

THE LIZARDS OF KANSAS

with

*Duplicate Copy
uncorrected.*

Notes on Habits.

by

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under direction of Dr. C. E. McClung.

Preface.

This paper was written in the school year 1911-12 for partial requirement for a Master of Science Degree. As the writer left school in March of 1912 to accept a Government position in the Philippine Islands, the paper was never formally accepted, although read and criticized by Dr. C. E. McClung. Credit to the amount of 7 hrs. was given on the thesis with the note that further credit would be given when bound, and formally submitted.

As Dr. McClung left the University of Kansas soon after I had done, no further effort was made to complete the requirements for the degree.

On my return from the Orient effort was made to complete the work required for the degree. Much to my surprise I learned that a thesis had been prepared during my absence on "The Lizards and Turtles of Kansas" by Mr. Victor Householder. I have been able to review this paper, and will say that Mr. Householder has worked absolutely independently in the matter. This latter paper has been accepted by the Kansas Biological Survey for publication at a later date. As this writer has had access to material collected during the past four years, it doubtless represents a more complete piece of work.

It is my duty to acknowledge my indebtedness to
Dr. C. E. McClung for suggestions and assistance. To
various members of the faculty for help in various ways;
To Members of the Biological Survey for specimens and notes;
To Mr. Jack Sterling for an extremely rare specimen of Eumeces
pluviales, (Cope). Taken in Dickenson County.

University of Kansas.

Aug. 13, 1916-

Lawrence, Kans.

Historical.

The reptiles of the state have never been studied thoroughly with the exception of the snakes. Specimens in the National Museum from this state, have been listed by Cope and Yarrow in their check-lists. Some of the earlier surveys describe and figure species occurring here, Miss A. E. Mosely published a list of snakes in the collection of the State University, in Trans. Kans. Acad. Sci., vol.VI. Mr. E. B. Branson published a comprehensive list of species with descriptions and figures in Kansas Univ. Sci. Bul. vol. IV #9, 1904.

The work done on lizards is much more meager. In 1881, F.W.Cragin published a paper entitled, "A Preliminary Catalogue of Kansas Reptiles and Batrachians", Trans. Kans. Acad. Sci., vol.VII. In this paper he lists 12 species of lizards and adds short notes and observations. In a supplementary list he includes Phrynosoma modestum, Bumeces aniplaurotus, Bumeces lentogrammus, Bumeces multi-virgatus and Baird's species, Bumeces inornatus, as liable to occur in this state. In a second paper, "Second Contributions to the Herpetology of Kansas with observations on

the Kansas Fauna" Trans. Kas. Acad. Sci., vol. IX., 1883, he adds to the list of species occurring in the state, Sceloporus undulatus thayeri, Sceloporus consobrinus, Cnemidophorus tessellatus and eumeces multivirgatus. The S. U. thayeri is regarded by Cope as merely a color variation and not constant. This, with the former list brings the number up to 15 recognized species and subspecies.

F. A. Hartman has published from this laboratory in Trans. Kas. Acad. Sci. vol. XX, pt. 2, 1906, a paper entitled "Food Habits of Kansas Lizards and Batrachians". Here he has given his personal observations of the food habits of the commoner varieties. He includes 10 species.

Method of Presentation.

The method followed in the description of species is that similar to all scientific literature; i.e. name, synonymy, technical description of family, genus species, and subspecies as regards scalation, length, coloration, etc. Most of the color details have been worked out from specimens in the collection of the University of Kansas, and observations on living specimens collected during the past four years. The nomenclature used is that of Cope; almost without exception the observations are those of the author. During the summer of '09 and '10 a number of specimens of

lizards were kept in captivity for the purpose of observing their habits as regards food, sleeping, reproduction, oviposition etc. The work was extremely interesting and many facts were learned. Data regarding dates of capture, time of day, etc., were kept, but the writer has not considered them worth recording.

The text figures are taken from Cope's *Crocedilians, Lizards and Snakes* (Rept. Nat. Mus. 1896) The photographs are from specimens in the University collections. The food tables are based on the examination of the stomach contents of an extended number of specimens and also on the work of F. A. Hartman mentioned above. The information in the introduction has been derived from a great number of sources as well as from personal observation, and only where parts have been transferred as a whole has credit been given to the author. A partial list of such works used is included in the bibliography.

General Discussion of the Group

Classification of Lizards.

The lizards belong to a group known as the order Squamata in which also are classed the Ophidia or snakes, and the *Rhoptoglossa* or the African chameleon. The differ-

ences between these three groups may be summed up as follows;

I. Ophidia. There is a fibrous union of the right and left halves of the lower jaw, an absence of functional limbs, of which at most only vestiges remain, and an elongate form of body. The single eyelid cannot be moved, and is transparent.

II. Rhiptoglossa. The toes are separated into groups of two and three respectively, so that the feet form grasping organs. The tongue is long, extensile and club-shaped. The skeleton lacks clavicles and interclavicles. The skull is casque-shaped and studded with tubercles.

III. Lacertilia or Lizard. In this group the right and left halves of the lower jaw are connected by a bony union. The great majority possess functional limbs, movable eyelids, and horny scales; many have a snake like form, with the reduction or loss of both pair of limbs or of one; and in some cases the eyelids are transparent and fixed as in snakes, while in some forms the scales may be rudimentary or wanting. In some of the limbless burrowing forms the quadrate bone has become more or less fixed.

The Batrachians, (frogs, salamanders, toads and newts), for a long time were classified among the reptilia because

of similiarity of form. The following distinctions have placed them in a class of their own. The Batrachians have a gill breathing apparatus at some time during their life history. The reptiles do not. The embryonic development of the reptiles is much the same as in the other higher forms belonging to the group Amniota, and in this they differ from the Batrachians also.

Tegument.

The covering of the lizards is divided into a great variety of structures. Sometimes the scales are ossified and in such cases they are traversed by canals, as in the Scincidae. In others, as in the *Phrynosoma* or "horned toads", the epidermis has developed into horny plates or scales which are elevated into acute spines. In these horns the epidermis is a smooth corneous covering. On the posterior part of the interior face of the thigh, in many genera, the scales of one or two rows are rosette shaped or fossate. This fossa is occupied by a waxy plug which projects somewhat beyond the level. The uses of these organs are unknown although there are many conjectures.

In most of the species the body scales are arranged in rows, and present a variety of coloring. The scales on the digits of some species are produced into spines as an

aid in securing a good foothold on an unstable surface.

This is true in certain species of the desert.

Reproduction.

Reproduction in lizards is both viviparous and oviparous. These characters have no generic value for both methods are found in the single genus Phrynosoma. In the oviparous species the eggs are usually buried either in the sand or earth, or left under a rock where there is more or less soil and moisture. The period of incubation is from a few hours to several weeks. The number of eggs or young varies considerably in the genus as well as among individuals of the same species. Certain species of the "horned toads" have as many as thirty young at a single time. The time of year in which the eggs are laid varies from the first of June to the middle of August. Concerning breeding habits, little is known save in a few species. Mr. J. K. Strecker has made some very careful observations on the breeding habits of the Sceloporus spinosus and phrynosoma cornutum.

Note:

Table of Classification.

Class Reptilia.

Order Squamata.

Suborder Sauria.

Family Iguanidae.

Genus *Crotaphytus*." *Sceloporus*." *Phrynosoma*." *Helbroekia*.~~Genus *Sceloporus*.~~

Family Aguidae.

Genus *Ophisaurus*.

Family Teiidae.

Genus *Cnemidophorus*.

Family Scincidae.

Genus *Leioloposma*." *Eumeces*.

List of Species Known to occur in Kansas.

1. *Crotaphytus collaris* (Say).
2. *Sceloporus undulatus undulatus* (Latreille).
3. *Sceloporus undulatus consobrinus* (Baird and Girard).
- ~~4. *Sceloporus thayeri* (Baird and Girard).~~

5. *Phrynosoma cornutum* (Harlan).
6. *Phrynosoma douglassii hernandesi* (Girard).
7. *Holbrookia Maculata maculata*. (Girard).
8. *Holbrookia maculata lacerta* (Cope).
- ~~9. *Amphispiza bilineata* (Gundlach).~~
10. *Ophisaurus ventralis* (Daudin).
11. *Cnemidophorus sexlineatus* (Linnaeus).
12. *Cnemidophorus tessellatus* (Say).
13. *Cnemidophorus gularis gularis* (Baird and Girard).
14. *Leiopisma laterale* (Say).
15. *Eumeces obsoletus*. (Baird and Girard).
16. *Eumeces quinquelineatus* (Linnaeus)
17. *Eumeces guttulatus* (Hallowell).
18. *Eumeces multivirgatus* (Hallowell).
19. *Eumeces septentrionalis* (Baird).
20. *Eumeces pluvialis*.

21. *Eumeces Lepto grammus*.

22. ~~Supplementary list of lizards, more or less likely to be taken in the state.~~

1. *Anota modestum* (Girard). Taken in northern New Mexico and along the Cimmaron and Canadian Rivers.

2. *Eumeces anthracinus* (Baird) Missouri, Northern Arkansas.

3. *Eumeces epipleurotis* (Cope). Northern boundary of Texas.
4. *Eumeces inornatus*. Sand hills along the Platte valley Nebraska.
(This species is not recognized by Cope).
5. *Uta stansburiana* (Baird and Girard.) Texas, Colorado, etc.

Scincidae.

Description of Family.

Tongue moderately long, free and feebly nicked in front, covered with imbricate scalelike papillae. Dentition pleurodont, teeth conical, bicuspid, or with spheroidal or compressed crowns; new teeth hollow out the base of the old ones. Ptergoid teeth may be present. Premaxillary bones two, sometimes completely separated; nasal double. Frontal single or double; parietal single; postorbital and postfronto temporal arches, complete, osseous; interorbital septum and columnella present; crania well developed; infraorbital fossae present, bounded by the maxillary, the transverse bone the palatine, and often also the ptergoid. Skull with bony dermal plates overroofing the supratemporal fossa. Limbs absent or present. Pectoral and pelvic arches constantly present.

Clavicle deleted and usually perforated proximally, interclavical cruciform. Ossified abdominal ribs are present. Body protected by bony plates underlying the scales which are cycloid hexagonal, rarely rhomboidal, imbricate. These are supplied with symmetrical tubules which usually consist of a transverse one anastomosing with several longitudinal ones. Head covered with symmetrical shields; an azygos-occipital rarely present. Pupil round. Eyelids well developed. No femoral pores. Cosmopolitan. All species are ovoviviparous. -----(Boulenger's Description.)

Eumeces (Weigman).

Synonymy.

- Eumeces*, (Weigman), part, *Herp. Mex.*, 1834; *Arch. of Naturg.*, 11, 1835; *Arch. f. Naturg.*, 1837. 1.--(Peters).
Mon. Berl. Ac., 1864.-- (Stoliczka). *Jour. Asiat. Soc. Beng.*, 41, 1872.--(Bocourt). *Miss. Sci. Sci. Mex Rept.*, 1879.---(Boulenger). *Cat. Liz. Brit. Mus.*, 3, 1887 *Mabuya* (fitzinger)., part. *N. Classif. Rept.* 1826.
Euprepis (Wagler)., part. *Syst. Amph.*, 1830.--(Coctean), *Tabl. Synop.*, 1857.
Plexniodian (Dumeril and Bibron), *Exp. Gen.*, 5, 1839. --(Cope), *Proc. Acad. Nat. Sci. Phila.*, 1861.

Lamprosaurus (Hallowell), Proc. Acad. Nat. Sci.

Phila., 1852.

Eurylepis (Blyth), Jour. Asiat. Soc. Bang., 23, 1854.

Mabonia (Gunther), Proc. Zool. Soc. Lond. 186; Rept.

Brit. Ind., 1864.

Description of Genus.

Nostril pierced in the nasal plate, Palatine and ptergoid bones separated on the median line of the palate, the latter with teeth. Supra nasal plates present. Limbs pentadactyl. The digits not denticulated laterally. The nostrils are lateral. The post nasals vary; either one or two. The head is covered with ossified plates concealing the muscles and with an external epidermis. The tongue is thick, elongate, chordate or arrow-shaped, slightly notched anteriorly, and quite homogeneously squamose throughout. The flap covering the anus is margined behind two large plates, with smaller ones on either side.

Cope gives the following keys of the American species of Numeres. He divides them into four groups having common characteristics.

Post nasal and one mental plate----- I.

A post nasal and two mental plates -----II.

No post nasal and two mental plates-----III.

No post nasal and one mental plate -----IV.

Owing to the extreme difficulty in classifying the scinks on color, (since in nearly all species the color of the young and an adult is different) the keys are given complete as regards species occurring in the state.

Division I. No species of this group are found in this state.

Division II. A large postnasal in full contact with the suprenasal. Hind leg applied twice forward, reaching the tip of the snout; and contained $2\frac{1}{3}$ times in the head and body. Fifth toe longer than second. Head depressed. Scales in young, black, 28-32 rows; 5 equidistant white lines, the two lateral each on adjacent edges of two rows of scales. A white line behind the thigh. The upper dorsal stripe separated by 4-6 whole rows of scales. With age the dorsal stripes become indistinct, and the color more olivaceous above. Males with head very broad behind; reddish. The color of the body more or less plain olive.-----

E. quinquelineatus.

Limbs short; hind leg applied twice forward reaches the ear, contained over $2\frac{1}{2}$ times in head and body; Fifth toe shorter than the second. Scales in 28 rows. Young black, with two rows of rounded, whitish-blue dots on each

side of head and another on each side of the chin. With increasing age it becomes more olivaceous. Scales each with a dusky margin; lighter and plain beneath.-----E. guttulatus. Limbs short, hind leg applied twice forward reaches to the insertion of the arm anteriorly; applied 3 times it reaches to the nose. Contained 3 times in head and body; from knee $4 \frac{1}{3}$ times; head 3 times. Fifth toe shorter than the second. Scales in 28 rows, the laterals smaller and in oblique series. Adults light brown olive above; each scale edged laterally, less distinctly behind, with darker beneath the greenish white. Labials edged laterally with dusky brownish black; (post nasal sometimes wanting).---E. Obscuretus. Head short. Appressed limbs meeting on side. Hind limbs applied twice forward reach midway from arm to ear; contained 3 times in head and body; hind leg from knee 4 times; head 4 times; fifth toe shorter than the second; scales in 26 rows. Internasals equal the prefrontals. Young dark olive, black above, black on sides blue beneath and on tail. 5 very narrow whitish dotted lines the two lateral on the centers of single rows of scales; the two dorsal lines margined narrowly by almost inappreciable black, and the lines separated by four rows of scales all lighter in the centers; becoming lighter olive with age.-----

-----E. leptogrammus.

Appress limbs separated by a space the length of fore feet. Internasal plate smaller than prefrontals; rostral elevated. Scales in 24 rows. Three dark bands of each side of the middle line; no lateral light bands; size medium.-----E. epipleurotus.

E. postnasal small more or less separated from contact with the supranasal by the prefrontal. Head short, conical, contained at least 5 times in head and body as is the hind leg from knee also. Hind leg short; when applied twice forward falling behind forelegs. Fifth toe shorter than the second. Vertical and frontal plates often in contact. Distance between centers of insertion of fore legs and hind legs twice that from center of fore leg to snout. Scales in 24 rows. Light olive; paler beneath. A broad median dorsal light band, borders each side by five dark and four light stripes; the first and fourth dark stripes broadest; the second light stripe in the middle of the third row of scales, and bordering the head, but defining no spots on sides of labials. Sometimes unicolor.-----

-----E. multivirgatus.

Division III.

Scales in 28 rows. four supraorbital plates; loreal not separating the supranasals and prefrontals, which meet

and inclose the small internasal. Olive, above with four equidistant and equal dark stripes on adjacent half rows of scales, the two inner sometimes effaced. Sides with narrow white lines, on the centers of single rows embracing a black stripe and margined above and below by black; the black upper margin of one of the dorsal stripes mentioned; the interval of the two upper lateral stripes six rows of scales; lower lateral stripe passing along upper edge of ear. Beneath light greenish.-----E. septentrionalis.

Division IV

Four supra ocular plates. Loreal plate elevated extending up to the rather longitudinal rhomboid internasal. The posterior edge of the loreal plate above the middle of the second labial; mental plate long and pentagonal. Appressed limbs overlapping. Scales of body in 24 rows. Dark olive green above. Sides with two narrow white stripes, the upper separated by 4 rows of olive scales; the interspace and narrow margin above, coal black or gray. Beneath, greenish livid, the tip of the chin white. Upper labials dusky with white stripe.-----E. anthracinus.

Mental single, four supraorbital plates present and no post nasal. Loreals elevated, scales in 26 rows, appressed limbs overlap.-----E. pluvialis

Eumeces quinquelineatus (Linnaeus).

Synonymy.

Eumeces quinquelineatus (Bocourt), Miss. Sci. Mex.,
Rept. 1879.--Smith, Geol. Surv. Ohio, Zool., 4--(Peters)
Monats b. k aked Berlin. 1864--(Cope), Proc. Liz. & Snakes
of N. Amer. Rept. Natl. Mus. 1898.

Eumeces fasciatus (Cope). Checklist N. Amer. Patr. &
Rept., 1875.--(Boulenger) Cat. Liz. Brit. Mus., 3, 1887.

Lacerta quinquelineata (Linnaeus), Syst. Nat. 12 ed. 1,
1886.---(Shaw), Gen. Zool., 3, pt. 1, 1800.

Lacerta tristata (Latreille), Hist. Nat. Rept., 1.

Scincus laticeps (Schneider). Hist. Amph., 2, 1801.--
(Daudin), Rept., 4, 1802-1803.

Scincus quinquelineatus (Schneider), Hist. Amph., 1801.--
(Latreille), Hist. Rept., 2, 1801.--(Daudin), Rept., 4.--
(Merrem), Tent. Syst. Amph. 1821.--(Kuhl), Beitr. Z. Zool.
U. Virg]. Anat.--(Harlan), Jour. Acad. Nat. Sci. Phila.,
6, 1827. Phys. Med. Res.--(Holbrook), N. Amer. Herp., 2,
1842.

Scincus tristatus (Daudin) Rept., 4.

Scincus erythrocephalus (Gilliams) Jour. Acad. Nat.
Sci. Phila., 1, 1818.--(Harlan), Jour. Acad. Nat. Sci.
Phila., 6, 1827. Phys. Med. Res.-- (Holbrook). N. Amer.

Herp., 2, 1842.

Scincus americanus (Harlan), Phys. Med. Res.

Scincus bicolor (Harlan) Jour. Acad. Nat. Sci. Phila. 4,
1824. Phys. Med. Res. (Cuvier), Pagne Anim. 2nd ed., 2,
1829.

Tiliqua bicolor (Gray), Griffith's Cuvier's Anim. King.
9, 1831.

Tiliqua quinquelineata (Gray), Griffith's Cuvier's
Anim. Kingdom, 9, Syn., 1831.

Plestiodon laticeps (Gray, Catr. Liz. 1845.--(Dumeril
& Bibron, Herp. Gen., 5, 1839.--(Holbrook), N. Amer. Herp.
2nd. ed.

Plestiodon quinquelineatus (Dumeril & Bibron) part.
Herp. Gen. 5, 1839.--(Gray), Cat. Liz. Brit. Mus., 1845.--
Gravenhorst, N. Ac. Leop. Carol., 23, 1851.

Scincus fasciatus (Holbrook), N. Amer. Herp., 2nd. ed.--
DeKay. New York Fauna, 3.

Eumeces laticeps (Peters), Monatsc. K. Akad. Wiss.
Berlin 1864.--Rocourt. Miss. Sci. Mex., Rept. 1879.

Mabuva quinquelineata (Fitzinger), N. Class. Rept.
Vienna, 1826.

Euprepis quinquelineata & fasciata (Wagler), Syst.
Amph., 1830.

Euprepis de Costesby (Cocteau), Tabl. Synopt. Scine.,

1837.

Elestiodon quinquelineatus & fasciatus (Holbrook),

N. Amer. Herp., 2, 1842.

Xumeces quinquelineatus Linnaeus

Description of species.

Rostral moderate much wider than high, forming only narrow sutures with the internasals; the fronto nasal layer, a little wider than deep, narrowly in contact with the frontal which is much narrower than long; three supraoculars in contact with the frontal; fronto parietals moderate, distinct, the interparietal completely separating the parietals postnasal present followed by a tall loreal; second loreal very large; 6th labial entering the eye; three rather enlarged preanals. The hind legs applied twice forward reaches the tip of the snout; fifth hind toe longer than second; scales in 28 to 32 rows.

Color.--5 equidistant white lines the two lateral each on adjacent edges of two rows of scales; a white line behind the thigh. The upper stripes separated by 4 or 6 whole rows of scales; old specimens olive the stripes becoming indistinct with the head broadened and reddish.

One of the commonest scinks in the state; usually found under stones around limestone cliffs.

Eumeces guttulatus (Hallowell)

Eumeces guttulatus (Cope). Checklist E. Amer. Rept, 1875.

(Boulenger), Cat. Pis. British Mus. III 1887.

Lamprosaurus guttulatus (Hallowell), Proc. Acad. Nat. Sci.

Phila. 1852

Sitgreaves Expl. Zuni and Colo. Riv. 1853.

Plestiodon guttulatus (Hallowell), Proc. Acad. Nat. Sci.

Phila. 1857.

Description of species.

Frontal transversely rhomboid, lateral corners truncate and in contact with the second postnasal, separating the postfrontals from the two internasals. Of the two pairs the latter is about one half the smaller. Behind it a small squarish postnasal, nearly equal to it and resting partly on the second labial; this is succeeded by a second, twice its area and height, higher and half as long as the loreal. Upper labials 7, lower labials 6.

Plates of the head generally similar to those of *E. quinquelineatus*. The frontal small, transversely losenge shaped and about equal to the post frontals. Quite acute laterally, where it touches the posterior post nasal, pass- above it, the two about the same length, and together about as long as the loreal. The limbs are short, the hinder applied forward reaching half way to the ear and

contained rather more than two and one half times in the body. The fore leg reaches to the angles of the mouth, and are longer than the head. The hind leg from the knee is contained $3\frac{1}{2}$ times in head and body and is one and $\frac{1}{3}$ times the head to the ear, which is contained $4\frac{1}{2}$ times in head and body. The first toe is rather shorter than the fifth, and free portion of the longest toe is very little more than half the head to the ear. Scales on sides arranged very obliquely so as to render it impossible to count the encircling series. There are, however, about 28 rows and about 57 scales in a row from the head to the tail. Length.

The average of ten adult specimens in the Uni. collections. Complete length 92mm.; from head to vent 40mm.; from vent to end of tail 53mm.

Coloration.

Adult specimens are from dark greyish to black. (in rare cases brownish), the tail blue. The belly is a dull bluish to gray and much lighter than back. Each of the upper and lower labials with a white spot, the last three the largest. A row of white spots from the prefrontal to the back of the eye, one on each intervening plate. Some specimens show light spots on all head plates, with the line on either side extending to the ear. In the young

the ground color is dark black and the tail is a brilliant blue.

Observations.

The writer collected four specimens from under a large flat rock in Riley Co. A large specimen of E. quinquebaccatus was found under this same rock. One of the E. guttulatus had been killed and another injured, probably by the larger species.

Three specimens collected in Anderson Co. in June, 1909, were kept in a small vivarium (a screened box with leaves and rock for hiding). They were fed on flies and crickets, and soon grew rather tame. They were voracious feeders and would feed even when someone was about the vivarium. They were crafty in their approach of a fly, which showed any movement. They would crouch, then crawl very slowly to the unsuspecting fly, and with a sudden final jerk of the head would grab it swallow it after a series of chewing movements. They paid no attention to a dead or motionless fly or bug.

One of the specimens kept was a female heavy with eggs. She was very cross and when either of the males approached her she would fight them. One failed to get away and lost two inches of his bright blue tail in conse-

quence. The female died before her eggs were laid. When placed in a box with *Leiolopisma laterale* they seemed quite afraid of the smaller lizard and did not fight but kept as far away as possible from them. A nest of four eggs was found in June in some leaf mold under a thin flat rock. The eggs were transferred to the vivarium but the embryos then nearly an inch long did not develop. The nest indicated that the eggs had been brooded.

The food ordinarily consists of various types of small insects, flies, crickets, and grasshoppers nymphs. Crickets were found in the stomachs of five out of ten examined. They are voracious and must consume a countless number of these insects injurious to crops and instrumental in carrying disease.

F. A. Hartman says of their habits--"The stomach of a single specimen contained a fly, a spider, two leafhoppers, and a cricket. Two specimens kept in captivity ate flies and grasshoppers with avidity. Five specimens of *Sceloporus undulatus* were placed in the same cage with them. Three of these were young, varying in size from $\frac{1}{4}$ to one inch and a half in length. In a few days no trace was left of the young. A little later on of the old ones was observed crawling about merely by the use of his front legs. His hind legs apparently useless from injury.

A little later a *H. guttulatus* was found in the act of shaking a *Sceloporus* by the back of the neck. The *Sceloporus* was quite as large as the Scink. On examining his hind legs they were found to be broken and chewed. This shows how aggressive and warlike these little scincs are."

Habitat.

They are usually found on rocky hillsides on or about rock fences and walls, and are never seen feeding save in a bright sunlight.

Distribution.

Cope reports the species from Texas, Okla, Arkansas and west to the pacific (as far north as San Francisco). The species seems quite common in Kansas, the writer having collected more than thirty specimens. It is not reported from Missouri by Mr. Hunter nor is there record of its having been taken in Nebraska. Kansas is probably its northern limit. Localities in Kansas.--Dickinson, Labette, Cowley, Sumner, Anderson, Franklin, Douglas, Shawnee, Riley, Russel.

Eumeces obsoletus Baird & Girard

Eumeces obsoletus Cope E. D. Nat'l Museum Rept. (1898),
646; F. W. Cragin, Trans. Kas. Acad. Sc. (1879-80), 7,
118; Strecker, Baylor Um. Bull. (), 18, No. 4, 26;
Bailey, N. Ann. Fauna (1906), No. 25, 45; W. Stone, Proc.
Acad. Natl. Sci. Phil. (Mar. 1911); Check List N. A. Papt.
(1875), 45; Bocourt, Miss. Sci. Mex. Rept. (1877), 443,
pls. XXIIa, fig. 4, XXIIId, fig. 4; Cope, Bull. U. S.
Nat. Mus. (1880), No. 17, 39; Boulenger, Cat. Liz. Brit.
Mus. (1887), 3, 374.

Pleistiodon obsoletum Baird & Girard, Proc. Acad. Nat. Sci.
Phil. (1852), 129; Hallow, Sitgreave's Exp. Zuni. & Col.
Rev. (1853), pl. III; Baird. U. S. Mex. Bound. Survey
Rept. (1859), pl. XXV, figs. -16.

Description of species.

Postnasal in full contact with supranasal. When present, fifth hind toe shorter than second the prefrontals are in contact in front of frontal. The frontal is elongate more than twice as wide as long, truncate behind, there are three supraoculars in contact with it; the fronto parietals are comparatively small smaller than interparietal which is close gate, completely separating the parietals.

Color.--Pale ashy brown above with bluish on the side, ^x
each scale having a darker border; the young are jet black,
except the tail which is a brilliant blue, with white spots
on the labials; sometimes faint lines are discernible on the
dorsal surface. The young of this species is quite similar
to the adult of *E. guttulatus*, so much so that one is fre-
quently in doubt. It is the largest scink attaining a
length of 18 mm. >

Eumeces leptogrammus, (Baird).

Synonymy.

Eumeces leptogrammus, (Cope), Check-list. N. Amer. Batr. and Rept., 1875, p. 45.--(Boulenger), Cat. Liz. Brit. Mus., III. 1887, p. 378.

Plestiodon leptogrammus (Baird), Proc. Acad. Nat. Sci. Phila., 1858, p. 256.

Description of Species.

Head short, rather broad with the profile sloping or convex. Plates much as in quinquelineatus. Seven upper labials, limbs short and weak. Hind leg laid forward twice reaches midway between the arm and ear. Tail one and one fourth times the head and body; cylindrical. Usually 24 scale rows around the body and about 58 from head to tail. The fifth hind toe shorter than second, free portion, $\frac{2}{5}$ the length of head to ear.

Color.- Generally black, or dark olivaceous above, with five very narrow and inconspicuous greenish-white dotted lines. One medio-dorsal and two lateral on each side. Beneath tail and body dark blue. Hind legs a uniform black.

Habitat.

This species has been found in Kearney and Woodson Counties. No specimens are in the collections of the University of Kansas.

Eumeces Epipleurotis Cope.

Synonymy.

Eumeces epipleurotis Cope. Bull. U. S. Nat. Mus., No. 17,

1870, P 40.

Head much as in the quinquelinatus form.

The prefrontals are broadly in contact in front of the frontal; the fronto-nasal narrow; snout rather obtuse. A small post nasal in front of the lower part of the anterior loreal which is in contact with the fronto-nasal; 5 supra oculars. A large temporal bordering the parietals which are wholly separated by the interparietal. Scales in 24 rows. The mental followed by a very narrow postmental several times as large. First pair of chinshields in contact only. The limbs are short, not touched when adpressed.

Coloration.

The median dorsal pale band covers only the adjacent halves of the two median rows of scales. A black band bordering it occupies the remaining row. A black line passes along the adjacent edge of the next row whose middle is white. The external edge of the same row is involved in the superior edge of a white band which covers two rows and two half rows of scales. Thus there are three dark bands on each side of the middle line the inferior widest. The color of the abdomen extends to the lower

dark band. Size small. Not common. Only one specimen taken.

(Note) Mr. Housholder has found this species in LaBette Co.

He states that the single specimen was sent to Dr. Leonhard Stejneger who confirmed his classification--thus making a first undoubted record of this species in the state and increasing greatly the known range of the form.)

Eumeces multivirgatus Hallowell

Synonymy.

Eumeces multivirgatus Cope, Checklist N. Amer. Batr. &
Rept. (1875), 45.

Eumeces inornatus Cope, Checklist N. Amer. Batr. & Rept.
(1875), 45.

Plestiodon multivirgatum Hallowell, Proc. Acad. Nat. Sci.
Phila. (1857), 251.

Plestiodon inornatus Baird, Proc. Acad. Nat. Sci. Phila.
(1858), 256.

Description of species.

Rostral appearing from above, incontact with the two internasals by narrow sutures; fronto nasal smaller than E/ quinquelineatus; frontal strongly concave laterally touching the fronto nasal; three supraoculars in contact with it; two postnasals usually of equal size; 24 to 26 rows of scales around the body; body cylindrical; slender, legs far apart, head short, convex above; ear very small circular; hind leg applied forward twice fall behind the foreleg and three times reaches the angle of the mouth, and is contained 3-1/3 times in head and body. Tail 1-1/2 times the head and body; 5th hind toe shorter than second.

Color.--Above pale olive, green, or gray, lighter beneath and on the sides with 4 or 5 brown stripes on each side. Every row of scales striped with brown. There is a narrow whitish stripe through the middle of the third row of scales from the dorsal line. Scales on tail and legs edged with brown. The labials whitish without brown except on the under edge.

There are no specimens in the collection. Reported from Kearvey Co. and Woodson Co.

Eumeces Septentrionalis Baird.

Eumeces septentrionalis (Cope). Checklist U. Amer. Rept &

Batr. 1875.

Plestiodon septentrionalis (Baird). Proc. Acad. Nat. Sci.

Phila. 1858.

Rept. U. S. Expl. Surv. Pt. R. P. 4, X 1859.

Description of Species,

Body and neck cylindrical, stout; head small conical and depressed. Interfrononasal plate small, rhomboidal, embraced between the supranasals and prefrontals, which are broadly in contact. A single postnasal (about equal to the nasal) equal in height and half the length of the loreal. Seven upper labials, two mentals, limbs short, the hinder reaching forward less than halfway to the forelegs and contained three and one half to four times in head and body. Head to ear contained between five and six times in head and body. Fifth hind toe a little shorter than second; the free portion of the longest toe equals half the side of the head. There are 28 rows of scales around the body, the lateral parallel with the dorsal, with approximately 59 scales from head to tail. Tail $1\frac{1}{4}$ times body in length.

Coloration.

The general color above light olive green with two lat-

eral white stripes inclosing a black one, the upper on each side along the center of one row of scales and separated by six dorsal rows. Four equal and equidistant black dorsal stripes between the white ones, each on two adjacent half rows of scales, the exterior margining the white lines the inner obsolete in old specimens. Beneath greenish white, more yellowish under the chin, lower white line passing above the ear. Upper labials white. A faint whitish line below the thigh, margined above and below with a dusky color.

This differs from the E. quinquelineatus in that one has a postnasal, the other none. The upper lateral stripe is on the middle of one row, not on adjacent edges of two; the lateral stripes are closer together; the lower passing above the ear instead of through it.

Distribution.-- Minnesota, Nebraska, and Kansas. Has been taken close to Canada.

There are no specimens in the State University and only a single specimen in the National Museum from Kansas. It has been reported from the southeastern corner of the state.

Eumeces anthracinus (Baird).

Synonymy.

Eumeces anthracinus (Cope). Checklist N. Amer. Batr. & Rept. 1895. Croc. Lizards and Snakes. Rept. Natl. Mus. 1898. (Boulenger). Cat. Liz. Brit. Mus., 2, 1887.

Plestiodon anthracinus (Baird).

Body and head depressed, quadrangular; in sections, rather slender; tail cylindrical, alternated one and one half times the head and body. Supranasals, internasals and prefrontals rhomboid; the former smaller and more transverse than the rest. One prefrenal equal to the supranasal, half as long as, and higher than the pentagonal loreal, extending upward to contact with the internasal. Upper labials 6 or 7. One large transverse pentagonal mental plate. Scales on the body in 24 rows, quite parallel on the sides. 47 scales from head to tail.

Coloration.

This species is darker olive greenish with two well defined white lines on each side; their interval and border above and below grayish black. Upper lateral stripe generally on the middle, sometimes a little below, of the third row of scales from the back; the lower on the ad-

adjacent edges of the sixth and seventh. This passes anteriorly through the ear, along the upper labials. The portion of the third row of scales on the back anterior to the white stripe, is black leaving four dorsal rows perfectly uniform dark olive green, without any trace of a median line. Under parts light greenish, paler beneath the head; the tail bluish black. Legs black above the under parts without trace of stripes. Very young specimens are lustrous black on the sides and exterior surface of their hind legs; the belly, greenish-blue; the tail, bluish beneath. With age the sides become gray, the under parts lighter greenish.

Distribution.

A widely scattered species occurring from Pennsylvania to Texas. Has been taken in Missouri. Reported from several localities by Julius Hunter Sr. No specimens have been reported as yet from Kansas.

Eumeces pluvialis Cope.

Synonymy.

Eumeces pluvialis (Cope), Bul. U. S. Nat. Mus. #17, 1880
(Boulenger), Cat. Liz. Brit. Mus. vol. 3, 1887.--(Cope) Rept.
Nat'l. Mus. 1898.

Eumeces anthracinus Baird var Cope Proc. Amer. Phil. Soc.
1887.

Description of Species.

There are four supraorbital plate present and no post-nasal. The loreals are rather elevated, the prenasal reaching the transverse interfrontonasal. The two preoculars are wedged between the fourth and fifth superior labials of which the fifth is elongate, and beneath the orbit. The scales are in 26 rows, and the limbs are well developed. When laid along the side they overlap, the fore claws reaching the end of the second toe. The mental is single. Length 119 mm.--Tail 82 mm.

Coloration.

The color is olive-black to black below, bluish green to blue. Two narrow greenish-white lateral bands separated from each other by a black band $2\frac{1}{2}$ scales wide, the upper ones separated by the width of six scales. There is a faint trace in the typical specimen of a pale vertebral line with a somewhat darker border on either side, and there is also a

blackish border above and below the upper and lower lateral lines. These lines extend to the orbit and ear respectively. The superior labials are greenish, and darker bordered. The other head plates are blackish brown.

Observations.

This is one of the rarest types of the scinca, and its occurrence in the state is surprising. The only specimen in our collections is one collected by Mr. John Sterling in Dickinson County. The only other reported specimen is from Alabama collected by Dr. Joseph Carson near Mobile. This specimen agrees with the original type in every detail save in the matter of color. There is a tendency in our specimen to be darker, the blackish rather than the greenish predominating. The other differences are not determinable.

The taking of this specimen in this state has extended the known range of the species greatly. The specimen is the personal property of the writer, and is deposited in the University collection, having been presented by Mr. Sterling, its discoverer.

LEILOPISMA (Dumeril & Bibron).

Leiolopisma (Dumeril & Bibron) Exp. Gen. V. 1839.

(Gray) Cat. Lis. Brit. Mus. 1845.

Description of Genus.

Nostril pierced in the nasal plate. Maxillary
bones in contact with the vomer. The palatine
bone of the palate. Tympanic
panna not covered with integument. Pterygoid bones in contact
act on the middle line. Eye lids movable; digits with non-
retractile claws. Supranasal plates wanting. Lower eye-
lid with a transparent disk; two fronto-parietal plates;
digits 5-5.

Body fusiform, cylindrical. Head short, pyramidal;
limbs well developed, scales smooth. This genus differs
from the other genus of the Scincidae in the absence of
internasals, the frontal coming broadly in contact with
the rostral, as well as the nasals. The plate has a trian-
gular notch running to a point instead of being more linear
and hollowed anteriorly. There are no pterygoid teeth. The
tongue appears flatter and more extensible at the tip.

Leiolopisma laterale (Say).

Leiolopisma laterale

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(Helbrook) N. Amer. Herp., 2d ed., II

1842.

Scincus lateralis (Say) Long's Exped. Rocky Mts., II 1823-

(Harlan).

Journ Acad. Nat. Sci. Phila. V. 1825;

VI. 1828.--(Helbrook).

U. Amer. Herp., 1836 I.

Scincus unicolor (Harlan) Journ. Acad. Nat. Sci. Phila.

V. 1826.

Oligosoma gemmingeri. (Cope). Proc. Acad. Nat. Sci. Phila.,

1864.

Oligosoma laterale (Cope). Checklist N. Amer. Rept.

Lygosoma lateralis (Bocourt). Wis. Sci. Mex. Rept. 1881.

Mecoa lateralis (Gray) Cat. Rept. Brit. Mus. 1845 --

(Guenther) Biol. Centr. Amer., Rept.,

Lygosoma gemmingeri (Bocourt) Miss. Sci. Mex., Rept.

Description of Species.

Body slender, quadrangular; vent rounded, attenuated one half times the body; frontal in contact behind with the verticle, before with the rostral; the prefrontals small; lateral. Nasal above the first labial, in contact with the post frontal. Seven upper labial. Bars large, vertical. Lower eyelid transparent in center; without scales.

Scales very thin and membranous; generally 28

around the body. The hindleg applied twice forward reaches half way between the arm and ear; contained three times in the head and body. Fifth hind toe shorter than second. Free portion of longest toe half the head. Tail cylindrical, pointed with transversely widened plates underneath. Length.

Whole length 124 mm. Head to vent 47 mm. From vent to end of tail 76 mm.

Coloration.

The upper part of the body a uniform reddish olive to brown. Two dark stripes on either side run from the tip of the snout through the eye, and above the ear to the tail, sometimes continuing to the tip of the tail. These stripes are of a dark brown color and are bordered by a lighter color above and below. The belly yellowish to drab, with faint lines along adjacent edges of the scales. Most of the specimens show two faint rows of black dots running from the back of the head to the tail. The young show the markings quite the same and very distinct.

Observations.

This diminutive lizard is a rather timid creature. It feeds usually in sunlight, and does not come out after sundown. It is very inquisitive and the writer has observed two which would come out from a pile of leaves whenever the leaves were rattled slightly. When a movement was made towards them they would hide only to reappear soon. One was observed making a large meal from flies swarming about the base of a tree that was leaking sap. Several specimens were kept during the summer and winter of 1910. They grew quite tame and would crawl lazily over ones hands and take flies from ones fingers with scarcely any hesitancy. When one attempted to replace them in their box they would scurry away and attempt to hide. A female deposited three diminutive eggs--6 mm. in length--3 mm. in width in one corner of the box. A small hole was dug and the eggs deposited. Then some earth and bits of leaves were thrown around them. They were not bothered again by the female. Whether this is proof that the eggs are not brooded as in some species of the scincs, is a question. The writer has never found the eggs of wild specimens.

Specimens kept in captivity ate ants and flies with a preference for the latter. One specimen has eaten

as many as 20 flies at a single meal. The attitude of the female toward the males was interesting; the female heavy with eggs would not allow a male to approach. She would crouch down and hold the head quite close to the ground and blow out her breath forcibly.

Habitat.

The writer has taken this species usually under logs and rocks in heavy woods. It appears to prefer shade to the open.

Distribution.

Steinejer reports it from China in Asia. In N. A. it occurs from the Atlantic to the Rocky Mountains and as far north as Nebr., Ill., and Ind.

In Kansas it has been reported from Riley, Bourbon Anderson, Franklin, Douglas, and Labette counties.

TEIIDAE.

Description of Family:

The tongue is flat, more or less elongate, ending in two long smooth points, the greater part of the surface covered with rhomboidal imbricate scale-like papillae; in a few genera the tongue is particularly long and narrow at the base, which is retractile into a sheath. In others it is bicuspid posteriorly; head pyramidal, with large, regularly disposed plates above; one pair supranasal plates. Nostrils opening in the midst of a plate or between two plates. Scales of the back granulate or carinate. Scales of the abdomen are large. The premaxillary teeth are conical. Ptergoid teeth but seldom present, and if present feebly developed. Limbs or rudiments are always present. Premaxillary single. Nasaals double, frontal and parietal single.

Cnemidophorus (Wagler).

Synonymy.

Cnemidophorus (Wagler) part. Syst. Amp., 1830.--(Wiegman)

Herp. Mex., 1834--(Demeril and Bibron). Exp. Gen. 5, 1839

(Gray), Cat. Liz. Brit. Mus. 1845.--(Bocourt) Miss. Soc.

Mex. Rept. 1874.-- (Boulenger). Cat. Liz., 2, 1885.

Description of Genus.

Scaly portion of tongue cordate behind and not retractile. Tail rounded. Teeth longitudinally compressed. Head shields large and rectangular; ventrals large; parietals and frontoparietals distinct; supercillaries segmental. A collar fold. Tempores present, in the center of a rosette of scales. Tongue with no sheath, free behind.

Gnemidophorus sexlineatus (Linnaeus).

Synonymy.

Gnemidophorus sexlineatus (Gray). Cat. Liz. Brit.

Mus. 1845.-- (Dumeril and Bibron). Erp. Gen., 5, 1839.--

(Dumeril) Cat. Meth. Rept., 1850 (Cope, check list N. Amer.

Patr. Rept. 1875; Trans. Amer. Phil. Soc. 1892.--(Bocourt).

Miss Sci. Mex., Rept., 1874.--Boulenger Cat. Liz. Brit.

Mus., 2, 1885.

Lacerta sexlineatus (Linnaeus) Syst. Nat., 12th ed.

1, 1766.-- (Gmelin) Syst. Nat. 1788.--(Latreille), Hist.

Nat. Rept., 1, 1801. (Daudin) Hist. Rept. 3, 1803. (Harlan)

Jour. Acad. Sci. Phila., 6, 1727.

Ameiva sexlineatus (Holbrook), N. Amer. Herp., 1st.

ed., 1, 1838.

Gnemidophorus sexlineatus.--(Dumeril and Bibron)

Erp. Gen., 5, 1839.-- Aug. Dumeril, Cat. Rept., 1, 1851.

Description of Species:

Scales of collar large, in few rows, the largest forming the lower. Scales of the upper surfaces minute, not larger than .33 mm. in diameter. Four supraorbital plates, the posterior small. Frontoparietals larger than parietals, with transverse anterior border. Interparietals longer than

wide. Dorsal as high as, or higher than long in consequence of the rather short muzzle. Superior labials five to below orbit, the last acuminate posteriorly, larger gular scales beginning rather abruptly in a line which extends entirely across the throat. Brachial scales in five or six longitudinal rows, very rarely in seven; antebrachials in three rows. Large postantebrachials absent. Femorals in six rows less frequently in seven; tibials in three rows. Femoral pores 15-17. Principal anal scuta three, two marginal, the third anterior. The longest toe of the extended leg reaches the auditory meatus. .

Head somewhat compressed and pointed. The ear opening is vertical and oblong. Two neck folds. Limbs well developed with their upper surface covered with large scales. Tail covered with whorls of large carinated scales; smooth beneath. Eyes small.

Length: Average of three large adult specimens; 232 mm; from head to vent 84 mm; vent to end of tail 150 mm.

Specimens from the western part of the state are larger on the average.

Coloration

The ground color above is greenish-brown to purple.

The head is a light brown, and a purplish brown stripe extends along the median dorsal scales from the head to the tail; on either side are three bright yellow lines with a darker line enclosed. The second line is the longest and extends from the eye to the sides of the tail. The throat is silver white, and the abdomen is bluish white. The tail is similar to the back, but very rough. The under surface is whitish. Some of the stripes of the back extend to the tail.

Observations.

This species is probably the most active of all our lizards. The speed with which they go over the ground is truly amazing. In countries where there are no rocks for hiding they dig temporary holes probably for shelter at night. These seem to be used continually. The writer has chased these wily creatures, recently, over cultivated fields for several rods only to have them disappear in one of these holes. These burrows are about a foot deep and are not large enough for the lizard to reverse its position. The eggs are laid in the open and are covered with sand or dirt.

In the chalk country of Trego and Gove Counties these lizards are very common but only a small number were

obtained, due to their great agility. Their food consists chiefly of grasshoppers, but other species of insects are eaten.

The writer observed a large male specimen chase a grasshopper (*Melanoplus differentialis*) for a number of feet, each time stalking the insect as a cat would a bird, only to have it jump and fly some distance. This was repeated three times. The "hopper" was finally captured by the lizard's climbing near the top of a weed (nearly three feet high), and jumping out to one of the branches and falling to the ground with the struggling insect.

Another specimen was seen to jump for a grasshopper nymph which flew about a foot from the ground; the lizard failed to catch it. Ditmar states that they frequently eat the eggs of birds which they find on the ground. They break the eggs with their strong jaws and lap up the contents with their long, flat, forked tongue. The tail is very brittle. Their very appropriate common name is, the "Race Runners".

Habitat. These seem to have no definite or distinctive habitat. The writer has found them on rocky hillsides, open corn fields and meadows, low sandy river banks and

about chalk cliffs.

Distribution. They have a very wide distribution. Found from the Atlantic to the Pacific. Occurs as far north as Ill., Neb., Colo., Ariz., and Calif.

The distribution in the state is not uniform, in five years collecting the writer has failed to find this species in Anderson, Douglas or Franklin Counties. Yet in the counties of the southeastern part of the state also the central and western parts, it is very common. Mr. Hunter says it is rather uncommon in Missouri. Has been reported from the following counties in the state. Trego, Fove, Graham, Hooks, Cherokee, Miami, and Labette.

Cnemidophorus tessellatus tessellatus Say.

Synonymy. Cnemidophorus tessellatus (Baird) U. S. Pac. R. R.

Sur. 10, 1859. Bunnison's report.--Cope, checklist Batr.

Rept. N. A. 1875. Trans. Amer. Phil. Soc., 1892.

Ameiva tessellata (Say), Long's Exped. Rocky Mts.

2, 1827.

Description of Species.

Scales of the back and sides generally coarse, 5 mm. in diameter. Scales of the collar not larger than those of the throat, the edge of the collar with smaller often granular scales. Four supraorbital scales, the scales posterior smaller than the others. These are separate from both the superciliaries, and the frontal and frontoparietal by granular scales whose extension anteriorly differs in different individuals. Frontoparietal longer than broad, longer than each parietal. The latter undivided. A transverse series of small plates bound the parietals and interparietals posteriorly. Frenal plate longer than post nasal. One row of scuta above and below orbit, separating the latter from the superior labials. Superior labials five to below middle of the orbit, the fifth acuminate posteriorly. Infralabials five.

Brachial scales in four to eight longitudinal rows

counted at the middle continuous with antebrachials, which are in three rows, and tibial plates in three longitudinal rows. Femoral pores varying from 19-21 in number.

Length. Varies from 260 mm. to 350 mm. in length.

Coloration.

Color varies from olivaceous black to greenish brown, which is marked by light yellow or orange longitudinal stripes of spots on the darker ground or reversed by black spots on a dark ground. Belly to near black or spotted.

Key to Subspecies.

1. Brachial scales 4-5 rows; femorals 6-7 rows.

Blackish olive above, with a median dorsal paler stripe and three similar stripes on each side; belly and throat unspotted.-----C. t. Perplexus.

The pale stripes on each side only the interspaces pale spotted, and frequently broken up into black or olive spots, so as to destroy their integrity; generally sparsely spotted with black below-----C. t. melanostethus.

No stripes, but 12-14 longitudinal series of pale spots on an olivaceous ground, more or less confluent; hind legs with numerous pale spots; throat, collar and more or less of the throat black-----C. t. melanostethus.

II. Brachial scales in 5-6 rows; femorals 8-9 rows. No stripes; ground color olive brown, with three rows of more or less obsolete black spots on the back and vertical black bars on the sides; abdominal plates pale, black edged; hands, and inferior faces of hind legs and tail red; larger.----C. t. rubidus.

III. Brachial scales 7-8 rows; femorals in 8-9 rows. Four light stripes above, interrupted and connected with light spots and lines in the black interspaces; sides, throat and inferior surfaces variegated black and white; medium.---

C. t. multiscutatis.

This species has been included in this list on the authority of F. W. Cragin. He says of the species.-- "The occurrence of this species in Kansas was hardly expected; but a specimen of the typical variety has been sent me from McPherson County, by Dr. John Rundstrom."

No specimens have been found in the state other than this.

Cnemidophorus gularis (B & G)

Cnemidophorus gularis (Baird & Girard). Proc. Acad.

Nat. Sci., Phila. 1852.----(Baird) U. S. Mex. Bound. Sur.,

Reptiles.----(Cope). Trans. Amer. Phil. Soc. 1892.--Croco.

Liz. and Snakes. Rept. Nat'l. Mus, 1898.

Cnemidophorus guttatis, (Hallowell). Proc. Acad. Nat.

Sci., Phila. 1854.

Description of Species.

This species is closely allied to the *C. sexlineatus* but differs by the greater number of femoral pores, and the longer muzzle. It is very variable in form and color.

There are postantebrachial plates present, the broader stripe and larger size of the scales. The frontonasal plates are smaller comparatively in *gularis*. There are a number of subspecies each well defined in its geographical distribution.

Cnemidophorus gularis gularis Baird & Girard.

Synonymy.

Cnemidophorus gularis (Baird & Girard). Proc. Acad.

Nat. Sci. Phila., vol 6, 1852: Marcy's Expl. Red River, 1854.--

--(Hallowell), Proc. Acad. Nat. Sci. Phila. vol. 8, 1856.--

(Baird), U. S. and Mex. Bound. Sur. Rept. 1859.

Description of Species.

The muzzle is very elongate, with the postnasals

longer than in *sexlineatus*. Frenal plates present. There are one or two rows of large scutes on the posterior face of the forearm. Femoral pores from 18-22, average 20. The longest toe of hind leg reaches forward to the auditory meatus. Frenoocular plate sometimes present.

Coloration.

There are six longitudinal stripes. There is a series of light spots between the longitudinal stripes, which are not confluent with the white stripes, and consequently does not break up the dark background into black spots. Most specimens have light spots on the sides below the inferior stripe. Usually larger than *C. sexlineatus*. This species is probably rare in the state. There are six specimens in the National Academy of Science at Philadelphia, from Kansas, which were taken in the southwestern part of the state. As this part of the state has as yet not been covered by the survey, it is probable that later search will bring to light a goodly number of this species.

Widely distributed in Southwestern United States.

Texas, New Mexico and Arizona.

Anguidae.

The limbs may be more or less developed, or entirely absent externally. The rudiments of the pelvic arches however, are always present. The clavicle is slender, and the inner clavical, in limbed species cruciform Abdominal ribs present. Body serpentine. Two groves on either side of the body. Teeth on inside of jaws and pointing inward. Tongue bifid, the posterior part covered with vitiform papilli.

Genus *Ophisaurus* (Daudin)

Synonymy.

Ophisaurus (Daudin) Hist. Rept; VII. (Fitzinger)

U. Classif. Rept. 1826--(Wagler) Syst. Aqple 1820.

(Weigeman) Herp. Mex. 1834.--Dumeril et Bibron V. 1839.

(Gray) Cat. Liz. 1845--(Foulenger) Cat. Liz. Brit. Mus.

1885. *Hyalinus* (Merrem) Teut Aqple. 1820.

Description of Genus.

Body serpentine, with out external trace of limbs.

A deep lateral groove from head to anus. Scales hard and bony in transverse series. An external ear and scaly eyelids. Nostril lateral and in a single plate. Tongue arrow shaped, notched and flat anteriorly, where it is free for about half its length. Two longitudinal series of teeth

on the roof of the mouth borne on the ptergoids and palatines.
Several supranasals. Sternal bones represented by cartilages.

Ophisaurus ventralis (Sinaeus)

Synonymy.

Ophisaurus Ventralis (Daudin) Hist Rept. VII-

Anguis ventralis(Linnaeus) Syst. Nat. 1766

Gamaesaura ventralis (Schneider) Hist. Amp. 1804

Eyalinus ventralis (Merrem) Teut. Syst. Amp. 1820

Anguis fragilis (Gmelin) Syst. Nat. 1798

Ophisaurus punctulatus (Cuvier) Regne Anim 1829

Ophisaurus stratulus (Cuvier) Regne Anim 1829

Ophisaurus lineatus (Gray) Ann. Mag. 1838

Ophisaurus ventralis (Hallowell) Proc. Nat. Acad.

Sci. Phila. VIII 1856.

Description of species.

A large and broad frontal plate. Behind this is a pentagonal interparietal, bordered by an elongate parietal plate on each side. The interfrontonasal is half as long as the frontal. There are 2 frontoparietals which are in contact with the fourth supraocular plate. There are two series of plates, supraorbitals and supercilliaris along the edge of

the head above the eye. Head continuous with the body. Compressed and pointed. Eyelids quite distinct, the lower well covered with scales. 7 supranasals; nasal plate small and perforate by the nostril. Rostral wider than high; 11 supra labials, 9th and 10th the largest. Marginal series of infralabials elongate and narrow. Ears a short longitudinal slit varying size; in line between mouth and lateral groove. Lateral extending from behind ear to anus. Palatine teeth present. The ptergoid teeth in three to five longitudinal series. Teeth conical. Scales bluntly carinated on dorsal side. Tail nearly twice as long as body. Brittle. 7 or 8 preanal scales, a little larger than the abdominal scales. The space between the nostril and eye occupied by two rows of five plates, with two other rows in a line above these posteriorly; Labials bordering on orbit or separated by one or more rows of small scales.

Coloration.

Dorsal ground color grayish drab to olive brown. Belly yellowish white. A mediadorsal stripe of dark brown extends from the center of the frontal to the end of the tail. On either side a large brown line inclosing three thin white lines. A white stripe above the groove. Below the groove there are two dotted brown lines. Many variations in these

stripes. Young specimens show three dotted lines below groove. Some adults only one. The white stripe above the groove is frequently mottled. Sides of the head and neck are various mottled with brown spots and blotches. Each labial has one or more brown spots. Head plates sometimes with scattered spots.

Length.

Two large adults measured 700 mm and 715 mm.

From head to vent 243 and 251 respectively from vent to end of tail 456 and 462 respectively.

Observations.

This little snake like lizard is a very interesting creature and a great feeder. The stomach of one taken in August under a wheat sheaf contained more than twenty bugs-- mostly small coleoptera and grasshoppers. One kept in a screened box for a time thrived well on grasshoppers, and in time he grew rather tame and did not struggle when held. He would take grasshoppers from ones hand.

One specimen was found late in November about the roots of a hedge tree, a foot and a half under ground. It was coiled and was motionless. The specimen when brought out in the sun showed some signs of life. It was not preserved.

The species seems common over most of the state. Probably very rare in the extreme west and southwest.

Habitat.

This snake like creature is burrowing form and is not met with frequently on the surface. Frequently found under shocks of grain, and in ground that is being plowed.

Distribution.

Found commonly throughout south and eastern United States as far west as Texas and as far north as Ind. and Iowa.

Localities in State.

Douglas, Allen, Rooks, Osborn, Cherokee Co's.

IGUANIDAE.

Description of Family.

Dentition plaiurodont. Teeth are attached to the inner face of the jaws. The tongue is thick and villose, entirely fixed to the floor of the mouth, or slightly free anteriorly, and feebly nicked, frequently not. Pupil round and eyelids well developed. Tympanum usually distinct. Femoral pores usually present. Scaling of the head extremely varied and angular appendages and crests and cranial ornamentation frequently present. Upper head scales usually small. Premaxillary not cut off from maxilla-palatines by maxillaries. Vertebra procoelus. Premaxillary single. Mesosternum anchor shaped. A xysternal fontanel present. Abdominal ribs seldom present.

CROTAPHYTUS (Holbrook).

Synonymy.

Crotaphytus (Holbrook), N. Amer. Herp., 2, 1842.-- (Baird and Girard), in Stansb. Expl. Gr. Salt Lake, 1852.-- (Bocourt), Miss. Sc. Mex. Rept., 1874.-- Boulenger, Cat. Liz. Brit. Mus. 2nd. Ed., 2, 1885.

Leiomaurus (A. Dumeril), part, Arch. Mus., 8, 1856.

Description of Genus.

Throat and sides of neck wrinkled; a gular fold; femoral pores present. Scales above, small tuberculate and paved; beneath larger, imbricate and hexagonal. Tail much longer than body, rounded. Head scaled above. Occipitals small; suborbitals of small plates. Ear distinct. Nostril rather lateral, anterior to end of canthus rostralis. Tongue arrow shaped, slightly notched at tip; where it is free as at the sides, the tip beneath with two discs. Palatine teeth. Cheek teeth compressed, with three-lobed crown behind; conical anteriorly; the bases in a shallow groove. The ear openings large. Males with enlarged post anal plates.

Crotaphytus collaris (Say).

Synonymy.

Crotaphytus collaris (Holbrook), N. Amer. Herp., 2, 1842.
(Baird and Girard) in Mercy's Red Riv. 1843.-- (Hallowell),
Proc. Acad. Nat. Sci. Phila., 8, Oct. 1856.--(Wied). Nov.
Act. Ac. Leop. Car 32, 1865.--(Baird), Rept. U. S. Expl. sur.,
13, Pt. 3. 1857; U. S. and Mex Bound. Surv., 1859.--(Cope),
Proc. Acad. Nat. Sci. Phila. 1866.--(Bocourt), Miss. Sc. Mex.,
Rept., 1874.--(Foulenger), Cat. Liz. Brit. Mus., 2nd. Ed. 2,
1885.

PHLYNOSOMA

Phrynosoma (Wiegmann) Isis. 1828. Kerpt. Mex., 1834.

--(Wagler), Syst. Amph. 1830.--(Dumeril and Bibron), Exp.

Gen., 4, 1837.--(Fitzinger), Syst. Rept. 1843.--(Gray),

Cat. Liz., 1845.--(Girard), U. S. Expl. Exp. Herp., 1858.

--(Bocourt) Miss. Sc. Mex. Rept., 1874.--(Boulenger).

Cat. Liz. Brit. Mus., 2, 1885.

Batrachosoma (Fitzinger), Syst. Rept., 1834. --(Girard)

U. S. Expl. Exp.--(Bocourt), Mis. Sc. Mex.

Tropiodes gaster (Fitzinger) Syst. Rept. 1843.

Anota (Hallowell), Proc. Acad. Nat. Sci. Phila., 1852.

--(Bocourt), Miss. Sc. Mex., Rept., 1874.

Tapaya (Girard), U. S. Expl. Exp. --(Bocourt), Miss.

Sc. Mex. 1874.

Description of Species. (Bryant 1911.)

Head short, cordiform, and elevated at the vertex; occipital and temporal regions bearing flattened and grooved spines which vary in length and number; cephalic plates small and polygonal; nostrils anterior or lateral; teeth small and bluntly conical; palatine teeth lacking; body short, suborbicular, greatly depressed and usually fringed by one or two rows of spinal scales; back covered with

scales which vary greatly in size and shape; scales of ventral surface smooth and equal sized; gular folds present; tail short usually rounded and conical; limbs short, digits moderately developed; tympanum visible or covered more or less with scales; femoral pores present; preanal pores lacking; no dorsal or caudal crest. Body broad with a lateral fringe. Dorsally it is covered with keeled scales which are irregular in shape and size. Ventrally the scales are small and regular, having an imbricated appearance. The head is short and triangular in shape with sharp projecting margins. A row of femoral pores, varying in number in the different species from 7-20, are found in both sexes on either thigh. Those of the male most highly developed. The large postanal scales in the male is the determining sex characteristic. Anal pores are absent.

Phrynosoma douglassii (Bell).

Synonymy.

Phrynosoma douglassii (Wagler), Syst. Amph., 1830.--
(Wiegmann), Herp. Mex., 1834.--(Holbrook), N. Amer. Herp., 2
1842.-- (Girard), Stans. Expl., 1852.--(Cope), proc. Acad.
Nat. Sci. Phila., 1866.--(Cooper) Wheeler's Report Expl. W.
100th Mer., 5, 1875. -(Gray), Synopsis, Rept. Griff., Cuv.
Anim. King., 9, 1831. Cat. Liz., 1845. Zool. Beachey's
Voy., 1839. (Dumeril and Bibron), Herp. Gen., 4, 1837.--
Fitzinger, Syst. Rept., 1843.--Boulenger, Cat. Liz. Brit.
Mus. 1885.

Agama douglassii (Bell), Trans. Linn. Soc. 16, 1833--
(Harlan), Med. and Phys. Res.

Phrynosoma orbiculare (Hallowell), Sitgreave's Exp.
Zuni and Colo. Riv. 1853.

? Tapaya hernandesi (Girard), U. S. Expl. Exped. Herp.,
1858. U. S. and Mex. bound. Surv. 1859.--(Bocourt), Miss.
Sc. Mex. Rept. 1874.

Tapaya brevirostris (Girard), U. S. Expl. Exped. Herp.
1858.--(Bocourt) Miss. Sc. Mex. Rept., 1874.

Tapaya douglassii (Girard), U. S. Expl. Exped. Herp.
1858.--(Bocourt), Miss. Sc. Mex., Rept., 1874.

Phrynosoma brevirostre (Cope) proc. Acad. Nat. Sci.

Phila., 1866.

Description of Species.

Temporal region wide, but not especially expanded.

Horns represented by conical protuberances on each side.

Three temporal and one occipital. Occipitals widely separated at the base. Six posterior inferior labials enlarged.

Two short oblique rows of conic scales on the sides of the neck, the superior the longer. Two large scales in vertical relation behind the nasal, and separated from it by a row of smaller scales. A small keystone superciliary. Gular scales rounded smooth. Back covered with occasional larger spring scales arranged more or less in rows. A rather larger single row of spinous scale extend on the side. Series of conic scales on sides of tail. Femoral pores 16.

Phrynosoma douglassii hernandesii (Girard).

Synonymy.

Phrynosoma hernandesii (Stejneger), N. Amer. Fauna. #3,1890.

Tapaya hernandesii (Girard), U. S. Expl. Exped. Herp.,

1858. U. S. and Mex. Bound. Sur., 1859.--(Bocourt), Miss. Sci.

Mex. Rept., 1874.

Tapaya brevirostris (Girard), U. S. Expl. Exped. Herp.,

1858.--(Bocourt), miss. Sci. Mex. Rept., 1874.

Phrynosoma brevirostre (Cope), proc. Acad. Nat. Sci.

Phila., 1866.-- (Boulenger), Cat. Liz. Brit. Mus., 2, 1885.

Description of Subspecies.

Head broader than long, with spines very small; nostril pierced in the line of the canthus rostralis; tympanum naked; the head spines which are subequal, not, or but slightly, larger than the largest spinous scales of the body, and turned upward; they number on each side, one postorbital, one occipital, and three temporals; in very young specimens the spines are not distinguishable; lower labials terminating in a series of four or five large compressed, obtuse, or pointed scales; a series of enlarged scales, as large or a little larger than, and parallel to, the lower labials; gular scales equal smooth, gular fold strong; a dermal thickening, bearing a few small erect spines on each side, between the gular fold and the tympanum. Back and limbs with scattered, rather large, erect, keeled, spinous scales, which are longer than broad. A regular lateral series of spines; pectoral and ventral scales smooth. 15-21 femoral pores on the male and 12-15 in the females. Male with enlarged postanal scales. Tail $2\frac{1}{2}$ times length of head.

Coloration.

x

The ground color presents a more or less mottled arrangement of yellow gray or brownish colors. Behind the occiput there are two rows of brown blotches four in number, extending somewhat beyond the middle of the back. These are partially edged by a lighter area extending medially from head to tail. The blotch nearest the head is usually the largest. The remainder of the back is covered with small white areas on a darker back ground. Head more or less mottled. Under surface of head and body almost white.

Length:-Total length of medium specimen from Rooks Co. 102 mm.

From point of snout to vent 81 mm. vent to end of tail 22mm.

Observations.

These strange, little "horned toads" as the Phrynosoma are commonly called, are probably the most unique of all our reptiles. They are quite inoffensive, readily become tame, and make fine pets. When stroked or handled they show an interesting habit of playing dead. They readily "come to life" if they think they can escape. So closely do they imitate their surroundings in color, that they are seen with great difficulty unless they are moving. The writer has never seen one attempt to bite.

Mr. Handel T. Martin of the University of Kansas states the following concerning the egg laying habits of this species. "Specimens of females were placed in a box of dry sand, and carefully observed. Prior to ovoposition the females would endeavor to hide in the loose sand in the box. This was probably due to the fact that they were watched. The eggs were from ten to twelve in number and from two to five minutes would elapse between ~~the~~ extrusion of eggs.

When an egg was deposited, some 30 seconds would elapse before the egg showed any movement. Then I could notice a slight motion of the head of the young, since the covering of the egg was semi-transparent; the motion was directed back and forth and after a few such motions the covering would tear and the young would emerge. Before the last egg was deposited the first young hatched would be picking up small ants placed in the cage. The female gave no attention whatever to the young. This is practically true of five females observed."

This species seems to be on the border line between the oviparous and the viviparous. Some of the species of this genus require a number of days to hatch the eggs after laying, others have their young born with no covering.

The food consists chiefly of ants, beetles, etc. Prac-

tically all of the specimens examined had small pebbles in the intestine. The occurrence of these is probably accidental as the pebbles were quite angular; such would doubtless not have been true had they been used for grinding. The specimens also contained a great number of small round worms. More than 200 were counted in the stomach and intestine of a large specimen. These were from 1/3 to 1 inch long.

Habitat.

The "horned toad" is strictly terrestrial in its habits. Most species are found in a dry sandy climate with very little vegetation.

Distribution.

This subspecies ranges from Nebraska to Texas, and west to the Pacific. Has been taken in Montana, Idaho and Oregon in the north.

In Kansas it is reported from the following counties:

Riley, Hooks and Douglas. Specimens have been turned loose about the university in the last years and are occasionally met with now.

Phrynosoma cornutum (Harlan).

Synonymy.

Phrynosoma cornutum (Gray), Syn. Rept. Griff., Cuvier
Anim. Kingd. 9, 1831; Cat. Liz. Brit. Mus., 1845.--(Holbrook),
N. Amer. Herp., 2, 1842.--(Girard), Stansb. Expl. St. Salt Lake
1852.--(E. Blanchard), Organ. Reg. Anim. 1852.--(Hallowell),
Sitgreaves Exped., Tun1, 1853.--(Girard), Herp. U. S. Expl.
Exped., 1858., U. S. Mex. Bd. Geol., 1859.--(Bocourt), Mis.
Sc. Mex. Rept. 1874.--(Poulenger), Cat. Liz. Brit. Mus., 2, 1885.

Agama cornuta (Harlan), Jour. Acad. Nat. Sci. Phila., 4,
1825; Med. and Phys. Res., 1835.--(Griffiths), Cuv. Anim. Kingd.
9, 1831.

Tapaya cornuta (Cuvier), Reg. Anim. 2nd. ed., 2, 1829.

Tropidogaster cornutus (Fitzinger), Syst., Rept., 1, 1843.

Tropidogaster bufonium (Fitzinger), Syst. Rept., 1, 1843.

~~Ag. Lacerte tapaya~~ axin (Barton), Med. and Phys. Jour., 3, 2,
1807. (?)

Phrynosoma bufonium (Wiegmann), Isis 1828.--Gray Syst.
Rept. Griff., Cuvier's Anim. Kingd., 9, 1831.

Phrynosoma harlanii (Wiegmann) Herp. Mex., 1, 1834.--
(Dumeril and Bibron), 4, 1837.--(Spring and Lacordaire),
Anat., pt. 2, 1842.--(Aug. Dumeril), Cat. Meth. Coll. Rept

Mus. Paris. 1851.

Phrynosoma orbiculare (Hallowell), Proc. Acad. Nat.
Sci. Phila., 6, 1852.

Description of Species.

Head short descending steeply in profile. Nostrils directed forward and separated from the scales of the canthus rostralis by a single scale. Posterior superciliary angle produced into a short horn. Temporal region expanded, supporting three horns, the anterior short, the median equal to or longer than the posterior. The series does not extend below the orbit. Occipital horns moderate, acute, well separated and divergent, and directed 45 degrees upward. Scales of front and vertex rugose, three conic scales posterior to the occipital, the posterior a median occipital. A row of conic scales connecting the posterior superciliary angles in front of parietal. Infralabials prominent and acute posteriorly, the last equal to, or longer than the first temporal. One row of enlarged gulars. On each side of the posterior gular border a small spine. Two longitudinal folds on the side of the neck, several spinuous scales on the inferior and longer and one on the superior and shorter. Dorsal scales larger,

flat and keeled medially, smaller laterally. A row of large flat keeled scales on each side of the vertebral line. External to these on each side, about four series of enlarged keel scales, with free apices directed posteriorly. Gular scales small. Two rows of spinous scales on each, the superior the larger scales and longer. Tail with a marginal row of spines on the basal half. Hind limbs short not reaching the axilla. Femoral pores present in males only, 9-12 in each series.

Coloration.

The general ground color is a yellowish to dark, brown. A mediadorsal light stripe runs from behind the occiput. This is widest immediately behind the head but narrows after two stripes branch off. These two narrow stripes run back and out for only a short distance. Immediately behind the head are two large dark brown spots one on either side of the white line. Behind these and equidistant from each other, are five pairs of brown spots each partially edged with a narrow line of white. Each of these spots is surmounted by a large conical scale. The three final pairs on the tail merge and are not separated by the white line. The fore and hind limbs are more or less mottled with brown blotches. On the head there is a darker area between the eyes and a second immediately behind.

Below and slightly behind the eye extend two darker areas.

The chin and neck are an immaculate yellowish white. The belly a yellowish white with or without small dull black spots.

Occipital horns dark brown or reddish.

Lateral rows of spines whitish.

Length: Total length 130 mm. from snout to vent 96mm. from vent to end of tail, 34 mm.

Observations.

This species is quite similar to the preceding species in many of its habits. It is scarcely more active and has practically the same food habits. Stomachs examined showed the presence of many ants and a number of sand grains the size of a radish seed.

The egg laying habits of this species is markedly different from that of *P. a. hernandesii*. In this species the eggs are buried and the time of incubation is some four or five weeks. Strecker in his paper on the breeding habits of *P. cornutum* states the following. "The usual site selected for the nesting burrows is the base of a slanting bank of earth or sand. As soon as one layer of eggs has been deposited, the r fills in ground over them, and is then ready for four lizatd

the next layer. In one nest examined by me the eggs were arranged in four layers of six each. The period of incubation is from 35-40 days. They do not receive any care from the mother, who probably never returns to the spot where she buries the eggs."

Habitat.

They have no fixed habitat. The writer has collected those in open fields, in pastures and along roadsides. In damp and wet weather they burrow into the earth.

Distribution.

This has probably the widest range of any *Phrynosoma*. Found from Missouri and Arkansas to Mexico and California. North to Kansas and Colorado. Not found on the Pacific slope. In Kansas reported from the following counties: Hile, Pratt, Labette, Cowley, Dickinson, Kingman, Ness and Pawnee.

Hartman states that the species is not as common in the state as formerly.

HOLBROOKIA (Girard)

Synonymy.

- Holbrookia (Girard) Proc. Amer. Ass. Ad. Sci. IV.
1851. Stansbury's Exp. Gr. Salt Lake 1852.--A.
Arch. Mus., VIII 1856. --Docourt, Miss. Sci. Mex.,
Rept. 1874. (Boulenger) Cat. Liz. Brit. Mus. VII.
1885.
Cophosaurus (Troschel) Arch. f. Nat., 1850.

Description of Genus.

Angular fold of large scales, side of neck variously plaited. Scales above and on sides small, nearly even, considerably less than ventral, all rhomboidal, imbricated. Tail moderate; not very brittle. Femoral pores distinct. No external ear. Nostrals superolateral, anterior to the end of canthus rostralis. A large infraorbital plate. Upper labials very oblique and imbricated. Head plates, including interparietal small. Tongue barely notched at tip, with two sessile triangular palates beneath. No palatines. Cheek teeth conical, posterior only faintly tricuspid.

Holbrookia maculata (Girard)

Synonymy.

Holbrookia maculata (Girard) Proc. Amer. Ass. Adv. Sci.

IV. 1851 (Stansbury) Exp. Rep. 1852. (Baird &

Girard) Marcy Red River 1853. (Hallowell) Proc.

Nat. Sci. Phila. VIII 1856. (A. Dumeril) Arch. Mus.

VIII. 1856. (Cope) Bull U. S. Nat. Mus. XVII 1880.

(Boulenger) Cat. Liz. Brit. Mus. 1885.

Holbrookia approximans.

(Baird) Proc. Acad. Nat. Sci. Phil. 1859. (Bocourt)

Miss. Sci. Mex. Rept. 1874.

Description of species.

Scales on back rather large, wider for 6 or 8 scales, then more laterally, about 125 from head to anus; head broad very short and convex; the lateral profile of upper part of the head rapidly curve toward mouth. Upper labials six, temporal plates smaller than those on the side of chin. Hind toe about $\frac{1}{3}$ the head and body; free portions of its longest toe equal to the length of the cephalic plates.

Above olive or ashy gray or green with sometimes a dorsal series of subquadrate dark blotches into lighter areola. Beneath white. The tail beneath without bands. A whitish stripe from eye along the sides below the dorsal blotches.

A second less distinct from mouth in line with lower edge of colored sides. Both sometimes broken up into small spots also seem more or less thickly on sides and above. Two oval indigo black spots in anterior half of each side scarcely visible from below.

Key to subspecies (Cope)

A. Snout more pointed; anterior supralabials narrower; muzzle plates smaller. Under surface of tail black spotted; no black spots on sides. Dorsal spots large, transverse, yellow bordered digilate posteriorly.- H. M. lacerata.

B. Spots absent or rarely present on inferior side of tail; two small spots on each side; dorsal spots small.

H. M. Maculata.

Holbrookia maculata lacerata (Cope)

Synonymy

Holbrookia maculata lacerata (Stejneger) U. Am. Fauna.

No. 3. 1890.

Holbrookia lacerata (Cope) Bull. Nat. Mus. No. 17. 1880

Boulenger Cat. Liz. Brit. Mus. 2nd ed. II 1885.

Description of sub-species.

Tail cylindrical, slender, a little longer than body; hind foot short, less than 1/3 of head and body; six or eight

supraorbital scuta surrounded by minute tubercules; scales of muzzle tubercular. Labials less elongate, five oblique, one flat; femoral pores 12-13.

Coloration.

No spots on sides; transverse blue spots on the inferior side of tail brown with six pairs of transverse dark-brown bars between the scapular region and groin, which extend downward and backward to the abdomen. Their posterior border is serrate or digitate and edged with yellowish, producing a variegated. The inner part of the spots is frequently cut off entirely. Spots continued on the upper part of the tail, and there are 6 longitudinal brown bars on the neck. A brown band across the supraorbital regions and a spot on the upper surface of the muzzle. Limbs brown and cross banded. A pale band on inferior part of side which is crossed by the ends of the lateral spots. Below this are five or six small dark spots sometimes obsolete.

Length.

Total length 99 mm; to vent 56 mm, from vent to end of tail 44 mm.

There are no specimens in the University collections of the Biological Survey thus far made. One specimen in the

Smithsonian Institute collection is from Neosho, Kansas.

Common in Central Texas. The finding of this subspecies so far north is very unusual.

Holbrookia maculata maculata (Girard)

Description of sub-species.

The body is moderately stout and depressed; much more so in the females. The head is broad and short, as wide as long, pointed anteriorly to the broad and rounded muzzle. The lateral line of the head is very convex posteriorly, then slopes from the middle to the head nearly in a straight line to the line of the mouth. The head above is covered with small polyhedral or pyramidal plates except in the supraorbital region. The occipital plate is large and polygonal, the edges raised with a central tubercle; it is surrounded by small plates. The eyelids are granular, with a series of longer flat plates along the edge. The loreal and supralabials are small and tubercular. The nostrils are superior situated in a single plate, except anteriorly, but closely surrounded by others which appear to form their outer border. The scales immediately behind the back of the head are smaller than elsewhere on the back. 120 scales from the occipital plate to the arm. The belly scales are rhomboidal and larger than any dorsal body scales. Those in front of arms the largest. Two transverse folds on the throat. The male has two plates behind the arms not seen in the female. The

femoral pores distinct.

Coloration.

The ground color above is an ashy gray and the belly immaculate white. Some specimens show a tendency to minute spots on the under part of arms and chin. Behind the head two rows of dark brown to blackish blotches extend to narrow part of the tail, about 12 to 13 in number. The size of the blotches varies. On either side above the legs is another row of blotches 8 to 10 in number and more indistinct. The arrangement of the blotches gives a superficial appearance of five straight lines, one medio-dorsal, the others lateral. Legs are blotched irregularly with brown. The top of the head shows a variety of dull markings the brown color sometimes covering the whole head.

Females taken in June were much more brilliant in coloring than the male. The ground color on the side was a dull orange color and the blue spots on the sides were very conspicuous. Some of the specimens showed a tendency toward having the ground color about the blotches emphasized so as to give the appearance of white spots.

Observations.

A great many specimens were taken in the chalk coun-

try in western Kansas. These with *Cnemidophorus sexlineatus* and *Sceloporus undulatus* were the only lizards found here. They were found in all types of localities and at all times of the day. When found they were nearly always in pairs, male and female. No specimens were observed in copulation. The females had not yet deposited their eggs.

They are very lively creatures and run very fast. Their tails are not brittle as those of the Scincs or Sceloporus. The number of eggs is from 5-8. None were found deposited.

Of the food habits F. A. Hartman says-- a squat, stubby-headed little fellow, common in sandy regions, especially in the sandhills sparsely covered with vegetation. Lives upon grasshoppers and small beetles. The stomachs of three specimens collected in Graham Co. contained small beetles, and a grasshopper nymph. Sixty of these little fellows were kept in captivity for a few months. They thrive on grasshopper nymphs. Grasshoppers which showed no signs of life when put into the lizard cage were never touched. But as soon as a grasshopper would move one of the lizards would creep up quietly to within an inch or two, turn his head quizzically, then suddenly grab the unsuspecting victim

and jerk his head from side to side swallowing it.

Distribution,

This subspecies is very common in the central plains region Texas, New Mex., Ariz., Okla., Neb. Wyoming and Kansas.

In the State it has been taken as far east as Shawnee Co. In the western part of the state it is quite common.

Specimens are recorded from Trego Grove, Graham, Osborne, Dickinson, Logan, Wallace and Barton Co's.

Mr. Hurter does not report it from Missouri. This state is probably its northeastern limit.

SCHELOPORUS (Wiegmann).

Sceloporus (Wiegmann). Isis. 1828; Herp. Mex. 1834.

(Fitzinger), Rept. Syst., 1843.--(Bocourt), Miss. Sc. Mex.,

Rept. 1874.--(Boulenger), Cat. Liz. Brit. Mus., 2, 1885.

Tropidolepis (Cuvier), Reg. Anim., 2nd Ed., 2, 1829.--

(Dumeril and Bibron), 4, 1837.-- (Fitzinger), Rept. Syst.,

1843.--(Gray), Cat. Liz., 1845.

Tropidurus (Wagler), part. Syst. Amph., 1830.

Description of Genus.

No gular constriction; one lateral fold on the neck.

Femoral pores. Scales imbricated; rhomboidal, rather verticillate on tail. Above generally carinated. Head above with regular plates. Superciliary plates imbricate toward a median keystone scale; labials not imbricate. Ears distinct. Tongue fleshy; arrow shaped; rounded at tips; broadly adherent, except at end where are two triangular discs beneath. No palatine teeth. Cheek teeth compressed. Tail rounded, very little.

SCHELOPORUS UNDULATUS.

Synonymy.

Sceloporus undulatus (Wiegmann), Isis 1828; Herp.

Mex., 1, 1834.--(Fitzinger) Syst. Rept., 1843.--(Girard),

Herpet. U. S. Expl. Ex. 1858.-- (Bocourt), Miss. Sci. Mexique.

Rep. 1874.--(Cope), proc. Amer. Phil. Soc., 1885.--(Boulen-

ARGANA collaris (Day), Long's Exped. Rocky Mts., 2, 1825.

(Harlan) Med. Phys. Res. 1835.

Liasaurus collaris (A. Dumeril), Arch. Mus., 8, 1856.

Description of Species.

Head very broad, its width fully equal to the distance from snout to ear. Supraorbital plates smaller than those on the middle and front of the head. Of these there are two rows between the middle orbits, and about seven between their anterior extremities; about six between nostrils. Infraorbital plates nearly equal in a chain of eight. Scales on the anterior border of ear subacutely tubercular. Scales of the gular fold as large as between the forelegs. Scales on the belly subhexagonal and imbricated; on the back smaller, rounded, tubercular and not larger along the median line. Femoral pores about 22. Scales on the under surface of hands and feet larger, conspicuously carinated and mucronate; on the hinder part of the tail moderately so. Elsewhere the scales are smooth. Labials small. Limbs long. Hind limbs reach to the eye or to the tip of the snout. Tail not brittle.

Coloration.

The upper parts of a variable shade of dark green or bluish; the thighs, back, and sides marked pretty regularly

and closely with rounded or oblong light spots, which on the lower part of back and tail above exhibit a tendency to transverse light bands. The upper part and sides of head, the tibia, and tail marked with similar dark spots. Two half rings of black, extending across the back between the insertion of the forelegs, each bordered with yellowish. Under parts yellowish-white tinged in specimens with greenish especially between the forelegs; the chin and throat green or blue, and quite reticulated with yellow. The double black half collars are constant; sometimes the anterior is interrupted above and the brachials extend forward. Both begin on the shoulders and seldom if ever connect below.

The coloration is exceedingly variable. In life the light spots, especially in young specimens, are of various shades of red orange, yellow, or white. The females are of a more reddish brown color and never as brilliantly colored as the males, and seldom as large. Both exhibit the tendency to change color, (as in *Anolis*), when excited, or at different times of the day. It does not seem to do this for protection. Males are much more brilliantly colored during the breeding season.

Length.

Measurements of large specimens (male) from Andersen

Co. Total length 302 mm; length from snout to vent 102 mm; from vent to end of tail 198mm.

Certain specimens from the Southeastern part of the state exhibit a certain amount of variation in the scutellation of the head, having two, instead of one row of interorbital plates. The heads appear larger in these specimens. The writer does not deem it advisable to separate these forms as a specimen from Anderson seems to be more or less intermediary having a normal head but the two rows. The number of undivided interorbital scutes in the normal form varies between one and four.

Observations.

This species is a very good one for observation. On a sunny morning they may be seen on rocks along roadsides sunning themselves, or chasing a grasshopper, often refusing to be frightened by the passersby. They are one of the commonest lizards in the central and eastern parts of the state.

The writer has collected many of them, finding them chiefly under rocks. When caught they bite quite ferociously, and hold on with the tenacity of a bulldog. Frequently old males will not run but will attempt to fight. When a boy, the writer has been badly frightened by having a large

male run towards him and jumping on him, running up his clothes to his shoulder. Three specimens have allowed themselves to be taken, refusing to move, but standing quiet with their mouths wide open. They run very swiftly with their tails over their back; often they run on their hind legs alone.

The writer has endeavored to keep these lizards in captivity in the vivarium but they are not good objects for study, as they refuse to become accustomed to their surroundings. They refused all food offered them, and soon became poor and colorless. They would not try to hide under rocks but continually tried to escape, jumping against the screen of their cage. One finally died of starvation in the midst of much food. Others when forced to eat would eject the food as soon as it was swallowed. They would fight each other.

This species lays from five to seven eggs. They are deposited at the end of shallow tunnels immediately below a large flat rock, and are cared for no more by the female. The passageway near the eggs is then stopped up by the female with closely packed earth, and the young when they hatch must dig out through this. Eggs were found on July 20 freshly laid. Eggs found Aug. 15th contained embryos $2\frac{1}{2}$ -3 inches long. These eggs were nearly double the others size. Eggs have

been transferred from their original nests to the vivarium but they failed to develop.

These lizards are more generally feared by ignorant people than any other. They are commonly known as "Mountain Boomers".

Their food consists chiefly of grasshoppers, adults and nymphs of various species. They are cannibalistic. The writer has found the remains of two young in the stomach of a large male.

Habitat.

Usually found about rock quarries, and rocky hillsides. They are strictly diurnal and seldom are seen out save when the sun shines. They spend the nights under flat rocks.

Distribution.

Missouri and Kansas south to Texas, west to Cal., Nevada and Utah.

Dr. Stjneger remarks.- "In spite of the fact that this species, in certain localities at least, ascends the mountains as high as 5,600 ft., it does not occur anywhere in the interior valley of California---; in fact, it does not seem to reach the coast anywhere; it is evidently an inland form".

ger). Cat. Liz. Brit. Mus., 2, 1885.

Lacerta undulata (Bosc), MMS.

Stellis undulatus (Latreille), Hist. Rept., 2, 1802.

Agarna undulata (Daudin), Hist. Rept., 3, 1805.--

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Lacerta fasciata (Greene), Jour. Acad. Nat. Sci. Phila.

1, 1818.

Lacerta hyacinthis (Greene), Jour. Acad. Nat. Sci. Phila., 1,

1818. (Male).

Uromastix undulatus (Werren), Tent. Syst. Amph., 1820 .

Tropidolepis undulatus (Cuvier), Regne Anim. Au. 2nd.

Ed., 2, 1829.-- (Gray), Syn. Rept. Griff. Cuv., 9, 1831; Cat.

Liz. Brit. Mus., 1845.--(Dumeril and Bibron), Erp. Gen., 9,

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(Aug. Dumeril) Cat. Meth. Coll. Rept. Mus. Hist. Nat., 1851.

Sceloporus occidentalis (Baird and Girard), Proc. Acad.

Nat. Sci. Phila., 6,--(Girard), Herp. U. S. Expl. Exp., 1858.

Sceloporus longipes (Baird), Proc. Acad. Nat. Sci. Phila.

1858.

Sceloporus elongatus (Stejneger), N. Amer. Fauna, No.

3, 1890.

Description of Species.

Cephalic plate smooth or longitudinally rugose, espec-

ially anteriorly, and laterally. Supraorbital region with one crescentic series of five or six, large, transverse plates, embracing a short series of three or four additional outer and inner series of small plates in its concavity. Two frontal plates, one before the other, the anterior undivided, usually with a third anterior and its adjacent one so arranged as to be surrounded by four plates. Free part of longest hind toe equal to the length of cephalic plates. Scales of the back and rump about equal, smaller than those near base of tail. Lateral scales smaller than dorsal. Dorsal scales angular pointed, well carinated, with conspicuous spines, and the lateral denticulations indistinct. The belly scales smooth, and strongly emarginated. The scales on the inside of the tibia distally, and behind anus decidedly carinated. Femoral pores about 14. There are about 41 oblique rows of scales from head to tail, and about 23 from cervical fold.

Key to subspecies.

Head scales usually wrinkled; color brown, with undulating brown cross bars. Tail usually blotched or dark.--

S. U. undulatus.

Head scales smooth; two pale dorsolateral stripes, or

small, brown dorsal spots; smaller. No spots on tail only
in median dorsal line.---S. U. Consobrinus.

SCELOPORUS UNDULATUS UNDULATUS (Latreille).

Synonymy.

Sceloporus undulatus undulatus (Cope), checklist Batr.

Rept. N. Amer., 1875.

Sceloporus undulatus (Baird), U. S. Pac. R. R. Reports

10;

Whipple's Rept.

Description of Subspecies.

This species is of rather small size, plates on the anterior portion of the above, with a tendency to being rugose carinate, the more posterior with a slight trace of the same. Smaller supreocular scales squameform or imbricate and carinate. The neck is constricted and narrower than the head. The head plates exhibit a great amount of variation so no exact formulas can be stated. Scales around the body are about 44 in number, and about 40 from back of head to anus. Scales on the back are all acute, and strongly crenated and spinous behind, with one or two slight denticulations on each side. Belly scales smooth. About 7 scales from orbit to ear. There are about 13 well defined femoral pores.

Coloration.

This species is of a brownish olive or gray above. There is a central dorsal portion covering about ten dorsal rows margined by a still lighter line. On each side of the back, from head to anus, are 8 or 10 narrow undulating V-shaped dark angular bands, the angle anterior, and situated in the edge of this light dorsal portion. The space on the back immediately behind the edge of this dark band, is generally lighter than the ground color, especially in the light lateral stripe. In the male they are most usually obliterated by a nearly continuous dusky band, which extends from the back in front of the shoulder to the groin. The male has the under surface of the head dark with two large blue spots on the sides of belly, one on either side. The scales on belly are frequently dark or light speckled with black. Sometimes the spots are aggregate where they form dark short lines. There are some dark, transverse lines on the head.

In the female the sides sometimes appear spotted with whitish, from the tips single scales being of this color. There is occasionally a trace of blue on chin and sides, and generally of black at the insertion of the arm.

Length: total length 160 mm. From snout to vent 68 mm. From

vent to end of tail 92 mm.

Observations.

The *S. u. un ulatus* is the form found in the central and northern part of the state. They are very active and run with great speed. The writer has seen them raise their spinuous scales in a rather formidable manner when angered. They show a slight tendency to change color, as observed in *Crotaphytus* and *Anolis*. The change is usually only from darker to lighter shades.

Dr. O. P. Hay says of their egg laying habit--"The eggs are said to be laid in the sand, in groups. They are deposited about the first of June, and hatched about July 10th. The eggs are long and narrow and covered with a tough coat with no calcareous material. The egg weighs about 20 gr. They are abandoned to their fate by the female, but when the young are hatched, they are treated with the utmost gentleness by all adults."

The number of eggs laid is approximately 10. The food consists chiefly of grasshopper nymphs, ants, and small coleoptera.

Habitat. In the east they are found commonly along fence rows, about fallen trees etc. It has gained the common name-

"Fence Lizard." Often seen along roadside in very dry or rocky places.

Distribution in State.

In the central and northeastern part of the state it is found commonly. In the eastern part it is rare. In the west it is replaced by *S. u. consobrinus*. Specimens are reported from Rooks, Riley, Cloud, Wyandotte and Republic counties.

SCALPORUS UNULATUS CONSOBRINUS. (Baird and Girard).

Synonymy.

Sceloporus consobrinus (Baird and Girard), Marcy's Rept.

on Red Riv. Rept. 1853.--(Baird), U. S. Pac. R. R. Surv.,

Whipples Rept. 1859.--(Cope), Bul. U. S. Nat. Mus., #1/,

880.--(Stejneger), N. Amer. Fauna #3, 1890.

Sceloporus garmani (Boulenger), Proc. Zool. Soc. Lond.,

1882.

Description of Subspecies.

Supraorbital region with one crescentic series of six large transverse plates embracing a much smaller one of (4-5) in its concavity, the whole bordered by a complete row internally and externally. Two central single plates, with a third more anterior, surrounded by five others, the plates all smooth. Occipital large, with two or three plates on each side. Scales of back, rump and sides of body not conspicuously different in size; those of the tail alone larger. Dorsal scales angular, strongly carinated, mucronate with tall spines, and with lateral denticulations, the belly scales decidedly notched. Scales in inside femur, and behind anus smooth. There are about 41 oblique series from head to above anus; about 30 from the lateral cervical fold. There are scarcely any material differences in the head scalation of the

two species save in their external appearances. The head plates appear thicker and more raised; a little wider on the occipital, and the plates on the whole appear to form a more rounding crown in the undulatus, while those of consobrinus seem more depressed, and thinner, the head scales smoother. The tail is without blotches save on the median line. The scales of the hind leg and under surface of the tail are smoother.

Coloration.

The ground color is a light drab-olive color. A broad mediodorsal stripe of this color extends from the occiput to the tail, and sometime may be traced to near its end. On the back this is about six scales wide while it narrows (owing to the obliquity of the scales), to about two scales wide. On either side are two lighter yellowish lines, two scales wide extending from back of the eye to some distance on the tail. On either side below the light line is another dusky line of the ground color, this is also bordered by another lighter line extending along the sides between the legs. In the males, below this second light line is found a large oval asure spot, extending from near the fore arm to hind leg. The dusky stripes on the back are covered with a series of dark brown spots, the medio-dorsal with two rows of about 13-14 in number, these ap-

two species save in their external appearances. The head plates appear thicker and more raised; a little wider on the occipital, and the plates on the whole appear to form a more rounding crown in the undulatus, while those of consobrinus seem more depressed, and thinner, the head scales smoother. The tail is without blotches save on the median line. The scales of the hind leg and under surface of the tail are smoother.

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pear to be the inner legs of V's with the outer leg on the second dusky line. The belly is a yellowish white. Back of arms and legs blotched. Head almost a uniform brown. Length; A large specimen from Trego Co., total length 142 mm. From head to vent $65\frac{1}{2}$ mm. From vent to end of tail 77 mm.

Observations.

This subspecies is very common in central western Kansas. During the summer of 1909 more than 200 specimens were obtained in Trego and Gove Counties, chiefly around the chalk cliffs. This species is very agile and great numbers of them would take refuge under the thistles blown in about the cliffs. Their tails are not as brittle as the scines yet show this tendency to quite a degree. Females taken in July had not as yet deposited their eggs. The number of eggs laid is from 10-20. One very large female contained 15 eggs. The females of *S. w. undulatus* examined contained a smaller number usually from 7-10. I do not know whether this is a constant differentiating characteristic or not.

Farmers in the western part of the state say that they are seen in large numbers in wheat fields, especially under the grain shocks. The writer has found as many as five under a single shock of wheat. Their food consists chiefly of small coleoptera, crickets, ants and grasshoppers.

Habitat: They are found in a great variety of places, about cliffs, in open fields and along low sandy river banks under wheat shocks. They have no permanent holes or burrows.

Distribution.

In the United States they are found from Texas to California and north in Nevada, Utah, Oklahoma, Kansas and Nebraska. In Kansas specimens are reported from Trego, Gove, Graham, Rooks, Osborne, Riley Counties.

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