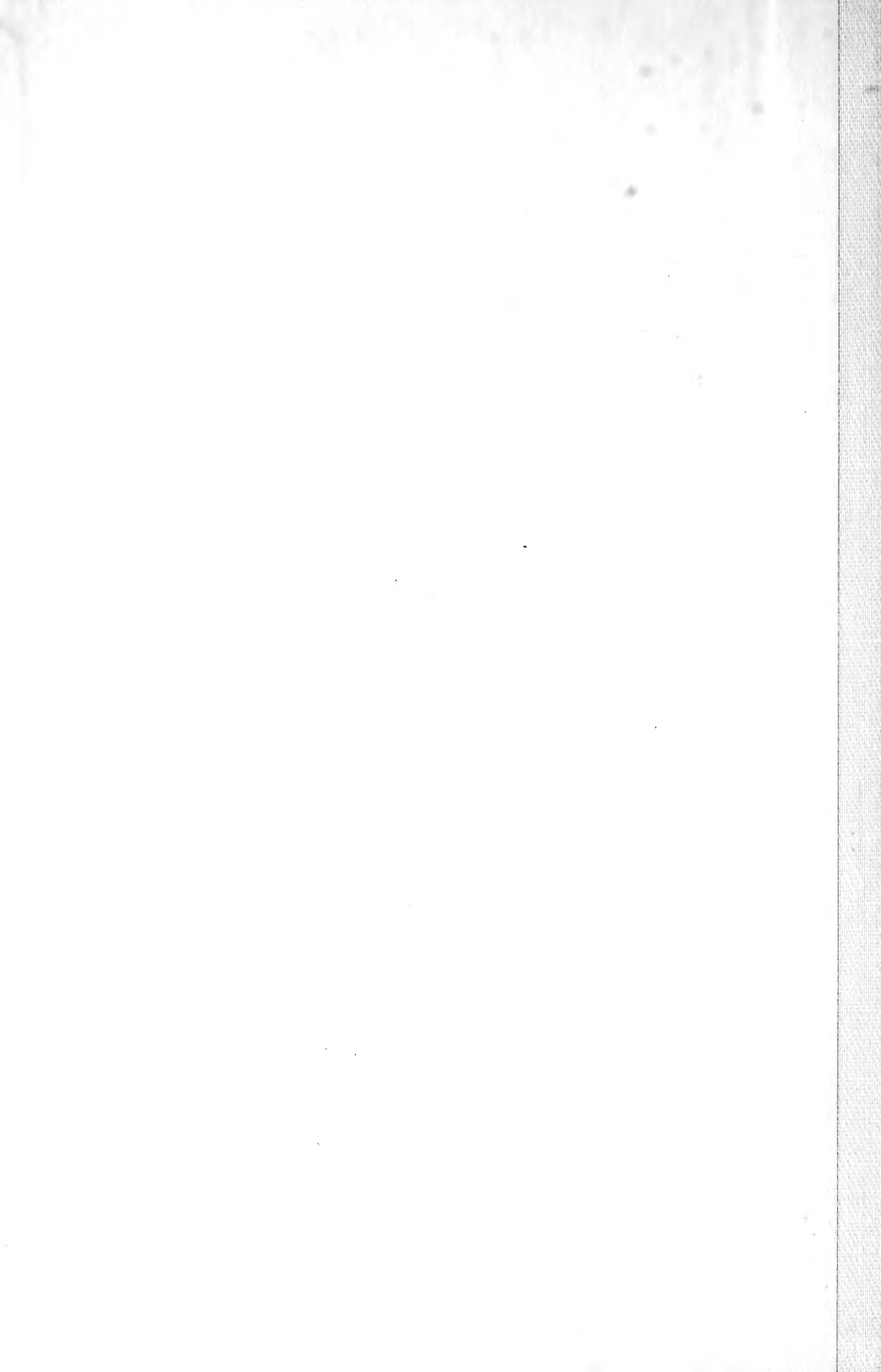


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VOLUME X

NUMBER 2

THE UNIVERSITY OF COLORADO STUDIES

The Amphibia and Reptilia of Colorado

MAX M. ELLIS AND
JUNIUS HENDERSON

PUBLISHED BY THE
UNIVERSITY OF COLORADO
BOULDER, COLO.

MAY, 1913

Price, 50 Cents



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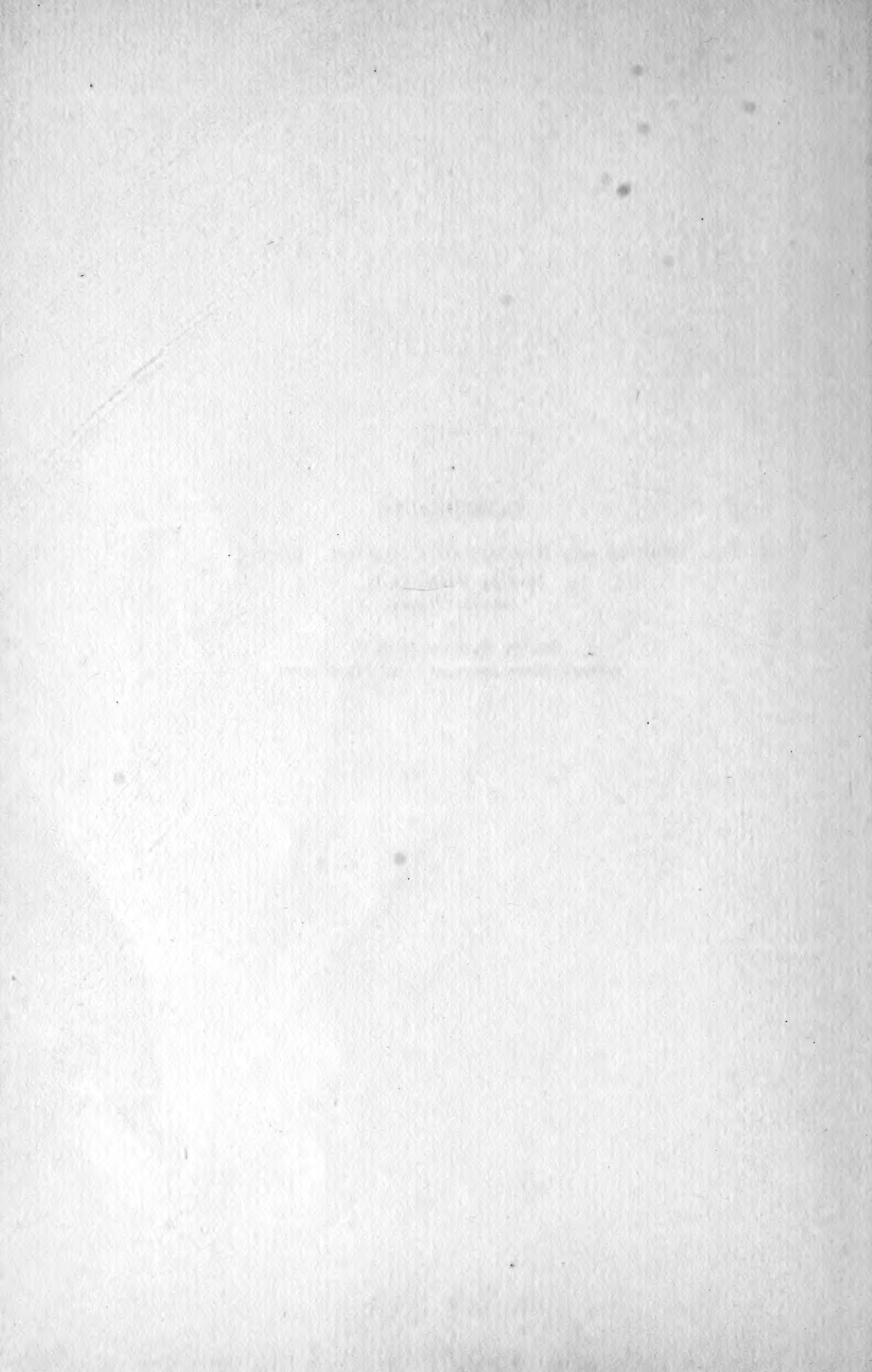


FRANCIS RAMALEY
EDITOR

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Ellis & Henderson)

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MAX M. ELLIS, PH.D.	
Instructor in Biology	
- AND -	
JUNIUS HENDERSON, B.A.	
Professor of Natural History and Curator of the Museum	



DEPARTMENT OF AGRICULTURE / BUREAU OF PLANT INDUSTRY

1911

PLANT INDUSTRY BUREAU REPORT

PLANT INDUSTRY BUREAU REPORT
ON THE
CULTURE OF THE
SUGAR BEET
IN THE
UNITED STATES
BY
J. H. HARRIS
CHIEF OF BUREAU

The sugar beet is one of the most important of our agricultural products. It is a member of the same family as the sugar cane, and its culture is similar to that of the cane. The beet is a biennial plant, and is raised in two seasons. The first season is spent in growing the roots, and the second season is spent in growing the tops. The roots are harvested in the fall, and the tops are harvested in the spring. The roots are then processed into sugar, and the tops are used for animal feed. The culture of the beet is a highly scientific and technical process, and it is the purpose of this report to describe the methods of culture and processing in detail.

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THE AMPHIBIA AND REPTILIA OF COLORADO

PART I¹

BY MAX M. ELLIS AND JUNIUS HENDERSON

Comparatively little has been published concerning the reptiles and amphibians of Colorado. The limited literature consists of records of species scattered through a number of publications, some of which are inaccessible to the general public. Considerable unrecorded material having accumulated, it seems opportune to publish this present report in order to place in the hands of naturalists and the general public such information as we have, bringing together into compact form the records heretofore published, and adding to them the unpublished material, so far as the same has come to our attention.

Environmental Conditions.—Colorado has an area of about 103,500 square miles, a latitudinal extent of about 276 miles and a longitudinal extent of about 375 miles. It is traversed from north to south, irregularly, by the continental divide—the “backbone of the continent”—its waters draining into two oceans. Its rock formations represent all the geological systems except possibly the Silurian. Though its average altitude is only approximately 6,800 feet, it varies in altitude from less than 3,500 feet to over 14,000 feet above sea-level, with consequent differences in climatic and other environmental conditions.² The mean annual rainfall varies in a general way with altitude and topography, from less than 10 inches to 30 inches or more. Data as to temperatures in the larger and higher masses of mountains are as yet very meager, but it may be said that the temperature at elevations of from 13,000 to 14,000 feet drops to a point below freezing nightly even in summer time, while the mean temperature for the warmest months in some of the lower portions of the state is nearly eighty degrees. On the whole, the state is a cool one. The diurnal range of temperature is great over the entire state.

¹ *Publication of the Colorado Biological Survey*, No. 14.

² ROBBINS, W. W., “Climatology and Vegetation in Colorado,” *Botanical Gazette*, Vol. XLIX, pp. 256-280, 1910, with maps, diagrams, tables and general discussion.

From east to west the state may be divided roughly into three topographical areas. (1) The eastern two-fifths (approximately) is included in the western portion of the Central Great Plains of North America. It is a region of flat or rolling prairies, semi-arid and treeless, except along the borders of the few streams, and where artificial irrigation has been adopted. (2) At their western edge the plains abruptly give way to the steep and high foothills which flank the great mass of mountains occupying the central area and extending from the northern border of the state clear across to the southern boundary, enclosing several open areas called "parks," of which the principal ones are North Park, Middle Park, and South Park. (3) The western portion of the state, beyond the higher ranges of mountains, is an area of mesas and dissected plateaus. The foothills and mountains are to a great extent heavily forested, chiefly by coniferous trees, up to an altitude of from 10,500 to 11,500 feet. The higher portions of the western mesa region are also forested, chiefly with pinyon pine and cedar.

Living Faunas and Floras.—In such a region, with its great differences of altitude, temperature, moisture and soil, a large fauna and flora would be expected, and in case of the flora and some of the zoölogical groups this expectation is fully realized. On the other hand, however, the reptilian and amphibian faunas are not very large, because of certain limiting factors, though there are probably more species found than is popularly supposed. The present paper records altogether 45 species of reptiles and 11 species of amphibians.

The class Reptilia includes crocodiles, alligators, turtles, tortoises, lizards and snakes, of which the first two are not found in our area. The class Amphibia (or Batrachia) includes frogs, toads, newts and salamanders. Both classes are included among the so-called cold-blooded animals. Birds and mammals, whose blood is always warm and does not vary much in temperature with changes in the temperature of the surrounding atmosphere, are called warm-blooded animals, and ordinarily to them a change of a few degrees in blood temperature means death. Reptiles, amphibians and fishes are commonly called cold-blooded animals, not because their blood is always cold, but

because it varies, within certain limits, as the temperature of the surrounding medium—water or air—varies. They can withstand considerable fluctuation in blood temperature without fatal consequences. Nevertheless, such changes have a marked influence upon the activity of these lower vertebrates, especially the reptiles. They are sluggish during cool weather and active during warm weather. Though large portions of Colorado never suffer from extreme cold, and the direct rays of the summer sun are often quite hot at midday over a considerable part of the state, yet on the whole the climate is cool, and even in the warmer areas the diurnal changes are great. The climate of the mountains, which occupy so much of the state, is especially cool, and above the 9,000-foot contour frost is apt to occur every month in the year. Hence a portion of the state is wholly unadapted to reptiles, much of it unfavorable, and little of it especially favorable. Lizards, which are so well represented, both in species and in individuals, in the states to the south and southwest, are represented by fewer species in Colorado and entirely unknown in large areas, though the small swifts and horned lizards are rather abundant in favorable localities. Aridity seems favorable to lizards, but most species of reptiles and amphibians are confined to the vicinity of perennial streams, ponds, marshes and lakes. A large portion of Colorado being semi-arid, this is another limiting factor, though some species of snakes, such as the prairie rattlesnake and hog-nosed snake, are common on the dry plains. In some portions of the world forests harbor many reptiles and amphibians, but the forest areas of Colorado are confined to the mountains and high mesas, which are otherwise unfavorable to a large reptilian and amphibian fauna.

Poisonous Species.—There is a widespread fear of snakes, lizards and salamanders, which is often said to be instinctive. It may well be doubted whether this fear is really instinctive. In many communities children are purposely taught to fear these animals, because some species are dangerous and they are unable to discriminate. In other instances children imbibe their fear from others, in the absence of conscious effort to teach them. Such fear, instilled into the minds of children, is very difficult to eradicate in later years. An astonishing

belief, which is also widespread, is that snakes and lizards are "slimy," which is exactly contrary to the fact.

Some of our Colorado amphibians are supplied with secretions which are poisonous when taken internally, which accounts for the fact that dogs, etc., will not usually molest toads. Their "bite," however, need not be feared.

In this region the bites of most reptiles and all amphibians are practically harmless. The spotted salamander, so much dreaded by most people, is not poisonous. None of our Colorado lizards are poisonous. Only one type of snake thus far found in the state is dangerous—the rattlesnake. It is true, some species can inflict a slight wound, which may become infected and thus cause trouble which would naturally, though erroneously, be attributed to snake poison. A scratch or bruise of any kind may become infected. The hog-nosed snake has a very bad reputation in eastern Colorado, but is in fact quite harmless, and students of snakes have no hesitation about handling it, despite the stories told of its venomous character. Considerable of the misconception concerning the dangerous character of various species is likely due to misidentification of species. Thus in some instances the hog-nosed snake and the copperhead have been confused, and the bullsnake, rattlesnake and hog-nosed snake are easily confused by persons who are not very familiar with them, or not close observers, or who get excited when they encounter a snake. Of course, in view of all the facts, it is as well for the layman, unless he knows the species, to avoid handling snakes, or at least to avoid their bites.

The danger of being bitten by even the venomous species is comparatively slight. It is said that in 1872 one western expedition killed not less than 2,000 prairie rattlesnakes, and not a man or animal was bitten.¹

The venom of snakes is in a measure proportioned to the size of the reptile. Hence our small Colorado species are by no means so dangerous as the large species of the South. Still, our Colorado rattlesnake is to be reckoned as a dangerous species, especially to

¹ STEJNEGER, LEONHARD, "Poisonous Snakes of North America," *Ann. Rept. U.S. Nat. Mus.* for 1893, . 444.

young children, and even to an adult if the venom is introduced directly into the circulation, which can very seldom happen. Under ordinary circumstances the bite is not apt to be fatal to an adult. Out of a considerable number of cases which have come to our knowledge, we have thus far but one report of death in Colorado as a result of snake bite—a four-year-old boy at Marshall, Boulder County—though there may be others. This is said, not with the idea of making people less vigilant in avoiding the reptiles or less prompt in seeking relief from their bites, but to allay, in a measure, the fear of fatal results and the excitement following a bite, which combine to render wise treatment and recovery more difficult.

The great works of Mitchell and Reichert on the venom of serpents¹ are not likely to be available to the general reader, but these and many other publications have been summarized by Stejneger.² Men who have studied the subject with great care are quite emphatic and almost unanimous in condemning the practice of using large quantities of alcohol in case of snake bite. Many cases of death following snake bite appear from the symptoms to have been the direct result of alcoholic poisoning, the alcohol being often administered in such quantities as to produce convulsions, under the mistaken notion that it is an antidote for the snake venom and that under such circumstances large quantities may be administered with impunity. It is not an antidote, and may have just the effect not desired. The strychnia treatment can of course be safely administered only under the watchful eye of a skilled physician. In a sparsely settled community getting a patient to a physician involves delay. In such an emergency, probably Dr. Stejneger's suggestion would meet the approval of most authorities, though they might differ somewhat as to minor details. His suggestion is as follows:

As for the preliminary treatment before medical assistance can be obtained or rational remedies applied, but little can be added to the old methods employed.

¹ MITCHELL, S. WEIR, "Researches upon the Venom of the Rattlesnake," *Smithsonian Contributions to Knowledge*, Vol. XII, No. 135, 1860; MITCHELL, S. WEIR, and REICHERT, EDWARD T., "Researches upon the Venom of Poisonous Serpents," *Smithsonian Contributions to Knowledge*, 1886.

² STEJNEGER, LEONHARD, "The Poisonous Snakes of North America," *Ann. Rept. U.S. Nat. Mus.* for 1893, pp. 337-487, 1895. See especially pp. 457-475 as to the poison; pp. 475-478 as to treatment; pp. 478-480 as to preventive inoculation, immunity and serum treatment.

The first thing to be done is to tie a strong ligature or two, a string or a handkerchief, between the wound and the heart, whenever practicable; next, cutting deeply into the punctures, so as to make the blood flow freely; sucking out of the blood from the wound, a procedure perfectly harmless, unless the person doing it has an open wound in the mouth; next, careful loosening of the ligature so as to admit a small quantity of the fresh blood to the ligated member in order to prevent mortification; next, administration of a stimulant; if at hand, small doses of an alcoholic liquor being given internally at frequent intervals; if alcohol is not at hand, and a stimulant appears imperative, a small dose of ammonia might be given, but *only* very shortly after the bite, not on a later stage, when it will certainly do harm, at least in cases of poisoning by rattlesnake, copperhead or water moccasin; if the patient has to wait for the arrival of a doctor, now is the time to try all reliable means to produce a profuse perspiration.

We may add that the wound and incisions may be washed with a solution of potassium permanganate, made by dropping enough of the crystals into water to give a rich wine color. If a hypodermic syringe be at hand, some of the solution can be injected in the neighborhood of the wound, but care must be taken not to strike an artery or vein with the solution, as that might prove speedily fatal.

Dr. W. J. Baird, of Boulder, has told us that a 1:60 solution of calcium chlorate in water may be injected in and about the wound with good effect, this compound acting upon the snake poison.

Some recent authors have condemned the practice of sucking the wound as a procedure both dangerous and useless. If one be reasonably sure that the mouth is free from wounds or sores and the teeth sound, there can be little danger, and some good must come from extracting a portion of the poison.

An outfit with full directions for the treatment of snake bites, including all necessary instruments and materials, with the Pasteur anti-venom serum, is now on the market.¹

Economic Relations.—Most people feel that it is a solemn duty to kill snakes and salamanders at sight. This is a mistaken policy, but so firmly established that it seems almost useless to protest. Most (perhaps we should say all) reptiles and amphibians are distinctly useful under natural conditions, where natural enemies keep them in

¹The addresses of firms handling these supplies may be obtained by writing to the Museum of the University of Colorado.

check. Some species may become harmful under artificial conditions, when the balance of nature has been disturbed by the destruction of their enemies,¹ but even under artificial conditions the checks upon increase are usually sufficient to make them useful, rather than harmful. Frogs are harmless and are used for food. Toads help to keep insects in check about the house and garden. Lizards serve a similar purpose in other places. Snakes subsist largely upon insects, mice and other pests. Even the rattlesnake does much good in that way, and, before the settlement of Colorado, served to keep the prairie-dogs in check, congregating about the colonies of the latter during the breeding season and subsisting on the young "dogs." On the other hand, snakes do destroy some eggs and young birds of useful species, though the harm they thus do is greatly outweighed by the good. Except perhaps around poultry yards it would be better to destroy only the rattlesnake.

Extinct Reptilian Faunas.—The great amphibians of Carboniferous age do not seem to be represented in the rocks of Colorado, but the gigantic lizard-like reptiles of Jurassic and Cretaceous times are well represented, their fossil remains showing that some of them were to be numbered among the largest, if not the largest, animals which ever lived on the earth. These great lizards are often all referred to as dinosaurs, although they include several distinct groups. Their scattered bones occur in many parts of the state, but the most important remains have been found near Cañon City and Morrison. They survived but a short while the retreat of the sea at the close of Cretaceous time, and are now wholly extinct everywhere.² During Tertiary time large land tortoises lived in northeastern Colorado, and their remains are found in the rocks of that age, especially in the neighborhood of Pawnee Buttes.³

¹ FISHER, A. K., "The Economic Value of Predaceous Birds and Mammals," *Yearbook of U.S. Dept. Agric.* for 1908, pp. 191-192, 1909.

² See MARSH, OTHNIEL C., "Vertebrate Fossils," *Geology of the Denver Basin in Colorado, U.S. Geol. Surv., Monog.*, Vol. XXVII, pp. 473-527, 1886; "The Dinosaurs of North America," *16th Ann. Rept. U.S. Geol. Surv.*, Part I, pp. 133-414, 1896; HATCHER, JOHN B., "The Ceratopsia," *U.S. Geol. Surv., Monog.*, Vol. XLIX, 1907; CASE, E. C., "A Revision of the Cotylosauria of North America," *Carnegie Inst. Wash., Pub.* No. 145, 1911.

³ See HAY, OLIVER P., "The Fossil Turtles of North America," *Carnegie Inst. Wash., Pub.* No. 75, 1908.

Collecting and Preserving Specimens.—There are large areas in the state from which no amphibians or reptiles are recorded, and no areas represented by large collections. In order to better understand the distribution of species, and to ascertain what unrecorded species may inhabit the state, it is desirable to obtain as much material as possible from every portion of Colorado. Specimens may be sent to the University Museum, at Boulder, at its expense, where they will be identified and returned to the sender, if desired, at his expense; otherwise they will be placed in the museum collection. If sufficient material can be accumulated, it is hoped some time to supply the principal high schools of the state with collections illustrating the herpetology of Colorado.

In collecting specimens care should be taken not to mutilate them, especially the head. If killed with a stick or other instrument the stroke should be back of the head, not on the head, and just sufficient to kill without mutilating. If it is convenient to confine the specimen in a closed vessel, it can of course be easily killed with ether or chloroform. It can then be preserved in grain alcohol, denatured, if not obtainable in natural condition, or 5 per cent solution of formaldehyde. Punctures, or in case of large specimens short slits, should be made in the abdomen, the incision extending just through the skin, in order to allow the alcohol or formaldehyde rapidly to penetrate all portions. In shipping, the solution may be poured off after the specimens have stood in it for two or three days, and the specimen wrapped in cloth or some other absorbent soaked in the solution.

The Literature.—The greater part of the literature of Colorado herpetology is based upon collections made many years ago, chiefly by the various expeditions and surveys sent out by the United States government. In the early reports many of the localities were indefinite, and a great deal of carelessness in subsequently reprinting the records has added to the confusion. Some labels read simply "Republican River," which river traverses portions of three states; or "Platte River," yet there are two distinct rivers of that name, one in Missouri and one in Nebraska, with branches in Colorado and Wyoming. "South Fork" may or may not refer to the South Platte in some cases.

Fort Laramie, Wyo., and Laramie, Wyo., have certainly been confused in some instances. Nebraska in the early reports may mean any portion of the territory formerly included under that name, thus requiring an extensive knowledge of both western geography and western history to avoid mistakes. Some Fort Bridger, Wyo., records have been inadvertently placed in Utah, and some Fort Garland, Colo., records have been ascribed to New Mexico. We have tried to avoid all records where there is a real doubt as to the locality, or have indicated the doubt. In the accompanying bibliography we have included all the publications which have reached our attention directly bearing upon Colorado herpetology, several which are limited to neighboring states, some works of general reference and several on fossil forms.

In citing the published records we have given the names used by the authors cited, so that the reader may determine for himself whether, in the light of present-day knowledge or future investigation, such references are justifiable. As in all other branches of natural science, nomenclature is rapidly changing.

Material.—The classification and description of the Colorado species has been based, as far as possible, on specimens actually examined by us. No records have been included in this report which were not based on captured specimens. When specimens were merely seen, although the identification may have been quite correct, we deemed the chance of error great enough to list them only as "reported specimens." The material used by us is for the most part that in the Museum of the University of Colorado. Through the kindness of the officials of the Colorado State Historical and Natural History Museum, the Colorado Museum of Natural History, the Agricultural College, and the Teachers' College Museum, we have been permitted to examine their specimens of Amphibia and Reptilia and include the records in this report. In addition to the various specimens collected in Colorado, we have made free use of the numerous specimens of Colorado species, collected in adjoining states, in the University Museum.

We wish to express our thanks to the following persons in particular, through whose kindness the work has been materially advanced: Professor L. A. Adams, Professor A. E. Beardsley, Professor E. Bethel,

Professor T. D. A. Cockerell, and Messrs. W. L. Burnett, L. J. Hersey, J. C. Smiley, H. G. Smith and A. G. Vestal.

SYSTEMATIC ACCOUNT

By means of the following key any of the forms found in Colorado belonging to the classes Amphibia and Reptilia may be separated readily, although considering these classes as a whole, there are forms which it does not cover. The detailed zoölogical definitions of these classes are given under the class headings, which descriptions cover all forms.

- A.** Body smooth, without scales or other epidermal structures on the body; frogs, toads, salamanders and tree frogs. Class *AMPHIBIA* (page 48).
- AA.** Body with scales or epidermal plates of some sort (excepting the soft-shelled turtles, which may be recognized by their dorsal and ventral shields); snakes, lizards and turtles. Class *REPTILIA* (page 61).

Class AMPHIBIA

Poikilothermous vertebrates with two occipital condyles, most species with functional gills in the early stages; skin without scales (except in the *Gymnophiona*); embryo without amnion and allantois, usually passing through a "tadpole" stage.

- A.** Tail present throughout life.
Order *CAUDATA*, the Salamanders and Newts (page 48).
- AA.** Tail not present in the adult stage.
Order *SALIENTIA*, the Toads and Frogs (page 50).

Order CAUDATA

This group of Amphibians, although fairly large, is represented by but a single species in Colorado.

Family AMBYSTOMIDAE

Four limbs present and well developed; eyes with eyelids; side of the head without a spiracle in the adult. This family of Salamanders is represented in North America, South America, Asia and Japan, although the majority of the species are found in the new world.

Genus **AMBYSTOMA** Tschudi

Ambystoma Tschudi, *Classification der Batrachier*, p. 92, 1838.

Ambystoma tigrinum (Green)

TIGER SALAMANDER

Salamandra tigrina Green, *Journ. Acad. Nat. Sci. Phila.*, Vol. V, p. 116, 1825.

Amblystoma mavortium—YARROW, *Wheeler Survey*, Vol. V, pp. 516-519, 1875 (Denver, San Luis Valley).

Amblystoma trisruptum—YARROW, *U.S.N.M. Bull.* 24, p. 150, 1882 (South Park, Colo.).

Amblystoma tigrinum—COPE, *U.S.N.M. Bull.* 34, p. 85, 1889 (South Park, Colo.); ELROD, *The Museum*, Vol. I, p. 263, 1895 (Pike's Peak, Colo.); COCKERELL, *Univ. Colo. Studies*, Vol. VII, p. 131, 1910 (Meeker, Colo.); PROSSER, *Univ. Colo. Studies*, Vol. VIII, pp. 257-263, 1911 (Tolland, Colo.); CARY, *N. Am. Fauna*, No. 33, pp. 22 and 40, 1911 (Loveland and Estes Park, Colo.).

Head longer than wide, its width equal to or slightly less than that of the body; body stout and somewhat depressed, with 12 costal grooves; tail compressed and long, its length usually about equal to that of the body and head; digits, 4-5, not webbed; sole of the foot with two tubercles; size medium, length up to twelve inches.

Ground color brown, blue-black or black, of a waxy luster, with numerous irregular spots and bars of yellow which are often so united as to cover a greater area than the ground color; ventral parts yellow, or blackish overlaid with yellow; throat bright yellow.

The larvae of this species are a rather uniform dark brown and may be recognized by the large bright red tufts, the external gills, on each side of the throat.

A. tigrinum ranges from Maine to California and south well into Mexico, a range greater than any other North American species of the Caudata. In the southern part of its range the larvae often become sexually mature and reproduce without transforming into adult salamanders, a condition which may be brought about artificially by confining the larvae to the water and keeping it warm enough. These sexually mature larvae are known as Axolotls and are quite abundant in the lakes and ponds in Mexico. They are highly prized by the natives for food. The eggs are laid in the early spring. They are

attached to plants or débris in the water near the shore. If conditions are favorable the salamanders mature in a single season, the adults leaving the water late in August. This salamander feeds on insects, insect larvae, worms and small Mollusca. Although popularly believed very dangerous, this species is quite harmless.

Colorado specimens.—*University Museum:* Meeker, August 16, 1909 (135 mm.), A. H. Felger, No. 64; Ohio City, July 4, 1911 (125 mm.), F. Rohwer, No. 133; Boulder, March 28, 1912 (222 mm.), E. Miller, No. 177; Tolland, July 27, 1911 (6 specimens, 120–200 mm.), F. Ramaley, No. 178; *Colorado State Historical and Natural History Museum:* Denver, September 10, 1892 (5 specimens, 100–150 mm.), H. G. Smith; Denver, August 9, 1900 (220 mm.), W. C. Ferril; Denver, August 10, 1900 (160 mm.), W. C. Ferril; Denver, August 18, 1900 (140 mm.), W. C. Ferril; Denver, July 18, 1902 (120 mm.), W. C. Ferril; Denver, July 24, 1904 (255 mm.), David Bellrose; Denver, August 31, 1904 (250 mm.), Mrs. N. P. Nelson; Denver, October 3, 1905 (110 mm.), Guy Bradbury; Denver, October 24, 1905 (180 mm.), F. A. Richardson; Broomfield, December 13, 1905 (270 mm.), William Ireland; Denver, October 24, 1907 (150 mm.), Richard Johnston; *State Teachers' College Museum:* Trinidad, A. E. Beardsley; Cache la Poudre, A. E. Beardsley; Alexander Lakes above Delta, and Durango, A. E. Beardsley; *reported* by Cockerell from Boulder, October 7, 1907, by Ramaley from Redrock Lake, near Ward, and from Beaver Reservoir, Boulder County. General reports show this species to be very abundant over the state.

Order SALIENTIA

Four of the five families of this group known from North America are represented in Colorado. The following key will distinguish them.

- A. Parotoid glands present, usually large and prominent; terrestrial.
 - B. Pupil of the eye vertical; upper jaw with teeth; parotoids not prominent in some species.
 - Family *Pelobatidae*, the Burrowing Toads (page 51).
 - BB. Pupil of the eye round or horizontal; skin with large warts; jaws toothless. . . . Family *Bufo**nidae*, the true Toads (page 52).
- AA. Parotoid glands wanting; most of the species semi-aquatic.
 - C. Tips of the digits more or less expanded into adhesive disks for climbing; size rather small. . . . Family *Hylidae*, the Tree Frogs (page 56).
 - CC. Tips of the digits not expanded into adhesive disks; size medium to large. . . . Family *Ranidae*, the Frogs (page 59).

Family PELOBATIDAE

The Western Spade-foot Toad is the only member of this family found in Colorado.

Genus SCAPHIOPUS Holbrook

Scaphiopus Holbrook, *N. Am. Herpt.*, Vol. II, p. 85, 1842.

Tympanic membrane present and external, although often quite obscured; hind foot with an elevated tubercle near the heel. The single species, *S. hammondi* Baird, has been reported from Colorado.

Scaphiopus hammondi Baird

WESTERN SPADE-FOOT TOAD

Scaphiopus hammondi Baird, *Rept. Pac. R.R. Survey*, Vol. IV, Reptiles, pl. 28, fig. 2, 1859.

Scaphiopus hammondi—CARY, *N. Am. Fauna*, No. 33, p. 27, 1911 (Morris, Colo.).

Scaphiopus hammondi bombifrons—DICKERSON, *Frog Book*, pl. ix, 1907 (Denver, Colo.).

Characterized at once by the vertical pupil of the eye; parotoid glands and tympanum quite obscure; length of the hind limb equal to or slightly greater than the length of the head and body; distance between the eyes equal to or slightly greater than the width of the eye; size medium to small, length less than three inches.

Dorsal color yellowish brown, greenish brown or gray; with or without two or more lighter stripes dorsally; usually with a dark stripe back of each eye; tubercles red or yellow, or tipped with red or yellow; under parts whitish with a bluish or a reddish cast; throat black in the male.

Two subspecies of this toad may be recognized.

- a. Muzzle high, rather abruptly truncate; skin rather rough; west of the range *S. h. hammondi* Baird.
- aa. Muzzle rounded; skin quite smooth; east of the range.

S. h. bombifrons (Cope).

The Spade-foot Toads are of particular interest because of their peculiar appearance and habits. They lead a rather solitary life in

burrows of their own construction. Because of this habit they are rarely seen except in the spring when they come to water to lay their eggs. At this time they are among the noisiest of amphibians. All observers agree as to the remarkable power of the voice of these toads. Professor A. E. Beardsley tells us that this toad is very abundant near Greeley every spring.

The Western Spade-foot Toad ranges through the Rocky Mountain and Great Basin region.

Colorado specimens.—*State Teachers' College Museum*: Greeley and near Greeley, A. E. Beardsley.

Family BUFONIDAE

Genus **BUFO** Laurenti

Bufo Laurenti, *Synopsis Reptilium*, p. 25, 1768.

A large genus of cosmopolitan distribution. Tongue free posteriorly and fastened to the floor of the mouth anteriorly; pupil of the eye horizontal; digits, 4-5, toes webbed. The toads are of large economic importance because of their feeding habits. It has been shown by various observers that the number of insects destroyed by a single toad is remarkable. Since toads are absolutely harmless and are quite inoffensive, they should be protected. Five forms are recorded from Colorado.

- a. Top of the head without bony crests.
 - b. Ventral parts spotted; parotoids rounded; webbing between the digits deeply indented *B. boreas* Baird and Girard.
 - bb. Ventral parts unspotted; parotoids elongate, wider posteriorly; webs short. *B. debilis* Baird.
- aa. Top of the head with elevated bony crests.
 - c. Median crests parallel, joining the lateral crests at right angles; no diagonal crests. *B. woodhousei* Girard.
 - cc. Median crests diverging posteriorly.
 - d. A short, diagonal crest, directed mesially from the angle at the junction of the median and lateral crests on each side.
 - B. americanus* LeConte.
 - dd. No diagonal crest; median crests diverging widely posteriorly.
 - B. cognatus* Say.

Bufo boreas Baird and Girard

MOUNTAIN TOAD; COLUMBIAN TOAD

Bufo boreas Baird and Girard, *Proc. Acad. Nat. Sci. Phila.*, p. 174, 1852.

Bufo microscaphus—YARROW, *Wheeler Survey*, Vol. V, p. 523, 1875 (South Park, Colo.); YARROW, *U.S.N.M. Bull.* 24, p. 162, 1882 (South Park, Colo.).

Bufo columbiensis—COPE, *U.S.N.M. Bull.* 34, p. 271, 1889 (South Park Colo.); YOUNG, *Proc. Acad. Nat. Sci. Phila.*, p. 298, 1909 (east slopes of Arapahoe Peaks, Boulder Co., Colo.).

Head short, widest just back of the eyes, its length 4 or a little more in the total length; muzzle long and sloping; fore-arm longer than the hand; glands on the tibia; size medium, length up to five inches.

General color brownish or greenish gray; sides with numerous irregular light colored blotches; usually a light colored area near the posterior angle of the mouth; ventral parts yellowish, whitish or even greenish, much mottled with black; tubercles of the feet black; tips of the digits dark brown.

Range, Colorado north and west to Puget Sound. In this state found only in the mountains.

Colorado specimens.—*University Museum*: Redrock Lake, above Ward, July 21, 1907 (75 mm.), G. S. Dodds, No. 179; Copeland Park, Boulder County, September 5, 1907 (3 specimens, 45–90 mm.), S. A. Rohwer, No. 180; Park Lake, Tolland, July, 1909 (2 specimens, 85 and 90 mm.), F. Ramaley, No. 181; Black Canyon, Tolland, August 29, 1912 (60 mm.), A. G. Vestal, No. 182; *Colorado State Historical and Natural History Museum*: Cumbres Pass, August 1, 1902 (75 mm.), W. C. Ferril; *State Teachers' College Museum*: Chamber's Lake and Grand Mesa, A. E. Beardsley.

Bufo debilis Girard

SONORAN TOAD

Bufo debilis Girard, *Proc. Acad. Nat. Sci. Phila.*, p. 87, 1854.

Head short, its length about 4.5 in the total length; muzzle truncate; hind leg short, its length equal to that of the head and body; parotoid glands large, widening posteriorly so as to be roughly triangular in outline; size small, rarely exceeding two inches in length.

General color brownish to ashy gray; small tubercles black; legs

more or less banded with black; under parts whitish or yellowish, or even dusky, but unspotted.

Range, Colorado south into Chihuahua.

Colorado specimen.—*State Teachers' College Museum*: Las Animas County, near Trinidad, 1883, A. E. Beardsley (det. A. E. Beardsley).

Bufo woodhousei Girard

WOODHOUSE'S TOAD

Bufo woodhousei Girard, *Proc. Acad. Nat. Sci. Phila.*, p. 86, 1854.

Bufo woodhousei—BAIRD, *Pac. R.R. Surv.*, Vol. X, v, p. 20, 1859 (upper Arkansas); COPE, *U.S.N.M. Bull.* 34, p. 284, 1889 (Colorado Springs, Colo.).

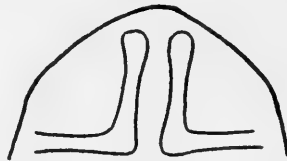
Bufo lentiginosus frontosus—YARROW, *Wheeler Survey*, Vol. V, p. 520, 1875 (Twin Lakes, Colorado Springs and Pueblo, Colo.).

Bufo lentiginosus woodhousei—YARROW, *Wheeler Survey*, Vol. V, p. 521, 1875 (between Pueblo and Ft. Garland); CARY, *N. Am. Fauna*, No. 33, p. 27, 1911 (Rangeley and Rifle, Colo.).

Head very short, almost twice as wide as long, its length about 5 in the total length; muzzle quite abrupt, somewhat rounded at the tip; parotoids long and oval; size large, males three to four inches in length, females four to six inches.

General color dull gray or dark brown, yellowish laterally; often quite distinctly marked with blackish spots; a light mid-dorsal stripe; ventral parts yellowish or whitish with small dark spots near the fore limbs; throat black in the male.

Range, Rocky Mountain region. This species is regarded by many authors as but a well-defined variety of *Bufo lentiginosus* Shaw.



Bufo woodhousei.—Diagram of Bony Crests

Colorado specimens.—*University Museum*: North of Boulder, June 1, 1910 (80 mm.), J. Henderson, No. 119; Grand Junction, August 8, 1912 (7 specimens, 32–90 mm.), J. Henderson and M. M. Ellis, No. 183; Montrose, August 9, 1912 (18 mm.), J. Henderson, No. 184; Rio Florida, near Durango, August 11, 1912

(95 mm.), J. Henderson and M. M. Ellis, No. 185; *Colorado State Historical and Natural History Museum*: Denver, July 27, 1900 (85 mm.), W. C. Ferril; Denver, August 6, 1900 (100 mm.), W. C. Ferril; Lamar, June 12, 1904 (40 mm.), H. G. Smith; *State Teachers' College Museum*: Greeley, A. E. Beardsley; *reported common at Greeley by Beardsley.*

Bufo americanus LeConte

AMERICAN TOAD (*Figure 2, Plate I*)

Bufo americanus LeConte, in Holbrook, *N. Am. Herpetology*, Vol. V, p. 5, 1842.

Bufo lentiginosus lentiginosus—YARROW, *U.S.N.M. Bull.* 24, p. 164, 1882 (Ft. Garland, Colo.).

Bufo lentiginosus americanus—YARROW, *U.S.N.M. Bull.* 24, p. 167, 1882 (South Platte River and Central Park).

Head short, its length 4 to 4.5 in the total length; muzzle rather abrupt; parotoids large and oval; size medium, males two to three inches, female three to four inches in length.

General color variable, yellow, brown, dark brown, gray or even greenish; usually much spotted with a color lighter than the ground color; a pale mid-dorsal stripe usually apparent; warts dull or marked with red or yellow; ventral parts light; throat of the male black.

Range, southern Canada south into Mexico, rather general in the United States. This species is regarded by many authors as merely a well-defined variety of *Bufo lentiginosus* Shaw, the common toad.



Bufo americanus.—Diagram of Bony Crests

Colorado specimens.—*University Museum*: Boulder, September 10, 1909 (85 mm.), J. Henderson, No. 186; Julesburg, July 19, 1912 (28 specimens, 10–105 mm.), J. Henderson and M. M. Ellis, No. 187; Brighton, July 26, 1912 (9 specimens, 20–40 mm.), J. Henderson, No. 188; *Colorado State Historical and Natural History Museum*: Denver, July 27, 1900 (70 mm.), H. G. Smith; Julesburg, August 31, 1905 (3 specimens, 40–45 mm.), H. G. Smith; Denver, August 6, 1900 (2 specimens, 40 and 50 mm.), W. C. Ferril.

Bufo cognatus SaySAY'S TOAD; WESTERN TOAD (*Figure 1, Plate I*)

Bufo cognatus Say, *Long's Exped. Rocky Mts.*, Vol. II, p. 190, 1823.

Bufo lentiginosus cognatus—YARROW, *Wheeler Survey*, Vol. V, p. 521, 1875 (Ft. Garland, Colo.); YARROW, *U.S.N.M. Bull.* 24, p. 165, 1882 (Ft. Garland, Colo.).

Bufo lentiginosus frontosus—YARROW, *U.S.N.M. Bull.* 24, p. 165, 1882 (Colorado Springs, Colo.).

Bufo cognatus—COPE, *U.S.N.M. Bull.* 34, p. 277, 1889 (Ft. Garland, Colo.); DICKERSON, *Frog Book*, pl. xxxii, fig. 90, 1907 (Denver, Colo.); COCKERELL, *Univ. Colo. Studies*, Vol. VII, p. 130, 1910 (Medano Ranch, Costilla Co., Colo.).

Head quite short, much wider than long, its length about 5 in the total length; parotoids large and oval; size large, length three to six inches.

General color yellowish brown, gray or greenish; dorsal pattern of large blotches of a rather bright dark brown or black, giving the toad a very conspicuous marking, these spots often more or less confluent; a distinct pale, mid-dorsal stripe; ventral parts yellowish.

A Western plains species, coming into the foothills region.



Bufo Cognatus.—Diagram of Bony Crests

Colorado specimens.—*University Museum*: Medano Ranch, Costilla County, July 2, 1909 (2 specimens, 50 and 55 mm.), E. R. Warren, No. 189; Julesburg, July 19, 1912 (100 mm.), J. Henderson, No. 190; Brighton, July 26, 1912 (9 specimens, 20–35 mm.), J. Henderson, No. 191; *Colorado State Historical and Natural History Museum*: Wray, June 15, 1902 (100 mm.), H. G. Smith; *State Teachers' College Museum*: Greeley, A. E. Beardsley.

Family HYLIDAE

The tree frogs are small amphibians, which, although they still lay their eggs in the water, have become more or less arboreal as adults. This habit has been made possible by the development of adhesive

disks at the tips of the digits. At the same time quite a number of species of this family have suffered a more or less complete loss of the webbing between the digits. Some species are neither arboreal nor aquatic but are rather terrestrial in habit. Tree frogs are found in many parts of the world but the majority of species are natives of the tropics of the New World. Two species belonging to genera restricted to North America are found in Colorado.

a. Fingers and toes almost free, webbing greatly reduced; skin smooth.

Chorophilus Baird.

aa. Toes rather completely webbed; skin rough.

b. Terminal digital disks very small . . . *Acris* Duméril et Bibron.

bb. Terminal digital disks quite prominent. . . . *Hyla* Laurenti.

Genus **CHOROPHILUS** Baird

Chorophilus Baird, *Proc. Acad. Nat. Sci. Phila.*, p. 59, 1854.

A single species of this genus is known from the state.

Chorophilus triseriatus (Wied)

THREE-LINED TREE FROG

Hyla triseriata Maximilian, Prinz zu Wied, *Reise Nord-Amerika*, Vol. I, p. 249, 1865.

Chorophilus triseriatus triseriatus—YARROW, *Wheeler Survey*, Vol. V, pp. 523 and 524, 1875 (Ft. Garland, Fairplay and Pagosa, Colo.); YARROW, *U.S.N.M. Bull.* 24, p. 170, 1882 (Fairplay and Pagosa, Colo.).

Chorophilus triseriatus—COPE, *U.S.N.M. Bull.* 34, pp. 343, 347, 1889 (Laramie River; Fairplay and Pagosa, Colo.); CARY, *N. Am. Fauna*, No. 33, p. 27, 1911 (Rangeley and ten miles east of Slater, Colo.).

Head much depressed, somewhat pointed anteriorly, rather long, its width about 3 in the total length; length of the hind leg to the heel reaching forward to the ear; total length of the head and body about 1.5 in the total length of the hind limb; size small, length less than 1.5 inches; males with a gular sac.

Color quite variable, gray, green, brown, or even reddish; usually with three dark stripes, or at least the indications of three stripes, one in the mid-dorsal region, and one on each side beginning at the

posterior margin of the eye and running parallel to the mid-dorsal stripe; ventral parts whitish, yellowish or greenish.

This species is almost always found on the ground, where it hides away under loose stones or fallen timber. Its generic name signifies "chorus-loving," and refers to the habit of the species of singing more or less in concert in the early spring. The loud voice of the male is the result of the reinforcing resonance given by the expanded gular sac.

Range, United States generally, abundant in the West and Rocky Mountain region. This species is recognized by some authors as but a variety of *C. nigritus* (LeConte).

Colorado specimens.—*University Museum*: Stapp's Lake, Boulder County, August 19, 1905 (18 mm.), G. S. Dodds, No. 192; Copeland Park, Boulder County, September 6, 1907 (2 specimens, 18 and 22 mm.), S. A. Rohwer, No. 193; Bluebird Mine, Boulder County, August 5, 1908 (32 mm.), T. A. McHarg, No. 194; Kremmling, August 5, 1911 (7 specimens, 18–20 mm.), J. Henderson, No. 131; Boulder, April 26, 1913, (2 specimens, 25–30 mm.), Robert Plimpton; *Colorado State Historical and Natural History Museum*: Denver, August 7, 1889 (2 specimens, 25 and 40 mm.), H. G. Smith; *State Teachers' College Museum*: Greeley and Grand Mesa, A. E. Beardsley.

Genus *ACRIS* Duméril et Bibron

Acris Duméril et Bibron, *Erpétologie Générale*, Vol. VIII, p. 506, 1841.

Acris gryllus (LeConte)

CRICKET FROG

Rana gryllus LeConte, *Ann. Lyceum New York*, Vol. I, p. 282, 1825.

Head depressed and pointed, its length about 3 in the head and body; length of the hind leg to the heel reaching forward to the snout or beyond; male with a gular sac; size small, length under 1.5 inches.

Color variable and changeable; generally brownish, greenish or reddish, and somewhat clouded with dusky; a triangular dark blotch on the top of the head between the eyes; a dark line on each side from the posterior margin of the eyes.

This frog, although a true tree frog, lives on the ground. In the spring it is very noisy, its voice being very powerful because of the gular sac.

Range, eastern and southern United States, west through Nebraska into the Northwest.

Colorado specimens.—*University Museum*: Wray, October 26, 1912 (2 specimens, 18–20 mm.), M. M. Ellis, No. 195.

Genus **HYLA** Laurenti

Hyla Laurenti, *Synopsis Reptilium*, p. 32, 1768.

This genus embraces more than half of the species of *Hylidae* and is represented in all of the large faunal divisions. Most of the species known are from Australia and the New World. The single species *Hyla arenicolor* Cope is found in Colorado.

Hyla arenicolor Cope

ARIZONA TREE FROG; SAND-COLORED TREE FROG

Hyla arenicolor Cope, *Journ. Acad. Nat. Sci. Phila.*, p. 61, 1866.

Head depressed and rounded anteriorly, its length about 3.5 in the total length; length of the hind leg to the heel reaching forward to the eye; first finger distinctly shorter than the second; male with a gular sac; size medium, length two inches or less.

Color variable and changeable; generally brownish gray to greenish, with numerous small rather round blotches of black (these spots sometimes in two irregular rows); hind legs crossed by three poorly defined dark bars; ventral parts roughened; throat dusky; belly whitish; often with a light spot below each eye.

Range, Utah and Colorado south into Mexico and west into California.

Colorado specimen.—*State Teachers' College Museum*: Mesa de Maya, Las Animas County, 1886, A. E. Beardsley (det. A. E. Beardsley).

Family **RANIDAE**

Genus **RANA** Linnaeus

Rana Linnaeus, *Syst. Nat.*, ed. X, p. 354, 1758.

Tongue free posteriorly, fastened anteriorly to the floor of the mouth; upper jaw with teeth; fingers free, toes webbed. A genus of cosmopolitan distribution, being the only one of this family found

in the United States. Of the many species of this genus but a single species, *Rana pipiens*, is found in Colorado.

Rana pipiens Schreber

LEOPARD FROG

Rana pipiens Schreber, *Naturforscher*, Vol. XVIII, p. 185, pl. iv, 1782.

Rana halecina berlandieri—YARROW, *Wheeler Survey*, Vol. V, pp. 526-527, 1875 (Denver and San Luis Valley, Colo.); YARROW, *U.S.N.M. Bull.* 24, p. 181, 1882 (Ft. Garland, Colo.).

Rana virescens brachycephala Cope—COPE, *U.S.N.M. Bull.* 34, p. 405, 1889 (Medicine Bow Creek—possibly Colorado; Ft. Garland, Colo.).

Rana pipiens—COCKERELL, *Univ. Colo. Studies*, Vol. VII, p. 130, 1910 (Meeker, seven miles northeast of Meeker, Buford, and five miles above Buford, Colorado; Medano Ranch, Costilla Co., Colo.); CARY, *N. Am. Fauna*, No. 33, p. 24, 1911 (Vermillion Creek, near Ladore, Colo.).

A lateral longitudinal fold along each margin of the dorsal surface, and several other, usually four, smaller longitudinal folds in the skin between the lateral folds, these smaller folds often much interrupted; head short, 3 to 3.5 in the total length; length of the hind leg reaching forward to the snout or beyond; size medium, length three to four inches.

General color variable, gray, brownish or usually green; dorsal pattern usually of two or more rows of large, rounded, black spots, margined with yellowish; spots across the dorsal surface of the legs forming rather distinct bars; ventral parts uniform white or yellowish.

Range, southern Canada south into Mexico, United States generally. Several subspecies of this species have been described but they all intergrade more or less.

Colorado specimens.—*University Museum*: Boulder, August 8, 1907 (35 mm.), F. Rohwer, No. 196; near Pine Glade School, southwest of Magnolia, August 22, 1907 (2 specimens, 65 and 70 mm.), F. Ramaley, No. 197; Louisville Junction, September 14, 1907 (3 specimens, 40-45 mm.), M. H. Perkins, No. 198; Bluebird Mine, Boulder County, August 5, 1908 (35 mm.), T. A. McHarg, No. 199; Meeker, August 6, 1909 (45 mm.), A. H. Felger, No. 52; seven miles northeast of Meeker, August 12, 1909 (9 specimens, 30-80 mm.), A. H. Felger and J. Henderson, No. 59; Julesburg, July 19, 1912 (17 specimens, 20-80 mm.), J. Henderson and M. M. Ellis, No. 200; Alamosa, July 27, 1912 (60 mm.), M. M.

Ellis, No. 201; Montrose, August 9, 1912 (75 mm.), J. Henderson, No. 202; Rio Florida, near Durango, August 11, 1912 (7 specimens, 60-80 mm.), J. Henderson and M. M. Ellis, No. 203; Grand Junction, August 8, 1912 (5 specimens, 40-50 mm.), J. Henderson and M. M. Ellis, No. 204; *Colorado State Historical and Natural History Museum*: Denver, July 31, 1890 (3 specimens, 30-65 mm.), H. G. Smith; Aurora Lake, near Denver, September 3, 1900 (5 specimens, 40-68 mm.), W. C. Ferril; Denver, September 3, 1900 (55 mm.), W. C. Ferril; Julesburg, September 22, 1900 (2 specimens, 60 and 70 mm.), H. G. Smith; Wray, September 17, 1903 (4 specimens, 30-80 mm.), H. G. Smith; Durango, September 27, 1905 (50 mm.), H. G. Smith; Holly, May 24, 1907 (5 specimens, 40-100 mm.), H. G. Smith; *Agricultural College Museum*: Ft. Collins, May 10, 1894 (3 specimens, 45-50 mm.), L. C. Bragg; *State Teachers' College Museum*: Greeley, A. E. Beardsley; reported common in all parts of the state along watercourses.

Class REPTILIA

Poikilothermous, air-breathing Vertebrates, with functional lung or lungs, without functional gills, and with a single occipital condyle. Embryo with amnion and allantois.

A. Body covered with epidermal plates or scales. Order *SQUAMATA*.

B. Bones of the lower jaw firmly united by a bony suture; mouth not dilatible; four limbs present (except in a few forms not represented in the Colorado fauna).

Suborder *Sauria*, the Lizards (page 61).

BB. Bones of the lower jaw united by ligaments so that the mouth may be greatly dilated; limbs wanting or represented by rudiments.

Suborder *Serpentes*, the Snakes (page 81).

AA. Body covered by two shields, a dorsal and a ventral, of bony or cartilaginous plates. Order *TESTUDINATA*, the Turtles (page 111).

AAA. Body covered with a heavy leathery epidermis; size large; body elongate (not found in Colorado). Order *CROCODYLIA*, the Crocodiles.

Suborder SAURIA

The Lizards

Three of the four families of Lizards recorded from the United States are represented in Colorado. These three may be separated by the following key.

A. Scales on dorsal parts dull, usually keeled; ventral parts covered with scales somewhat larger than the dorsal scales; tongue smooth or covered

with very fine papillae which give it a velvety appearance; tongue thick and only free from the floor of the mouth at the tip.

Family *Iguanidae* (page 62).

- AA.** Scales on dorsal parts very small and granular; ventral parts with large plates; anterior portion of the tongue free from the floor of the mouth; considerable of the surface of the tongue covered with scalelike papillae; tip of the tongue deeply forked. . . . Family *Teiidae* (page 76).
- AAA.** Scales on both dorsal and ventral parts smooth, polished and highly lustrous; anterior portion and sides of the tongue free from the floor of the mouth; considerable portion of the surface of the tongue covered with scalelike papillae; tip of the tongue only slightly notched.
Family *Scincidae* (page 78).

Family IGUANIDAE

The Iguanas and the Iguana-like Lizards

A very large family of lizards, particularly abundant in tropical and subtropical America, although the family is represented in the East Indies. Seven genera of this family have been reported from Colorado and five of these are known to be more or less abundant in the state. The other two stand on uncertain records.

- A.** Body elongate, its width always much less than the length of the tail; posterior margin of the head without bony "horns"; lateral margins of the body without rows of large, pointed, elevated scales.
- b.** A median dorsal row of large, strongly keeled scales, elevated into a dorsal crest. . . . *Dipsosaurus* Hallowell (page 63).
- bb.** No such row of elevated scales in the mid-dorsal region.
- c.** Ear opening exposed.
- d.** A gular fold.
- e.** Occipital plate larger than either nasal plate, separated from the rostral region by not more than ten plates; plates on the top of the head large and irregular.
Uta Baird and Girard (page 64).
- ee.** Occipital plate equal to or smaller than either nasal plate, separated from the rostral region by at least twelve plates; plates on the top of the head small, and much alike in size and shape. . . . *Crotaphytus* Holbrook (page 65).
- dd.** No gular fold. . . . *Sceloporus* Wiegmann (page 67).
- cc.** Ear opening covered. . . . *Holbrookia* Girard (page 70).
- AA.** Body depressed and robust, length of the tail equal to or usually less than the maximum width of the body; head with bony "horns" in the occipi-

tal and temporal regions; body with one or two rows of elevated, large pointed scales on each lateral margin.

- f. Ear opening exposed. . . . *Phrynosoma* Wiegmann (page 71).
 ff. Ear opening covered with scales. . . . *Anota* Hallowell (page 75).

Genus **DIPSOSAURUS** Hallowell

Dipsosaurus Hallowell, *Proc. Acad. Nat. Sci. Phila.*, Vol. VII, p. 92, 1854.

But a single species of this genus is known, *Dipsosaurus dorsalis* (Baird and Girard).

Dipsosaurus dorsalis (Baird and Girard)

DESERT IGUANA OR KEEL-BACKED LIZARD

Crotaphytus dorsalis Baird and Girard, *Proc. Acad. Nat. Sci. Phila.*, p. 126, 1852.

Dipsosaurus dorsalis—YARROW, *U.S.N.M. Bull.* 24, p. 54, 1882 (Colorado); COPE, *Rept. U.S.N.M.*, p. 245, 1898 (Colorado).

Gular fold present; head small, about equal to the hind foot in length; femoral pores present; nostrils terminal, beyond the end of the canthus rostratus; a mid-dorsal row of large, elevated, strongly keeled scales; size moderately large; length ten to twelve inches.

Color pale brown to brownish gray, shading into yellowish brown in the caudal region; dorsal pattern of several narrow, irregular, longitudinal, dark brown or black stripes; tail with dark cross bands; ventral parts whitish or yellowish, without markings.

This lizard feeds on plants, particularly flower heads. It is most closely related to the tropical Iguanas of any of the North American species. We have not examined specimens of this species from Colorado, and the two records of it from this state are uncertain. If found in Colorado it will probably be in the southwestern part of the state, as this lizard ranges from Southern California to Arizona. Professor A. E. Beardsley states that a large lizard answering the description of *Dipsosaurus dorsalis* has been reported to him several times from Lamar, Rocky Ford and Canon City, although he has never secured specimens of it.

This lizard is a desert species.

Genus **UTA** Baird and Girard

Uta Baird and Girard, *Stansbury's Exped. Great Salt Lake*, p. 344, 1852.

Gular fold present, marked by larger scales; tail longer than the body; ear openings not covered, rather large and prominent; femoral pores present; occipital plate large and somewhat rounded.

A genus of rather small lizards confined to southwestern United States and northern Mexico.

KEY TO THE COLORADO SPECIES OF *UTA*

- a. Five or six rows of scales in the mid-dorsal region distinctly larger than the adjoining scales; the central rows of this series smaller than the edge series *U. ornata* Baird and Girard.
- aa. Scales along the mid-dorsal region very slightly if at all larger than the adjoining scales; the mid-dorsal scales grading insensibly into the lateral scales *U. stansburiana* Baird and Girard.

Uta ornata Baird and GirardORNATE SWIFT (*Figures 5 and 6*)

Uta ornata Baird and Girard, *Proc. Acad. Nat. Sci. Phila.*, Vol. VI, p. 126, 1852.

Uta ornata—YARROW, *Wheeler Survey*, Vol. V, p. 568, 1875 (Twin Lakes, Colo.); COPE, *Rept. U.S.N.M.*, p. 317, 1898 (Plateau Creek near Eagalite, Colo.); CARY, *N. Am. Fauna*, No. 33, p. 26, 1911 (Plateau Creek, Mesa Verde, Spruce Tree Ruins, Coventry, Colo.).

Head depressed and broad; five or six rows of enlarged scales in the mid-dorsal region forming a longitudinal band of scales abruptly larger than the adjoining scales, the center of this band with smaller scales; a row of slightly elevated, conical scales on each side of the back near the lateral margin; other dorsal scales small and closely set; ventral scales larger than the dorsal scales; length from tip of snout to vent about 1.5 in the length of the tail; total length up to eight inches.

General color gray to blackish gray or brownish gray; of a more or less mottled pattern with irregular black cross bands, quite distinct on the sides but interrupted dorsally; a dark area on each side of the neck; ventral parts whitish to greenish; throat greenish or yellowish;

males with a large area of bright blue or greenish blue on each side of the anterior portion of the abdomen.

Range, New Mexico and Colorado west into California.

Colorado specimens.—*University Museum*: Rifle, July 2, 1908 (128 mm.), S. A. Rohwer, No. 205; four miles west of Meeker, August 11, 1909 (120 mm.), J. Henderson, No. 206; *Colorado State Historical and Natural History Museum*: Grand Junction, September 17, 1904 (2 specimens, 70 and 116 mm.), H. G. Smith; reported by Cary, *l.c.*, Sindbad Valley, McElmo and Arboles.

***Uta stansburiana* Baird and Girard**

STANSBURY'S SWIFT

Uta stansburiana Baird and Girard, *Proc. Acad. Nat. Sci. Phila.*, Vol. VI, p. 69, 1852.

Uta stansburiana—CARY, *N. Am. Fauna*, No. 33, p. 26, 1911 (Mack, Plateau Creek and DeBeque, Colo.).

Head depressed; scales of the back small and of a rather uniform size, closely set and weakly keeled; no mid-dorsal rows of enlarged scales; scales on the tail spiny and larger than those of the back; length from tip of snout to vent about 1.5 in the length of the tail; size small, total length usually less than five inches.

General color dark gray to dark grayish green; dorsal pattern of two irregular rows of dark, more or less crescentic blotches, surrounded by smaller, scattered spots of blue and black; one or two pale stripes, somewhat interrupted, along each side; a dusky area back of each fore limb, often surrounded by yellowish; ventral parts greenish or yellowish white; under parts of the jaw, bluish.

A species of the Great Basin, ranging north into Oregon and south into Texas.

Colorado specimens.—Reported by Cary, *l.c.*, from Desert north of Mack, Plateau Creek, Coventry, Paradox Valley, Salt Canyon, Dolores River Canyon and McElmo, Colo.

Genus **CROTAPHYTUS** Holbrook

Crotaphytus Holbrook, *N. Am. Herpetology*, Vol. II, p. 79, 1842.

Scales small; gular fold present; tail much longer than the body, slender and cylindrical; ear openings not covered; femoral pores present; occipital plate small.

Moderately large lizards found in southwestern United States and northern Mexico. The food of these lizards consists of insects, small toads and lizards and often small individuals of their own species. They will also eat small flower heads. As regards food, they stand between the strictly herbivorous *Dipsosaurus* and the insectivorous *Sceloporus*. One species is known from Colorado.

***Crotaphytus collaris* (Say)**

COLLARED LIZARD

Agama collaris Say, *Long's Exped. Rocky Mts.*, Vol. II, p. 252, 1823.

Two subspecies of this lizard are described. They may be distinguished by the following key.

- a. Interorbital plates in a single row. *C. c. collaris* (Say).
- aa. Interorbital plates in at least two rows. *C. c. baileyi* (Stejneger).

At present only the subspecies *baileyi* is known from Colorado. However, as the true *collaris* is recorded from points near Colorado, that variety should be looked for in southern Colorado.

***Crotaphytus collaris baileyi* (Stejneger) (Figures 3 and 4)**

Crotaphytus baileyi Stejneger, *N. Am. Fauna*, No. 3, p. 103, 1890.

Crotaphytus collaris baileyi Cockerell, *Univ. Colo. Studies*, Vol. VII, p. 131, 1910 (Rifle Gap, Garfield Co., Colo.); CARY, *N. Am. Fauna*, No. 33, p. 25, 1911 (McElmo, Coventry and Sindbad Valley, Colo.).

Head depressed, very broad in the region just back of the eyes, pointed anteriorly and narrowed posteriorly, length a little less than that of the hind foot; scales small, ventral scales larger than the dorsal scales; length from the tip of the snout to the vent about 2 in the length of the tail; maximum total length about fifteen inches.

General color grayish yellow, yellowish brown, grayish green or green; a double collar of two black bands, very heavy at the sides and interrupted dorsally, separated by a band of white or yellow and bordered with the same color; ventral parts yellowish or greenish; throat yellow or orange; under parts of the jaw bluish; dorsally with numerous small light spots; sides of the abdomen and the tops of the hind limbs with small dark red spots; inside of the back of the

mouth black. Markings vary from quite obscure to distinct, and both colors and markings are more vivid at the breeding season.

Mr. H. G. Smith of the State Historical and Natural History Museum informs us that this species is commonly known as the "Boomer" in western Colorado. It is extremely active and when disturbed often runs on its hind legs. Like most of our *Iguanidae*, the Collared Lizard is oviparous. One specimen reported by Ditmars² laid twenty-one eggs early in August.

Crotaphytus collaris ranges from Idaho south into Mexico, west into California and east into Arkansas.

Colorado specimens.—*University Museum*: Rifle Gap, August 5, 1909 (245 mm.), A. H. Felger, No. 55; *State Historical and Natural History Museum*: Grand Junction, August 13, 1905 (255 mm.), Ora Keithley; Grand Junction, May 17, 1906 (260 mm.), W. C. Ferril; *Colorado Museum of Natural History*: Trinidad, May 2, 1911 (300 mm.), L. J. Hersey; Trinidad, June 7, 1911 (340 mm.), L. J. Hersey; Trinidad, August 5, 1911 (60 mm.), L. J. Hersey; Trinidad, September 5, 1911 (5 specimens, 250–300 mm.), L. J. Hersey; *State Teachers' College Museum*: Trinidad and Delta, A. E. Beardsley; *reported* common at Trinidad, by L. J. Hersey.

Genus **SCELOPORUS** Wiegmann

Sceloporus Wiegmann, *Isis*, p. 369, 1828.

Scales moderately large, keeled dorsally, with the keeled portion often produced into a sharp point; no gular fold; tail a little longer than the body; ear openings not covered; femoral pores present; supraorbital plates prominent.

The Spiny Swifts, *Sceloporus*, are small to moderately large lizards, including some of the most abundant species found in the United States. Species of this genus are found from Central America to Canada, and over the whole of the United States. They feed largely upon small insects and insect larvae. In general color they are gray or brown, lighter below, and the males have a blotch of blue on each side of the abdomen. Two species are recorded from Colorado.

KEY TO THE COLORADO SPECIES OF SCELOPORUS

- a. Supraorbital plates in four rows; inside row of small plates, second row of large plates, third and fourth rows of small plates.

S. consobrinus Baird and Girard.

² DITMARS, *Reptile Book*, p. 115, 1907.

- aa. Supraorbital plates in five rows; inside row of small plates, second and third rows of larger, subequal plates, fourth and fifth rows of small plates and more or less irregular. . . . *S. graciosus* Baird and Girard.

Sceloporus consobrinus Baird and Girard

YELLOW-BANDED SWIFT (*Figures 10 and 11*)

Sceloporus consobrinus Baird and Girard, in Marcy, *Rept. Red River Reptiles*, p. 237, 1853.

Sceloporus consobrinus—YARROW, *Wheeler Survey*, Vol. V, p. 574, 1875 (Pagosa, Colo.); CARY, *N. Am. Fauna*, No. 33, p. 26, 1911 (Douglass Spring, Escalante Hills, LaVeta and Arboles, Colo.).

Sceloporus undulatus—ELROD, *The Museum*, Vol. I, p. 137, 1895 (Garden of the Gods, Colo.); COCKERELL, *Univ. Colo. Studies*, Vol. VII, p. 131, 1910 (Meeker, Colo., and four miles west of Meeker, Colo.).

Sceloporus elongatus—CARY, *N. Am. Fauna*, No. 33, p. 26, 1911 (Arkins, Escalante Hills, Meeker, Rangeley, Plateau Creek and McElmo, Colo.).

Head somewhat pointed anteriorly, widest in the region of the eyes and very slightly narrower behind the eyes, length of the head about 1.5 in the length of the hind foot, profile sloping; supraorbital plates in four rows, the inside row of small plates, a second row of large plates, the two outside rows of small plates; a pit on each side of the neck near the ear opening, guarded by large scales and lined with very small scales; length from tip of snout to the vent not more than 1.5 in the length of the tail; total length six to eight inches.

General color yellowish or greenish gray; two stripes of yellow or a yellowish gray lighter than the ground color, on each side; the upper of these stripes the brighter, covering two or three rows of scales; the lower separated from the upper by seven to nine rows of scales, and covering three or four rows of scales, quite suffuse along its ventral margin; between the two light stripes, the ground color may be slightly darker than the general ground color, producing a dark stripe; dorsally with many very fine cross bands of black, these bands often being less than a half of a millimetre wide but so dark as to be quite distinct; ventral parts whitish or yellowish, rarely greenish, with quite a few small black or dark brown dots; throat of the male with a bright peacock blue band, traces of which may appear in

the female; sides of the abdomen of the male with large greenish blue blotches.

This species is quite common through the Rocky Mountain region, ranging south into Mexico. By some zoölogists it is considered as but a variety of the common swift of the east, *S. undulatus* (Latreille). *S. consobrinus*, however, is a species of the elevated arid portion of the United States.

Colorado specimens.—*University Museum*: Boulder, May 18, 1907 (171 mm.), F. Rohwer, No. 207; Little Fossil Mountain, near Rifle, July 2, 1908 (160 mm.), S. A. Rohwer, No. 209; Perry Park, July 25, 1908 (146 mm.), Albert Dakan, No. 212; Box Elder Creek, foothills, northwest of Ft. Collins, August 13, 1908, J. Henderson, No. 68; four miles west of Meeker, August 11, 1909 (2 specimens, 110 and 150 mm.), J. Henderson and T. Duce, No. 208; Boulder, October 9, 1911 (157 mm.), Ben Rowland, No. 146; two miles east of Durango toward Rio Florida, August 11, 1912 (144 mm.), J. Henderson and M. M. Ellis, No. 210; near Chautauqua, Boulder, September 21, 1912 (56 mm., vent to snout, with regenerating tail), N. deW. Betts, No. 211; Wray, October 27, 1912 (2 specimens, 70 and 75 mm.), M. M. Ellis and A. G. Vestal, No. 213; *Colorado State Historical and Natural History Museum*: Estabrook, July 4, 1903 (2 specimens, 120 and 130 mm.), H. B. McCurdy; Estabrook, July 11, 1903 (120 mm.), E. A. Dugan; Durango, August 27, 1903 (3 specimens, 110 to 125 mm.), H. G. Smith; Buffalo Park, September 7, 1903 (150 mm.), W. C. Ferril; Wray, September 17, 1903 (150 mm.), H. G. Smith; Pagosa, August 8, 1904 (2 specimens, 105 and 115 mm.), H. G. Smith; Grand Junction, September 16, 1904 (40 mm.), H. G. Smith; Grand Junction, September 17, 1904 (3 specimens, 130–145 mm.), H. G. Smith; Wray, May 31, 1905 (90 mm.), H. G. Smith; Grand Junction, August 13, 1905 (6 specimens, 100–125 mm.), H. G. Smith; Basalt, August 16, 1905 (120 mm.), H. G. Smith; *Colorado Museum of Natural History*: Trinidad, August 5, 1909 (3 specimens, 60–120 mm.), L. J. Hersey; Ponia, near Trinidad, August, 1910 (120 mm.), L. J. Hersey; *Agricultural College Museum*: Larimer County, May 11, 1902 (180 mm.), W. L. Burnett; *private collection* of A. G. Vestal, Wray: October 27, 1912 (50 mm.), A. G. Vestal; *State Teachers' College Museum*: Trinidad, A. E. Beardsley.

Sceloporus graciosus Baird and Girard

SAGE-BRUSH SWIFT

Sceloporus graciosus Baird and Girard, *Proc. Acad. Nat. Sci. Phila.*, Vol. VI, p. 69, 1852.

Sceloporus graciosus—CARY, *N. Am. Fauna*, No. 33, p. 24, 1911 (Bear River Bluffs near Maybell, Colo., and twenty miles west of Baggs Crossing, Colo.).

This swift is quite similar to *S. consobrinus*, from which it differs in the arrangement of the supraocular plates. These are in five rows, an inside row of small plates, followed by two rows of medium-sized plates, with two outside rows of small plates. In coloration it is also much the same as *S. consobrinus*. There are two yellowish stripes on each side separated by a dusky area covering from seven to nine rows of scales. In this dusky area, however, there is a row of more or less crescent-shaped spots of dark brown or black. There are also two rows of these same spots dorsally between the two upper light stripes. *S. graciosus* is a species of the Great Basin, ranging from Oregon south into Mexico.

Reported by Cary, *l.c.*, from Escalante Hills, valleys of Texas and Evacuation Creeks; Rio Blanco Co.; Grand Valley, north of Mack, Colo.; Rifle, Coventry and McElmo, Colo.

Genus **HOLBROOKIA** Girard

Holbrookia Girard, *Proc. A.A.A. Sci.*, Vol. IV, p. 201, 1851.

Scales small and smooth; throat with a gular fold; tail shorter or longer than the body; ear openings covered; femoral pores present; body depressed; size small.

The Spotted Lizards, *Holbrookia*, range from Wyoming and Utah south into Mexico, from Kansas into California.

Holbrookia maculata Girard

SPOTTED LIZARD (*Figures 7, 8 and 9*)

Holbrookia maculata Girard, *Proc. Am. Asso. Adv. Sci.*, Vol. IV, p. 201, 1851.

Holbrookia maculata—COPE, *Rept. U.S.N.M.*, p. 297, 1898 (Colorado Springs, Colo.).

Holbrookia maculata maculata—YARROW, *Wheeler Survey*, Vol. V, p. 563, 1875 (Denver and Colorado Springs, Colo.).

Holbrookia maculata propinqua—YARROW, *Wheeler Survey*, Vol. V, p. 564, 1875 (Twin Lakes, Colo.).

Head somewhat rounded anteriorly, widest in the region of the eyes, not well marked off from the neck, 1.00 to 1.25 in the length of the hind foot, profile rather abruptly sloping; length of the tail less than the length of the body from the tip of the snout to the vent; size small, total length less than six inches.

General color gray or greenish gray to brownish yellow; two rows of about twenty dark, irregular spots on each side of the back, these spots more or less confluent on the tail; many small light spots dorsally; ventral parts whitish; two or three dark blue or black spots on each side of the abdomen just back of the fore-limb.

Range, that of the genus.

Colorado specimens.—*University Museum*: Denver, May 14, 1905 (90 mm.), H. Markman, No. 214; LaJunta, July, 1905 (4 specimens, 95–110 mm.), G. S. Dodds, No. 215; Boulder, September, 1907 (150 mm.), F. Rohwer, No. 216; eight miles east of Platteville, June 18, 1912 (9 specimens, 85–95 mm.), J. Henderson and R. M. Butters, No. 217; *Colorado State Historical and Natural History Museum*: Denver, 1872 (75 mm.), J. W. LaMunyon; Denver, 1878 (2 specimens, 80 and 90 mm.), H. G. Smith; Denver, 1900 (2 specimens, 70 and 80 mm.), W. C. Ferril; Denver, 1903 (2 specimens, 80 and 85 mm.), W. C. Ferril; Wray, September 23, 1903 (100 mm.), H. G. Smith; Barr, June 13, 1906 (105 mm.), A. H. Felger; *State Teachers' College Museum*: Trinidad, A. E. Beardsley; *reported* common all along the foothills from Trinidad to the Wyoming line by Beardsley.

Genus **PHRYNOSOMA** Wiegmann

Phrynosoma Wiegmann, *Isis*, p. 367, 1828.

Body stout, depressed, and somewhat arched in the mid-dorsal region; head bearing several bony processes or "horns," particularly in the temporal and occipital regions; lateral margins of the body with one or two rows of large, elevated scales; scales of the back irregular in size and shape, many pointed, keeled and elevated; scales of the ventral surface smaller and more regular; a distinct gular fold; femoral pores present; no abdominal ribs; viviparous or oviparous.

To this genus and the following one, *Anota*, belong the "Horned Toads" of North America. This term is, however, incorrect, as these queer little animals are true lizards and should be known as Horned Lizards. In spite of their peculiar and rather offensive appearance they are quite harmless. When disturbed they often swell up and assume a defensive attitude. If sufficiently irritated they will squirt several drops of blood from just above the eyes.¹ This blood may be driven a distance of almost a foot. Because of this peculiar habit many strange stories are told of these animals and they are commonly

¹ *Proc. U.S. Nat. Mus.*, Vol. XV, pp. 375–378, 1892.

regarded as very dangerous by the Negroes in the southwest. They depend upon their general appearance for protection, as they move rather slowly. Their cephalic horns are very effective as protective structures in rendering them difficult to swallow. Cope¹ records finding a rattlesnake, which had died from attempting to swallow a *Phrynosoma*, with the occipital horns forced through its skin. Strecker² found a hawk dead from the same cause.

Horned Lizards are found from Washington to Southern Mexico. They range as far east as Missouri and Arkansas, being restricted to the arid and semi-arid regions.

The two species of this genus found in Colorado may be distinguished by the following key.

- a. One row of elevated, pointed scales along each lateral margin of the body; horns short *P. hernandesi* (Girard).
- aa. Two rows of elevated, pointed scales along each lateral margin of the body; horns long and prominent *P. cornutum* (Harlan).

***Phrynosoma hernandesi* (Girard)**

HERNANDEZ'S HORNED TOAD OR LIZARD (*Figures 12 and 14*)

Tapaya hernandesi Girard, *Wilkes U.S. Expl. Exped., Herpt.*, p. 395, 1858.

Phrynosoma douglassii douglassii—YARROW, *Wheeler Survey*, Vol. V, pp. 580 and 581, 1875 (Ft. Garland, Colorado Springs and Pagosa, Colo.).

Phrynosoma douglassii hernandesi—COPE, *Rept. U.S.N.M.*, p. 414, 1898 (Pagosa and Colorado Springs, Colo.).

Phrynosoma hernandesi—COCKERELL, *Univ. Colo. Studies*, Vol. VII, p. 131, 1910 (Meeker, Colo., and two miles southeast of Meeker, Colo.).

Horns short, not exceeding the diameter of the eye in length; one rather prominent horn projecting backward from the posterior end of each canthus rostratus; three directed outward and backward from the lateral angles of the head in the temporal region; a short horn on each side of the occipital region, pointing backward and upward, and a very small median occipital horn.

One row of elevated, pointed scales on each lateral margin of the body; dorsal scales irregular in size and shape, many elevated, pointed

¹ *Rept. U.S.N.M.*, p. 404, 1898.

² *Proc. Biol. Soc. Wash.*, Vol. XXI, p. 168, 1908.

and keeled; ventral scales smooth, closely set and of rather uniform size and shape; nasal openings on the canthi rostrati; gular fold prominent.

Length of the head 2 to 3 in the maximum width of the body, 1 to 1.25 in the maximum width of the head; tail short, 1.20 to 1.75 in the maximum width of the body.

Color grayish to blackish, varying toward brown; a lighter mid-dorsal streak; under parts whitish.

Average specimens, about 100 mm.

The specimen from Monarch contained 14 tenebrionid beetles, *Eleodes* sp. and a large number of ants.

This species is viviparous. The young, which usually number less than twelve, are born in the middle or late summer.

Range, Oregon to Arizona, east to Kansas.

Two forms of this species may be recognized, a plains form and an upland form, scarcely entitled to recognition as subspecies.

a. Occipital spine more nearly vertical than the last temporal spine when the head is viewed from the side; tail shorter than the hind limb; plains form.

P. h. ornatissimum (Girard).

aa. Occipital spine and the last temporal spine directed backward at about the same angle when seen from the side; tail equal to or longer than the hind limb; upland form *P. h. hernandesi* (Girard).

Colorado specimens.—*University Museum*: Boulder, September 7, 1907 (45 mm.), W. H. Foster, No. 218; Boulder, August 28, 1908 (95 mm.), A. L. Goodrich, No. 219; Owens Lake, Boulder County, August, 1908 (78 mm.), F. Rohwer, No. 220; Boulder, August, 1908 (90 mm.), F. Rohwer, No. 221; two miles southeast of Meeker, August 8, 1909 (72 mm.), W. W. Robbins, No. 59; four miles east of Wellington, June 13, 1911 (100 mm.), J. Henderson, No. 222; Cottonwood Springs, north of Ft. Morgan, June 22, 1912 (95 mm.), J. Henderson, No. 223; *Colorado State Historical and Natural History Museum*: Denver, July, 1873 (90 mm.), Mary G. Smith; Denver, August 2, 1900 (120 mm.), W. C. Ferril; Denver, May 20, 1903 (2 specimens, 95 and 100 mm.), W. C. Ferril; Denver, Capitol Grounds, August 14, 1903 (9 specimens, 80–120 mm.), W. C. Ferril; LaVeta Pass, August 21, 1903 (60 mm.), C. E. Langerr; Antonito, August 22, 1903 (90 mm.), H. G. Smith; Hugo, June 9, 1906 (110 mm.), W. C. Ferril; *Colorado Museum of Natural History*: Trinidad, August, 1909 (26 specimens, about 25 mm.), L. J. Hersey; *Agricultural College Museum*: Cortez, August 13, 1903 (120 mm.), S. A. Johnson; *private collection* of A. G. Vestal, Monarch, Boulder County, May 17, 1912 (115 mm.), A. G. Vestal; *State Teachers' College Museum*:

Trinidad and Greeley, A. E. Beardsley; reported by Cary, *l.c.*, from both sides of the range as *Phrynosoma ornatissimum*.

Phrynosoma cornutum (Harlan)

TEXAS HORNED TOAD (*Figure 13*)

Agama cornuta Harlan, *Journ. Acad. Nat. Sci. Phila.*, Vol. IV, p. 299, 1825.

Phrynosoma cornutum—COPE, *Rept. U.S.N.M.*, p. 435, 1898 (Pagosa and Colorado Springs, Colo.).

Horns long, the longest more than twice the diameter of the eye in length; one short stout horn directed backward and outward from the posterior end of each canthus rostratus; three from the temporal region on each side pointing outward and backward, of these the anterior is the shortest, the middle one the longest and the posterior one just equal to or usually slightly shorter than the middle one; two large occipital horns, one on each side, directed upward and somewhat backward, these being the largest of the horns; a small, median occipital horn.

Two rows of elevated pointed scales on each lateral margin of the body; dorsal scales of various sizes, many large, flattened, keeled and elevated; scales on ventral parts more or less distinctly keeled.

Nasal openings between the canthi rostrati; gular folds prominent and covered with keeled scales.

Length of the head 1.25 to 1.75 in the width of the head, almost 3 in the maximum width of the body; tail long, about equal to the maximum width of the body in length.

Color grayish brown to blackish brown, subject to much variation; usually twelve, more or less distinct spots of a slightly darker color than the ground color may be seen on the dorsal surface; below whitish; tail irregularly marked above; a median dorsal stripe lighter than the ground color.

Size moderately large, average specimens 125 mm. or larger.

This species, unlike the other members of this genus, is oviparous. Strecker,¹ who has studied the egg-laying habits of this lizard, finds that it lays about two dozen eggs in a burrow some six or seven inches

¹ *Proc. Biol. Soc. Wash.*, Vol. XXI, pp. 165-168, 1908.

deep. These burrows are usually constructed on sloping ground. The eggs are placed in layers, each layer being carefully covered with packed dirt. The breeding season is from April to the last of July.

Range, north to Colorado, east to Missouri, south into Mexico. Abundant in Texas.

Colorado specimens.—*University Museum*: Boulder, June 23, 1911 (135 mm.), E. Bethel, No. 124. As a specimen of this species escaped from captivity near the University campus about this time it is thought that this specimen does not represent a true record for this species. *Colorado State Historical and Natural History Museum*: Denver, 1872 (4 specimens, 80–105 mm.), J. W. LaMunyon, locality uncertain; *State Teachers' College Museum*: Trinidad, A. E. Beardsley.

Genus ANOTA Hallowell

Anota Hallowell, *Proc. Acad. Nat. Sci. Phila.*, p. 182, 1852.

Characters of the genus the same as those of *Phrynosoma* excepting the covered ear opening.

Anota modesta (Girard)

LITTLE HORNED TOAD

Phrynosoma modestum Girard, *Stansb. Exped. Great Salt Lake*, p. 361, 1852.

We have no specimens of this species in our collection. Professor T. D. A. Cockerell reports this species from the Wet Mountain country in Custer Co., Colo. The specimen which he collected there some years ago was sent to Washington and the identification of *Phrynosoma modestum* (Girard) returned. The specimen is lost and we are unable to ascertain by whom it was determined. This species is included in this report only as a species likely to be found in southern Colorado, since it is found in northern New Mexico. We quote Cope's description, as we have not examined specimens of it.

Smallest of the species. Head broadly rounded; muzzle very obtuse, profile descending steeply from a tranverse angle above the nostrils. Temporal regions expanded, supporting a series of acuminate tubercles from below the front of the orbit, of which the posterior only is distinctly a horn. It is directed posteriorly, having usually the same direction and length of the occipital. One short acute occipital horn on each side; no interoccipital. Posterior superciliary plate angu-

lar, but not prominent. Infralabials increasing regularly in size to the posterior, which are not very prominent. Gular scales equal. A strong prehumeral fold, in front of which is a fossa, and in front of this a semicircular fold convex backward with a few larger tubercles on its border. . . . In life the color of this species is a light yellowish brown, sometimes with a shade of pink. A blackish spot begins on each side of the nape and extends round to a point anterior to the humerus. There is sometimes a sooty shade on each side from the middle to the groin. A small blackish spot behind the vent on the middle line, and frequently a similar spot on each side of the anterior border of the vent. There are no dorsal spots or cross bars, but the tail is indistinctly annulate with blackish. Under surface pale yellowish, immaculate, except the gular region, which is generally indistinctly dusky spotted.—*Rept. U.S.N.M.*, pp. 437 and 438, 1898.

Family TEIIDAE

The Striped Lizards

This family of lizards, which contains a fairly large number of species, is found only in the New World. Only a single genus is found in the United States, *Cnemidophorus*.

Genus CNEMIDOPHORUS Wagler

Cnemidophorus Wagler, *Syst. Amph.*, p. 154, 1830.

Dorsal scales rather small, ventrals large; gular fold present, double; head plates large and regular; ear openings exposed; femoral pores present; scaled portion of the tongue heart-shaped or V-shaped posteriorly; body elongate; size medium, length up to twenty inches, of which the small, elongate tail makes up over half; range, United States generally, south into South America. Three species have been taken in Colorado.

- a. Under part of the throat with a band of scales distinctly and abruptly larger than the adjoining scales.
- b. Femoral pores, 15 to 17; posterior margin of the frontal plate just reaching the junction of the second and third supraocular plates, so that the suture between second and third supraocular plates appears continuous with that separating the frontal and fronto-parietal plates; head tapering rather uniformly to the snout; no large, post-antibrachial plates; size small. . . . *C. sexlineatus* (Linnaeus).
- bb. Femoral pores, 18 to 25; posterior margin of the frontal plate passing the junction of the second and third supraocular plates; head rather

- suddenly pointed beyond the eyes; large post-antibrachial plates present; size medium. *C. gularis* Baird and Girard.
- aa. Under part of the throat without a band of large scales; size moderately large. *C. tessellatus* (Say).

The color pattern of these three species is so similar and so subject to the same type of variation that a comparative description will perhaps be more effective than individual descriptions of each.

The typical pattern as shown by the young of all three species is composed of a series of four to eight longitudinal stripes of yellow on a ground color of dark brown or olive. In *C. sexlineatus* these stripes remain prominent throughout life on the body and the anterior portion of the tail. On the posterior portion of the tail they break up and disappear. The spaces between the light stripes are darker than the general ground color.

The next type of pattern is that of the adult *C. gularis*. The young of this species are marked much like the adult of *C. sexlineatus*, although the two dorsal light stripes show a tendency to be less distinct. The adult, however, has irregular rows of light spots in the dark area between the longitudinal stripes, and the stripes themselves tend to break down into spots. In some specimens this is completed so that they resemble typical individuals of *C. tessellatus*.

In the adult *C. tessellatus* the breaking up of the longitudinal stripes is usually complete, so that the typical pattern of this lizard is one of spots, the spots being those between the longitudinal stripes and the remains of the longitudinal stripes. The light spots may even become so prominent as to appear to form the background, thus giving a yellowish background with dark spots. The young of this species are marked much like the adult *C. sexlineatus*. Cope[†] gives a series of figures showing the parallel variation of the dorsal pattern of *C. gularis* and *C. tessellatus*.

The ventral parts of all three species are whitish, yellowish or even greenish and the dorsal ground color is subject to the same variation in shades of color that is found in other lizards. The tail when complete (most specimens will have lost portions of the tail if they are of

[†] COPE, *Rept. U.S.N.M.*, pl. 5, 1898.

any size) is more than twice the length of the body and is covered with larger, coarser scales.

Cnemidophorus sexlineatus (Linnaeus)

RACE RUNNER; SIX-LINED LIZARD

Lacerta sexlineata Linnaeus, *Syst. Nat.*, 12th ed., Vol. I, p. 364, 1766.

Cnemidophorus sexlineatus—COPE, *Rept. U.S.N.M.*, p. 597, 1898 (Plateau Creek, near Eagalite, Colo.).

Colorado specimens.—*Colorado State Historical and Natural History Museum*: Denver, May 21, 1900 (160 mm.), H. G. Smith; Grand Junction, September 16, 1904 (4 specimens, 105–130 mm.), H. G. Smith; Wray, May 31, 1905 (175 mm.), H. G. Smith; *Colorado Museum of Natural History*: Ponia, near Trinidad, August, 1910 (2 specimens, 90 and 120 mm.), L. J. Hersey; *State Teachers' College Museum*: Corrizo Creek, Las Animas County, and Greeley, A. E. Beardsley.

Cnemidophorus gularis Baird and Girard

SPOTTED RACE RUNNER

Cnemidophorus gularis Baird and Girard, *Proc. Acad. Nat. Sci. Phila.*, p. 128, 1852.

Cnemidophorus gularis—CARY, *N. Am. Fauna*, No. 33, p. 27, 1911 (Grand Valley, McElmo and Hotchkiss, Colo.).

Colorado specimens.—*Reported* by Cary, *l.c.*, from Golden, Colo.

Cnemidophorus tessellatus (Say)

TESSELLATED LIZARD

Ameiva tessellata Say, *Long's Exped. Rocky Mts.*, Vol. II, p. 50, 1823 (Canyon of Arkansas, Colo.).

Cnemidophorus tigris—CARY, *N. Am. Fauna*, No. 33, p. 26, 1911 (Plateau Creek and McElmo, Colo.).

Colorado specimens.—*Colorado State Historical and Natural History Museum*: Grand Junction, May 17, 1906 (2 specimens, 260 and 270 mm.), W. C. Ferril.

Family SCINCIDAE

The Skinks

A very large family of lizards of cosmopolitan distribution. Two genera are known from the United States, one of which, *Eumeces*, is represented in the Colorado fauna.

Genus **EUMECES** Wiegmann

Eumeces Wiegmann, *Herpt. Mex.*, p. 36, 1834.

Scales smooth and polished, very closely and firmly set, moderately large; no gular fold; ear openings not covered; no femoral pores; size small to moderately large.

A genus of wide distribution, species of *Eumeces* being known from North America, Africa and Asia. Four species are recorded from Colorado and a fifth will doubtless be found when the collections are made more complete. This fifth species, *Eumeces quinquelineatus* (Linnaeus), is accordingly included in the key, since it is reported from some of the adjoining states.

- a. Fifth hind toe longer than the second; scales in 28 to 32 rows; head 4.5 in the length without the tail. *E. quinquelineatus* (Linnaeus).
- aa. Fifth hind toe shorter than the second.
 - b. Scales in 28 to 30 rows.
 - c. Free portion of the fifth hind toe more than half the length of the head. *E. guttulatus* (Hallowell).
 - cc. Free portion of the fifth hind toe less than half the length of the head. *E. obsoletus* (Baird and Girard).
 - bb. Scales in 26 rows. *E. leptogrammus* (Baird).
 - bbb. Scales in 24 rows. *E. multivirgatus* (Hallowell).

This key is adapted from Cope, as specimens of all of these species were not at hand for examination.

Eumeces obsoletus (Baird and Girard)

SONORAN SKINK (*Figures 15 and 16*)

Plestiodon obsoletum Baird and Girard, *Proc. Acad. Nat. Sci. Phila.*, p. 129, 1852.

Head somewhat pointed anterior to the eyes; profiles sloping evenly; length of the head about 5 in the length of the head and body; size rather large; length up to 12 inches.

Color variable in the different stages; color of the adult, yellowish, greenish or olive brown, head with a reddish cast, tail lighter and often rather blue; five rather indistinct, longitudinal yellowish stripes;

medium-sized individuals with the yellowish stripes quite distinct; young specimens much darker than the adults, with the stripes very indistinct.

This lizard, like the other species of the genus, has the power to break off its tail when it is seized by that part. The escaping tail-less lizard regenerates a new tail. Specimens are often taken with a small half-formed tail, showing the loss of a former tail.

This skink ranges from Utah and Wyoming south into Mexico, east into Kansas and Nebraska.

Colorado specimens.—*University Museum*: four miles east of Wellington, June 13, 1911 (108 mm.), J. Henderson and R. M. Butters, No. 224; Greasewood Lake southeast of Osgood, June 23, 1912 (90 mm.), J. Henderson, No. 225; *State Teachers' College Museum*: near Greeley, A. E. Beardsley.

***Eumeces guttulatus* (Hallowell)**

BLUE-SPOTTED SKINK

Lamprosaurus guttulatus Hallowell, *Proc. Acad. Nat. Sci. Phila.*, p. 206, 1852.

Dorsal stripes wanting; a row of bluish spots over each eye and on the chin; dorsal parts uniformly blackish in the young, becoming olive green in the adult; tail of the young bluish; size small, length less than five inches. Range, Colorado south to Mexico.

Colorado specimen.—*State Teachers' College Museum*: Corrizo Creek, Las Animas County, A. E. Beardsley.

***Eumeces leptogrammus* (Baird)**

HAYDEN'S SKINK

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

General color dark green above, bluish to dark blue below; five dorsal stripes of greenish white dots, the mid-dorsal stripe being the widest and most prominent. Range, Nebraska, Wyoming south to Texas.

Colorado specimen.—*State Teachers' College Museum*: Big Bend, Weld County, A. E. Beardsley.

Eumeces multivirgatus (Hallowell)

MANY-LINED SKINK

Plestiodon multivirgatum Hallowell, *Proc. Acad. Nat. Sci. Phila.*, p. 251, 1857.

General color grayish green to olive green; ventral parts greenish; mid-dorsal region dark green bordered on each side by four or usually five stripes of brown which alternate with stripes of the ground color.

Range, Nebraska, Colorado and Kansas south into Texas.

Colorado specimen.—*State Teachers' College Museum*: near Greeley, A. E. Beardsley.

Suborder *SERPENTES*

The Snakes

KEY TO THE FAMILIES AND GENERA OF THE COLORADO SNAKES

- A. No pits on the sides of the head. *COLUBRIDAE*
- B. Maxillary teeth without grooves (all of the Colorado *Colubridae* excepting one small, reddish snake with a black head, belong here).
- C. Anal plate entire.
 - D. Scales in 17 to 25 rows.
 - E. Scales keeled; 17 to 21 rows.
 - Thamnophis* Fitzinger (page 82).
 - EE. Scales smooth; 19 to 25 rows.
 - Ophibolus* Baird and Girard (page 90).
 - DD. Scales in 29 to 35 rows.
 - Pityophis* Holbrook (page 92).
- CC. Anal plate divided.
 - F. Scales distinctly keeled.
 - G. Rostral plate projecting and recurved, producing a "snout." *Heterodon* Latreille (page 95).
 - GG. Rostral plate not projecting as above.
 - H. Loreal plate present.
 - Tropidonotus* Kuhl (page 96).
 - HH. Loreal plate absent.
 - Storeria* Baird and Girard (page 98).
 - FF. Scales smooth or very faintly keeled.
 - I. Nasal plates, one on each side; size small.
 - J. Dorsal parts uniform bright green.
 - Liopeltis* Cope (page 99).

- JJ. Dorsal parts not green; general color gray, brownish or reddish. . . . *Chionactis* Cope (page 100).
- II. Nasal plates, two on each side.
- K. Maxillary teeth subequal; scales smooth; size small; dorsal parts uniform ashy brown to bluish black; with or without yellowish red collar; ventral parts orange or red.
Diadophis Baird and Girard (page 101).
- KK. Posterior maxillary teeth longer than those in front; scales smooth or faintly keeled; size large; young specimens striped and spotted dorsally.
Zamenis Wagler (page 103).
- BB. Posterior maxillary teeth with grooves; anal plate divided; loreal plate absent; scales smooth.
Tantilla Baird and Girard (page 106).
- AA. Head with a pit on each side between the eye and nostril; fangs present, large, hollow, and erectable; species venomous. . . . *CROTALIDAE*.
- L. Top of head covered with closely set, small scales, excepting the large supraocular plate above each eye.
Crotalus Linnaeus (page 107).
- LL. Top of the head covered by nine large plates.
Sistrurus Garman (page 110).

Family COLUBRIDAE

To this family belong the majority of species of snakes. The family as a whole is known as one of harmless snakes.

Genus *THAMNOPHIS* Fitzinger

Thamnophis Fitzinger, *Syst. Rept.*, p. 26, 1843.

Eutainia Baird and Girard, *Cat. N. Am. Reptiles*, Pt. I, p. 24, 1853.

Eutaenia Cope, *Proc. Am. Phil. Soc.*, p. 495, 1886.

Anal plate entire (we have an exceptional specimen from Meeker, Colo., of *Thamnophis elegans*, with the anal plate divided); scales in 17 to 23 rows, all distinctly keeled excepting those of the first row on each side, which are also usually more or less keeled; superior labials, usually 7 or 8, sometimes 6 or 9; preoculars, 1, sometimes 2, rarely 3; posterior maxillary teeth, especially the last two or three, longer

than those in front; small to medium sized snakes; general color pattern of three stripes, a dorsal and two laterals, on a darker ground color.

The Garter Snakes, genus *Thamnophis*, are the most abundant and most variable group of North American snakes. The color pattern, and the number of scale rows, labials and other plates are subject to great variation, almost every combination within the limits of the genus being known. As a result some sixty-five forms of *Thamnophis* have been described, which have been variously ranked by different zoölogists as species, varieties and synonyms. The garter snakes are usually semi-aquatic in habit. Few species are found far from water. All species are viviparous and produce large numbers of young. When pursued the garter snakes will try to escape but when captured they attempt to bite vigorously and usually emit a substance from the anal glands which gives off a sweet, sickening odor. These snakes are quite harmless.

Range, from Central America over most of North America as far north as Canada.

KEY TO THE COLORADO SPECIES OF THAMNOPHIS

It is to be noted that the species of this genus vary in such a way as to produce a seeming intergradation of all forms. Several types are distinct, however, and of these four are found in this state. In the identification of Garter Snakes particular attention should be paid to the locality from which the specimen was collected.

- a. Lateral stripe on the *third* and *fourth* rows of scales.
 - b. Superior labials, seven; plains species; in Colorado east of the main range. *Th. radix* (Baird and Girard).
 - bb. Superior labials, eight; southern Colorado. *Th. megalops* (Kennicott).
- aa. Lateral stripe on the *second* and *third* rows of scales.
 - c. Superior labials, seven; dorsal scales in nineteen rows; postgenial a fourth to a half longer than the genial; sides of the body above the lateral stripe with spots of brick red color; Colorado, general.
 - Th. parietalis* (Say).
 - cc. Superior labials, eight; dorsal scales in twenty-one rows; genials and postgenials subequal; Colorado, general except in the eastern plains.
 - Th. elegans* (Baird and Girard).

Thamnophis radix (Baird and Girard)PLAINS GARTER SNAKE (*Figures 17, 18 and 20*)

Eutaenia radix Baird and Girard, *Cat. N. Am. Reptiles*, Pt. I, p. 34, 1853.

Eutaenia marciana—YARROW, *Wheeler Survey*, Vol. V, p. 555, 1875 (Pueblo, Colo.); YARROW, *U.S.N.M. Bull.* 24, p. 118, 1882 (Pueblo, Colo.).

Eutaenia radix—COPE, *Rept. U.S.N.M.*, p. 1028, 1898 (Pueblo, Colo.); RUTHVEN, *U.S.N.M. Bull.* 61, p. 77, 1908 (Pueblo, Greeley, Ft. Collins, Colo.).

Dorsal scales typically in 21 rows, in 19 or 21 rows just back of the head, and in 19 or rarely 17 rows over the posterior portion of the body; first row of scales faintly, if at all, keeled, others distinctly keeled, especially those in the mid-dorsal region. Superior labials, usually 7, 1st, 2d, 3d and 7th subequal, 4th, 5th and 6th larger, the 5th being the largest; inferior labials, usually 10, 1st longest, directed mesially and posteriorly, so as to meet the 1st from the opposite side in the mid-ventral line, 2d smallest, 6th largest and widest. Ventrals, about 150, 140–180. Tail one-fifth to one-fourth of the total length.

General color brown or olive, darker dorsally; ventral parts pale yellow, yellowish green or greenish blue. A mid-dorsal stripe, varying in color from a pale lemon yellow to a rich orange red or orange brown, usually orange, beginning in the posterior angle of the parietal plates and continuing to the tip of the tail, covering only one row of scales at its origin, widening over three or four rows just back of the head, narrowing again so as to cover only a single mid-dorsal row and half or more of the adjacent row on each side, from the anal region on, covering only parts of two rows. A lateral stripe of pale yellow, blue or green, somewhat interrupted by black spots from above and below, covering more or less completely the *third* and *fourth* rows of scales on each side, beginning just back of the angle of the jaw and continuing to the base of the tail or beyond. Space between the dorsal and lateral stripes dark and in general of a checkerboard pattern, which is formed by two or three rows of black or dark green spots, each covering about three scales, alternating with the lighter ground color. Below the lateral stripe an irregular row of dark spots alternating with patches of the bluish or yellowish ground color. Two small pale yellow spots, often more or less confluent, on the parietals near or

on their mesial edges. Top of the head dark brown to almost black, lighter in the rostral region; labials and postorbitals yellowish or bluish, the labials rather completely crossed at their junctions by black bars. Each ventral with a dark spot on its anterior margin at or just below its junction with the first row of scales, the remainder of each ventral usually of a uniform color, although not infrequently with small black dots or clouds of color.

This description will cover only average specimens. The variation in color is considerable, so that the various elements of the pattern may be either accentuated or obscured.

The food of this active species has been reported by numerous observers. The smaller individuals feed upon earthworms, insect larvae and small tadpoles. As the snake grows, larger food is taken, frogs, large tadpoles, fish, in addition to insects of various sorts. They are particularly fond of grasshoppers. Ruthven¹ has observed this species feeding upon the tree frog, *Chorophilus nigritus*. In habit *Thamnophis radix* is almost amphibious, being found most abundantly in the sloughs and high grass near streams. When disturbed it will go into the water, where it swims and dives actively. It is rarely taken more than a mile from water and the swampy zone along streams is to be regarded as its habitat. It is a viviparous species and produces from fifteen to forty young at one time. These are born in the latter part of the summer, although a specimen taken at Boulder, Colo., in early July, 1912, contained twenty well-developed embryos.

Thamnophis radix is strictly a species of the plains region. It ranges from western Indiana to the foothills of the Rocky Mountains, north into Canada and south to Oklahoma.

Colorado specimens.—*University Museum*: Boulder, April 29, 1906 (4 specimens, 430–710 mm.), No. 227; University Campus, Boulder, October, 1906 (2 specimens, 500 and 580 mm.), No. 228; Niwot, August 31, 1911 (725 mm.), F. Rohwer, No. 226; near Boulder, July 7, 1912 (190 mm.), M. M. Ellis, No. 230; Julesburg, July 17, 1912 (660 mm.), J. Henderson, No. 229; Boulder, October 29, 1912 (240 mm.), M. M. Ellis, No. 231; *Colorado State Historical and Natural History Museum*: Denver, June 27, 1890 (540 mm.), H. G. Smith; Denver, July 31, 1890 (460 mm.), H. G. Smith; Denver, August 15, 1900 (960 mm.), W. C.

¹ *U.S.N.M. Bull.* 61, p. 75, 1908.

Ferril; Aurora Lake, Denver, September 3, 1900 (2 specimens, 475 and 710 mm.), W. C. Ferril; Highline Ditch, Denver, September 3, 1900 (690 mm.), W. C. Ferril; Denver, June 10, 1901 (860 mm.), C. F. Leach; Denver, June 27, 1903 (850 mm.), Mrs. H. B. McCurdy; Yuma, June 6, 1905 (600 mm.), H. G. Smith; Julesburg, August 25, 1905 (230 mm.), H. G. Smith; Boulder, December 12, 1911 (470 mm.), L. C. Bragg; *State Teachers' College Museum*: Las Animas, Baca and Weld counties, A. E. Beardsley; reported by Henderson from Goodrich, Colo., June 22, 1912.

Thamnophis megalops (Kennicott)

ARIZONA GARTER SNAKE

Eutaenia megalops Kennicott, *Proc. Acad. Nat. Sci. Phila.*, p. 330, 1860.

Eutaenia macrostemma megalops—YARROW, *U.S.N.M. Bull.* 24, p. 117, 1882 (Rio Grande, Colo.).

This species differs from *Thamnophis radix* (Baird and Girard), particularly in the number of superior labials, the usual number being 8, or occasionally 9. The spots between the dorsal and lateral stripes do not give such a pronounced checkerboard pattern and the snake as a whole is of a duller, lighter color.

This species is included in the fauna of Colorado on the record of a specimen taken by H. W. Henshaw, June, 1873, at Rio Grande, Colo. It ranges over the whole of the Mexican plateau and into northern Arizona and New Mexico. It is then to be expected in Conejos, Archuleta, LaPlata and Montezuma counties of Colorado.

Thamnophis parietalis (Say)

RED BARRED GARTER SNAKE (*Figure 19*)

Coluber parietalis Say, *Long's Exped. Rocky Mts.*, Vol. I, p. 186, 1823.

Eutaenia sirtalis dorsalis—YARROW, *Wheeler Survey*, Vol. V, p. 554, 1875 (Rio Grande, Colo.).

Eutaenia sirtalis obscura—YARROW, *U.S.N.M. Bull.* 24, p. 126, 1882 (southern Platte; between the Arkansas and Cimarron, N.Mex.).

Thamnophis sirtalis parietalis—RUTHVEN, *U.S.N.M. Bull.* 61, p. 167, 1908 (Ft. Collins, Denver, Greeley, Colo.); COCKERELL, *Univ. Colo. Studies*, Vol. VII, p. 131, 1910 (Meeker and Buford, Colo.).

Dorsal scales in 19 rows, in 17 rows over the posterior portion of the body; all scales keeled, those of the first row weakly so. Superior labials, usually 7, 1st, 2d, 3d, and the 4th and 7th, subequal, 5th

largest; inferior labials, 10 or sometimes 9. Ventrals, about 160, 145-180. Genials 1.25 to 1.5 in the postgenials. Tail one-fifth to one-third of the total length.

General color olive brown, red brown or almost black; ventral parts grayish yellow, greenish or bluish. A mid-dorsal stripe, varying from lemon yellow to light green or blue in color, beginning in or just posterior to the angle of the parietal plates and continuing to the tip of the tail, covering more or less completely the three mid-dorsal rows of scales in the anterior and middle portion of the body and narrowing so as to cover only parts of two rows in the tail region. A lateral stripe of pale yellow, blue or green, covering completely or in part the *second* and *third* rows of scales, beginning rather indistinctly just back of the angle of the jaw and continuing to the anal region or beyond, in the tail region covering but a single row of scales or a single row and a part of another. Space between the dorsal and lateral stripes dark, pattern indistinctly made up of two rows of black or dark green spots, the upper series of which is usually fused into a dark stripe along each side of the dorsal stripe, lower series quite distinct, the spots alternating with smaller areas of the brick red ground color. First row of scales and the upper edges of the ventrals dusky or even dark, usually giving the lower edge of the lateral stripe sharp definition. Two small pale spots often confluent, on the parietals near or on their mesial edges. Top of the head brownish or blackish, lighter in the rostral region.

The food of this species is probably much the same as that of *Thamnophis radix*. It is known to eat earthworms, insects, frogs and toads. These animals are the common types of food offered in the swampy places frequented by this snake. It is, however, occasionally taken some distance from water. Little is known concerning the breeding habits of this species. Ruthven² records a large female from Iowa giving birth to seventy-three young late in September.

Thamnophis parietalis ranges from the Mississippi River to the Pacific Ocean, south to Oklahoma and north into Canada. It is most abundant in the western half of its range.

² U.S.N.M. Bull. 61, p. 167, 1908.

Colorado specimens.—*University Museum*: Boulder, May 20, 1905 (500 mm.), No. 232; *Colorado State Historical and Natural History Museum*: Denver, June 3, 1901 (1200 mm.), H. G. Smith; Julesburg, May 2, 1906 (860 mm.), W. C. Ferril; *Agricultural College Museum*: Ft. Collins, April 30, 1892 (3 specimens, 150–300 mm.); *State Teachers' College Museum*: Greeley, A. E. Beardsley.

***Thamnophis elegans* (Baird and Girard)**

WESTERN GARTER SNAKE

Eutainia elegans Baird and Girard, *Cat. N. Am. Reptiles*, Pt. I, p. 34, 1853.

Eutaenia marciana—YARROW, *U.S.N.M. Bull.* 24, p. 118, 1882 (Ft. Garland, New Mexico = Colorado).

Eutaenia vagrans vagrans—YARROW, *Wheeler Survey*, Vol. V, pp. 551–553, 1875 (Twin Lakes, Conejos, Pagosa and San Luis Valley, Colo.); YARROW, *U.S.N.M. Bull.* 24, pp. 119–120, 1882 (Cache la Poudre River, San Luis Valley, Conejos, Twin Lakes, Pagosa, and French Creek, Colo.).

Tropidonotus vagrans—BOULENGER, *Cat. Snakes British Mus.*, Vol. I, p. 203, 1893 (Wales Canyon, Pueblo County, Colo.).

Eutaenia elegans vagrans—COPE, *Rept. U.S.N.M.*, p. 1041, 1898 (Pagosa, Twin Lakes, Conejos, San Luis Valley, Cache la Poudre River, Colo.).

Thamnophis ordinoides elegans—RUTHVEN, *U.S.N.M. Bull.* 61, p. 140, 1907 (Conejos, San Luis Valley, Rio Grande, Durango, Pagosa, Boulder County, Gypsum, Grand Junction, Twin Lakes, Hayden, Colo.).

Thamnophis elegans—COCKERELL, *Univ. Colo. Studies*, Vol. VII, p. 131, 1910 (Meeker and Buford, Colo.).

Thamnophis elegans vagrans—CARY, *N. Am. Fauna*, No. 33, pp. 27, 40, 45, 1911 (Meeker; Higho and Pearl, North Park; Snake River, Slater, Routt County, Colo.).

Dorsal scales in 21 rows, in 19 or 21 rows just back of the head, and in 19 or 17 rows in the posterior portion of the body; first row faintly keeled, others distinctly so. Superior labials, usually 8, first four subequal, 6th the largest; inferior labials, usually 10 (sometimes 9 or 11). Ventrals, about 170, 150–185; tail one-fifth to a little more than one-fourth of the total length. Genials and postgenials subequal.

Ground color brown, brownish green or greenish buff; ventral parts greenish or grayish. A mid-dorsal yellowish stripe, lighter than the ground color, rather indistinct, covering the mid-dorsal row of scales and parts of the adjoining row on each side, interrupted by the dark spots from each side, and often almost obliterated by the darker

ground color, in some specimens so interrupted as to cease to be a stripe at all. A lateral stripe of yellowish or bluish color, covering the *second* and *third* rows of scales, often very indistinct and so interrupted as to be scarcely recognizable. Between the dorsal and lateral stripes two rows of black spots, which by alternation with patches of the ground color produce a tessellated pattern. These spots may be quite prominent and the pattern very distinct or they may be scarcely distinguishable from the general ground color. Two small pale yellow spots near or on the mesial margin of the parietal plates more or less surrounded by a cloud of black. Top of the head dark, labials green. Ventrals greenish varying from yellow to gray, each with a dark bar or cloud at its junction with the first row of scales, mesial portion often clouded with black or blue.

The form of this highly variable species found most abundantly in Colorado is that of greenish color and indistinct pattern called variety *vagrans*. The food and habits of *Thamnophis elegans* are much the same as described for the other Colorado garter snakes. Mr. H. G. Smith, of the State Historical and Natural History Museum, told us that the 640 mm. female of this species which he collected at Dolores, Colo., June 27, 1890, gave birth to ten young shortly after her capture. The smallest of these was 190 mm. in length. One of the specimens, No. 61, disgorged a frog, *Rana pipiens*, when captured.

The range of this species is from the foothills on the east side of the Rocky Mountains to the western slope of the Sierra Nevada and Cascade mountains, north to Canada and south into New Mexico and Arizona. It is a species of the high plateau and mountain regions.

Colorado specimens.—*University Museum*: Buford, August 23, 1904 (2 specimens, 570 and 620 mm.), J. Henderson, No. 48; Copeland Park, Boulder County, September 5, 1907 (2 specimens, 580 and 600 mm.), F. Rohwer, No. 237; Allen's Park, Boulder County, September 6, 1907 (690 mm.), S. A. Rohwer, No. 242; Meeker, August 9, 1909 (500 mm.), A. H. Felger, No. 65; Curtis Reservoir, seven miles northeast of Meeker, August 12, 1909 (2 specimens, 270 and 640 mm.), A. H. Felger, No. 61; three miles south of Axial, August 14, 1909 (300 mm.), A. H. Felger, No. 60; Snake Slough, three miles above Meeker, August 17, 1909 (400 mm.), J. Henderson and T. Duce, No. 62; Buford, August 20, 1909 (280 mm.), T. Duce, No. 47; Buford, August 23, 1909 (825 mm.), A. H. Felger, No. 46;

Boulder, May 22, 1910 (280 mm.), S. Searcy, No. 245; Lake Eldora, near Eldora, July, 1910 (2 specimens, 410 and 780 mm.), J. E. Gutberlet, No. 233; Park Lake, Tolland, July, 1910 (3 specimens, 360-470 mm.), W. W. Robbins, No. 240; Mammoth Creek, Tolland, July 28, 1910 (570 mm.), No. 244; Tolland, July 24, 1910 (670 mm.), F. Ramaley, No. 235; four miles northeast of Ohio City, August 22, 1911 (2 specimens, 420 and 550 mm.), A. Daugherty, No. 234; ten miles northeast of Ohio City, July 16, 1911 (570 mm.), F. Rohwer, No. 236; one mile northeast of Ward, near Jim Creek, September 4, 1911 (250 mm.), N. deW. Betts, No. 239; twenty-five miles northwest of Kremmling, July 11, 1911 (230 mm.), J. Henderson, No. 238; four miles northeast of Ohio City, July 14, 1911 (580 mm.), A. Daugherty, No. 6; Muddy Creek, twenty-five miles northwest of Kremmling, July 12, 1911 (410 mm.), J. Henderson, No. 246; East Lake near Tolland, July 12, 1912 (560 mm.), G. S. Dodds, No. 241; west of Nederland, August 30, 1912 (850 mm.), J. Henderson, No. 243; *Colorado State Historical and Natural History Museum*: Dolores, June 27, 1890 (13 specimens, 190-640 mm.), H. G. Smith; Cumbres Pass Lake, August 1, 1900 (480 mm.), H. G. Smith; Buffalo, June 29, 1903 (900 mm.), W. C. Ferril; Estabrook, July 9, 1903 (700 mm.), H. G. Smith; Cumbres Pass, August 24, 1903 (4 specimens, 415-640 mm.), H. G. Smith; Grand Junction, September 16, 1904 (315 mm.), H. G. Smith; *State Teachers' College Museum*: Estes Park, Big Thompson River and upper Cache la Poudre, A. E. Beardsley.

Genus *OPHIBOLUS* Baird and Girard

Ophibolus Baird and Girard, *Cat. N. Am. Reptiles*, Pt. I, p. 82, 1853.

Anal plate entire; scales smooth, in 19 to 25 rows; superior labials, 7 or 8; preoculars, 1; posterior maxillary teeth slightly longer than those in front; moderately large to small snakes; colors bright, pattern usually made up of rings or bands.

The snakes of the genus *Ophibolus* are called King Snakes or less frequently, as the result of the absurd belief that they can milk cows, Milk Snakes. They are of distinct economic importance because of their feeding habits. Their food consists for the most part of small mammals, lizards and other snakes, members of their own species often being included in the last item. They are terrestrial and enter the burrows of rodents and other snakes in their search for food. They feed on poisonous and harmless snakes alike, as they are quite immune to the bite of the former. When killing their prey they often constrict it.

The species of this genus, of which there are some ten or twelve, are confined to North and Central America. They are oviparous.

***Ophibolus doliatus* (Linnaeus)**

WESTERN MILK SNAKE, RED KING SNAKE, OR RINGED KING SNAKE
(*Figure 23*)

Coluber doliatus Linnaeus, *Syst. Nat.*, ed. XII, p. 379, 1766.

Five distinct subspecies of this variable species may be distinguished. The Colorado specimens examined by us were all referable to *O. d. gentilis*, although it is probable that the subspecies *O. d. doliatus* may be found in southeastern Colorado.

a. No oblique black bar back of the eye.

b. Black bands forming distinct rings entirely around the body; black spots opposite the dorsal bands of the ventral color.

O. d. gentilis (Baird and Girard).

bb. Black bands not forming rings around the body.

O. d. doliatus (Linnaeus).

***Ophibolus doliatus gentilis* (Baird and Girard)**

Ophibolus gentilis Baird and Girard, *Cat. N. Am. Rept.*, Pt. I, p. 90, 1853.

Ophibolus doliatus gentilis Cope, *Check-list N. Amer. Batr. and Rept.*, p. 36, 1875.

Ophibolus triangulus gentilis—GARMAN, *Mem. Mus. Comp. Zool.*, Vol. VIII, No. 3, p. 66, 1883 (Colorado and Utah); COCKERELL, *Univ. Colo. Studies*, Vol. VII, p. 131, 1910 (Boulder, Colo.).

Dorsal scales smooth, in 21 or rarely 23 rows; ventrals, 160 to 220; tail one-fifth to one-eighth of the total length.

Predominant color varying from slate brown, through brick red to scarlet; ventral parts light gray to bright yellow; dorsal pattern of twenty to forty irregular blotches of the predominating color, separated by narrower bands of the ventral color, which come up from below, leaving the dorsal blotches as saddles; dorsal blotches strongly margined with narrow black bands (which in two subspecies form complete rings around the body); ventral parts with or without black spots opposite the dorsal bands of the ventral color; top of the head usually with a patch of the predominating color, margined with

black, and surrounded by the ventral color. Size medium; length up to three feet.

Range of *O. doliatus*, United States generally, and northern Mexico; of *O. d. doliatus*, Florida north to Maryland and west into Oklahoma and Texas; of *O. d. gentilis*, Nebraska and Colorado, south into Mexico, west of the Mississippi River.

This harmless and useful snake is often mistaken for the poisonous Harlequin Snake, *Elaps fulvius* (Linnaeus), since their color patterns are of the same type and made up of the same color units. We have no records of the Harlequin Snake in Colorado, although it is known from northern and western Texas. The poisonous *Elaps* may be recognized by the order of the colors, as the red band is bordered on each side by a yellow band while in the harmless *Ophibolus* the red band is bordered on each side by a black band.

Colorado specimens.—*University Museum*: Boulder, July 22, 1904 (190 mm.), V. E. Metcalf, No. 128; Boulder, August, 1911 (245 mm.), No. 130; *Colorado State Historical and Natural History Museum*: Yuma, June 6, 1905 (2 specimens, 570 and 630 mm.), Mrs. D. H. Boyes; Orchard, July 12, 1910 (skin only, 340 mm. to lower jaw), Mrs. E. M. Fowle; *Colorado Museum of Natural History*: Clear Creek, near Golden, June, 1912 (450 mm.), alive at the museum when examined by us; *Agricultural College Museum*: Beulah (210 mm.), H. F. Wilson; *State Teachers' College Museum*; Weld, Larimer and Baca counties, A. E. Beardsley.

Genus **PITYOPHIS** Holbrook

Pityophis Holbrook, *N. Am. Herpetology*, Vol. IV, p. 7, 1842.

Anal entire; scales keeled, in 27 to 35 rows; preoculars, 1 or 2; maxillary teeth equal; rostral plate large and recurved between the internasals; a cartilaginous epiglottis which may be elevated vertically in front of the glottis, producing a loud hissing sound when the breath is expelled; large, heavy snakes.

The Bull Snakes, genus *Pityophis*, are the largest of the North American harmless snakes, often reaching the length of eight feet. They are generally believed to be quite dangerous. This is perhaps due to their bold disposition and angry behavior when disturbed. At this time they produce a loud hissing sound which may be heard

twenty feet or more and is terrifying enough to the person unfamiliar with this type of snake. The Bull Snakes are oviparous and lay eggs almost as large as hen's eggs. They range over the United States and Mexico. Their food consists largely of small mammals and birds. Because of the large number of rodents eaten by these snakes they are to be regarded as not only harmless snakes, but as beneficial snakes.

Pityophis catenifer (Blainville)

BULL SNAKE (*Figures 24, 25, 26, 35 and 36*)

Coluber catenifer Blainville, *Nouv. Ann. du Mus.*, Vol. IV, p. 290, 1835.

Three subspecies of this snake are recognized, two of which occur in Colorado. These are distinguished particularly by their range and less exactly by the size of the rostral plate.

- a. Range, Canada to northern Mexico, west of the Mississippi River and east of the Rocky Mountains; rostral plate separating the internasal plates for two-thirds or more of their length. *P. c. sayi* (Schlegel).
- aa. Range, west of the Rocky Mountains.
 - b. Range, Great Basin from Utah and Nevada south to Arizona and New Mexico, east to Colorado and west to the Sierra Nevada Mountains; rostral plate separating the internasal plates for not more than one-third of their length. *P. c. bellona* (Baird and Girard).
 - bb. Range, west of the Sierra Nevada Mountains; rostral plate just reaching the internasals. *P. c. catenifer* (Blainville).

Pityophis catenifer sayi (Schlegel)

Coluber sayi Schlegel, *Ess. Physionomie des Serpentes*, p. 157, 1837.

Pityophis catenifer sayi Brown, *Proc. Acad. Nat. Sci. Phila.*, Vol. LIII, p. 55, 1901.

Pityophis elegans—YARROW, *U.S.N.M. Bull.* 24, p. 108, 1882 (between the Arkansas and Cimarron, N.Mex.).

Pityophis sayi sayi—YARROW, *U.S.N.M. Bull.* 24, p. 105, 1882 (Pagosa, Colo.); CARY, *N. Am. Fauna*, No. 33, p. 27, 1911 (eight miles west of Naturita, Colo.).

Dorsal scales keeled, excepting the first three or four rows on each side (sometimes as many as 11 rows are smooth on each side), in 27 to 35 rows; superior labials, 8 or 9; inferior labials, 12; postoculars, 3 to 5; nasal opening large and prominent, directed posteriorly; rostral plate large and recurved; ventrals, 200 to 250; tail less than

one-fourth of the total length; size large, body heavy, length often eight feet (specimens exceeding nine feet in length have been recorded).

Ground color yellowish gray, or yellowish or reddish brown, often bright yellow or even orange yellow; ventral parts lighter, with an irregular row of dark blotches near the lateral margins of the ventrals; dorsal pattern consisting of a row of rather large, somewhat rectangular, brown, reddish brown or black spots, occupying the mid-dorsal region, these spots often more or less confluent near the head, forming a dark mid-dorsal stripe in which are small spots of the yellowish ground color; between the dorsal row of spots and the ventrals on each side a row of smaller more indistinct spots of a lighter shade than the dorsal spots; head yellowish, with or without a dark stripe from the eye to the posterior angle of the mouth. Mr. L. J. Hersey reports this species from Barr, Colo., as eating the eggs of the Pin Tail Duck, in the summer of 1906.

Colorado specimens.—*University Museum*: Boulder, May 10, 1911 (700 mm.), No. 77; Boulder, October 9, 1911 (410 mm.), B. Rowland, No. 145; *Colorado State Historical and Natural History Museum*: Denver, May 14, 1903 (635 mm.), W. C. Ferril; Colorado, 1896 (1550 mm.); Denver, June 12, 1903 (970 mm.), H. G. Smith; Wray, May 31, 1905 (1130 mm.), H. G. Smith; Julesburg, May 1, 1906 (1040 mm.), W. C. Ferril; *Agricultural College Museum*: Ft. Collins, July, 1892 (1280 mm.), C. P. Gillette; *State Teachers' College Museum*: Las Animas and Baca counties, A. E. Beardsley; reported by Henderson from foothills five miles south of Box Elder, Larimer County, 1905; from Osgood, June 23, 1912; from Wild Cat Creek, northeast of Ft. Morgan; by Cockerell, from Boulder, May 22, 1907, as variety, *P. c. sayi*.

***Pityophis catenifer bellona* (Baird and Girard)**

Pityophis bellona Baird and Girard, *Cat. N. Am. Rept.*, Pt. I, p. 66, 1853.

Pityophis catenifer bellona Brown, *Proc. Acad. Nat. Sci. Phila.*, Vol. LIII, p. 54, 1901.

Pityophis sayi bellona—YARROW, *Wheeler Survey*, Vol. V, pp. 515 and 541, 1875 (Pagosa, Colo.); YARROW, *U.S.N.M. Bull.* 24, pp. 106–107, 1882 (Pagosa, Cal., probably an error for Col.); COPE, *Rept. U.S.N.M.*, p. 876, 1898 (Pagosa, Colo.).

Colorado specimen.—*State Teachers' College Museum*: Fruita, A. E. Beardsley.

Genus **HETERODON** Latreille

Heterodon Latreille, *Hist. Nat. Reptiles*, Vol. IV, p. 32, 1799.

Anal plate divided; scales keeled, in 23 or 25 rows; rostral plate large, produced, upturned and recurved, producing a "snout" at the end of the head; a ring of scales around each eye, of which three or four are in front of the eye; posterior maxillary teeth much longer than those in front; large, thick-bodied snakes.

The snakes of this genus are known as the Hog-nosed Snakes, and incorrectly as "Spreading Vipers and Adders." The last two names are the result of the ability of these snakes to expand the anterior portion of the body when disturbed so as to resemble somewhat the Asiatic Cobra. They are, however, harmless. When disturbed the Hog-nosed Snakes make a very elaborate show of fight. The snake expands the body just back of the head and strikes vigorously and viciously, although it rarely bites even if opportunity be offered. If these demonstrations are not sufficient the snake may feign death, suddenly, by dropping over on its back. Hog-nosed Snakes are often confused with rattlesnakes by those unfamiliar with them. They feed for the most part on toads and frogs.

The three species of this genus are found only in North America. They are oviparous.

Heterodon nasicus Baird and GirardWESTERN HOG-NOSED SNAKE (*Figures 28, 29, 30 and 31*)

Heterodon nasicus Baird and Girard, *Cat. N. Am. Reptiles*, Pt. I, p. 61, 1853.

Heterodon nasicus—BAIRD, *Pacific R.R. Survey*, Vol. X, Pt. V, No. 3, p. 19, 1857 (No. 1263, Rocky Mountains).

Heterodon simus nasicus—YARROW, *Wheeler Survey*, Vol. V, pp. 555-556, 1875 (Denver and Pueblo, Colo.); YARROW, *U.S.N.M.*, *Bull.* 24, p. 141, 1882 (Ft. Lyon, Colo.).

Heterodon nasicus nasicus—COPE, *Rept. U.S.N.M.*, p. 777, 1898 (Ft. Lyon, Colo.).

Dorsal scales keeled, in 23 rows; superior labials, 8; inferior labials, 10; 10 or 11 scales around the eye; several small scales between the prefrontals and the internasals; ventrals, 125 to 150; tail one-

eighth to one-fourth of the total length; average specimens under three feet; body stout and heavy.

Ground color grayish, to grayish yellow or grayish brown; ventral parts whitish, mottled with irregular dark blotches and with a wide dark area down the center; dorsal pattern of a central row of large, rather rounded, brownish or blackish spots, separated by spaces of about the same size of the ground color; the sides with two rows of dark spots smaller in size, placed one above the other opposite the spaces between the dorsal spots; another set of more suffuse spots showing rather indistinctly between the successive pairs of lateral spots; under parts of the head whitish; top of the head with a narrow light stripe crossing it in the region of the eyes; a dark, oblique band extending from the posterior portion of the supraocular plate to the posterior angle of the mouth, including all or part of the last two superior labials; a second, larger, oblique band, just back of, and separated by a single row of scales from the first dark band.

Range, Montana and Dakota south into Mexico, east to Arkansas. A plains species.

Colorado specimens.—*University Museum*: LaJunta, July, 1905 (425 mm.), G. S. Dodds, No. 247; Hudson, August, 1905 (255 mm.), H. Markman, No. 248; five miles east of Grover, June 26, 1906 (170 mm.), J. Henderson, No. 249; Lodgepole Creek, near Ovid, July 17, 1912 (190 mm.), J. Henderson, No. 250; near Julesburg, July 17, 1912 (525 mm.), J. Henderson and M. M. Ellis, No. 251; three miles east of Osgood, June 22, 1912 (550 mm.), J. Henderson, No. 252; *Colorado State Historical and Natural History Museum*: Denver, August 13, 1902 (460 mm.), C. Murray; Denver, June 2, 1903 (430 mm.), H. G. Smith; Lamar, June 20, 1904 (790 mm.), H. G. Smith; Lamar, June 8, 1904 (750 mm.), H. G. Smith; Denver, June 1, 1905 (480 mm.), E. Bethel; *Agricultural College Museum*: Ft. Collins, July, 1892 (2 specimens, 220 and 310 mm.), C. F. Baker; *State Teachers' College Museum*: Greeley and Trinidad, A. E. Beardsley; reported by Henderson from Goodrich, near Crow Creek, June 22, 1912; from Foston, June 25, 1912; from ten miles north of Sterling, July 23, 1912.

Genus **TROPIDONOTUS** Kuhl

Tropidonotus Kuhl, *Isis von Oken*, p. 205, 1826.

Natrix Laurenti, *Synopsis Reptilium*, p. 73, 1768.

Anal plate divided; scales keeled, in 17 to 23 rows; posterior maxillary teeth longer than those in front; rather large snakes.

To this genus belong the Water Snakes. They are found in all parts of the world along streams and in swamps. They lead a semi-aquatic life, feeding upon fish, tadpoles, frogs and other aquatic animals. The many species of this genus are viviparous, producing many young.

Tropidonotus sipedon (Linnaeus)

WATER SNAKE (*Figure 27*)

Coluber sipedon Linnaeus, *Syst. Nat.*, ed. X, p. 219, 1758.

Tropidonotus sipedon—COCKERELL, *Univ. Colo. Studies*, Vol. VII, p. 131, 1910 (Boulder, Colo.).

Dorsal scales keeled, dull and lusterless, in 23 or 25 rows; superior labials, 8 (rarely 9); inferior labials, 9; ventrals, 125 to 150; tail one-fourth or less of the total length.

General color yellowish brown or red brown. Body crossed by fifty or more dark brown or almost black irregular bands, which reach to the ventrals on each side. These bands are most distinct on the sides of the body, dorsally they may be more or less completely broken up into large spots; between these bands or spots are irregular, somewhat triangular patches of the lighter yellowish or reddish ground color, on the sides of the body the ground color often bright red. These markings are usually much obscured in large or old specimens. Ventral parts yellowish or brownish, rather heavily and irregularly blotched, especially back of the anal, with black, gray, brown and red. In the variety *transversus* the ventrals are without markings. Labials pale yellow, their junctions with each other marked with black. Color pattern rather variable, even a green form of this species being known from Florida.

As its name implies, this snake spends the greater part of its life either in the water or very near it. It is often found coiled under loose wet stones on the stream bank. It is quite active and delights to climb into the branches of bushes overhanging the water. The belief is current in many parts of the country that this snake is the dangerous "Water Moccasin." Although sometimes incorrectly called the Moccasin, this snake is one of the harmless species. When given a chance it retires at once if disturbed, but when escape is

impossible it makes a bold fight, striking and biting vigorously. At the same time it emits a disagreeable odor from the anal glands.

It feeds on fishes, of which it is particularly fond, frogs, tadpoles and salamanders. This species is viviparous and bears according to Ditmars¹ as many as forty-four young. The average number of young is about twenty-five.

The Water Snake, which is one of the large snakes, reaching the length of four feet, ranges over the most of the United States east of the Rocky Mountains. Three subspecies of this snake may be recognized by their color patterns.

- a. Body crossed dorsally by dark bands throughout its length; ventrals spotted. *T. s. fasciatus.*
- aa. Body crossed dorsally by dark bands in the anterior half only; bands giving place to spots in the posterior half; ventrals spotted. *T. s. sipedon.*
- aaa. Body marked dorsally with spots only; ventrals without spots. *T. s. transversus.*

Colorado specimens.—*University Museum:* Boulder, 1909 (220 mm.), S. Searcy, No. 67; *Colorado State Historical and Natural History Museum:* Denver, June 27, 1890 (265 mm.), H. G. Smith; Wray, September 18, 1903 (385 mm.), W. C. Ferril; Wray, May 20, 1904 (2 specimens, 650 and 750 mm.), H. G. Smith; Wray, June 15, 1906 (2 specimens, 450 and 1200 mm.), H. G. Smith; *State Teachers' College Museum:* Greeley, Baca, Las Animas and Weld counties, A. E. Beardsley.

Genus **STORERIA** Baird and Girard

Storeria Baird and Girard, *Serpents of North America*, p. 135, 1853.

Anal plate divided; scales heavily keeled, in 15 or 17 rows; loreal plate absent; small snakes; genus restricted to North America.

The genus *Storeria* is represented in Colorado by the species *Storeria dekayi* (Holbrook).

Storeria dekayi (Holbrook)

DEKAY'S SNAKE

Tropidonotus dekayi Holbrook, *N. Am. Herpt.*, Vol. III, p. 53, 1842.

Dorsal scales keeled heavily, in 17 rows; superior labials, 7; nasals, 2, with nostril between; ventrals, 120 to 150; caudals, 40 to

¹ DITMARS, *Reptile Book*, p. 353, 1907.

60; tail short, 6 to 9 in the total length; size small, less than 16 inches.

General color above brownish, varying to olive or reddish brown; a pale mid-dorsal stripe, about four scales wide; on each side of the mid-dorsal stripe a row of dark spots, the spots being about two rows of scales apart; below these rows of spots on each side other spots may be present; all of the spots subject to variation; head brown, often with small black dots, and sometimes with a spot under each eye and across the side of the head; ventral parts pinkish to salmon red; ends of the ventrals usually with brown spots.

This small snake is one of the most abundant snakes of eastern United States. It hides under stones and fallen timber and is rarely seen except when sought for. Its food consists of earthworms, slugs and insects. It is viviparous, bearing as many as eighteen young (Ditmars).¹ Some discussion has arisen as to whether this species is aquatic or not. Branson² states that all of the Kansas specimens examined by him were either from the water or near the water. On the other hand, this snake has been taken in non-aquatic environments. It is probable that it lives in both habitats.

Range, eastern United States generally, west to the Rocky Mountains and south into Mexico.

Colorado specimen.—*State Teachers' College Museum*: Las Animas County, A. E. Beardsley.

Genus **LIOPELTIS** Cope

Liopeltis Cope, *Proc. Acad. Nat. Sci. Phila.*, p. 559, 1860.

This genus is represented in the North American fauna by but a single species, *L. vernalis* (DeKay). The other species are found in eastern Asia.

Liopeltis vernalis (DeKay)

SMOOTH GREEN SNAKE; GRASS SNAKE; LITTLE GREEN SNAKE

Coluber vernalis DeKay, in Harlan, *Journ. Acad. Nat. Sci. Phila.*, Vol. V, p. 361, 1827.

Liopeltis vernalis—CARY, *N. Am. Fauna*, No. 33, p. 40, 1911 (Rio Pinos, near Vallecito, Colo.).

¹ *Reptile Book*, p. 269.

² *Kans. Univ. Sci. Bull.*, Vol. II, No. 13, p. 395, 1904.

Dorsal scales in 15 rows, smooth and with a velvety luster; superior labials, 7; inferior labials, 8; ventrals, 120-140; tail about one-third of the total length.

Dorsal parts bright green to olive to the lower edge of the first row of scales (turning bright blue in alcohol); head darker; ventral parts and labials pale yellowish green or yellowish white.

This snake is probably entirely insectivorous. Smooth green caterpillars are its favorite food. It lives among the low underbrush and tall grasses. When disturbed it darts away and quickly conceals itself in the grasses and leaves. It is often found on bushes and briars where its green color makes it very difficult to see unless it is moving. This snake lays from eight to ten eggs. Ditmars¹ gives a very interesting account of finding a nest of this species under a stone in a hollow of moss and lichens. He states that the young were four and five-eighths inches in length when first hatched, olive in color above and greenish white below.

This species ranges over most of the United States east of the Rocky Mountains.

Colorado specimens.—*University Museum*: Boulder, August 11, 1911 (305 mm.), G. A. Smith, No. 127; *Colorado State Historical and Natural History Museum*: Palmer Lake, September 14, 1900 (380 mm.), W. C. Ferril; reported by Henderson at Boulder, September 5, 1912.

Genus **CHIONACTIS** Cope

Chionactis Cope, *Proc. Acad. Nat. Sci. Phila.*, p. 303, 1861.

Anal plate divided; scales smooth; scales in 13 to 17 rows; superior labials, 7; size small to medium. Of the several species of this genus but one is known from Colorado.

Chionactis episcopus (Kennicott)

GROUND SNAKE

Lamprosoma episcopum Kennicott, *U.S. Mex. Bound. Survey*, Vol. II, p. 22, 1859.

- a. Back crossed by 18 to 25 black bands *C. e. isozonus* Cope.
 aa. Back without cross-bands *C. e. episcopus* (Kennicott).

¹ DITMARS, *Reptile Book*, p. 326, 1907.

Chionactis episcopus isozonus Cope

BLACK-BANDED GROUND SNAKE

Contia isozona Cope, *Proc. Acad. Nat. Sci. Phila.*, p. 304, 1866.

Chionactis episcopus isozonus Cope, *Rept. U.S. Nat. Mus.*, p. 939, 1898.

Dorsal scales smooth, in 15 rows; superior labials, 7; ventrals, 140 to 160; loreal small; tail about one-fifth of the total length; size small to medium, length under 18 inches.

General color brownish or grayish with a reddish cast to quite red; back crossed by about 20 black bands separated by equal bands of the ground color, these bands completely encircling the tail, but not quite reaching the ventrals over the body; ventral parts pinkish.

Range, Colorado and Utah south into Mexico.

Colorado specimen.—*State Teachers' College Museum*: Las Animas County, Corrizo Canyon, A. E. Beardsley.

Genus **DIADOPHIS** Baird and Girard

Diadophis Baird and Girard, *Cat. N. Am. Reptiles*, Pt. I, p. 112, 1853.

Anal plate divided; scales smooth, in 15 or 17 rows; superior labials, 7 or 8; inferior labials, 7 or 8; preoculars, 2, rarely 1; maxillary teeth equal; color uniform brownish black, gray or blue above, red or yellow below, usually with a yellow collar; size small, length under two feet.

The Ring-necked Snakes, as those of this genus are called, are small active snakes, which because of their habit of hiding away under stones and bark are not often seen. Their food consists of the small animals which they find in these places, insects, salamanders, earthworms and other smaller snakes. They are oviparous or ovoviviparous.

The four species of this genus and their varieties are restricted to North America and the Bahama Islands.

Diadophis regalis Baird and GirardSONORAN RING-NECKED SNAKE (*Figures 21 and 22*)

Diadophis regalis Baird and Girard, *Cat. N. Am. Reptiles*, Pt. I, p. 115, 1853.

Diadophis regalis arnyi—COPE, *Rept. U.S.N.M.*, p. 746, 1898 (mouth of Cache Creek, Colo.).

Dorsal scales smooth, with a satin luster or slightly polished, in 17 rows; superior labials, 7; inferior labials, 7; ventrals, 170-250. Body narrowing rather suddenly back of the anal.

Dorsal parts slate brown to brownish or bluish black. Top of the head black or greenish black, smooth and polished. Some specimens with a collar of salmon yellow shading to pale yellow below, two or three scales wide, outlined with black, not completely encircling the body, broken in the mid-dorsal line by one to three rows of scales. This collar may be completely developed as just described or may be represented by but small areas of yellow, or may be entirely wanting. Labials yellow, except as the black of the top of the head covers the upper margins of the superior set and is continued down over those of both sets at the angle of the jaw. Ventrals pale yellow just back of the head, shading to bright red near the anal, bearing two irregular rows of black dots on each side and occasional spots in their mesial portions. Under parts of the tail bright red and without spots except near the anal. Mental region pale yellow and spotted.

Diadophis regalis is a rather active species feeding upon insects, smaller snakes, and such other small creatures as it can find under bark, stones, and in similar places. When cornered and disturbed it has the habit of elevating and wriggling its tail. The forms closely related to this species are oviparous. No observations are recorded concerning the breeding habits of this species.

The range of this snake is from the Mississippi River to Colorado and Arizona; it has been taken in Illinois, although it is rare east of the Mississippi.

The Western Ring-necked Snake, *Diadophis amabilis* Baird and Girard, may be found in Colorado. This snake, which closely resembles *Diadophis regalis* Baird and Girard, may be recognized by the number of scale rows, it having fifteen rows instead of seventeen rows.

The figures given of *Diadophis regalis*, No. 253, are from a specimen taken at Abilene, Kan., by Dr. H. P. Mera.

Colorado specimen.—*State Teachers' College Museum*: Trinidad, A. E. Beardsley.

Genus **ZAMENIS** Wagler

Zamenis Wagler, *Syst. Amph.*, p. 188, 1830.

Bascanion Baird and Girard, *Cat. N. Am. Reptiles*, Pt. I, p. 93, 1853.

Anal plate divided; scales smooth, in 15, 17 or sometimes 19 rows; superior labials, 7 or 8; posterior maxillary teeth successively longer than those in front; preoculars, 2, the lower much the smaller; long and rather slender snakes.

Snakes of this genus are popularly known as Black Snakes, Racers and Coachwhip Snakes. They are generally believed to constrict their prey, which is not the case. For food they take particularly small rodents, insects, and birds and eggs when they can get them. All of the North American species are oviparous, laying from eight to twenty-four eggs. Species of this genus are found in Central and North America, Europe and Asia.

Young specimens of the species of this genus are marked with numerous cross bands of dark brown on a ground color of lighter brown. As they grow older this pattern is either obscured or entirely obliterated by the darker ground color of the adult. Specimens of all species of this genus may be found in which these bands are fairly distinct even in the adult. This is especially true of *Z. taeniatus*.

KEY TO THE COLORADO SPECIES OF ZAMENIS

- a. Scales in 15 rows (rarely 17); adult with 2 to 5 narrow stripes on each side; belly yellowish and more or less spotted; upper labials, 8.
Z. taeniatus (Hallowell).
- aa. Scales in 17 rows (rarely 19); adult without lateral stripes; upper labials, 7 or 8.
 - b. Upper labials, 7. *Z. constrictor* (Linnaeus).
 - bb. Upper labials, 8. *Z. flagellum* (Shaw).

Zamenis constrictor (Linnaeus)

BLACK SNAKE; BLUE RACER

Coluber constrictor Linnaeus, *Syst. Nat.*, ed. X, p. 216, 1758.

Bascanium constrictor vetustum—YARROW, *Wheeler Survey*, Vol. V, pp. 541-542, 1875 (Pueblo, Colo.).

Bascanium constrictor—YARROW, *U.S.N.M.*, *Bull.* 24, p. 108, 1882 (Pueblo, Colo.).

Zamenis constrictor—COPE, *Rept. U.S.N.M.*, pp. 796-797, 1898 (Pueblo and Denver, Colo.).

Dorsal scales smooth, in 17 or rarely 19 rows; superior labials, 7; ventrals, 160 to 200; tail, one-fifth to one-third of the total length; long, rather slender species, length up to six feet.

Two subspecies of this snake, separated by their color and to some extent by their range, are known. Both occur in Colorado.

Z. constrictor constrictor (Linnaeus).—Dorsally, dark blue black to shiny black; under parts whitish to slate gray. Range, United States east of the Rocky Mountains, and northern Mexico; quite rare in the western part of its range, where it is almost completely replaced by the following variety.

Z. constrictor flaviventris (Say).—Dorsally, bright, dark green to olive green; ventral parts bright yellow to greenish yellow. Range, United States west of the Mississippi River, south into Mexico.

Colorado specimens.—*Colorado State Historical and Natural History Museum*: Denver, June 5, 1902 (750 mm.), H. G. Smith; Lamar, June 20, 1904 (2 specimens, 325 and 1520 mm.), H. G. Smith; Yuma, June 12, 1906 (385 mm.), H. G. Smith; *Agricultural College Museum*: Ft. Collins, 1906 (310 mm.), S. A. Johnson; *State Teachers' College Museum*: Baca, Las Animas, and Weld counties, A. E. Beardsley; reported by Cockerell from Boulder.

Zamenis flagellum (Shaw)

COACHWHIP SNAKE (*Figures 32 and 33*)

Coluber flagellum Shaw, *Gen. Zoöl.*, Vol. II, Pt. II, p. 475, 1802.

Bascanium flagelliforme testaceum—YARROW, *Wheeler Survey*, Vol. V, p. 542, 1875 (Pueblo, Colo.); YARROW, *U.S.N.M.*, *Bull.* 24, p. 112, 1882 (Pueblo, Colo.).

Zamenis flagellum flagellum—COPE, *Rept. U.S.N.M.*, p. 803, 1898 (Pueblo, Colo.).

Coluber testaceus—SAY, *Long's Exped. Rocky Mts.*, p. 48, 1823 (probably near the junction of Fountain Creek and the Arkansas River).

Dorsal scales in 17, rarely 19, rows; superior labials, 8; ventrals, 170 to 220; tail one-fifth to one-third of the total length; slender species, length up to eight feet.

Anterior portion of the body dark brown to almost black, gradually shading into light brown in the caudal region; ventral parts white,

yellow or slightly pink, somewhat clouded in the anterior regions; sometimes with very indistinct cross bands in the caudal region. The general color of this species varies from dark brown to gray or red brown in the different portions of its range.

The name Coachwhip Snake is quite descriptive of the posterior half of the body where the scales are so arranged as to give the appearance of the plaited cord of a whip.

This very active species ranges from Florida to California, south into Mexico and north into Kansas, Colorado and Utah.

Colorado specimens.—*University Museum*: Boulder, May 23, 1905 (295 mm.), No. 254; Altona, July 14, 1912 (340 mm.), N. deW. Betts, No. 255; *Colorado State Historical and Natural History Museum*: Yuma, June 7, 1905 (750 mm.), H. G. Smith; *State Teachers' College Museum*: Las Animas and Baca counties, A. E. Beardsley.

Zamenis taeniatus (Hallowell)

STRIPED RACER

Leptophis taeniata Hallowell, *Proc. Acad. Nat. Sci. Phila.*, Vol. VI, p. 181, 1852.

Bascanium taeniatum taeniatum—YARROW, *U.S.N.M.*, *Bull.* 24, p. 112, 1882 (Canyon Creek, Colo.).¹

Zamenis taeniatus—COPE, *Rept. U.S.N.M.*, p. 817, 1898 (Canyon Creek, Colo.).

Bascanion taeniatum—CARY, *N. Am. Fauna*, No. 33, p. 27, 1911 (Plateau Creek, Morris, Colo.).

Dorsal scales in 15, rarely 17, rows; superior labials, 8; ventrals, 180 to 220; tail one-fourth to one-third of the total length; average specimens three or four feet in length.

Dorsally pale brown to dark brown, gradually becoming lighter toward the tail; ventral parts yellowish, usually somewhat spotted, especially near the head; a yellowish stripe along the junction of the ventrals with the first row of dorsal scales and a second yellowish stripe on the third and fourth rows of scales (variety *ornatus*); or a narrow black stripe on each of the first four or five rows of scales and at the junction of the ventrals and the first row, with lighter areas between (variety *taeniatus*).

¹ There is a Canyon Creek in La Plata County and another in Ouray County.

Specimens of this species tend to retain the cross bands of the young color pattern even as adults. Range, western Texas to California, south well into Mexico and north into Colorado and Utah.

Genus **TANTILLA** Baird and Girard

Tantilla Baird and Girard, *Cat. N. Am. Reptiles*, Pt. I, p. 131, 1853.

Homalocranium Duméril et Bibron, *Mem. Acad. Sci.*, XXIII, 490, 1853.

Anal plate divided; scales smooth and polished, in 15 rows; posterior maxillary teeth grooved and separated from the others by an interspace; size small; color reddish or brownish.

These snakes are found in North, Central and South America and the West Indies.

Tantilla nigriceps Kennicott

TEXAS BLACK-HEADED SNAKE (*Figure 34*)

Tantilla nigriceps Kennicott, *Proc. Acad. Nat. Sci. Phila.*, p. 328, 1860.

Size small, not exceeding twenty inches.

Dorsal scales smooth and polished, in 15 rows; upper labials, 7; inferior labials, 6; ventrals, about 155.

Uniform yellowish, red brown or drab color above, shading to white, pale yellow or pink below; top of the head blackish brown to almost black, the dark color extending to the level of the eyes on each side and back of the head for about three rows of scales; posterior margin of the colored area V-shaped. Rostral region lighter.

These seem to be the first records for this little snake in Colorado, and Yuma is the most northern point from which it has been taken. Cope¹ does not list it north of Wichita River, Tex., although Branson² finds it as a rare snake in southern Kansas.

It is a very retiring snake, and burrows for its food. This consists of insect larvae and earthworms.

This species ranges through Texas, where it is quite abundant, north to Colorado and Kansas and west to Arizona.

Colorado specimens.—*University Museum*: LaJunta, July, 1905 (220 mm.), G. S. Dodds, No. 256; *Colorado State Historical and Natural History Museum*: Yuma, near Dry Willow Creek, July 7, 1905 (340 mm.), H. G. Smith.

¹ COPE, *Rept. U.S.N.M.*, p. 1114, 1898.

² BRANSON, *Kans. Univ. Sci. Bull.*, Vol. II, p. 415, 1902.

Family CROTALIDAE

Pit Vipers

This family of snakes is distinguished at once by the peculiar pit on each side of the front of the head below the nostril. This structure although well enervated is of unknown function. The *Crotalidae* have large movable fangs in the front part of the upper jaw. These fangs, which are hollow, are connected with poison sacks and so arranged that the opening of the mouth elevates the fang. These snakes are venomous, the bite of several species often proving fatal in spite of medical attention. Four species are recorded from Colorado.

Genus CROTALUS Linnaeus

Crotalus Linnaeus, *Syst. Nat.*, ed. X, p. 214, 1758.

Anal plate entire; subcaudal plates entire; genials large; scales heavily keeled, excepting the first two or three rows on each side, in 23 to 31 rows; labials, 12 or more, subequal; tail terminating in a jointed rattle.

The rattlesnakes, of which there are sixteen or more species, range from Canada to Brazil. They are of a specialized and distinctive type. All the species of this genus are viviparous. The young when first born have only the button on the end of the tail and the rattles appear after the subsequent sheddings of the skin. More than a single rattle may be produced in a single year so that the general belief that the age of the snake may be determined by the number of its rattles is without foundation. For food the rattlesnakes generally take warm-blooded prey, birds and small mammals.

KEY TO THE COLORADO SPECIES OF CROTALUS

- a. Supraocular plate produced and elevated into a distinct "horn" above each eye; size small, length of adults usually less than three feet.
C. cerastes Hallowell.
- aa. Supraocular plate not elevated into a "horn" above each eye; size large.
 - b. Tail whitish or yellowish, crossed with three or four distinct, black rings; back with numerous diamond-shaped areas of blackish.
C. atrox Baird and Girard.
 - bb. Tail without distinct black rings; colored areas on the back rounded.
C. confluentus Say.

Crotalus cerastes Hallowell

HORNED RATTLESNAKE OR SIDEWINDER

Crotalus cerastes Hallowell, *Proc. Acad. Nat. Sci. Phila.*, p. 95, 1854.

Crotalus cerastes—COPE, *Rept. U.S.N.M.*, p. 1199, 1898 (Colorado River, Colo.).

Dorsal scales in 21 rows, all excepting the first two or three rows on each side heavily keeled; superior labials, 11 or 12; inferior labials, 12 or 13; supraocular plates elevated into a distinct "horn" on each side; ventrals, 130 to 150; tail one-eighth to one-sixth of the total length; size small, under three feet in length.

Ground color yellowish, brownish or pinkish; ventral parts yellowish; dorsal pattern of thirty or more rounded blotches of dark brown, separated and somewhat surrounded by grayish white; caudal blotches forming rather distinct bands; a dark bar extending some distance back of the eye; labial region light.

This peculiar little rattlesnake is included in the Colorado fauna on a very uncertain record. The true Colorado River does not flow through Colorado although its headwaters are found in this state. If "Colorado River, Colo.," refers to some of these headwaters this record is valid, although it may be only an error. This snake should be looked for, however, in the extreme southwestern portion of the state. The name "Sidewinder" is given this little reptile because of the peculiar sideways movements it often makes. It ranges through Arizona, Nevada and southern Utah into California.

Crotalus atrox Baird and Girard

WESTERN DIAMOND RATTLESNAKE

Crotalus atrox Baird and Girard, *Cat. N. Am. Reptiles*, Pt. I, p. 5, 1855.

Dorsal scales in 25 or 27 rows, all excepting the first and second rows on each side, strongly keeled; superior labials, 16; inferior labials, 15; ventrals, 170 to 190; top of the head flat; tail about one-sixth of the total length.

Ground color yellowish, brownish, gray or even slightly pink; ventral parts yellowish, often somewhat clouded with gray or black,

especially near the lateral margins of the ventrals; dorsal pattern of thirty to forty or more, hexagonal to diamond-shaped blotches of black or dark brown, each blotch emarginate with ashy white and with more or less of the ground color in its center; tail ashy white, crossed by three to six black or very dark brown rings which are open ventrally; head without the vertical white stripe under the nostril which is present in *C. adamanteus* (Beauvais), the eastern Diamond-Back Rattlesnake.

Length, up to seven feet. This rattlesnake ranges from the middle of Texas west to Arizona. In southern California it is represented by a red subspecies, *C. atrox ruber* Cope.

Colorado Specimen.—We include this rattlesnake in the fauna of Colorado on the record kindly given us by Mr. L. J. Hersey of the Colorado Museum of Natural History in Denver. This specimen, determined by Mr. Hersey, was five and one-half feet in length and was collected at Trinidad, Colo., by William Wilson, August 17, 1912.

***Crotalus confluentus* Say**

PRAIRIE RATTLESNAKE (*Figures 38, 39 and 40*)

Crotalus confluentus Say, *Long's Exped. Rocky Mts.*, Vol. II, p. 48, 1823 (probably near junction of Fountain Creek and the Arkansas River).

Crotalus confluentus confluentus—YARROW, *U.S.N.M. Bull.* 24, p. 77, 1882 (Cache la Poudre River); COPE, *Rept. U.S.N.M.*, p. 1172, 1898 (Cache la Poudre River).

Dorsal scales in 27 or 29 rows, all strongly keeled, excepting those of the first two or three rows on each side; superior labials, 15 or 16; inferior labials, 16 to 18; ventrals, 170 to 190; top of the head flat or very slightly concave; tail about one-sixth of the total length.

Ground color greenish yellow, gray or brown; ventral parts yellowish; dorsal pattern of thirty or more rounded blotches of dark brown, distinctly darker around the edges and outlined with yellowish white; pattern more obscure toward the tail; a dark bar extending from just below the middle of the eye to the posterior angle of the mouth, bordered on each side by a yellow stripe one row of scales wide; two dark spots in the occipital region; two more or less distinct yellowish stripes on each supraocular plate; an irregular row of spots, often rather indistinct, down each side of the body.

C. confluentus is the common rattlesnake of the state. It is one of the medium-sized rattlesnakes, average specimens being between three and four feet in length. It ranges from southern Canada south almost to Mexico, east into Kansas and Nebraska, and west into Idaho, Utah and Arizona.

Colorado specimens.—*University Museum:* Colorado (580 mm., 5 rattles), No. 78; LaJunta, July, 1905 (620 mm., 8 rattles), G. S. Dodds, No. 257; Wray, October 27, 1912 (shed skin, 650 mm.), M. M. Ellis; *Colorado State Historical and Natural History Museum:* Denver, August 10, 1903 (370 mm., 4 rattles), H. Davies; Denver, October 1, 1904 (2 specimens, 210 and 230 mm.), A. T. Allen; Watervale, August 7, 1906 (780 mm., 9 rattles), H. G. Smith; *State Teachers' College Museum:* top of Pole Hill near Loveland, Greeley and Las Animas County, A. E. Beardsley; *reported* by Henderson from Crow Creek near Cornish, 1904; from Osgood, 1911; from foothills northeast of Lyons, the mountains north of Lyons and Owl Canyon, west of Ft. Collins; from Boulder, near Sanitarium, October 13, 1912; common just south of the northern state line from the Union Pacific Railway to Pawnee Butte, and one northeast of Ault; by Sam Service from Estes Park, September 18, 1908; by Cockerell, from Boulder, 1911.

Genus **SISTRURUS** Garman

Sistrurus Garman, *N. Am. Reptiles*, p. 110, 1883.

Tail with a rattle; head with nine plates instead of the small scales found in *Crotalus*; other characters much the same as *Crotalus*. The snakes of this genus because of their small size are known as Pigmy Rattlesnakes. It is to be remembered, however, that although they are small they are dangerous. One species is recorded from Colorado.

Sistrurus catenatus (Rafinesque)

THE MASSASAUGA

Crotalinus catenatus Rafinesque, *Am. Monthly Mag.*, Vol. IV, p. 41, 1818.

Two subspecies of this little rattlesnake are known. They may be little more than geographical varieties.

- a. Scales in 23 rows; colors light; range, southwestern United States.
S. c. edwardsii (Baird and Girard).
- aa. Scales in 25 rows; colors dark; range, eastern and northern United States east of the Rocky Mountains *S. c. catenatus* (Rafinesque).

Sistrurus catenatus edwardsii (Baird and Girard)

EDWARDS' MASSASAUGA

Crotalophorus edwardsii Baird and Girard, *Cat. N. Am. Rept.*, Pt. I, p. 15, 1850.

Sistrurus catenatus edwardsii Cope, *Rept. U.S. Nat. Mus.*, p. 1144, 1898.

General color and pattern much the same as *Crotalus confluentus*. Range, Colorado south into Mexico.

Colorado specimen.—*State Teachers' College Museum*: Baca County, A. E. Beardsley.

Order *TESTUDINATA*

The Turtles

Four families of Turtles are known from Colorado, although but six species have been reported. The families may be distinguished by the following key.

- a. Body much depressed; carapace and plastron poorly ossified and covered with a thick leathery skin; snout long and tubular.
Family *Trionychidae* (page 111).
- aa. Body elevated at least in the mid-dorsal region; carapace and plastron well ossified.
 - b. Tail long, with a mid-dorsal series of elevated bony tubercles; plastron small, with 9 plates. Family *Chelydridae* (page 113).
 - bb. Tail short, without a mid-dorsal row of tubercles; plastron large.
 - c. Plastron with 7, 9 or 11 plates; 23 marginal plates on the carapace.
Family *Kinosternidae* (page 114).
 - cc. Plastron with 12 plates; 25 marginal plates.
Family *Testudinidae* (page 115).

Family *TRIONYCHIDAE*

The Soft-Shelled Turtles

Turtles of this family are found in the fresh waters of America, Asia, including Japan, and Africa. They may be recognized at once by their greatly depressed bodies and the leathery covering of the carapace which takes the place of external plates in the other turtles. Most of the species are of small or moderate size, but the Southern Snapper, found in southern United States, *T. ferox*, is known to reach

a weight of thirty pounds or more. The soft-shelled turtles are vigorous, active animals and when disturbed snap much like the true snapping turtles. A single genus of this family is represented in Colorado.

Genus **TRIONYX** Geoffroy

Trionyx Geoffroy, *Annales Mus. Paris*, p. 84, 1809.

Plastron poorly developed posteriorly; hind limbs and tail free; digits, 5-5; claws, 3-3; range, that of the family. One species known from Colorado.

✓ **Trionyx spiniferus** LeSueur

SPINY SOFT-SHELLED TURTLE

Trionyx spiniferus LeSueur, *Mém. Mus. Hist. Nat. Paris*, p. 258, 1827.

Dorsal surface covered with tiny elevations; anterior margin of the carapace, especially that of adult females, with numerous small conical tubercles (these are usually wanting or very small in young specimens); nostrils at the tip of the elongate snout, crescent-shaped and each with a small papilla projecting into it from the septum; tail of the female scarcely projecting beyond the margin of the carapace, that of the male projecting beyond the carapace almost the length of the head; digits, 5-5; claws, 3-3; size medium, length of the carapace up to fifteen inches.

Dorsal color olive, green or brownish, with a margin of lighter color separated from the rest of the ground color by a narrow black line; young specimens with twenty or more rounded spots of dark color, margined with black, these spots becoming more indistinct as the animal grows older; ventral parts white or yellowish; under parts of the legs and the ventral margin of the carapace more or less mottled with black.

The flesh of this turtle is of very good quality and the turtle is much sought after in regions where it is at all abundant. It ranges from Maine to the Rocky Mountains, and south to Mexico. It is most abundant in the north central states.

Colorado specimens.—*University Museum*: Evans, July 4, 1908 (about 250 mm.), J. Henderson; *State Teachers' College Museum*: Cache la Poudre, South Platte River and Greeley, A. E. Beardsley.

Family CHELYDRIDAE
The Snapping Turtles

Snapping Turtles are found in North and South America, and in Asia. They are powerful, heavy, freshwater turtles, found usually in sluggish streams. A single species of snapper is known from Colorado.

Genus CHELYDRA Schweigger

Chelydra Schweigger, *Prodromus Monographiae Chelonorum*, p. 23, 1814.

✓ *Chelydra serpentina* (Linnaeus)

SNAPPER, OR SNAPPING TURTLE (*Figure 37*)

Testudo serpentina Linnaeus, *Syst. Nat.*, ed. X, p. 199, 1758.

Carapace broad, elevated anteriorly and notched posteriorly; costals, 4 on each side; neurals, 5; nuchal, 1; marginals, 23; plastron small and cross-shaped, of 9 plates; 2 or 3 inframarginals at the outer margin of the bridge; tail long, equal to the length of the plastron, cylindrical and tapering, with a row of bony tubercles on its mid-dorsal surface and a few smaller tubercles on the sides, with two rows of plates on its ventral surface; head large, much depressed and pointed; digits, 5-5, webbed to the claws; claws, 5-4; size large, specimens weighing as much as forty pounds having been reported.

General color brown, blackish brown or olive above; ventral parts whitish or yellowish.

This turtle takes its common name from its behavior when attacked. At this time it jumps suddenly and snaps with great vigor. With its powerful curved jaws it can easily snap a fair-sized stick in two, and average-sized specimens are dangerous if carelessly handled. It feeds on all sorts of small aquatic animals, including water birds. The habit of snappers, of swimming under water birds and dragging them down, is well known. They will on occasion take floating carcasses. The eggs, about fifty in number, are laid in moist sand in June.

This species is of considerable importance as a food for man.

Large numbers of these turtles are marketed every year. *C. serpentina* ranges over the United States and southern Canada east of the Rocky Mountains, and south into Ecuador.

Colorado specimens.—*University Museum*: White Rocks, near Boulder, September 17, 1910 (310 mm.), F. Rohwer and J. Rowland, No. 258; Wray, October 27, 1912 (125 mm.), M. M. Ellis, No. 259; *Colorado State Historical and Natural History Museum*: Wray, May 21, 1904 (180 mm.), H. G. Smith; *reported* by D. M. Andrews from Boulder Valley, several times during the past ten years; by F. Rohwer, a dead specimen at the same time and place the one above recorded was caught; by N. deWitt Betts, Base-line Reservoir, southeast of Boulder, 1911; common at Greeley by Beardsley.

Family KINOSTERNIDAE

The Mud Turtles

Rather small, strictly aquatic turtles, characterized by the much elevated carapace and the narrow body, resulting in a somewhat compressed appearance for the animal as a whole. A family of a few species confined to the Americas. Of the two North American genera one is represented in Colorado by a single species.

Genus KINOSTERNON Spix

Kinosternon Spix, *Species Novae Testudinum*, p. 17, 1824.

✓ *Kinosternon flavescens* (Agassiz)

YELLOW-NECKED MUD TURTLE

Platythyra flavescens Agassiz, *Contrib. Nat. Hist. U.S.*, Vol. I, p. 430, 1857.

Carapace narrow and much elevated in the median line, smooth or in young specimens with a very indistinct dorsal keel, very slightly if at all notched on the anterior margin, general outline elliptical; costals, 4 on each side; neurals, 5; marginals, 23; plastron large, covering most of the ventral surface, lobes movable so that they may be drawn against the margin of the carapace and enclose the head and feet; plastral plates, 11 or 9; feet rather broadly webbed; digits, 5-5, claws, 5-4; size small, length of the carapace up to six inches.

General color yellowish brown or greenish brown above; plates

somewhat outlined with black; ventral parts yellow; head greenish above and yellowish below; neck bright yellow.

Range, Arkansas to Rocky Mountains, north into Colorado.

Colorado specimens.—*Colorado State Historical and Natural History Museum*: Lamar, June 20, 1904 (140 mm.), H. G. Smith; *State Teachers' College Museum*: Baca County, A. E. Beardsley.

Family TESTUDINIDAE

Pond Turtles and Box Turtles

This is a large family of turtles of cosmopolitan distribution. The two genera found in Colorado may be distinguished by the structure of the plastron.

a. Plastron firm throughout; carapace rather depressed; aquatic.

Chrysemys Gray.

aa. Plastron with its anterior portion hinged and movable; carapace elevated and rounded; terrestrial. *Terrapene* Merrem.

Genus CHRYSEMYS Gray

Chrysemys Gray, *Cat. Tortoises*, p. 27, 1844.

We have examined specimens belonging to two species of this genus which were reported as collected in Colorado. Of these two species one, *C. belli* (Gray), is known to be quite abundant in the ponds and lakes of eastern Colorado. The other stands on the record of one specimen, 240 mm., University of Colorado Museum, labeled, "Denver, Colo.," and referable to the species *C. elegans* (Wied). This species we include only in our key, although since it is known from the Yellowstone region and from Kansas, it is probably found in this state.

a. Upper jaw with a small tooth on each side of the median notch.

C. belli (Gray).

aa. Upper jaw without a small tooth on each side of the median notch.

C. elegans (Wied).

✓ *Chrysemys belli* (Gray)

BELL'S PAINTED TURTLE

Emys belli Gray, *Synopsis Reptilium*, p. 31, 1831.

Carapace broad, rather depressed, widest in the posterior portion; costals, 4 on each side; neurals, 5; marginals, 25, those in the pos-

terior region somewhat extended into a shelf beyond the general curvature of the carapace; plastron wide, of 12 plates; feet well webbed; digits, 5-5; claws, 5-5; size medium, large specimens about twelve inches in length.

Dorsal color olive green or brown, usually with a reddish or bronze cast; plates often distinctly margined with black; plastron yellowish, with two dark brown or black longitudinal blotches, extending across each plate excepting the first two, separated by a narrower area of the ground color (although they may be confluent), and irregularly joined to those of the next plate, forming two more or less well-defined concentric ellipses; other parts of the plastron often blurred with blackish; marginal region below, greenish, crossed by numerous small light streaks, some of which may be red but most of which are orange or yellow; under parts of the head with numerous longitudinal stripes; feet greenish above, with a bright yellow mid-dorsal stripe, breaking up and sending a branch down each digit, below yellowish.

This turtle ranges from the Mississippi River west to the Rocky Mountains and north into British Columbia. It has also been taken in Illinois and northern Michigan.

Colorado specimens.—*University Museum*: Boulder, June 24, 1911 (160 mm.), No. 125; Wray, October 27, 1912 (120 mm.), M. M. Ellis, No. 260; Castle Rock, June 9, 1912 (175 mm.), M. M. Ellis, No. 261; Ft. Morgan (165 mm.), H. W. Clatworthy, No. 263; east of Boulder (125 mm.); *Colorado State Historical and Natural History Museum*: Denver, July 31, 1900 (165 mm.), H. G. Smith; Denver, August 25, 1900 (150 mm.), H. G. Smith; *State Teachers' College Museum*: Cache la Poudre, Platte River at Greeley and Lakes near Greeley, A. E. Beardsley; reported by J. Henderson, Platteville, June, 1912; as abundant in some of the lakes east of Boulder.

Genus **TERRAPENE** Merrem

Terrapene Merrem, *Versuch Syst. Amphibien*, p. 27, 1820.

The Colorado species of this genus are two.

- a. Four digits on the hind foot *T. ornata* (Agassiz).
- aa. Three digits on the hind foot *T. triunguis* (Agassiz).

✓ **Terrapene ornata** (Agassiz)

PAINTED BOX TURTLE

Cistudo ornata Agassiz, *Contrib. Nat. Hist. U.S.*, Vol. I, p. 445, 1857.

Carapace much elevated and rounded, compressed in the mid-dorsal region; marginals, 25; plastron broad, of twelve plates, the two halves on a common hinge so that the plastron may be closed against the margin of the carapace; size up to ten inches.

General color above and below yellowish or yellowish brown, with numerous rather bright yellow stripes and bars, varying to quite pale brown with indistinct markings.

Range, Illinois to the Rocky Mountains, south into Texas.

Colorado specimens.—*University Museum*: Wray, October 27, 1912 (120 mm.), M. M. Ellis, No. 262; *Colorado State Historical and Natural History Museum*: Wray, May 20, 1904 (140 mm.), W. C. Ferril; Lamar, June 20, 1904 (140 mm.), H. G. Smith; Kit Carson, September 6, 1907 (150 mm.), W. C. Ferril; *private collection* of E. Bethel, Denver (2 carapaces, 125 and 150 mm.), E. Bethel; *State Teachers' College Museum*: Ft. Morgan and Box Elder, A. E. Beardsley; *reported* by Cockerell from near Boulder.

✓ **Terrapene triunguis** (Agassiz)

THREE-TOED BOX TORTOISE, OR BOX TURTLE

Cistudo triunguis Agassiz, *Contrib. Nat. Hist. U.S.*, Vol. I, p. 445, 1857.

This tortoise differs little in general appearance from the preceding one, aside from the difference in the number of toes. In color it is greenish brown with very indistinct lighter markings.

Range, west of the Mississippi, north into Kansas and Colorado.

Colorado specimen.—*Colorado State Historical and Natural History Museum*: Wray, May 20, 1904 (130 mm.), H. G. Smith.

DISTRIBUTION

The discussion of the distribution of our herpetological fauna may be divided into two parts, the general or geographic distribution, and the altitudinal distribution.

Tables 1, 2, 3 and 4 give the data for the geographic distribution. It is to be noted that the absence of a record does not exclude the

species, for in many cases it is apparent that a given species very probably occurs in a given area judging from its known distribution. In Table 1 it may be seen that ten species of Colorado Amphibians are species of wide range, since they are found on both sides of the mountains and in several or all of the adjoining states. One species deserves particular attention, *Bufo boreas*. As may be seen from Tables 2, 3 and 4, the other species of our fauna have come in from the south. This toad, however, is not found south of Colorado and in the state is found only in the mountains in the montane zone. It ranges north into Oregon where it is abundant. It must be considered as either our only species of northern origin or a species left here in the montane zone as the climate has become warmer since the retreat of the glaciers. It may be noted that the terrestrial molluscan fauna of Colorado is on the whole more closely related to the northern than to the southern fauna.

The snakes and lizards (Tables 2 and 3) are evidently species which have come into the state from the south. That this migration is still going on to some extent is shown by the addition to our fauna in this report of four snakes, one turtle, one toad, one frog and one lizard from the south. Three groups of reptiles exclusive of the turtles may be noted: the first of seven lizards and five snakes which are found on both sides of the range; a second of twelve snakes and seven lizards found only east of the range; and a third of four snakes and three lizards found only on the west side of the range. The last two restricted classes are of course in general species of the Great Basin Plains and of the Mississippi Basin.

We have no records of turtles from the west side of the range in Colorado (Table 4). It is probable that *Kinosternon flavescens*, reported from Utah, and other Great Basin species will be found in western Colorado. The relatively small number of species of this group in our fauna is due largely to the lack of permanent sluggish streams. Most of our streams are either too high and rapid in the spring or too low in the summer for turtles.

Of the adjoining states New Mexico has a greater proportion of our fauna than any other, 47 of our 56 species occurring in that state.

TABLE 1

DISTRIBUTION OF THE COLORADO AMPHIBIA WITH REFERENCE TO THE MAIN RANGE AND THE ADJOINING STATES

	Colorado East of Range	Colorado West of Range	New Mexico	Kansas	Nebraska	Wyoming	Utah
<i>Ambystoma tigrinum</i>	x	x	x	x	x	x	x
<i>Scaphiopus hammondi</i>	x	x	x	..	x	x	x
<i>Bufo boreas</i>	x	x	..	..	..	..	x
— <i>woodhousei</i>	x	x	x	..	x	x	x
— <i>americanus</i>	x	x	x	x	x	..	x
— <i>cognatus</i>	x	x	..	x	x	..	..
— <i>debilis</i>	x	..	..	x	..	..	..
<i>Chorophilus triseriatus</i>	x	x	x	x	..	..	x
<i>Acris gryllus</i>	x	..	..	x	x	..	..
<i>Hyla arenicolor</i>	x	*	x	..	..	..	x
<i>Rana pipiens</i>	x	x	x	x	x	x	x
Total	11	8	7	7	7	5	8

x = printed record or specimen record for area so marked.
 * = probable distribution.

TABLE 2

DISTRIBUTION OF THE COLORADO LIZARDS

	Colorado East of Range	Colorado West of Range	New Mexico	Kansas	Nebraska	Wyoming	Utah
<i>Dipsosaurus dorsalis</i>	x	..	x	x	..	..	..
<i>Uta ornata</i>	x	x	x	..	..	..	x
— <i>stansburiana</i> . . . . .	..	x	x	..	..	..	x
<i>Crotaphytus collaris baileyi</i>	x	x	x	..	..	..	x
<i>Sceloporus consobrinus</i>	x	x	x	..	x	..	x
— <i>graciosus</i> . . . . .	..	x	x	..	..	..	x
<i>Holbrookia maculata</i>	x	*	x	..	x	..	x
<i>Phrynosoma cornutum</i>	x	x	x	x	..	..	x
— <i>hernandesi</i>	x	x	x	..	..	x	x
<i>Anota modestum</i>	x	..	x	..	..	..	..
<i>Cnemidophorus sexlineatus</i>	x	x	x	x	x	..	..
— <i>tessellatus</i>	x	x	x	..	..	..	..
— <i>gularis</i> . . . . .	..	x	x	..	..	..	..
<i>Eumeces obsoletus</i>	x	..	x	x	x	..	x
— <i>guttulatus</i>	x	..	x	..	..	..	..
— <i>multivirgatus</i>	x	..	..	x	x	..	..
— <i>leptogrammus</i>	x	..	..	..	x	x	..
Total	17	10	15	5	6	3	9

x = printed record or specimen record for area so marked.
 * = probable distribution.

TABLE 3
DISTRIBUTION OF THE COLORADO SNAKES

	Colorado East of Range	Colorado West of Range	New Mexico	Kansas	Nebraska	Wyoming	Utah
<i>Thamnophis elegans</i>	x	x	x	..	..	x	x
— <i>radix</i>	x	..	x	x	x	x	..
— <i>megalops</i>.....	..	x	x	..	..	..	..
— <i>parietalis</i>	x	x	x	x	x	x	x
<i>Ophibolus doliatus</i>	x	..	x	x	..	..	..
<i>Pityophis catenifer sayi</i>	x	x	x	x	x	..	x
— <i>catenifer bellona</i>.....	..	x	x	..	x	..	x
<i>Heterodon nasicus</i>	x	..	x	x	x	..	..
<i>Tropidonotus sipedon</i>	x	..	..	x	x	..	..
<i>Storeria dekayi</i>	x	..	..	x	..	..	..
<i>Liopeltis vernalis</i>	x	x	x	x	..	x	..
<i>Chionactis episcopus isozonus</i>	x	..	x	x	..	..	x
<i>Diadophis regalis</i>	x	..	x	x	..	..	..
<i>Zamenis constrictor constrictor</i>	x	..	x	x	x	x	..
— <i>constrictor flaviventris</i> ...	x	*	x	x	x	x	x
— <i>flagellum</i>	x	*	x	x	x	..	x
— <i>taeniatus</i>.....	..	x	x	..	..	..	x
<i>Tantilla nigriceps</i>	x	..	x	x	..	..	..
<i>Crotalus atrox</i>	x	..	x	..	..	..	..
— <i>cerastes</i>.....	..	x	x	..	..	..	x
— <i>confluentus</i>	x	x	x	x	x	x	x
<i>Sistrurus catenatus edwardsii</i> ..	x	..	x	x	..	..	..
Total.....	22	18	9	20	16	10	7
				16	10	7	10

x=printed record or specimen record for the area so marked.

*=probable distribution.

TABLE 4
DISTRIBUTION OF COLORADO TURTLES

	Colorado East of Range	Colorado West of Range	New Mexico	Kansas	Nebraska	Wyoming	Utah
<i>Trionyx spiniferus</i>	x	..	x	x	x	x	..
<i>Chelydra serpentina</i>	x	..	..	x	x	..	..
<i>Kinosternon flavescens</i>	x	*	x	x	x	..	x
<i>Chrysemys belli</i>	x	..	x	x	..	..	..
<i>Terrapene ornata</i>	x	..	x	x	x	x	..
— <i>triunguis</i>	x	..	x	x	..	..	..
Total.....	6	0	5	6	4	2	1

x=printed record or specimen record for the area so marked.

*=probable distribution.

TABLE 5
ALTITUDINAL DISTRIBUTION OF COLORADO AMPHIBIA

	3,000 4,000	4,000 5,000	5,000 6,000	6,000 7,000	7,000 8,000	8,000 9,000	Above 9,000
<i>Ambystoma tigrinum</i>	*	x	x	x	x	x	x
<i>Scaphiopus hammondi</i>	*	x	x	..	..	..	..
<i>Bufo boreas</i>.....	..	..	..	..	x	x	x
— <i>woodhousei</i>	x	x	x	x	?	?	x
— <i>americanus</i>	x	x	x	x	x	..	..
— <i>cognatus</i>	x	x	x	x	x	..	..
— <i>debilis</i>	*	*	x	..	..	..	..
<i>Chorophilus triseriatus</i>.....	..	x	x	x	x	x	x
<i>Acris gryllus</i>	x	..	..	..	..	..	..
<i>Hyla arenicolor</i>	*	x	..	..	..	..	..
<i>Rana pipiens</i>	x	x	x	x	x	x	x
Total..... 11	5	8	8	6	6	4	5

x = printed record or specimen record for zone so marked.
 * = known from the zone so marked in some of the states adjoining Colorado.
 ? = probable distribution.

TABLE 6
ALTITUDINAL DISTRIBUTION OF COLORADO LIZARDS

	3,000 4,000	4,000 5,000	5,000 6,000	6,000 7,000	7,000 8,000	8,000 9,000	Above 9,000
<i>Dipsosaurus dorsalis</i>.....	*	..	..	..	..	..	..
<i>Uta ornata</i>	*	x	x	x	?	?	x
— <i>stansburiana</i>	*	x	..	..	..	..	..
<i>Crotaphytus collaris baileyi</i> ...	*	x	x	..	..	..	..
<i>Sceloporus consobrinus</i>	x	x	x	x	x	..	..
— <i>graciosus</i>	*	x	x	..	..	..	..
<i>Holbrookia maculata</i>	x	x	x	?	?	?	x
<i>Phrynosoma cornutum</i>	*	*	x	x	x	..	..
— <i>hernandesi</i>	*	x	x	x	x	..	..
<i>Anota modestum</i>	*	x	..	..	..	..	..
<i>Cnemidophorus sexlineatus</i> ...	x	x	x	..	..	..	..
— <i>gularis</i>	*	x	x	..	..	..	..
— <i>tesellatus</i>	*	x	x	..	..	..	..
<i>Eumeces obsoletus</i>	*	x	..	..	..	..	..
— <i>guttulatus</i>	*	x	..	..	..	..	..
— <i>multivirgatus</i>	*	x	..	..	..	..	..
— <i>leptogrammus</i>	*	x	..	..	..	..	..
Total..... 17	3	15	10	4	3	..	2

x = printed record or specimen record for the zone so marked.
 * = known from the zone so marked in some of the states adjoining Colorado.
 ? = probable distribution.

TABLE 7
ALTITUDINAL DISTRIBUTION OF THE COLORADO SNAKES

	3,000 4,000	4,000 5,000	5,000 6,000	6,000 7,000	7,000 8,000	8,000 9,000	Above 9,000
<i>Thamnophis elegans</i>.....	..	x	x	x	x	x	x
— <i>radix</i>	x	x	x	..	..	..	..
— <i>megalops</i>	*	x	..	..	..	..	..
— <i>parietalis</i>	*	x	x	x	..	..	..
<i>Ophibolus doliiatus</i>	x	x	x	..	..	..	..
<i>Pityophis catenifer sayi</i>	x	x	x	x	x	..	..
— <i>catenifer bellona</i>	*	x	?	?	x	..	..
<i>Heterodon nasicus</i>	x	x	x	..	..	..	..
<i>Tropidonotus sipedon</i>	x	x	x	..	..	..	..
<i>Storeria dekayi</i>	*	x	..	..	..	..	..
<i>Liopeltis vernalis</i>	*	*	x	x	x	..	..
<i>Chionactis episcopus isozonus</i>	*	x	..	..	..	..	..
<i>Diadophis regalis</i>	*	*	x	x	..	..	..
<i>Zamenis constrictor constrictor</i>	..	x	..	..	..	..	..
— <i>constrictor flaviventris</i> ...	x	x	x	..	..	..	..
— <i>flagellum</i>	x	x	x	..	..	..	..
— <i>taeniatus</i>	*	*	x	..	..	..	..
<i>Tantilla nigriceps</i>	x	x	..	..	..	..	..
<i>Crotalus atrox</i>	*	*	x	..	..	..	..
— <i>cersates</i>	*	x	..	..	..	..	..
— <i>confluentus</i>	x	x	x	x	x	..	..
<i>Sistrurus catenatus edwardsii</i>	*	x	..	..	..	..	..
Total.....22	9	18	14	6	5	1	1

x=printed record or specimen record for the zone so marked.

*=known from the zone so marked in some of the states adjoining Colorado.

?=probable distribution.

TABLE 8
ALTITUDINAL DISTRIBUTION OF COLORADO TURTLES

	3,000 4,000	4,000 5,000	5,000 6,000	6,000 7,000	7,000 8,000	8,000 9,000	Above 9,000
<i>Trionyx spiniferus</i>	*	x	x	..	..	..	..
<i>Chelydra serpentina</i>	x	x	x	..	..	..	..
<i>Kinosternon flavescens</i>	*	x	..	..	..	..	..
<i>Chrysemys belli</i>	x	x	x	x	..	..	..
<i>Terrapene ornata</i>	x	x	x	..	..	..	..
— <i>triunguis</i>	*	*	x	..	..	..	..
Total.....6	3	5	5	1	..	..	..

x=printed record or specimen record for the zone so marked.

*=known from the zone so marked in some of the states adjoining Colorado.

Kansas has much the same snake fauna and Utah the same lizard fauna as Colorado, both of these states having, however, many additional species of these two groups not found in Colorado.

Tables 5, 6, 7 and 8 give the data collected on the altitudinal distribution of our species. The amphibians (Table 5) seem the least influenced by altitude of any of the groups. Seven of the eleven species have been taken above the 6,000-foot contour line. The 7,000-foot contour is passed by but five of the snakes and five of the lizards, and it is not reached by any of the turtles. Three species, a snake, *Thamnophis elegans*, a toad, *Bufo boreas*, and the salamander *Ambystoma tigrinum* have been taken above the 10,000-foot contour.

GLOSSARY

- Acuminate.* With a sharp point at the end.
- Allantois.* An embryonic membrane which serves as an organ of respiration.
- Amnion.* An embryonic membrane which completely envelopes the developing embryo.
- Amphibious.* Living in the water and on the land interchangeably at one and the same time of life.
- Anal gland.* A glandular diverticulum of the rectum, from which an odoriferous substance is discharged. It is well developed in some snakes.
- Anal plate.* The large ventral plate just in front of the vent, in snakes and lizards.
- Annulations.* Bands of color around the body or the appendages.
- Bridge.* A bony connection, at the sides of the body, between the carapace and plastron of turtles.
- Canthus rostratus.* A marginal elevation, marking the junction of the top of the head with the sides of the head.
- Carapace.* The bony or cartilaginous dorsal shield of a turtle.
- Cephalic.* Pertaining to the head.
- Compressed.* Flattened, as by pressure from the sides.
- Costals.* A row of large plates on each side of the central row of plates of the carapace of turtles. See Fig. 37, No. 2.
- Costal grooves.* A series of horizontal grooves on the sides of the abdomen of salamanders.
- Depressed.* Flattened as by pressure from above and below.
- Epiglottis.* A cartilaginous flap just in front of the upper end of the trachea.
- Fangs.* The long hollow or grooved teeth of the venomous reptiles.
- Femoral pores.* Small openings usually arranged in a single row, on the upper half of the hind legs of many lizards.
- Frontal plate.* A large plate near the middle of the top of the head. See Fig. 36, Nos. 7 and 11.
- Fronto-parietal plate.* A small plate lying between the frontal and the parietal plates on either side.
- Genial.* The anterior pair of the four plates lying near the middle of the mental region. See Fig. 18, No. 1.
- Glottis.* The upper end of the trachea.
- Gular fold.* A fold of skin across the under side of the throat.
- Gular sac.* A sac on the throat of the males of many amphibians which when expanded acts as a resonator for the voice.
- Immaculate.* Without markings.
- Infralabials.* Also called inferior labials. A row of scales along the margin of the lower jaw. See Fig. 35, No. 3.
- Inframarginals.* Small plates just ventral to the marginals of the carapace of turtles.
- Internasals.* Plates on the top of the head of snakes and lizards, between the nasals. See Figs. 35 and 36, No. 8.
- Interoculars.* Plates on the top of the head between the eyes.

- Interorbitals.* Same as interoculars.
- Keeled.* With a distinct elevated ridge.
- Labials.* Scales margining the jaws. Superior labials, Fig. 35, No. 5; inferior labials, Fig. 35, No. 3.
- Loreal plate.* Small plate between the preoculars and the nasals.
- Marginal plates.* The outside row of plates of the carapace of a turtle. See Fig. 37, No. 3.
- Mental plates.* Plates in the chin region.
- Mesial.* Pertaining to the middle.
- Muzzle.* The elevated portion of the snout.
- Neurals.* The plates along the middle of the carapace of a turtle. See Fig. 37, No. 1.
- Nape.* The back of the neck.
- Nasal plates.* The plate or plates carrying the nasal opening. See Fig. 35, Nos. 9 and 10.
- Nuchal plate.* A small median marginal plate of the carapace of turtles, just back of the head. See Fig. 37, No. 4.
- Occipital.* Pertaining to the top of the back of the head.
- Occipital condyle.* A process on the occipital bone forming the major articulation of the skull with the backbone.
- Occipital plate.* A plate in the occipital region.
- Oviparous.* Egg-laying.
- Ovoviviparous.* Retaining the egg until hatched, or until the time of hatching.
- Parotoid glands.* Large glands on the sides of the head of many amphibians, in the region of the ear.
- Parietals.* Plates on the top of the head. See Fig. 36, No. 13.
- Plastron.* The ventral bony or cartilaginous shield of turtles.
- Poikilothermous.* Having a body temperature approximately the same as that of the surrounding medium. Popularly called "Cold-Blooded."
- Postgenials.* The second pair of four large plates lying near the middle of the mental region.
- Postorbitals.* Scales just back of the eye. See Fig. 35, No. 4.
- Prefrontals.* A pair of plates just in front of the frontal. See Fig. 36, No. 14.
- Preoculars.* Scales just in front of the eye. See Fig. 35, No. 2.
- Rostral.* A plate forming the anterior end of the head. See Figs. 35 and 36, No. 1.
- Subcaudals.* The large plates on the ventral surface of the tail of a snake.
- Superciliary.* Plates just above the eye on the margin of the head.
- Supraocular.* Plates just above the eye, forming the roof of the orbit. See Fig. 35, No. 6, and Fig. 36, No. 12.
- Temporal.* The posterior portion of the side of the head.
- Tessellated.* With a spotted or checkerboard pattern.
- Tympanic membrane.* That covering the ear opening.
- Vent.* The posterior opening of the alimentary canal.
- Ventrals.* Large plates on the ventral surface of snakes.
- Viviparous.* Bearing living young.

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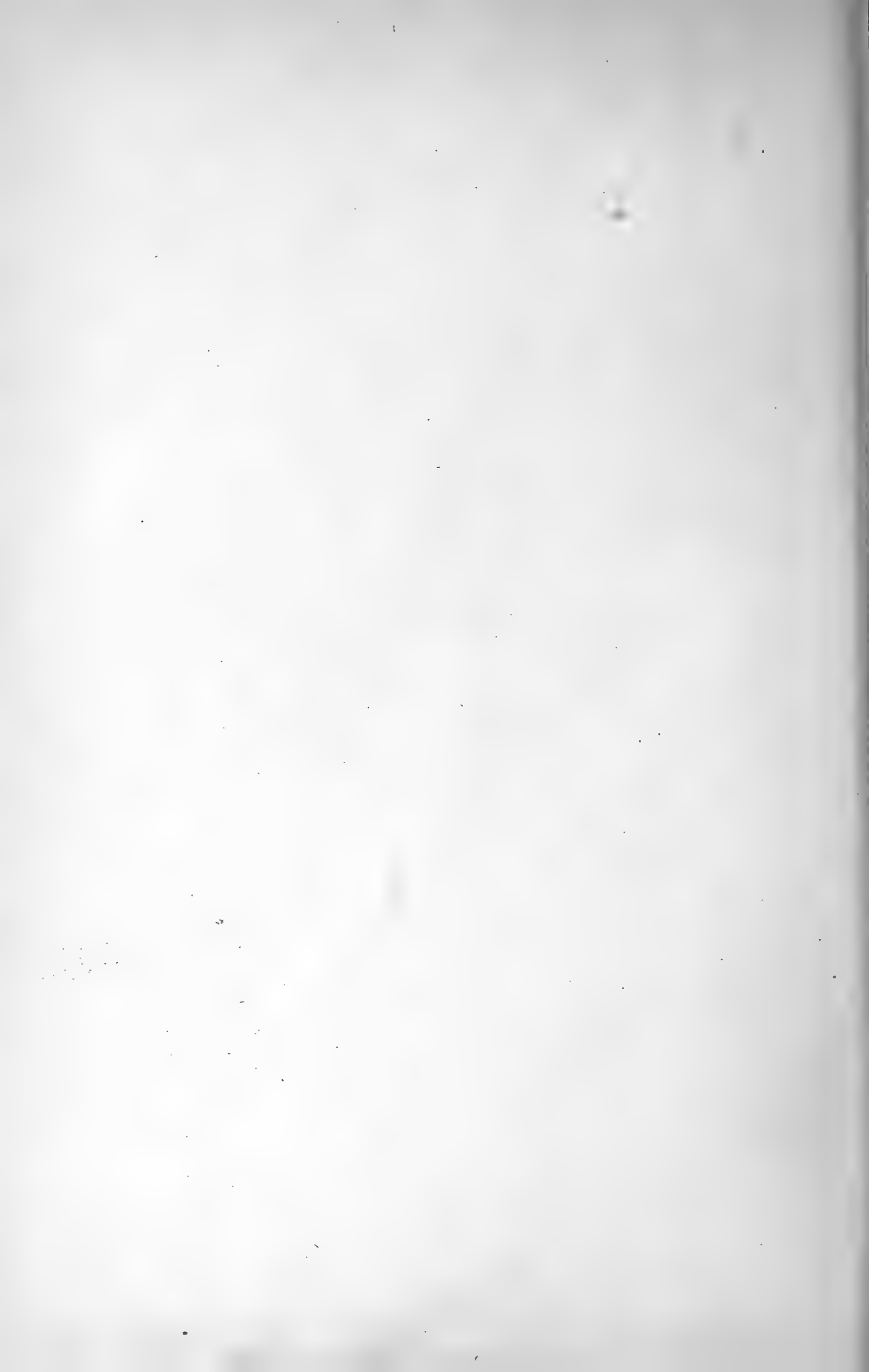


PLATE I
AMPHIBIA AND REPTILIA OF COLORADO



FIG. 1.—*Bufo cognatus*. Western Toad (page 56).



FIG. 2.—*Bufo americanus*. American Toad (page 55)

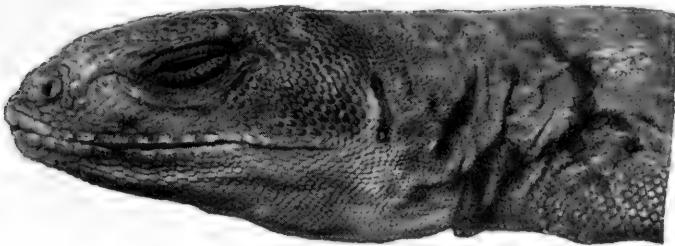


FIG. 3.—*Crotaphytus collaris baileyi*. Bailey's Collared Lizard (page 66).



FIG. 4.—*Crotaphytus collaris baileyi*. Bailey's Collared Lizard (page 66).



FIG. 5.—*Uta ornata*. Ornate Swift (page 64).

PLATE II
AMPHIBIA AND REPTILIA OF COLORADO



FIG. 6.—*Uta ornata*. Ornat Swift (page 64).

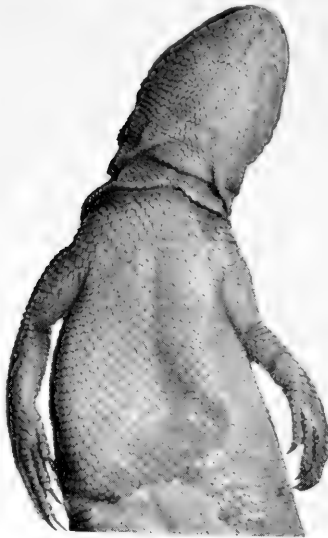


FIG. 7.—*Holbrookia maculata*. Spotted Lizard (page 70).



FIG. 8.—*Holbrookia maculata*. Spotted Lizard (page 70).

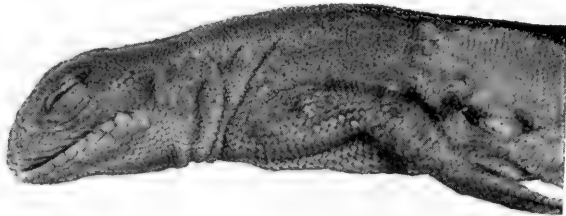


FIG. 9.—*Holbrookia maculata*. Spotted Lizard (page 70).

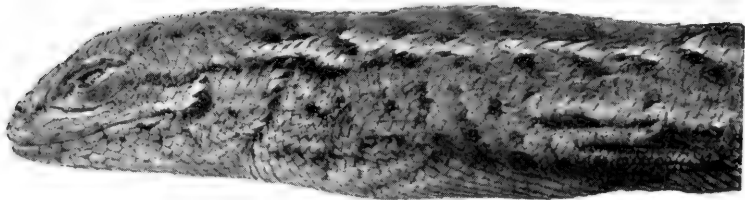


FIG. 10.—*Sceloporus consobrinus*. Yellow-banded Swift (page 68).

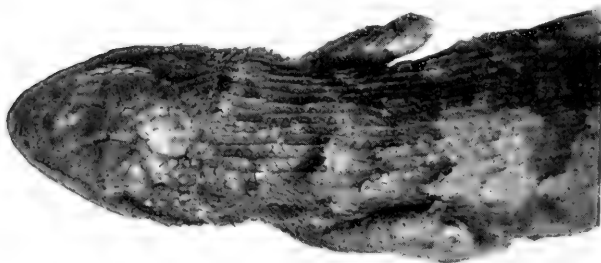


FIG. 11.—*Sceloporus consobrinus*. Yellow-banded Swift (page 68).

PLATE III
AMPHIBIA AND REPTILIA OF COLORADO



FIG. 12.—*Phrynosoma hernandesi*. Hernandez's Horned Toad (page 72).

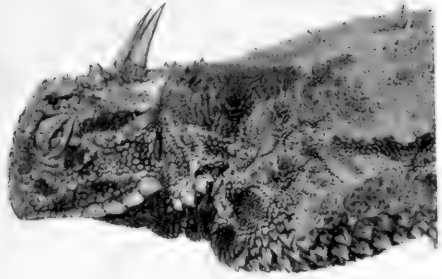


FIG. 13.—*Phrynosoma cornutum*. Texas Horned Toad (page 74).

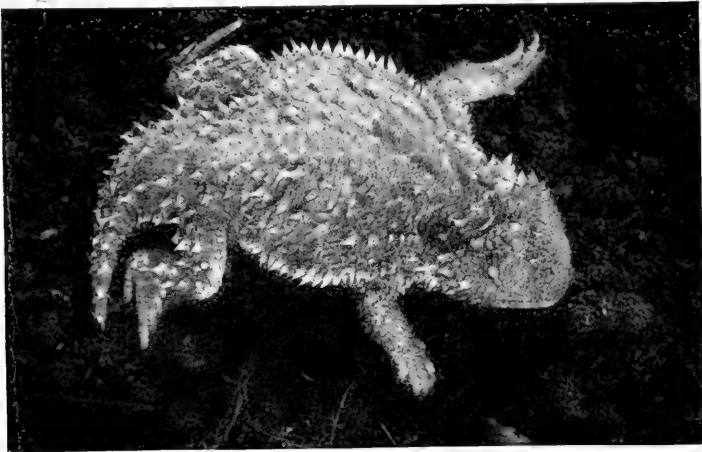


FIG. 14.—*Phrynosoma hernandesi*. Hernandez's Toad (page 72).

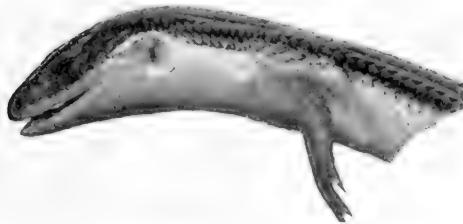


FIG. 15.—*Eumeces obsoletus*. Sonoran Skink (page 79).

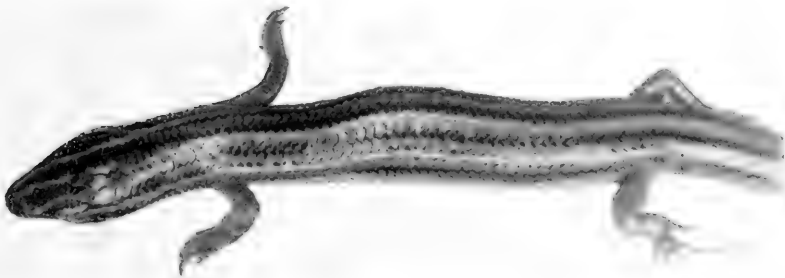


FIG. 16.—*Eumeces obsoletus*. Sonoran Skink (page 79).

PLATE IV
 AMPHIBIA AND REPTILIA OF COLORADO



FIG. 17.—*Thamnophis radix*. Plains Garter Snake (page 88).



FIG. 18.—*Thamnophis radix*. Plains Garter Snake: 1, Genial; 2, Post-genial (page 88).



FIG. 19.—*Thamnophis parietalis*. Red-barred Garter Snake (page 86).

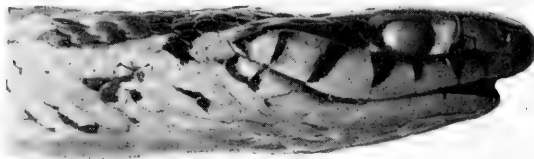


FIG. 20.—*Thamnophis radix*. Plains Garter Snake (page 88).



FIG. 21.—*Diadophis regalis*. Sonoran Ring-necked Snake (page 101).



FIG. 22.—*Diadophis regalis*. Sonoran Ring-necked Snake (page 101).



FIG. 23.—*Ophibolus doliatu*s gentilis. Red King Snake (page 91).

PLATE V
AMPHIBIA AND REPTILIA OF COLORADO

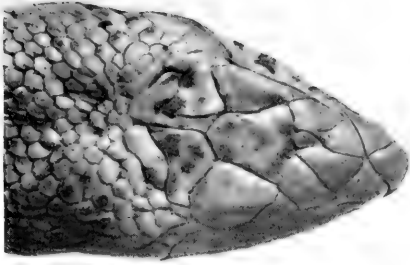


FIG. 24.—*Pityophis catenifer sayi*. Bull Snake (page 93).

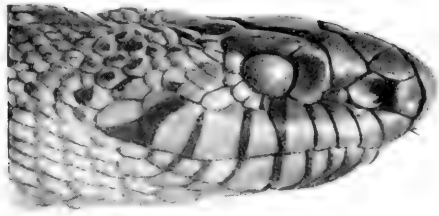


FIG. 25.—*Pityophis catenifer sayi*. Bull Snake (page 93).



FIG. 26.—*Pityophis catenifer sayi*. Bull Snake (page 93).



FIG. 27.—*Tropidonotus sipedon*. Water Snake (page 97).

PLATE VI
AMPHIBIA AND REPTILIA OF COLORADO



28



29



30



31

FIGS. 28, 29, 30 and 31.—*Heterodon nasicus*. Western Hog-Nose Snake (page 95).

PLATE VII
 AMPHIBIA AND REPTILIA OF COLORADO



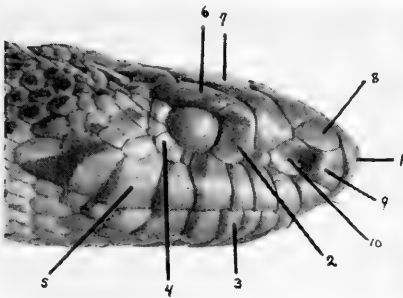
FIG. 32.—*Zamenis flagellum*.
 Coachwhip Snake
 (page 103).



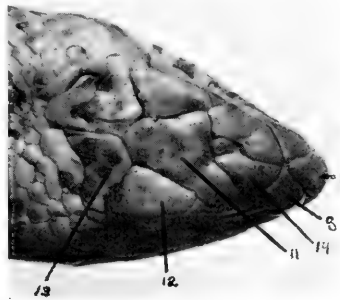
FIG. 33.—*Zamenis flagellum*.
 Coachwhip Snake
 (page 104).



FIG. 34.—*Tantilla nigriceps*.
 Texas Black-headed Snake
 (page 106).



35



36

FIGS. 35 and 36.—*Pityophis catenifer sayi*. Bull Snake: 1, rostral; 2, preocular; 3, infralabial; 4, postorbital; 5, supralabial; 6 and 12, supraocular; 7 and 11, frontal; 8, supranasal; 9 and 10, nasals; 13, parietal (page 93).

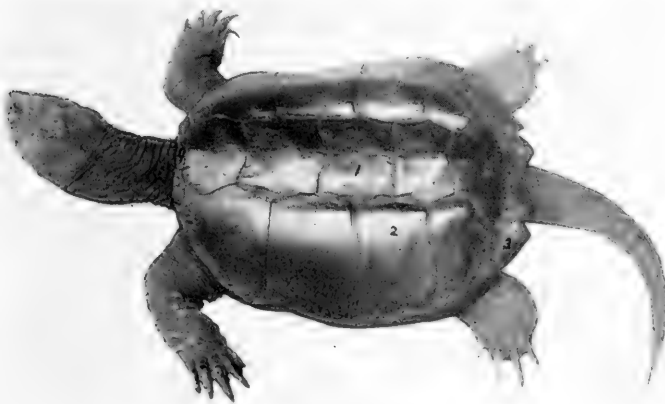


FIG. 37.—*Chelydra serpentina*. Snapping Turtle: 1, neural; 2, costal; 3, marginal; 4, nuchal (page 113).

PLATE VIII
AMPHIBIA AND REPTILIA OF COLORADO

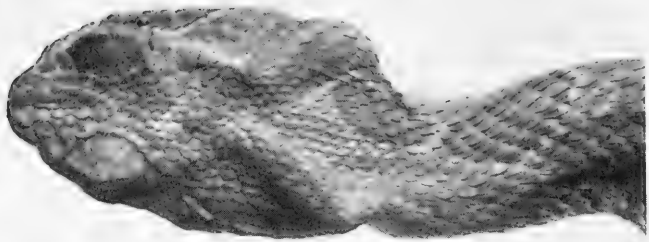


FIG. 38.—*Crotalus confluentus*. Prairie Rattlesnake (page 109).



FIG. 39.—*Crotalus confluentus*. Prairie Rattlesnake. Skull showing fangs (page 109).

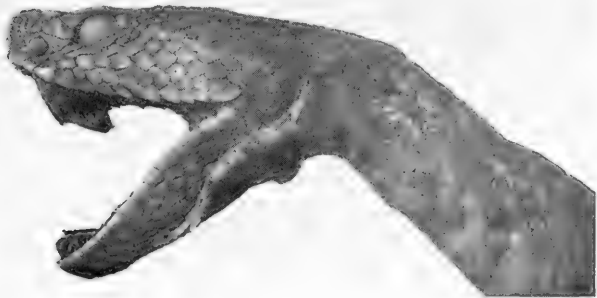


FIG. 40.—*Crotalus confluentus*. Prairie Rattlesnake. Showing fangsheaths (page 109).

AMPHIBIA AND REPTILIA OF COLORADO PART II¹

BY MAX M. ELLIS AND JUNIUS HENDERSON

During the past two years many Colorado amphibians and reptiles (including specimens of the Red-spotted Toad, *Bufo punctatus* Baird and Girard, a species not previously recorded from this state) have been added to the University Museum collections. The data from these collections, together with the data concerning specimens in the museum of Colorado College kindly sent us by Mr. E. R. Warren, form the basis of this report.

The numbers in parenthesis after certain records are the University of Colorado Museum numbers of the specimens so listed. Specimens in the Colorado College Museum are marked (C.C.).

Class AMPHIBIA Family AMBYSTOMIDAE *Ambystoma tigrinum* (Green) TIGER SALAMANDER

Boulder, October 8, 1913 (290); Canyon City, November, 1913; larvae, University Lake, Boulder, November, 1913, and March, 1914; larvae and adults, near Alma, Park County, above 10,000 ft., August, 1914; Nederland, Boulder County, above 9,000 ft., 1914; larvae, Lake Moraine, El Paso County (C.C.); reported by Warren from Crested Butte, Gunnison County, above 7,000 ft., and from Colorado Springs.

Reports from all parts of the state show this species to be very abundant in ponds, lakes, and reservoirs. Mr. Sam Bloomfield, of Denver, informs us that he has found "waterdogs," as the young of this salamander are locally known, in most of the lakes and ponds in eastern Colorado in which he has seined for fish. That the tiger salamander winters in Colorado in both the larval and adult stages is shown by the capture of several large specimens of the larvae of this

¹ Publication of the Colorado Biological Survey Number 17. Part I appeared in the *University of Colorado Studies*, Vol. X, pp. 39-129, 1913.

species, 300 to 400 mm. in length, in the University Lake at Boulder both in November and the following March. Hibernating adults of this species are often found in midwinter. One of the enemies of the tiger salamander was found to be the snapping turtle, *Chelydra serpentina* (Linnaeus), which promptly seized and devoured large larvae of *Ambystoma tigrinum* when placed in the same tank. The behavior of this turtle suggests a possible method of removal of the young tiger salamanders from reservoirs in which that species has become too abundant.

Family BUFONIDAE

Bufo boreas Baird and Girard

COLUMBIAN TOAD

Tolland, 9,000 ft., May, 1913 (429); Buena Vista, 8,500 ft., June 5-9, 1914 (459 and 460); Cottonwood Springs near Buena Vista, 9,000 ft., June 6, 1914 (489); Hortense Hot Springs near Buena Vista, 8,500 ft., June 10, 1914 (490); near Alma, above 10,000 ft., August, 1914 (491); Estes Park, July 31, 1904 (C.C.); near Twin Lakes, June 7, 1914 (492).

This species was very abundant at Buena Vista in June, 1914. At night the adults were found in numbers under the street lights and in the grass near irrigation ditches. During the day few adults were seen, but many juvenile specimens were collected about roadside pools and in the short grass in the overflowed areas along Cottonwood Creek and its tributaries. These juvenile specimens were feeding actively during the middle of the day, although exposed to direct sunlight, and individuals were observed frequently capturing spiders and small Diptera among the grass stems. At Hortense Hot Springs large numbers of juvenile individuals less than 30 mm. in length were found about the overflow pool in water at 23° C. Following the stream back from the overflow pool toward the springs the water increased in temperature rapidly, the young toads continuing abundant until the water was at 34° C. Above this point few toads were seen, although one small individual was taken from water at 45° C. quite near one of the springs. This toad was swimming very rapidly at the time and may have been endeavoring to reach cooler water.

In this connection it may be noted that the pools of very hot water near several of the hot springs were death-traps for *Bufo boreas* and several other animals. From one such pool, the water of which was at 54° C., three large specimens of this toad and several insects were taken, the flesh of all being thoroughly cooked.

***Bufo punctatus* Baird and Girard**

RED-SPOTTED TOAD (Figs. 8 and 9)

Bufo punctatus Baird and Girard, *Proc. Acad. Nat. Sci. Phila.*, Vol. VI, p. 173, 1852 (Rio San Pedro of the Rio Grande del Norte).

Head moderately broad, its width equaling or slightly exceeding its length; length of the head about 3.5 in the total length; bony crests wanting on the top of the head, or sometimes feebly developed (in alcoholic material the skin of the head may be so shriveled as to render the crests of the head quite apparent); parotoid glands somewhat elevated, subtriangular and small, not much larger than the eyes and not equal to the width of the head; a small bony ridge between the ear and the eye on each side of the head; general outline when seen from above ovoid, the entire animal being rather more elongate and less globose than the heavier species of toads (as *Bufo cognatus* Say); neck region rather well defined; body not much wider than the head and somewhat depressed.

Ground color grayish or reddish brown, varying to greenish; dorsal surface of the body rather uniformly covered with small warts which are tipped with bright red or orange; bases of the warts more or less dusky; ventral surface of the body yellowish to orange; throat of the male dusky.

Size rather small, length 2 to 3 inches.

This toad is included here in the herpetological fauna of Colorado for the first time, specimens having been taken on Basin Creek near the northern line of San Miguel County, about six or eight miles from Naturita, Colorado, at an elevation of about 6,500 feet. These specimens were captured by Mr. Henderson and Roy Coffin on June 19, 1914. This record of the red-spotted toad extends its range about 150 miles north and about 350 miles north and northeast up the Colorado River drainage, as the most northern locality from which this species has been recorded previously is the floor of the Grand Canyon of the Colorado between Kaibab and Cocanini Plateaus.¹

Bufo punctatus ranges across southwestern United States and northern Mexico from central Texas through southern New Mexico and Arizona into Lower California. Stejneger, l.c., states that

¹ STEJNEGER, *N. Amer. Fauna*, No. 3, p. 117, 1890.

"this is a southern species which extends northward along the Colorado River." Little is known concerning the habits and habitat relations of this species. Ruthven,¹ who records *Bufo punctatus* from Alamogordo, New Mexico, suggests that "it is possibly a canyon form which has extended its range on to the desert floor by way of irrigating ditches." The Colorado specimens were captured in Basin or Dry Creek, a small, alkaline stream, where it cuts through a low mountain range. This stream is probably entirely without water in dry seasons except for a few very small pools. Basin Creek drains into the San Miguel, which in turn, by way of the Dolores River, finally drains into the Colorado River, the water ultimately passing through the Grand Canyon locality mentioned by Stejneger, l.c. Hence the toad may be expected along other western Colorado streams. On Basin Creek *Bufo punctatus* was associated with *Bufo woodhousei* Girard.

In the key to the *Bufo* of Colorado² *Bufo punctatus* would run to *Bufo debilis* Girard, to which it is very closely related. These two species may be separated as follows:

- a. Warts tipped with red or orange; length of the hind leg from the base to the heel reaching forward to the front of the eye or beyond; parotoid rather small.

Bufo punctatus Baird and Girard

- aa. Warts not tipped with red or orange, or at least very slightly so; length of the hind leg from the base to the heel reaching forward to the ear; parotoid glands large. *Bufo debilis* Girard

Bufo woodhousei Girard

WOODHOUSE'S TOAD

Greeley, August 13, 1902 (C.C.); Naturita, June 15, 1914 (453); Basin Creek, six miles west of Naturita, June 19, 1914 (454); reported common from Naturita to Gypsum Creek in 1914 by Henderson.

Bufo cognatus Say

WESTERN TOAD

Medano Ranch, Costilla County, July, 1909 (C.C.).

¹ *Bull. Amer. Mus. Nat. Hist.*, Vol. XXIII, p. 507, 1907.

² *Univ. Colo. Studies*, Vol. X, p. 52, 1913.

PLATE I



FIG. 1



FIG. 2



FIG. 3



FIG. 4

Chorophilus triseriatus. Three-lined Tree Frog. Variation in color pattern of specimens from a single pool (page 257).

PLATE II



FIG. 5.—*Crotaphytus collaris baileyi*. Bailey's Collared Lizard (page 250)



FIG. 6.—*Acris gryllus*. Cricket Frog, dorsal view (page 258)



FIG. 7.—*Acris gryllus*. Cricket Frog, side view (page 258)



FIG. 8.—*Bufo punctatus*. Red-spotted Toad. Head; dorsal view (page 255)



FIG. 9. *Bufo punctatus*. Red-spotted Toad. Head; side view (page 255)

Family HYLIDAE

Chorophilus triseriatus Wied

THREE-LINED TREE FROG (Figs. 1-4)

Boulder, May 1-10, 1914; near Alma, Park County, above 10,000 ft., August, 1914 (493).

Eggs and adults of this little frog were taken in temporary pools formed by the melting snow along a railroad right-of-way near Boulder, during the first ten days of May, 1914. On May 9 eggs were collected in the four-celled stage and kept out of doors in water from the pool in which they were found. The development of these eggs was very rapid, a fact which may be correlated with the use of temporary pools as the spawning grounds by this species. On the 11th all of the eggs were in the elongated stage preceding hatching, and during the 12th most of the eggs hatched. The tadpoles of *Chorophilus triseriatus* immediately after leaving the eggs were very black and about 8 mm. in length, resembling the tadpoles of the common toad in outline.

Since the adults of this species were so abundant about the pools near the University during the spring spawning season, a study of the variation in the color pattern was made. The color pattern has been used by several writers in connection with certain anatomical characters for the separation of the subspecies of *Chorophilus nigrinus* LeConte, and *Chorophilus triseriatus* (Wied) is considered as one of these subspecies by some writers. The data collected from 40 adults taken from a single pool about ten feet across, are given below:

Back with stripes only; spots if present, on the eyelids only	9
No spots on the eyelids	1
Spot on each eyelid free	5
Spot on each eyelid fused with the mid-dorsal stripe	3
Stripes and spots both present on the back	27
No spots on the eyelids	2
Spot on each eyelid free	15
Spot on each eyelid fused with mid-dorsal stripe	10
Spots only	4
No spots on the eyelids	1
Spot on each eyelid	3

It may be seen from the above that the three types of color pattern given as characteristics for *Chorophilus nigrinus* LeConte, *Chorophilus feriarum* Baird, and *Chorophilus triseriatus* Wied, by Hay,¹ as well as several other combinations of these characters, occurred in this single collection. All of these specimens were of the same proportions, having the length of the body 1.3 to 1.5 in the length of the hind leg, the anatomical character diagnostic of *Chorophilus triseriatus* Wied.

***Acris gryllus* (LeConte)**

CRICKET FROG (Figs. 6 and 7)

Wray, August, 1913.

Family RANIDAE

***Rana pipiens* Schreber**

LEOPARD FROG

Greeley, September 28, 1902 (C.C.); Medano Ranch, Costilla County, June 24, 1902 (C.C.); Buena Vista, 8,500 ft., June, 1914; Alma, Park County, above 10,000 ft., August, 1914 (494); Lake George, 8,000 ft., September 28, 1914 (495); Florissant, 8,200 ft., September 28, 1914 (496).

The Leopard Frog has been reported as very abundant near all of the ponds and lakes in eastern Colorado by numerous correspondents.

***Rana catesbeana* Shaw**

BULLFROG

This species of frog has been introduced from the East into several ponds and reservoirs in the upper South Platte valley during the past two years. At present the results seem rather discouraging to those interested in introducing this frog because of its economic importance, as the species is not well established. If found, the adults of this species are easily recognized by their large size, large individuals frequently reaching the length of 12 inches from tip of snout to tip of the outstretched hind leg. Bullfrogs of any size may be distinguished from the Leopard frog by the absence of the lateral folds of skin so prominent on the edges of the back of the Leopard frog;

¹ *Rep. State Geol. Ind.*, for 1891, p 470, 1892.

by the very large ear; and by the rather uniform yellowish-olive color, the back of the Bullfrog being mottled with brown, or dusky, instead of being distinctly spotted with black, as is the Leopard frog.

Class REPTILIA

Family IGUANIDAE

Crotaphytus collaris baileyi (Stejneger)

BAILEY'S COLLARED LIZARD (Fig. 5)

Naturita, June 11 and 15, 1914 (444 and 445); 5 miles west of La Plata-Montezuma County line at Mancos Spring, June, 1913 (284).

This species was common from Naturita south and west in 1914, and was especially abundant in the rocky bluffs and ridges bordering the Paradox Valley and Basin Creek. It was seldom seen far from rocky ledges. The figure of this species shows the characteristic attitude of this species when surprised or disturbed among the sagebrush.

Sceloporus consobrinus Baird and Girard

YELLOW-BANDED SWIFT

Bedrock, Dolores River, April 17-19, 1908 (C.C.); Coventry, Montrose County, 6,800 ft., April 24, 1908 (C.C.); Boulder foothills, above 6,000 ft., August 6, 1913, April 21, 1914, and May 10, 1914 (286, 434, and 435); Gypsum Creek, tributary to the Dolores River, July, 1914 (448); Tapagausche Creek, San Miguel County, August 1, 1914 (449).

Specimens of this swift from southwestern Colorado have been referred to the species *Sceloporus elongatus* Stejneger, a form stated by Stejneger¹ to be quite close to *Sceloporus consobrinus*. The specimens examined by us from southwestern Colorado do not differ in any tangible character from specimens of *Sceloporus consobrinus* taken in other parts of Colorado, unless it be in the carination of the scales. The specimens from southwestern Colorado have the keels of the scales a little less evident and a little more restricted to the apical portions of the scales than some of the specimens collected in the foothills near Boulder. Stejneger, l.c., has pointed out this difference between *Sceloporus elongatus* and *Sceloporus consobrinus*,

¹ *N. Amer. Fauna*, No. 3, p. 112, 1890.

stating that, "the scales (of *Sceloporus elongatus*) are not so strongly carinated, the keel being lower and mostly confined to the terminal half of the scale." Since similar variations were found among specimens of the swifts collected in eastern Colorado, all of our Colorado specimens are here listed as *Sceloporus consobrinus*.

Several of the specimens of this swift in the museum of the University of Colorado have small red mites clinging to various parts of the body, particularly to the sides of the head in the lateral folds.

Sceloporus graciosus Baird and Girard

SAGEBRUSH SWIFT

Bedrock, Dolores River, 5,150 ft., April 17, 1908 (C.C.); Howard, San Miguel County, June 10, 1909 (C.C.).

Holbrookia maculata Girard

SPOTTED LIZARD

Greeley, April 28, 1902 (C.C.); Barr, May 29 and 30, 1908 (C.C.).

Phrynosoma hernandesi ornatissimum (Girard)

HORNED TOAD

Bedrock, April 19, 1908 (C.C.); Coventry, April 19, 1908 (C.C.); Boulder, September, 1913 (414); Naturita, June 11, 1914 (446); Gypsum Creek, tributary of the Dolores River, July, 1914 (447); Marshall, Boulder County, June 2, 1913 (282).

Phrynosoma hernandesi hernandesi (Girard)

HORNED TOAD

Greeley, August 8, 1902 (C.C.); 2 miles southeast of Medano Ranch, Costilla County, 7,700 ft., July 5, 1909 (C.C.); 3 miles from Muddy Creek, on Gardner-Silver Cliff Road, Huerfano County, July 15, 1909; Trinidad, September 25, 1909 (C.C.); Colorado Springs, May 18, 1903 (C.C.); between Douglas Spring and Snake River, Moffat County, June 29, 1907 (C.C.).

Family TEIIDAE

Cnemidophorus sexlineatus (Linnaeus)

RACE RUNNER

Barr, June 1, 1908 (C.C.); Canyon City, July, 1913; Joe Davis Gulch, Dolores River, August 8, 1914 (451); reported as common in Dolores Canyon and north and south of Paradox Valley in 1914 by Henderson.

Family COLUBRIDAE

Thamnophis radix (Baird and Girard)

PLAINS GARTER SNAKE

This garter snake and *Thamnophis parietalis* (Say) are the first snakes to appear in the spring about Boulder. They are found together near the temporary pools, feeding upon the little tree frog, *Chorophilus triseriatus* (Wied), which also frequents these pools. We have not taken the Plains Garter Snake in any situation above 6,500 feet near the foothills.

The Plains Garter Snake has a fatal habit of coming on the railroad track during the early days to enjoy the heat of the bare ballast and the iron rails. On one occasion seven dead, but recently killed, specimens of this snake were found on a half-mile of track, immediately after the passing of a train.

Thamnophis parietalis (Say)

RED-BARRED GARTER SNAKE

Boulder, April 15, May 10 and 17, 1914 (433, 436, and 439).

Thamnophis megalops (Kennicott)

Pine River, La Plata County, fall of 1906 (C.C.).

Thamnophis elegans (Baird and Girard)

WESTERN GARTER SNAKE

Bedrock, April 24, 1908 (C.C.); Chambers Ranch, near Glenn Eyrie, El Paso County, May, 1908 (C.C.); Dolores River, San Miguel County, August, 1914 (442); Naturita, June 12, 1914 (443).

Ophibolus doliatus genitilis (Baird and Girard)

RED KING SNAKE

Flagstaff Mountain, Boulder, above 6,000 ft., May 18, 1914 (438).

***Pityophis catenifer sayi* (Schlegel)**

EASTERN BULL SNAKE

Greeley, June 15, 1902 (C.C.); Marshall, Boulder County, May 19, 1914 (441); Hortense Hot Springs, near Buena Vista, about 9,000 ft., June 8, 1914 (497).

This bull snake is quite common in the upper Arkansas River valley near hot springs. Several persons assured us that large specimens of this species were often seen about the Hortense and Cottonwood Springs late in November.

***Pityophis catenifer bellona* (Baird and Girard)**

GREAT BASIN BULL SNAKE

Douglas Spring, Moffat County, June 25, 1907 (C.C.); Naturita, June 15, 1914 (457); reported as fairly common from Naturita to Little Gypsum Creek in 1914 by Henderson.

***Tropidonotus sipedon fasciatus* (Linnaeus)**

WATER SNAKE

Greeley, May 12, 1903 (C.C.).

***Liopeltis vernalis* (DeKay)**

LITTLE GREEN SNAKE

Several reports of this little snake have reached us from the upper South Platte River valley and Park County. One of these reports, which seemed reliable in every detail, mentions this snake as occurring above 9,500 feet. We have no specimens from this part of the state, although we have previously recorded this snake from Palmer Lake, El Paso County.¹ There is a specimen of this snake in the Museum of the State Agricultural College, from Steamboat Springs, Colorado.

***Zamenis constrictor flaviventris* (Say)**

BLUE RACER

Boulder, September 11, 1913 (289).

¹ *Univ. Colo. Studies*, Vol. X, p. 100, 1913.

Tantilla nigriceps Kennicott

TEXAS BLACK-HEADED SNAKE

LaJunta, data incomplete (C.C.); Boulder, December, 1914 (500).

The Boulder specimen of this snake was taken from a trench which was being dug for pipe lines in the city limits. Just how far below the surface the snake was when uncovered was not learned. The record of this species in Boulder is apparently the most northern for the species, and places it nearer the mountains than it has previously been taken.¹

Family CROTALIDAE

Crotalus confluentus Say

PRAIRIE RATTLESNAKE

Near Paradox Valley, June 1914 (452); Paradox Valley, June 15, 1914 (455); Gypsum Creek, tributary of the Dolores River, June, 1914 (456); reported common in the San Miguel and Dolores River regions, south and west of Naturita in 1914 by Henderson.

Family CHELYDRIDAE

Chelydra serpentina (Linnaeus)

SNAPPING TURTLE

Several specimens of this turtle have been taken in the tributaries of Boulder Creek near Boulder during the past two years. One specimen, brought to the Museum of the University of Colorado during March, 1914, had been dug out of a straw pile where it was wintering, and was quite stupid when received. After being placed in the tank in the building it soon became active and remained so, although it was several weeks before active turtles were found out of doors.

Family TESTIDINIDAE

Chrysemys belli (Gray)

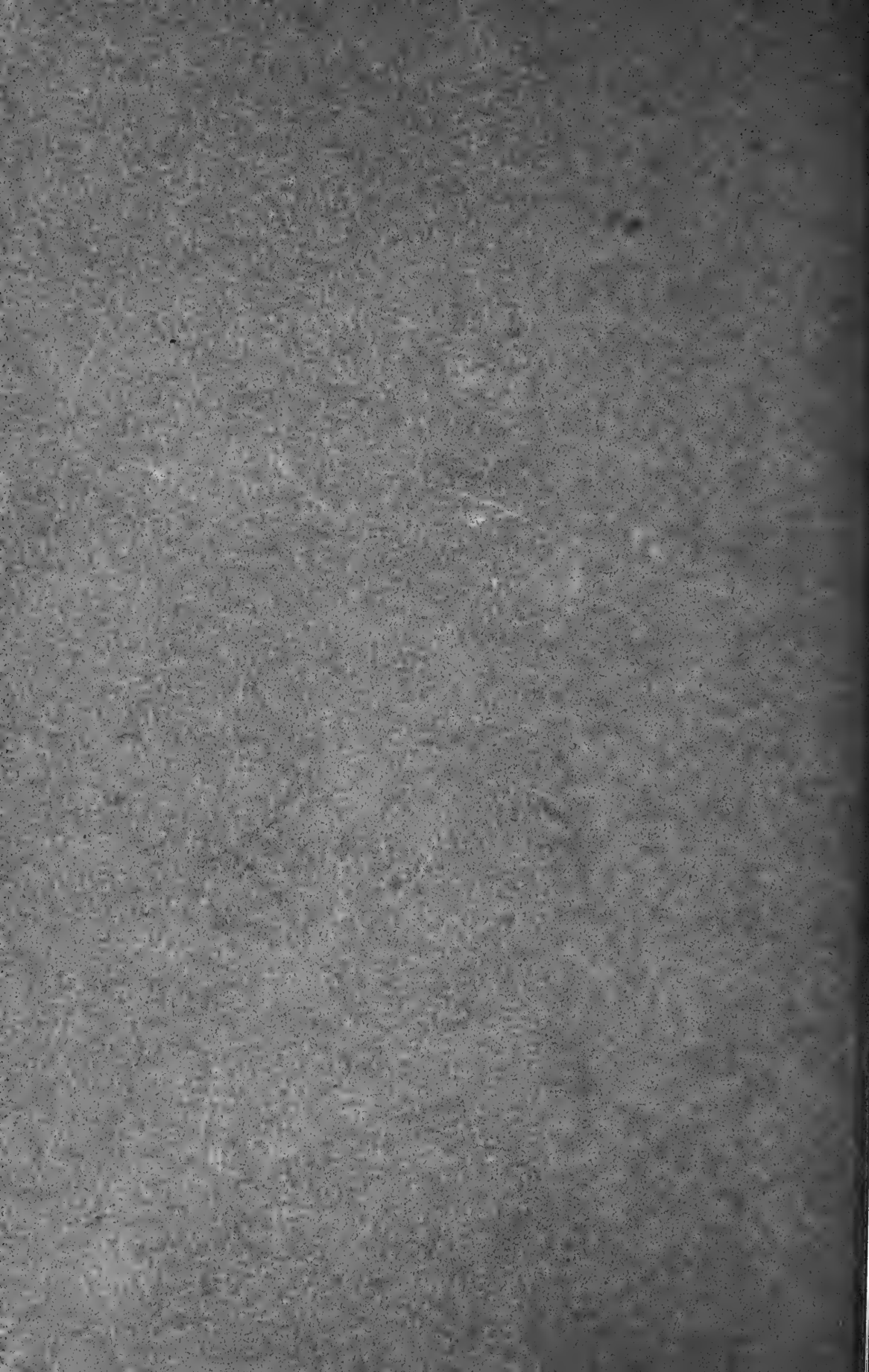
BELL'S PAINTED TURTLE

Greeley, March 9, 1903 (C.C.); Wray, June, 1914.

Bell's Turtle is reported as common, often abundant, in many of the ponds and lakes of eastern Colorado.

¹ *Univ. Colo. Studies*, Vol. X, p. 106, 1913.

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