length of tail.	. . .	2 1/2 "
width of head.	. . .	1 1/2 "

Habits:

Spends winter in and about stagnant pools. May hibernate in Crayfish burrows. Breeds in spring, leaves water and does not return to live in water. During this time, they lose some aquatic characters, and cannot remain under water very long.

SPOTTED SALAMANDER

Ambystoma maculatum (Shaw)Coloration:

Black to bluish above with medium sized, rounded, yellow, or orange spots behind eyes and on top of head. Belly lighter than back, and immaculate. Belly rarely with black spots.

Structure:

Head broad, somewhat flattened. Nostrils near end of snout. 11 vertical grooves on sides. Very faint groove down center of back. Groove lengthwise on sides of tail.

Habits:

Adults:

head and body length.	$3\frac{1}{2}$	inches
length of tail.	$3\frac{1}{2}$	"
width of head.	$\frac{1}{2}$	"

Habits:*

Rain and temperature determine when this salamander comes from hibernation; must be warm and wet. Feeds on earthworms, centipedes, spiders, insects, and small vertebrates.

* Reported only from Douglas county Kansas. No specimens reported in recent years.

TIGER SALAMANDER

Ambystoma tigrinum (Green)Coloration:

Color above, brownish to steel-gray. Belly lighter. Large whitish blotches on back and sides; may extend onto head. If any spots on back, they do not cross center. Tail blotched. Legs sometimes banded.

Structure:

12 vertical grooves on sides. Head flattened; neck usually distinguishable. Eyes small. Tongue large; attached on all sides. Skin of head and body minutely porous. Hind legs stouter than front ones. Tail compressed from sides.

Size:

Adults:
 head and body length. . . . 4 inches
 length of tail. . . . $\frac{22}{5}$ "
 width of head. . . . $\frac{4}{5}$ "

Habits:

Eggs laid in water and attached to sticks and weeds. As many as 1047 eggs in one mass. Larvae carnivorous, frequently cannibalistic. Neither vicious nor poisonous, though will bite, bite painful, but not dangerous.

SECTION V.

FROGS AND TOADS

FROGS and TOADS

1. Webs between the toes. 2
 No webs between the toes. Texas narrow-mouthed toad,
Gastrophryne texensis
 (Girard) pg. 90
2. Pupil of eye vertical. . Hammond's spade-foot,
Scaphiopus hammondi (Baird)
 pg. 91
 Pupil of eye not vertical. 3
3. Sucking disks on ends of toes. . Hylidae. 4
 No sucking disks on ends of toes. 3
4. Bar distinct. 5
 Bar not distinct. Triangular dark spot between
 eyes. Upper part of hind legs striped.
 Cricket frog,
Acris gryllus (Le Conte)
 pg. 92
5. Large, irregular, star-shaped dark spot on back.
 Black bar on upper eyelid, and black bordered
 light spot below eye. Common tree toad,
Hyla versicolor versicolor
 pg. 93
 No star-shaped spot on back. 6
6. Lines on back form an irregular cross, or X. Underparts
 cinnamon color. . . Spring peeper,
Hyla crucifer (Wied)
 pg. 94
 Lines on back straight and broad. 7

7. Three stripes on back; possibly one short stripe added, making four. Fourth toe very long.
 Three-striped tree frog,
Pseudacris nigrita triseriata (Wied) pg. 95
- White stripe on upper jaw; Legs barred above, and white or pale-buff below. Dark band from arm, through eye, to nostril.
 Clarke's-striped tree frog,
Pseudacris nigrita clarkii
 (Baird) pg. 96
8. Plump, wide waisted. Large gland present on sides of neck, behind eye. . Bufo 9
- Slender waisted. No gland behind eyes. . Rana 12
9. Bony ridges on head. 10
- No bony ridges on head. . Little green toad,
Bufo debilis (Girard)
 pg. 97
10. Bally spotted; most of spotting on edges and forward portion. Black spots on back with light centers.
 American toad,
Bufo americanus americanus
 (Holbrook) pg. 98
- Underparts not spotted. 11
11. Bony ridges on head meeting to form V.
 Great plains toad,
Bufo cognatus (Say) pg. 99
- Bony ridges on head run parallel.
 Rocky mountain toad,
Bufo woodhousii (Girard)
 pg. 100

12. Glandular fold in skin of lower part of hind leg.
skin quite rough. . . .Northern gopher frog,
Rana areolata (Baird and
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Frogs and Toads

TEXAS NARROW MOUTHED TOAD

Gastrophryne texensis (Gizard)

Coloration:

Dark colored. Smooth skinned. Underparts uniformly white. Back, grayish-olive above with black spots. Region of front legs and front half of breast, whitish with green cast.

Structure:

Body slightle depressed. Head noticeably pointed. Legs slender.

Size:

Adults;
length. 4/5 to 1 inch

Habits:

Seeks protection under logs, or in dead tree stumps, sunken in the ground. Breed in small pools, road-side ditches, or ponds. The call starts with a little whistle, and runs into a "bleat". Tadpole, grayish-olive, and small; flat and wide; about one-inch long, including tail. Usually quite late in coming from hibernation; about June 15.

HAMMOND'S SPADEFOOT

Scaphiopus hammondi (Baird)Coloration:

Back, greenish. Sides yellowish, mineral-gray, or greenish. Green spots on back, top of head, and legs. Forward, underparts white; sometimes buff on throat. Rear underparts sometimes purplish. Males with splash of green on either side of throat.

Structure:

Body stout and toad-like. Eyes large and protuberant with vertical pupils. Skin smooth, dotted with fine, roundish bumps. Head broader than long; muzzle short and overhanging lower jaw.

Size:

Adults;
length. $1\frac{1}{2}$ to $2\frac{1}{2}$ inches

Habits:

Live underground in burrows dug in soft earth by backing into ground, digging with hind feet which are armed with "spades". Hook from side to side as they dig, the dirt falling on their heads. Breed in temporary pools or overflow areas. Remains in burrow during dry weather, and comes out only during rainy spells. Young have blackish skin, and measure three-fourths inches in length.

CRICKET FROG

Acris gryllus (Le Conte)Coloration:

Variable and changeable; usually some shade of brown, with triangular mark between the eyes; mark is of solid color, not an outline, and with light border on rear portion. Usually with light spots on jaw. An oblique line from eye to arm. Eye bright orange. Throat of male yellow in spring.

Structure:

Ear indistinct. Frequently a fold in skin across breast. Disks on toes small. Skin rough, warty. Head pointed and long from eyes to muzzle. Feet fully webbed. Hind legs very long.

Size:

Adults;
length. 3/5 to 1 1/3 inches

Habits:

Primarily a ground frog; disks on toes too small to aid much in climbing. Found in meadows, or about creeks or ponds in the spring. Usually found in open country. Very active. Its only protection from enemies lies in its long jump. Call resembles sound of metal clickers in rapid succession. Tadpole with two rows of horny teeth on upper and lower lips.

COMMON TREE TOAD

Hyla versicolor versicolor (Le Conte)Coloration:

Varies through many shades of brown, green and gray. An oblique, dark band on top of head above each eye. Large irregular star-shaped blotche on back. Light spot below forward portion of eye. Forward part of undersurface of body, light; may be bright orange or yellow. Black bar on upper eyelid. Black bordered green bars on legs. Closely resembles a bit of bark with a lichen growing on it.

Structure:

Skin rough, warty. Disks on fingers and toes conspicuous. Undersurface with granulated appearance, less pronounced on throat. Prominent fold of skin of breast. Webs of hind feet well developed; fingers slightly webbed.

Size:

Adults;
length. $1\frac{1}{2}$ to 2 $\frac{2}{5}$ inches

Habits:

Call, a loud resonant trill, ending abruptly; ten or eleven calls per minute. Found along wooded ravines, and in edges of woods, and marshes. Can change color to match surroundings.

SPRING PEPPER

Hyla crucifer (Wied.)Coloration:

An oblique cross on back. General color varies from light-fawn to dark brown; sometimes red. Bars on legs. Male throat brown; primrose-yellow on male groins. Citrine-yellow of rear of lower jaw. Region of front legs on under-surface, pale yellow; rest of under-surface, light cinnamon. Male in early spring may be liver-colored, chestnut-brown, or claret-brown.

Structure:

Head pointed; sharply angled along line from nostrils to eyes. Muzzle extends beyond upper lip. Ear visible, but smaller than eye. Disks on fingers and toes prominent. Feet only moderately webbed. Skin smooth. Fingers not webbed.

Size:

Adults; *
length. $\frac{3}{4}$ to $1\frac{1}{2}$ inches

Habits:

Call, clear, shrill, high pitched; sort of peep, peep sound.

*Smallest tree frog found in Kansas.

THREE-STRIPED TREE FROG

Pseudacris nigrita triseriata (Wied.)

Coloration:

Brown, olive, or grayish with dark brown triangular spot between eyes; this may take form of a spot, or small stripe. Most prominent stripe runs from nostril through eye, over arm, and along side, half-way to groin. Three dark stripes down back, may be continuous or broken. Dark spots along legs. Light-cream, or silvery line along upper jaw. Underparts white, or light-cream color.

Structure:

Small, slender, with pointed head. Fourth toe extremely long; with small disks on all toes. Skin of underparts, finely tubercular, granular. Nostrils nearer tip of muzzle than eyes. Muzzle extends beyond line of jaw. Ear small. Eyes widely separated. Long slender toes, slightly webbed.

Size:

Adults: length. 4/5 to 1 1/2 inches

Habits:

Lives in low bushes, and plants. Breed in ditches, pools, temporary bodies of water. Call, a vibrating chirp.

CLARKE'S STRIPED TREE FROG

Pseudacris nigrita clarkii (Baird)Coloration:

Grayish-olive with longitudinal spots; spots may be arranged in three stripes. Dark stripe on side of head extends to nostril. Light stripe on upper jaw. Legs barred above and pale-buff beneath. Male throat, dark-olive-buff. Coloration protective. One male specimen with pale, smoke-gray background, with areas of tea-green, surrounded by black. Stripe on side, honey-brown. Ear, army brown. White, or primrose-yellow spots on tubercles of rear underparts. A dark stripe through eye to complete stripe from side of head to nostril.

Structure:

Snout, acute, and projecting beyond lower jaw. Toes slightly dilated at tips. Male throat with one to three longitudinal folds of skin.

Size:

Adults;
length: $\frac{3}{4}$ to $1\frac{1}{2}$ inches

Habits:

Call, a grinding note, measured, and not shrill. Breed with spring rains. Prefer shallow water to tree habitat. Can move head side-ways. Tadpole grayish-olive when hatched; very small.

LITTLE GREEN TOAD

Bufo debilis (girard)Coloration:

Green toad with black spots on back. Few gold or yellow tubercles on sides. Legs with dark, bar-like spots. Black-bar at arm insertion; may be black line. Black line, or few spots on lower breast. Eyelids and large glands behind eyes may have black lines crossing them. Underparts white; no spots.

Structure:

Skin rough, with small warts and granulations. Underparts finely granulated. Head wide and flat. Space between eyes greater than width of eyelids. Glands behind eyes very large, and prominent. Each gland extends backward to point beyond shoulder. Upper margin of glands nearly straight, lower margin curved. Webs on feet, medium sized. No bony ridges on head. Snout protruding. First finger shorter than second. Hind legs shorter than body. Ears small.

Size:

Adults;
length. 1 to 1 4/5 inches

Habits:

Small, burrowing toad. Call, cricket-like; low, sustained trill.

AMERICAN TOAD

Bufo americanus americanus (Holbrook)

Coloration:

General color, olive. Three or four pairs of dark spots down back. Some males with considerable yellow on underparts. Light stripe down back (not constant).

Structure:

Short, fat body. Head short, and snout broadly circular. Lower surfaces roughly granular. Back covered with various sized warts. Some quite large and in pairs. Eyes prominent. Arms, legs, hands, and feet warty or roughly tubercular. Glands behind eyes large, oblong, and connected to ridges between eyes by a longitudinal ridge. Ridges on head form a right angle at corner of eye; one branch extending downward in front of ear.

Size:

Adults;
length. 2 1/6 to 4 1/4 inches

Habits:

Call, a long sustained, musical, high-pitched trill. Found in gardens, and cultivated fields. Prefers shady places. Prowls at night, eating most all forms of insects. Excrete a fluid on body when handled; perfectly harmless.

GREAT PLAINS TOAD

Bufo cognatus (Say)Coloration:

Dark, or light brown; may be gray, or dull green. Light streak down center of back. May be striped or spotted. Spots may be as follows: one between large glands behind eyes, three spots on either side of streak down back, two spots behind and in line with glands behind eyes. Many other spots may be present. Underparts white toward front and yellow toward rear. Pattern on back may show many lines running at right angles to stripe down center of back.

Structure:

Head broad. Snout short; sides and front of snout steep. Bony ridges between eyes form inverted V; point toward snout. Glands behind eyes small. Hind legs nearly as long as body. Space between nostrils wider than space between eyes. Toes webbed; webs deeply indented. Entire upper surface closely set with warts. Nostrils open upward, and are situated half-way between top of bony ridges on head, and edge of jaw. Ear, a conspicuous oval.

Size:

Adults:
length. 1 7/8 to 4 inches

Habits:

Live in agricultural regions of great plains.

ROCKY MOUNTAIN TOAD

Bufo woodhousii (Girard)Coloration:

Grayish-drab on back with several large brownish warts. Warts usually surrounded by larger area of darker color. Narrow, light stripe down center of back. Several dark spots on sides. Underparts are dark-cream color. Legs tea-green color. Tubercles, tips of fingers, and toes reddish brown. Warts centered in area of darker color. Forearm with two or three dark bands. Underparts of hind legs, deep olive-buff, or cream-buff; sometimes a pinkish-cinnamon color. Iris of eye spotted with vinaceous cinnamon and sulphur yellow.

Structure:

Parallel bony ridges on head between eyes form right angle down and behind eyes. Glands behind eyes, long and rather slender. Throat of male, black. First finger slightly longer than second. Large warts on back, each with several pits. Skin rough, eyelids warty. Ear distinct, vertical, oval. Sole of foot rough with small tubercles. Web of foot short.

Size:

Adults;

length: 2 1/4 to 4 3/4 inches

Habits:

Lives in irrigating ditches, and near water.

NORTHERN GOPHER FROG

Rana areolata (Baird and Girard)Coloration:

Brownish frog with darker brown spots on back and sides. Spots variable in size. Two folds in skin about one inch apart on back with three or four rows of dark spots between them. Spots surrounded with grayish white borders, which on the lower side, become the background color. On back, area between spots a speckled drab, or grayish-olive. Greenish-yellow on groin, and concealed parts of legs and feet. Prominent dark bar on upper arm. Broad fleshy, spotted band along jaw. Light center in ear. Several small, light rimmed, dark spots on eyelids, and between eyes, and on top of snout.

Structure:

Skin warty on back and sides. Head short. Thumb enlarged in male. On under side, where arm attaches, skin noticeably thin. Folds in skin on back form two lines running length of body. Distinct fold over ear from eye to shoulder. Lower and rear portion of hind leg, granulated. Head broad and thick. Muzzle long. Space between eyes wider than eyelids. Eyes large; ear, half to two-thirds size of eye. Webs on feet short.

Size:

Adults;
length. 2 $\frac{1}{2}$ to 4 $\frac{1}{2}$ inches

BULLFROG

Rana catesbeiana (Shaw)Coloration:

Greenish drab on back. Whitish underneath. Few dusky spots on legs. Sides may be spotted with dark. Spots, when present, may or may not be connected. Iris of eye golden or reddish brown.

Structure:

Head broad and flat. Body stout and flat. Ear of male much larger than eye. Fold of skin from back of eye around top and rear of ear to arm. Toes broadly webbed. No joints free from web except last joint of fourth toe. Skin may be roughened with fine tubercles. No ridges down either side of back.

Size:

Adults;
length. 5 2/5 to 8 inches

Habits:

Strictly aquatic; prefer ponds to rivers and creeks. Deep bass voice carries far. Largest frog in Kansas. Will eat most anything they can swallow. Excellent food for man. Practically all its food is water animals.

GREEN FROG

Rana clamitans (Latreille)Coloration:

Yellow throated bullfrog. Greenish-brown cast. Bright-green mask from ear forward along jaw. Dusky bars on legs. Occasionally, black spots on back. Underparts white. Head and shoulders may have metallic sheen.

Structure:

Two folds of skin on back starting directly behind eyes. Branch of these folds down behind ears. Skin may be slightly roughened by small tubercles. A large frog. Fold of skin from angle of mouth to arm; yellowish-white stripe on this fold. Fourth toe free of webbing on last two joints. Head narrower than that of Bullfrog. Head thick. Ear of male larger than eye. Eye large and bright. Iris of eye golden, with oval black pupil. Ear, a conspicuous, flat, brown circle with a yellow spot in center. Ear of female, about size of eye, and lacks yellow spot in center.

Size:

Adults:
length. 2 to 4 inches

Habits:

A solitary species. Lives in swamps, and large, deep ponds.

COMMON LEOPARD FROG

Rana pipiens (Schreber)Coloration:

Brown or green in general color. Two light, raised stripes running back from eyes. Two or three rows of spots between these stripes. Spots round in general shape. Spots, black, with light borders. Similar spots on sides irregularly arranged in three or four rows. Dark spot on top of head, and one on top of either eyelid. Light line along jaw, below ear, and to top of arm; entire line bordered below with dark bands. Underparts a glistening white.

Structure:

Smooth skinned. Slender body, and medium in size. Two more or less broken folds of skin extend along back. Webs deeply indented. Tubercles under joints of toes prominent.

Size:

Adults:

length. 3 to 4 inches

Habits:

Found in swampy marsh lands; uplands in backwaters. Call, a low guttural note, 3 or 4 seconds long, followed by 3-6 short notes. Call given by males from surface, or beneath water.

PICKEREL FROG

Rana palustris (Le Conte)Coloration:

Generally brown in color, with light raised ridges from eyes down back. Two or three rows of black spots between the ridges; spots squarish, and arranged regularly. Dark streak from eye to nostril. Forward, underparts white. Under side of legs, yellow or orange. Legs barred with dark bands. Upper jaw may be yellow, marked with brown.

Structure:

Slender, smooth skinned, and medium in size. Thumb much enlarged in breeding males. Foot distinctly webbed; webs deeply indented, leaving two joints of fourth toe free. Palm of hand shows well developed tubercles.

Size:

Adults;
length. 1 4/5 to 3 1/6 inches

Habits:

Low pitched, croaking note with very little carrying power. Live in sphagnum moss bogs, marl ponds, cold streams, and quiet waters of bayous. Lives out of water more than in it. Head of tadpole pointed. Eyes close together. Nostrils close to end of snout. Eggs attached to sticks and weeds in water.

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