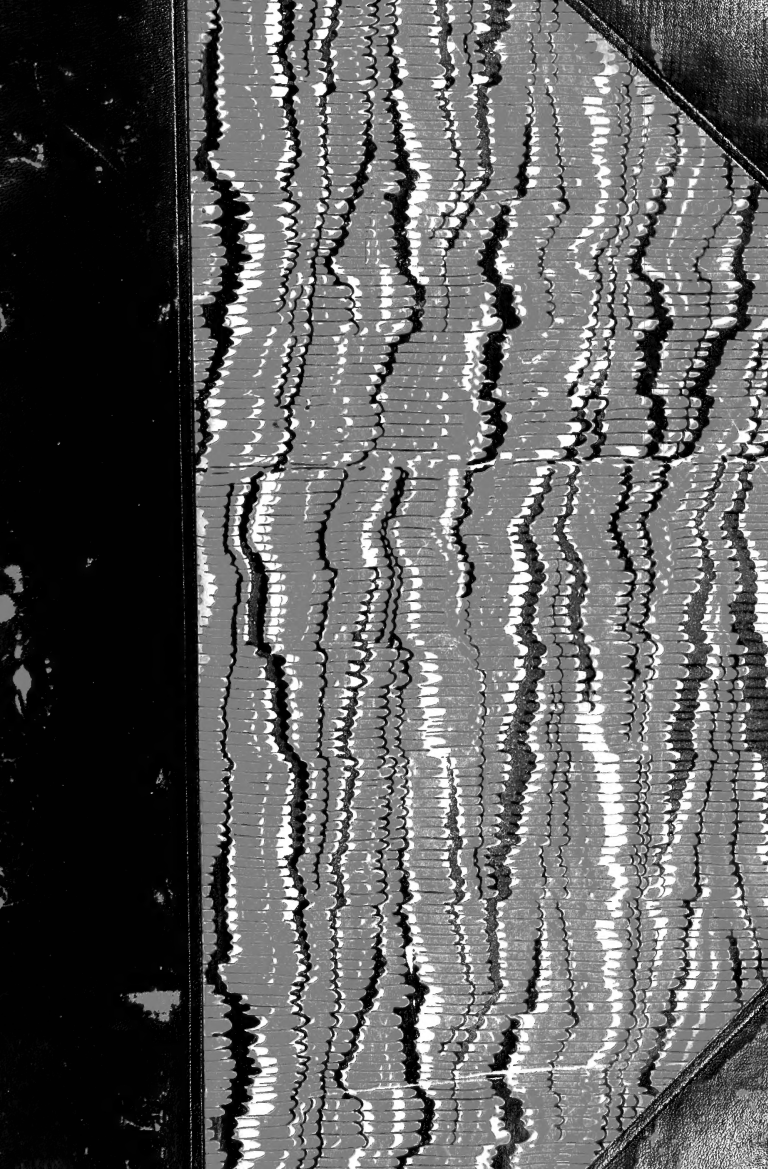


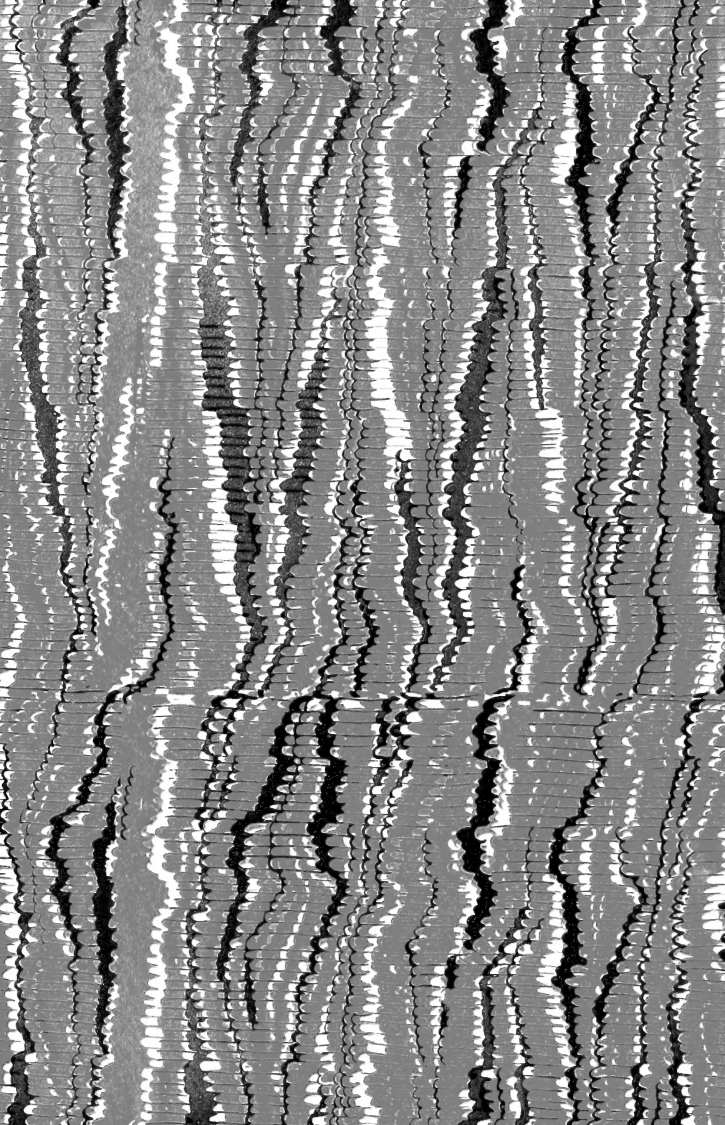
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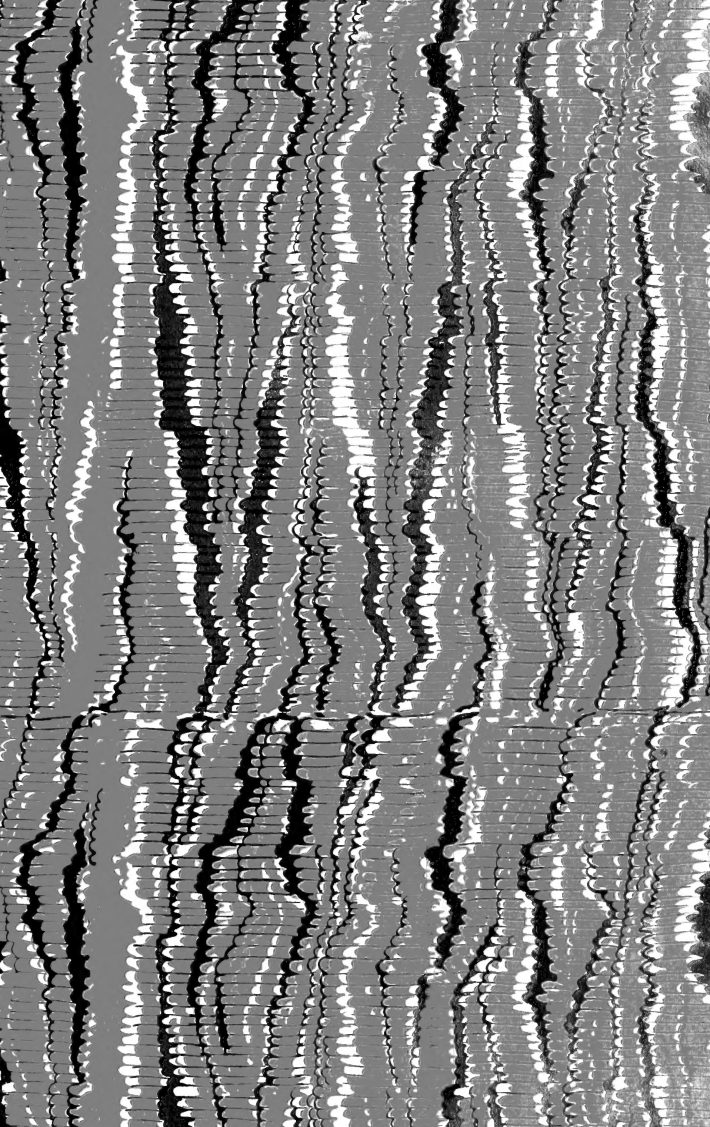
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THE REPTILES
OF
WESTERN NORTH AMERICA

BY
JOHN VAN DENBURGH

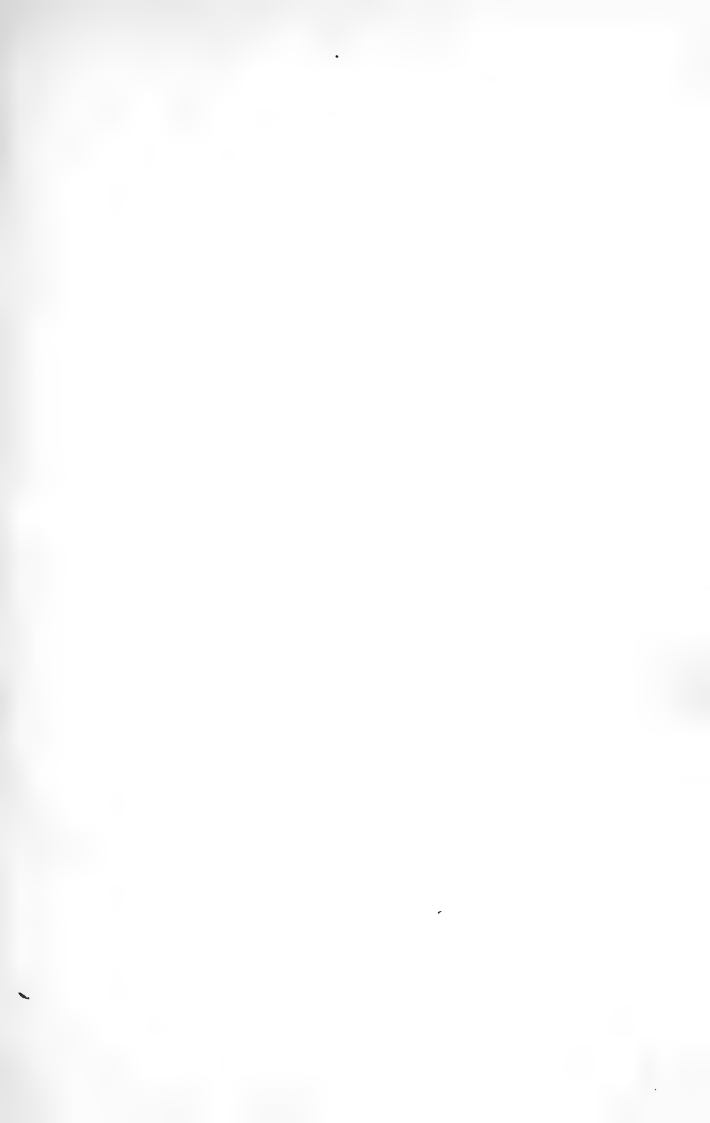
With One Hundred and Twenty-eight Plates

Volume II. Snakes and Turtles

SAN FRANCISCO
PUBLISHED BY THE ACADEMY
NOVEMBER 23, 1922









THE REPTILES
OF
WESTERN NORTH AMERICA

An Account of the Species Known to Inhabit

CALIFORNIA

AND

OREGON, WASHINGTON, IDAHO, UTAH, NEVADA,
ARIZONA, BRITISH COLUMBIA, SONORA
and LOWER CALIFORNIA

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To one largely responsible
for its completion this book
is dedicated June 25, 1922.

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THE REPTILES OF WESTERN NORTH AMERICA

Suborder II. SERPENTES (Snakes)

SYNOPSIS OF FAMILIES

- a.—Tail cylindrical or conical, not oar-shaped.
- b.—Ventral scales less than twice as broad as dorsals.
Plates on top of head not larger than those on body;
anus bordered in front by a single plate; a small spine
at end of tail.
- Leptotyphlopidae.**—p. 624.
- b'.—Ventral plates more than twice as broad as dorsal
scales.
- c.—No rattle at end of tail; no pit between nostril and
eye.
- d.—A small spur at each side of the anus; tail short
and truncate, or top of head with small scales;
pupil vertical.
- Boidæ.**—p. 630.
- d'.—No spur at side of anus; tail tapering; top of head
with large plates; pupil round or vertical.
- e.—No enlarged fangs at front of mouth; coloration,
if in rings, not red separated from black by
white (yellow).
- Colubridæ.**—p. 644.
- e'.—A pair of large permanently erect fangs near
front of upper jaw; coloration, in rings, red
separated from black by white (yellow).
- Elapidae.**—p. 887.
- c'.—A horny rattle at end of tail; a pit between nostril
and eye; a pair of large erectile fangs; pupil vertical.
- Crotalidæ.**—p. 893.

a².—Tail short, strongly compressed laterally, paddle-shaped.

Hydridæ.—p. 891.

Family 11. LEPTOTYPHLOPIDÆ

There are no large plates on the belly, the body being covered everywhere with uniform scales. The head is very small and continuous with the neck. The nasal plate reaches the margin of the lip. The eye may be seen through the ocular plate. One or two large plates precede the anus. The tail ends in a small spine. A pelvic girdle is present, but there are no external traces of limbs. The lower jaw is toothed.

The small, blind snakes belonging to this family are similar in appearance to the Typhlopidae of the Old World and tropical America, but differ in several structural features.

The two genera which occur within the geographic limits of this work may be distinguished by the following

SYNOPSIS OF GENERA

a.—Ocular plate in contact above with the median series of scales on the head.

Siagonodon.—p. 624.

a².—Ocular plate in contact above with a supraocular plate which separates it from the median series of scales.

Leptotyphlops.—p. 627.

Genus 22. *Siagonodon*

Siagonodon PETERS, Sitzb. Ber. Ges. Naturf. Freunde, Berlin, 1881, p. 71 (type, *septemstriatus*).

The body is cylindrical, covered with smooth, cycloid scales. The rostral plate is very large, and is recurved on both the upper and lower surfaces of the protruding snout. The nasal plate is very large; behind it is the large ocular, followed in turn by wide parietal and occipital plates. A

row of small scales runs along the top of the head behind the rostral plate. No supraocular plates are present. The preanal plate is not divided.

A single species represents this genus in California, Arizona and Lower California.

135. *Siagonodon humilis* (Baird & Girard)

WESTERN WORM-SNAKE

- Rena humilis* BAIRD & GIRARD, Cat. N. Amer. Reptiles, Pt. I, Serpents, 1853, p. 143 (type locality, **Valliecityas, Cal.**); COOPER, Proc. Cal. Acad. Sci., Vol. IV, 1870, p. 67; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 64; STEJNEGER, Proc. U. S. Nat. Mus., Vol. XIV, 1891, p. 501; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 590; STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 203; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 136.
- Stenostoma humile* PETERS, Monatsberichte Akad. Wiss. Berlin, 1857, p. 402; COPE, Proc. Acad. Nat. Sci. Phila., 1861, p. 305; COPE, Proc. Acad. Nat. Sci. Phila., 1886, p. 312; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 44; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 142; GARMAN, Mem. Mus. Compr. Zool. Cambr., Vol. VIII, 1883, p. 130; BELDING, West Amer. Scientist, Vol. III, No. 24, 1887, p. 98.
- Siagonodon dugesii* BOCOURT, Miss. Sci. au Mex., Rept., 1882, p. 507, pl. XXIX, fig. 9 (type locality, **Colima, Mexico**).
- Glauconia humilis* BOULENGER, Cat. Snakes Brit. Mus., Vol. I, 1893, p. 70; COPE, Amer. Naturalist, Vol. XXX, 1897, p. 1014; MOCQUARD, Nouv. Arch. Mus. Hist. Nat., Ser. 4, Vol. I, 1899, p. 315; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 719, fig. 144; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 14; DITMARS, Reptile Book, 1907, p. 210, pl. LXIII.
- Siagonodon humilis* VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 150; McLAIN, Contributions to Neotropical Herpetology, 1899, p. 3; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 153; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 409; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, p. 145; STEJNEGER & BARBOUR, Check List N. Amer. Rept., 1917, p. 72; STEPHENS, Copeia, No. 54, 1918, p. 34; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci.,

Ser. 4, Vol. XI, 1921, p. 52; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.

Leptotyphlops humilis RUTHVEN, Bull. Am. Mus. Nat. Hist., Vol. XXIII, 1907, p. 573; GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 176; STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 63.

Description.—Body long and slender, with short, blunt tail bearing a small spine at its tip. Head small, continuous with neck, slightly depressed, with prominent, rounded snout. Rostral plate strongly recurved on top of snout, and continued back on lower surface of head to mouth. A large nasal plate bordering lip, divided behind, and sometimes in front of, nasal opening. Ocular plate reaching margin of lip between two labials. Two large plates, parietal and occipital, behind ocular. No supraocular plate. Nasal, ocular, parietal and occipital plates separated from corresponding plates on opposite side of head by single series of small, rounded, imbricate scales. Scales on chin smallest. Fourteen rows very strongly imbricate scales around middle of body; middle ventral series often slightly enlarged. Preanal plate single. Caudal scales similar to those on body.

The entire upper surface, five to seven longitudinal rows of scales, is brown, sometimes slightly grayish at the edges of the scales. The lower parts are creamy white, rarely clouded with gray.

Length to anus.....	91	98	133	199	235	272	291	368
Length of tail.....	4	4	7	10	9	9	11	16
Width of head.....	2	2	2	3	4	4	4	
Width at middle of body	2	2	2½	4	5	5	6	

Distribution.—In California, this little snake has been found at Fort Yuma, Imperial County; Vallecito at about 1600 feet, and near Banner on the east slope of the Cuyamaca Mountains at about 3000 feet altitude, and near Ladrillo Station near Pacific Beach, San Diego County;

and near Bennett Wells in Death Valley, Inyo County. Boulenger records a specimen from San Bernardino, San Bernardino County, and it has been taken also in the Shover Mountains, near Colton, in this county. It probably occupies most of the intervening desert regions. It occurs in both Upper and Lower Sonoran zones.

In Arizona it has been collected at Fort Mohave, Mohave County, Yuma, Yuma County, Tucson, Pima County and in the foothills of the Catalina Mountains about 18 miles northeast of Tucson, and Sabino Canyon, Pima County.

In Lower California it has been found at San Ignacio, and on Cerros Island, and, in the Cape Region, at Cape San Lucas, San Jose del Cabo, San Francisquito, Sierra Laguna, and La Paz.

It ranges south on the mainland of Mexico to Colima, and has been taken in Sonora at San Miguel de Horcasitas.

Habits.—This little snake evidently is a burrowing species. Professor Thornber found several in a pile of manure on the Greasewood plains east of Tucson. Mr. Herbert Brown found one under a stone about a foot square, about 20 feet from the edge of a pool of water. Under the stone the earth had been worked from between the grass roots, showing several runways, in one of which the snake was coiled.

Genus 23. *Leptotyphlops*

Leptotyphlops FITZINGER. Syst. Rept., 1843, p. 24 (type, *nigricans*);

STEJNEGER, Proc. U. S. Nat. Mus., 1891, p. 501.

Stenostoma, WAGLER, Nat. Syst. Amphib., 1830, p. — (not of Latreille, 1810).

Catodon DUMÉRIEUX et BIBRON, *Erpét. Génér.*, Vol. VI, 1844, p. 318 (not of Artedi).

Glauconia GRAY, *Cat. Lizards Brit. Mus.*, 1845, p. 139; COPE, Proc.

U. S. Nat. Mus., Vol. XIV, 1892, p. 589; BOULENGER, *Cat. Snakes*

Brit. Mus., Vol. I, 1893, p. 59; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 716.

Rena BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, Serpents, 1853, p. 142 (type, *dulcis*).

The body is cylindrical, covered with smooth, cycloid scales. The rostral plate is very large, and is recurved on both the upper and lower surfaces of the protruding snout. The nasal plate is very large; behind it is the large ocular, followed in turn by wide parietal and occipital plates. A row of small scales runs along the top of the head behind the rostral plate. This central row of scales is separated from the ocular plate of each side by a small supraocular plate.

One species of this genus has been found in Arizona.

136. *Leptotyphlops dulcis* (Baird & Girard)

EASTERN WORM-SNAKE

Rena dulcis BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, Serpents, 1853, p. 142 (type locality, **between San Pedro and Camanche Springs, Tex.**).

Stenostoma dulce PETERS, Monatsb. Akad. Wiss. Berlin, 1857, p. 402; COPE, Proc. Acad. Nat. Sci. Phila., 1861, p. 305; JAN, Arch. Zool. Anat. Phys., 1861, p. 189; JAN, Iconogr. Génér. Ophid., 2e livr., pls. 5, 6, fig. 5, text 1864, p. 36; JAN, Elenco Syst. degli Ofidi, 1864, p. 15; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 44; COPE, Bull. U. S. Nat. Mus., No. 17, 1880, p. 20; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 63; COPE, Proc. Acad. Nat. Sci. Phila., 1883, p. 11.

Stenostoma rubellum GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, 1883, p. 130 (type locality, **Uvalde, Texas**).

Leptotyphlops dulcis STEJNEGER, Proc. U. S. Nat. Mus., 1891, p. 501; COCKERELL, American Naturalist, Vol. XXX, April, 1896, p. 326; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 409; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 72.

Glauconia dulcis COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 590; BOULENGER, Cat. Snakes, Vol. I, 1893, p. 65; COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 717, fig. 143; BROWN, Proc. Acad.

Nat. Sci. Phila., 1901, p. 13; BROWN, Proc. Acad. Nat. Sci. Phila., 1903, p. 548; DITMARS, Reptile Book, 1907, p. 210; STRECKER, Proc. Biol. Soc. Washington, Vol. XXI, 1908, p. 73; STRECKER, Baylor Bulletin, Vol. XVII, No. 4, 1915, p. 28.

Glauconia dissecta COPE, Amer. Naturalist, 1896, p. 753 (type locality, silver mines at Lake Valley, southern New Mexico); COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 716, fig. 142.

Description.—Body long and slender, with short, blunt tail bearing a small spine at its tip. Head small, continuous with neck, slightly depressed, with prominent rounded snout. Rostral plate strongly recurved on top of snout, and continued back on lower surface of head to mouth. A large nasal plate extending to lip, divided behind, and sometimes in front of, nasal opening. Ocular plate reaching margin or lip between labial plates. Usually one labial behind ocular and one or two between it and nasal. Usually two large plates, parietal and occipital, behind ocular. Nasal, parietal, and occipital plates separated from corresponding plates on opposite side of head by a single series of small, rounded, imbricate scales on head behind rostral. Oculars separated from this central series by a pair of small supra-ocular plates. Infralabials four or five, similar to the small scales on the chin. Fourteen rows of strongly imbricate scales; ventral series often slightly enlarged. Preanal large, single. Caudal scales similar to those on body.

The color above is reddish or grayish brown; reddish white below.

Length to anus.....	181	223
Length of tail.....	10	12

Distribution.—This little snake ranges from north-central, central and southern Texas south into Mexico and west across New Mexico and Arizona. Mr. Herbert Brown sent me a specimen which he had collected at Yuma, the most

western record. Professor Brown of the University of Arizona told me that he had examined a specimen collected on the grounds of the Carnegie Desert Laboratory near Tucson, in 1911.

Remarks.—This snake differs from *Siagonodon humilis* in the presence of supraocular plates. It is believed to be subterranean in its habits, and therefore is rare in collections.

Family 12. BOIDÆ

The belly is provided with a series of large plates. The head may be covered with either small scales or large plates. The eye is well-developed, with vertical pupil. Rudimentary pelvis and hind limbs are present, the latter usually showing externally as a small spur on each side of the anus. Both jaws bear teeth. The labial plates are without pits.

Two genera of boas have been found in California.

SYNOPSIS OF GENERA

a.—Head covered with small scales; tail not very blunt.

Lichanura.—p. 630.

a'.—Head with large plates above; tail very blunt.

Charina.—p. 638.

Genus 24. *Lichanura*

Lichanura COPE, Proc. Acad. Nat. Sci. Phila., 1861, p. 304 (type, *trivirgata*); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 722.

The head is slightly distinct from the neck, and is covered with small scales. The nostril is between two plates, the anterior of which meets that of the opposite side on the median line. The scales on the body are smooth and nearly as wide as long. The urosteges and preanal plate are undivided. The short tail is tapering, but ends in a rounded plate. The eye is moderately large with vertical pupil. Two species are known.

SYNOPSIS OF SPECIES

a.—Gastrosteges more numerous, about 220 to 243; longitudinal bands, when present, not dark chocolate or blackish brown and not in strong contrast with the ground color.

L. roseofusca.—p. 631.

a².—Gastrosteges fewer than 220; light with dark brown longitudinal bands in strong contrast.

L. trivirgata.—p. 636.

137. *Lichanura roseofusca* Cope

CALIFORNIA BOA

Plate 58

Lichanura roseofusca COPE, Proc. Acad. Nat. Sci. Phila., 1868, p. 2 (type locality, **northern Lower California**); COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 43; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 65; STEJNEGER, Proc. U. S. Nat. Mus., Vol. XIV, 1891, p. 514; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 591; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 138; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1896, p. 1006; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 152, fig.; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 724, fig. 146; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 14; GRINNELL & GRINNELL, Throop Inst. Bulletin, No. XXXV, 1907, p. 37, fig. 13; DITMARS, Reptile Book, 1907, p. 211; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, 151; ATSATT, Univ. Cal. Publ. Zool., Vol. 12, No. 3, 1913, p. 41; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 410; RUTHLING, Copeia, No. 15, 1915; GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 177; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 73; COWLES, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, 1920, p. 66; STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 63; WRIGHT, Copeia, 1921, No. 95, p. 35; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 52; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 130.

Lichanura myriolepis COPE, Proc. Acad. Nat. Sci. Phila., 1868, p. 2 (type locality, **northern Lower California**); COPE, Bull. U. S.

- Nat. Mus., No. 1, 1875, p. 43; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 65; STEJNEGER, Proc. U. S. Nat. Mus., Vol. XII, 1889, p. 98; STEJNEGER, Proc. U. S. Nat. Mus., 1891, p. 512-515.
- Charina trivirgata* GARMAN, Mem. Mus. Compr. Zool. Cambr., Vol. VIII, No. 3, 1883, p. 131 (part); BOULENGER, Cat. Snakes Brit. Mus., Vol. 1, 1893, p. 129 (part).
- Lichanura orcutti* STEJNEGER, Proc. U. S. Nat. Mus., Vol. XII, 1889, p. 96, fig. 1 (type locality, **Colorado Desert, San Diego County, California**); STEJNEGER, West Amer. Scientist, Vol. VI, No. 46, 1889, p. 83; STEJNEGER, Proc. U. S. Nat. Mus., Vol. XIV, 1891, p. 513-515; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 592; COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 726, fig. 147; WERNER, Archiv fur Naturgeschichte, Vol. 87, 1921, Abt. A, Heft 7, p. 260.
- Lichanura simplex* STEJNEGER, Proc. U. S. Nat. Mus., Vol. XII, 1889, p. 97, fig. 2 (type locality, **San Diego, Cal.**)
- Lichanura trivirgata* WERNER, Archiv fur Naturgeschichte, Vol. 87, 1921, Abt. A, Heft 7, p. 259 (part).

Description.—Top of head nearly flat, covered with small smooth scales. Snout long, with a more or less prominent high rostral plate. Superior labials 13 or 14, high anteriorly, but with tips sometimes cut off and appearing as small scales below loreals. Inferior labials 15 to 17. Loreals usually three, but their number not at all constant. About seven to 10 scales encircling eye. Scales on body smooth, imbricate, nearly as wide as long, and arranged in from 35 to 43 longitudinal rows, lowest row on each side formed of larger scales. Gastrosteges narrow, varying in number from 220 to 242. Urosteges varying in number from 38 to 48; in a single series. Spurs small, but easily seen at each side a little in front of anus.

The color above is light bluish or brownish gray or deep drab, with or without three more or less indefinite reddish or yellowish brown longitudinal bands. The middle one of these bands originates between the eyes, while the others arise on the temples. All or none of these bands may extend



Lichanura roseofusca, California Boa
Collected near Akulla, Maricopa County, Arizona, May, 1912.

to or along the tail. The lower surfaces are yellowish white, more or less spotted or blotched with brown or gray.

Length to anus	370	518	695	765	860	870
Length of tail.....	48	66	90	80	117	110

Distribution.—The original specimens of this snake were collected in northern Lower California by William M. Gabb. I have examined a specimen taken at Ensenada, Lower California, on June 8, 1893. Thence the species ranges north through southern California and east to western Arizona. A dried specimen found by Mr. Slevin on Mejia Island, in the Gulf of California, seems to belong to this species.

In Arizona, it has been secured only in the Harqua Halla Mountains in northwestern Maricopa County, but has been seen also in the Harcuver Range in northeastern Yuma County.

In California, it has been collected in the Providence Mountains in the northeastern part of San Bernardino County, and in the Colorado Desert, San Diego County. Most of the records are from regions nearer to the coast, where it has been taken in Los Angeles (Mt. Wilson, Arroyo Seco, Sierra Madre at 1900 and 2500 feet, Eaton Canyon near Pasadena, San Gabriel Mountains at 1700 feet, mouth of San Gabriel River near Azusa, Claremont), San Bernardino (east of Victorville, Cucamonga Canyon San Gabriel Mountains, San Bernardino Mountains, Live Oak Canyon near Redlands), Riverside (Banning, Gavilan, San Jacinto, San Jacinto Mountains near Cabazon, Palm Canyon at 3,000 feet, desert seven miles south of Palm Springs), and San Diego (San Diego, Witch Creek, Dulzura, Bonsall), counties.

Habits.—Grinnell and Grinnell say: "During a camping trip the last week in March, 1906, at the mouth of the San Gabriel, our field party secured no less than four boas along the rocky southern base of the hills and at the mouth of Fish Canyon, a tributary of the San Gabriel River.

"One was discovered during a driving rain. It was crawling in the open canyon bed near the margin of a torrent. And this seems to be characteristic of this species, that it comes out in cloudy weather or else frequents shady places. Its movements are slow. When picked up it winds tightly about one's arm or else coils up in an intricate knot. Hence one boy who had seen the species before called it the "rubber snake."

Atsatt records one as found trying to swallow a mouse. (*Peromyscus*) which had been caught in a trap. The snake had wrapped its body about the mouse whose head it had taken into its mouth. When disturbed it crawled slowly away, and upon being gently struck on the head, coiled up in a ball with the head hidden within the coils.

Mr. A. H. Wright, states that "It might be of interest to note the food reactions of a California boa in captivity. The literature of the life-history of this species is somewhat scanty. The captive was taken, Dec. 16, 1917, in the desert, seven miles south of Palm Springs, San Bernardino Co., California, by Dr. J. Chester Bradley. He kept it as a pet until the following May when it was shipped to me at Ithaca, N. Y. During the period of Dec. 1917-May, 1918, it fed on nothing. With us it began the same career and fasted. Flies, spiders, various insects, and worms were offered but not accepted.

"In midsummer we placed in its cage a house mouse. Later the same day we discovered the mouse had been killed. It had apparently been seized between the eyes but not eaten. In a few days we captured a live white-foot mouse

and placed it with the snake. Almost instantly it began to be active. The snake deliberate normally became animated. Soon it seized the mouse on the side of the body. Then it began to coil itself about the animal. When the prey was sufficiently held by the coils the snake released its mouth hold and felt along the body and head until it seized the mouse between the eyes as in the house mouse. Then it began to crush the creature with its coils. But this mouse it also did not eat. In either case it was not the size which was responsible for the non-completion of the process, as was later revealed.

“Our main objective was to make it feed. In two nesting boxes were young English sparrows of which we wished to dispose. We placed one in the cage. Instantly the snake seized it by the body, coiled about it, released mouth hold, sought the head, began crushing with coils and finally began swallowing the bird quite rapidly for a snake. There were practically no feathers on the bird. Thereafter it ate young English sparrows. It usually went through the process we have described, a truly constrictor habit. Rarely, however, it would seize the bird by leg or head and swallow it at once with no coiling about the bird at all. Is its natural habit feeding on young birds of the desert?

“As a pet I consider it the finest native snake of the states. It is gentle, never bites, is clean and glossy of skin, coils into a ball or up the arm and is a beautifully patterned snake. This individual was befriended by the whole neighborhood of children.”

138. *Lichanura trivirgata* Cope

SAN LUCAN BOA

- Lichanura trivirgata* COPE, Proc. Acad. Nat. Sci. Phila., 1861, p. 304 (type locality, **Cape St. Lucas, Lower California**); JAN, Iconogr. Génér. Oph., 2e livr., 1865, pp. 69, 70; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, pp. 43, 93; BOCOURT, Miss. Sci. au Mex., Reptiles, 8e livr., 1882, p. 514; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 142; BELDING, West Amer. Scientist, Vol. III, No. 24, p. 98; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 65; STEJNEGER, Proc. U. S. Nat. Mus., 1889, p. 98, fig. 3; STEJNEGER, Proc. U. S. Nat. Mus., 1891, pp. 512, 514, 515; COPE, Proc. U. S. Nat. Mus., 1891 (1892), p. 591; BOULENGER, Cat. Snakes Brit. Mus., Vol. I, 1893, p. 129 (part); VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. V, 1895, p. 137; VAN DENBURGH, Proc. Am. Philos. Soc., Vol. XXXVII, No. 157, 1898, p. 141; COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 723; DITMARS, Reptile Book, 1907, p. 211; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 73; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 52; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115; WERNER, Archiv fur Naturgeschichte, Vol. 87, 1921, Abt. A, Heft 7, p. 259 (part); TERRON, Mem. y Rev. Soc. Cient. Antonio Alzate, Vol. 39, 1921, p. 164.
- Charina trivirgata* GARMAN, Mem. Mus. Compr. Zool., Vol. VIII, No. 3, 1883, pp. 8, 131; GARMAN, Bull. Essex Inst., Vol. XVI, No. 1, p. 22.

Description.—Top of head nearly flat, covered with small smooth scales. Snout long, high, broadly rounded, with prominent, broad high, recurved rostral. Superior labials 14 or 15, high anteriorly, but with tips sometimes cut off and appearing as subloreal. Loreals usually two or three. A series of scales encircle eye. Scales on body smooth, in 40 or 41 rows, laterals a little larger. Gastrosteges narrow, varying in number from 240 to 241, at least. Anal not divided. Urosteges in a single series of about 44. The diameter of the eye is about one-third the distance from the orbit to end snout.

The color above is yellowish or brownish gray with

three deep reddish or blackish brown longitudinal bands in strong contrast with the ground color. These bands extend from the snout to the end of the tail. In the type specimen the median dark band was about four scales wide, the two lateral bands about five scales wide, and the stripe of ground color between them was about three and a half scales wide. The belly and lower sides are whitish, irregularly speckled or blotched with dark brown.

A living specimen was colored as follows: The head is pure drab-gray with markings of seal-brown above, uniform whitish below. On the body the ground color above is rich drab-gray, with a slight creamy cast, separating three longitudinal stripes of very dark seal-brown. The belly and sides are creamy white, irregularly dotted and blotched with seal-brown.

Length to anus	486	533
Length of tail.....	96	101

Distribution.—This species apparently is confined to the Cape Region of Lower California. Mr. Xantus obtained the original specimens in swamps among the mountains near Cape San Lucas. Mr. Belding secured an individual near La Paz. Mr. F. Billa sent me one collected near San José del Cabo. It has been collected near Santa Anita.

Habits.—The snake of this species which I had alive for some time was very gentle, and rather slow in its movements. It had the curious habit, often shown by *Charina* and *Lichanura roseofusca*, of coiling itself into a compact mass or ball when disturbed.

Genus 25. *Charina*

Charina GRAY, Cat. Snakes Brit. Mus., 1849, p. 113 (type, *bottæ*).

Wenona BAIRD & GIRARD, Proc. Acad. Nat. Sci. Phila., 1852, p. 176.

Pseudoeryx JAN, Arch. f. Nat., 1862, p. 242 (type, *bottæ*).

The head is not, or is very slightly, distinct from the neck, and is provided with irregular large plates above. The nostril is between two plates. The scales on the body are smooth, small, imbricate, and about as long as wide. The urosteges and preanal plate are undivided. The tail is short, very blunt, ending in a large, rounded plate. The eye is small, with vertical pupil.

SYNOPSIS OF SUBSPECIES

a.—Scales usually in more than 41 rows.

C. b. *bottæ*.—p. 638.

a².—Scales in 41 rows.

C. b. *utahensis*.—p. 642.

139. *Charina bottæ bottæ* (Blainville)

PACIFIC RUBBER SNAKE

Plate 59

Tortrix bottæ BLAINVILLE, Nouv. Ann. Mus. Hist. Nat., Vol. IV, 1835, p. 289, pl. XXVI, fig. 1-1b (type locality, California).

Charina bottæ GRAY, Cat. Spec. Snakes Brit. Mus., 1849, p. 113; COPE, Bull. U. S. Nat. Mus., No. I, 1875, p. 43; BOCOURT, Miss. Sci. au Mex., 8e livr., 1882, p. 511; GARMAN, Mem. Mus. Compr. Zool. Cambr., Vol. VIII, No. 3, 1883, p. 7; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 64; STEJNEGER, Proc. U. S. Nat. Mus., Vol. XIII, 1890, p. 181; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 592; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 154; McLAIN, Critical Notes, 1899, p. 11; COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 728, figs. 148, 149, 150; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 15; DITMARS, Reptile Book, 1907, p. 211, pl. LXIV; RICHARDSON, Proc. U. S. Nat. Mus., Vol. 48, 1915, p. 426; DICE, Univ. Cal. Publs. Zool., Vol. 16, No. 17, 1916, pp. 314, 319; GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17,

- No. 10, 1917, p. 177; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 74 (part); WERNER, Archiv fur Naturgeschichte, Vol. 87, 1921, Abt. A, Heft 7, p. 260.
- Wenona isabella* BAIRD & GIRARD, Proc. Acad. Nat. Sci. Phila., 1852, p. 176 (type locality, **Puget Sound**); BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 140; GIRARD, U. S. Explor. Exped., 1858, p. 113, Atlas, pl. VII, figs. 8-14; LORD, Naturalist Vancouver Island, Vol. II, 1866, p. 305.
- Wenona plumbea* BAIRD & GIRARD, Proc. Acad. Nat. Sci. Phila., 1852, p. 176 (type locality, **Puget Sound**); BAIRD & GIRARD, Cat. N. Amer. Reptiles, Pt. I, 1853, p. 139; GIRARD, U. S. Explor. Exped., Herp., 1858, p. 112, Atlas, pl. VII, figs. 1-7; BAIRD, Rep. Pacific R. R. Surv., 1859, p. 11; COOPER, Rep. Pacific R. R. Surv., Vol. XII, Pt. III, 1860, p. 303; JAN, Elenco syst. degli Ofidi, 1863, p. 21; JAN & SORDELLI, Iconogr. génér. des Ophid., 3e livr., 1864, pl. II, fig. 2, text, 1865, p. 69; LORD, Naturalist Vancouver Island, Vol. II, 1866, p. 305; BOCOURT, Miss. Sci. au Mex., Rept., 8e livr., 1882, p. 512, pl. XXX, figs. 7-7c.
- Charina plumbea* COPE, Proc. Acad. Nat. Sci. Phila., 1861, p. 305; YARROW & HENSHAW, Ann. Rep. Chief of Engineers, for 1878, Surv. W. 10th Merid., Appendix NN, 1878, p. 217; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 142; COPE, Proc. Acad. Nat. Sci. Phila., 1883, pp. 21, 23; TOWNSEND, Proc. U. S. Nat. Mus., Vol. X, 1887, p. 240; STEJNEGER, Proc. U. S. Nat. Mus., Vol. XIII, 1890, p. 181; STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 203.
- Pseudoeryx bottæ* JAN, Elenco syst. degli Ofidi, 1863, p. 21; JAN & SORDELLI, Iconogr. génér. des Ophid., 3e livr., 1864, pl. II, fig. 1, text 1865, p. 67.
- Charina bottæ* var. *plumbea* GARMAN, Mem. Mus. Compr. Zool. Cambr., Vol. VIII, No. 3, 1883, p. 131.
- Charina brachyops* COPE, Proc. U. S. Nat. Mus., Vol. XI, 1888, p. 88, pl. XXXVI, figs. 2a-2f (type locality, **Point Reyes, Cal.**); STEJNEGER, Proc. U. S. Nat. Mus., Vol. XIII, 1890, p. 181; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 592; BOULENGER, Cat. Snakes Brit. Mus., Vol. I, 1893, p. 131; COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 727; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 15; WERNER, Archiv fur Naturgeschichte, Vol. 87, 1921, Abt. A, Heft 7, p. 260.
- Charina bottæ bottæ* VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. X, No. 3, 1920, pp. 31, 32; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 28, 36.

Description.—Top of head very slightly rounded, covered with plates which often differ greatly in size, shape and number in different individuals. Rostral plate very large. Between it and broad frontal are two or three pairs of plates: anterior nasal, internasal and prefrontal. Labial and prefrontal plates sometimes entering orbital ring. A single loreal usually present, but sometimes two or none. Supralabials eight to 11, often nine, the anterior ones usually very high, but, like all the headplates, subject to much variation. Infralabials nine to 13, usually 11. Scales on body smooth, imbricate, about as wide as long, and arranged in from 41 to 49 longitudinal rows; lowest row on each side formed of larger scales. Gastrosteges narrow, varying in number from 192 to 218. Urosteges varying in number from 27 to 40, usually all single, but sometimes a few divided. Anal spurs small but distinct. Tail very short and nearly as blunt as head.

All the upper and lateral surfaces are grayish, yellowish or greenish brown, without dark or light markings. The chin and throat are sometimes clouded with gray or brown. The rest of the lower surface is yellowish white.

Four young, from Placer County, are dull buff both above and below.

Length to anus.....	193	238	356	408	482	519
Length of tail.....	26	31	47	58	58	73

Remarks.—In one specimen from Red Point, Placer County, and one from Fyffe, El Dorado County, California, the scales are in 41 rows. Other specimens from these localities have 43 rows. All other specimens from California, Nevada, Oregon, and Washington, of which I have records have more than 41 rows of scales. Thus of 47 specimens from these states 15 have 43 rows, 20 have 45, six have 47, and six have 49 rows.



Charina bottae bottae, Pacific Rubber Snake
Collected at Rio Campo, Sonoma County, California, August, 1912.

Distribution.—The Rubber Snake, or Two-headed Snake as it is often called because of its blunt tail, is not rare in the moister portions of California, Oregon, Washington, and western Nevada. It usually is found in or near coniferous woods.

In California, it seems to be restricted to the coast region and the Sierra Nevada and has not been found south of Tulare County. It has been taken in Siskiyou (near Mount Shasta), Lassen (south base of Mount Lassen, Eagle Lake), Nevada (Donner Lake), Placer (Red Point, Summit Soda Springs, Cisco, Tahoe City), El Dorado (Strawberry Valley, Fyffe, Mount Tallac, Fallen Leaf Lake), Calaveras (Mokelumne Hill), Mariposa (Yosemite Valley), Fresno (Fresno, Huntington Lake), Tulare (Redwood Canyon East Fork Kaweah River), Humboldt (Humboldt Bay), Trinity (Coffee Creek), Mendocino (Comptche), Sonoma (Russian River near Rio Campo), Marin (Point Reyes, three miles west from Inverness, Sausalito, Mt. Tamalpais), Alameda (Berkeley, Temescal, Oakland), San Francisco (Presidio), San Mateo (Halfmoon Bay), Santa Clara (Palo Alto, Black Mountain), Santa Cruz (Big Basin, Santa Cruz, Soquel), and Monterey (Carmel), counties.

In Nevada, it has been secured on the Humboldt River, at the big Bend of the Truckee River, and in Ormsby County and at Glenbrook, Douglas County.

In Oregon, it has been taken in Lake (Summer Lake), Douglas (Drain), Lane (Blue River, McKenzie Bridge), Marion (Salem), and Clackamas (Milwaukee), counties, and in the Upper Willamette Valley between Portland and Salem, the John Day Valley, and at Bourne. Specimens have also been collected in Baker County, and near Wallowa Lake, Wallowa County, but I do not know whether they are of this subspecies or *C. bottæ utahensis*.

In Washington, it has been secured in King (Seattle),

Pierce (Fort Steilacoom), Chelan (Lucerne), Yakima Bumping Lake at 3,300 feet), Whitman (Pullman), and Columbia (Blue Mountains), counties. Those from the last two localities may possibly be *C. bottæ utahensis*.

In British Columbia, it has been collected in Lillooet River Valley. Lord records it from Vancouver Island, the woods along the bank of the Chelukweyuk River, and the Sumass and Chelukweyuk prairies.

Habits.—This little snake is most abundant in moist places, such as are found in the redwood forests of the Coast Range. It is slow of movement, and very gentle. When handled, it usually ties itself into a curious ball-like knot often with the head hidden and the tail held as though it were the head, which it much resembles. Like *Lichanura*, it never tries to defend itself by biting. A female caught in June contained large eggs. A specimen from Carmel had eaten six young mice. It regurgitated four of these when handled, but soon swallowed one again. Cope records one of these snakes captured in the act of swallowing a blue-bellied lizard, and Mr. Slevin found one which had eaten two of these lizards (*Sceloporus occidentalis occidentalis*).

140. *Charina bottæ utahensis* Van Denburgh

GREAT BASIN RUBBER SNAKE

Plate 60

Charina bottæ VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 5, No. 4, 1915, p. 106; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 74 (part); ORTENBURGER, Copeia, 1921, No. 100, p. 84 (?).

Charina bottæ utahensis VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. 10, No. 3, 1920, p. 31 (type locality, **Little Cottonwood Canyon, Wasatch Mountains, Wasatch County, Utah**); VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 40, 44.



Charina botti utahensis, Great Basin Rubber Snake
Adult female collected in Little Cottonwood Canyon, Wasatch Mountains, Wasatch County,
Utah, June, 1913, holding tail in imitation of head

Description.—Top of head very slightly rounded, covered with plates which vary in size, shape and relations. Usually a large frontal, bordered on each side by two supraoculars and behind by a broad crescent-shaped plate. Usually three pairs of plates, with or without one or more small azygous plates, between frontal and rostral. Loreals variable. Labial plates sometimes entering orbital ring, anterior labials very high. Scales on body smooth, imbricate, about as wide as long, and arranged in 41 (or perhaps 43) longitudinal rows, lowest row in each side being formed of larger scales. Gastrosteges rather narrow and ranging in number from 202 to 210. Urosteges in one series of from 33 to 39. Anal spurs small. Tail very short and nearly as blunt as head.

All the upper surfaces are yellowish brown or olive, without dark or light markings. The chin and throat usually are clouded with gray or brown. The other lower surfaces are light yellow.

Length to anus.....	213	392	455	480	535
Length of tail.....	28	61	59	60	70

Remarks.—This subspecies differs from *C. b. bottæ* in the number of scale-rows. These are 41 in eight specimens from Utah and three from Idaho. One specimen from Cody, Bighorn County, Wyoming, and another from Chico, Park County, Montana probably should be referred to this subspecies, although each has 43 rows of scales.

Distribution.—In Utah, this boa has been found in Wasatch (Little Cottonwood and Provo canyons in the Wasatch Mountains), Cache (12 miles up Logan Canyon), and Salt Lake (Fort Douglas) counties.

In Idaho, it probably is this subspecies which has been collected at Blue Lake and in Hood's Valley, Kootenai

County, at Hope, Bonner County, and on Fish Haven Creek, Bear Lake County.

Habits.—Like the Pacific Boa, this snake has the habit of pretending that its very blunt tail is its head. This is well shown in the photograph of a living specimen (Plate 60), where the end of the tail, held somewhat elevated and protected by the coils of the snake, might easily be mistaken for a head and perhaps save the real head from attack. These snakes thus merit the popular name Two-headed Snake.

Family 13. COLUBRIDÆ

This family contains a large number of snakes in which the belly is covered with a series of large plates; the head plates are large and more or less regular; the eye is always well-developed, but its pupil may be either round or elliptical; there are no rudiments of limbs or pelvis; both jaws are toothed, without poison-fangs near the front of the mouth.

Snakes of western North America have been referred to 19 genera belonging to this family. These may be identified by the following

SYNOPSIS OF GENERA

- a.—Scales smooth.
- b.—Anal plate divided; urosteges in two series.
- c.—Loreal plate absent.
- d.—Anterior nasal united with internasal, sometimes meeting its mate on top of the snout; rostral prominent, greatly depressed; scales in 13 rows.
 Chilomeniscus.—p. 868.
- d'.—Internasal distinct, anterior nasal not extending onto top of head; rostral not depressed.
- e.—Rostral not turned up at tip; scales in 15 rows.
 Tantilla.—p. 875.

e'.—Rostral turned up at tip; scales in 17 rows.

Ficimia.—p. 777.

c'.—Loreal plate present.

dd'.—Pupil round.

ee'.—Rostral not free at edges.

ff'.—Normally one anterior temporal; urosteges fewer than 75; scales in 15 or 17 rows.

g'.—No narrow light transverse nuchal collar; fourth infralabial usually largest; preocular normally single and temporals 1+2.

h'.—Snout more or less depressed; each gastrostege not marked with a transverse blackish bar.

Sonora.—p. 858.

h'.—Snout high; each gastrostege with a narrow transverse blackish bar.

Contia.—p. 770.

g'.—A narrow light transverse nuchal collar; fifth infralabial usually largest; preoculars normally two, and temporals 1+1.

Diadophis.—p. 647.

ff'.—Anterior temporals normally more than one; urosteges more than 75; scales in 15 or more rows; no single narrow nuchal collar.

gg'.—Scales in fewer than 23 rows; gastrosteges fewer than 240.

Coluber.—p. 658.

gg'.—Scales in more than 30 rows; gastrosteges more than 240.

Elaphe.—p. 697.

ee'.—Rostral large, with free lateral edges; coloration in longitudinal bands.

Salvadora.—p. 688.

dd'.—Pupil vertically elliptical.

- eee.—Rostral very large, with free lateral edges; coloration in spots, and blotches.
Phyllorhynchus.—p. 692.
- eee'.—Rostral normal, without free edges; coloration in blotches.
 fff.—Gastrosteges fewer than 200.
Hypsiglena.—p. 779.
- fff'.—Gastrosteges more than 200.
Trimorphodon.—p. 884.
- b'.—Anal plate single.
 cc.—Urosteges in one series (at least anteriorly). Snout protruding; coloration in cross-bands.
Rhinocheilus.—p. 773.
- cc'.—Urosteges in two series.
 ddd.—Scales in 21 to 23 rows; loreal nearly as high as long; rostral not protruding; coloration in rings, blotches, or lines.
Lampropeltis.—p. 740.
- ddd'.—Scales in 27 to 31 rows; loreal elongate; rostral prominent; coloration in blotches.
Arizona.—p. 701.
- a'.—Dorsal scales keeled. Laterals keeled or smooth; urosteges in two series.
 bb.—Anal plate single.
 ccc.—Prefrontals normally four (often two); scales in 27 to 35 rows, several of the lower usually smooth; no longitudinal lines.
Pituophis.—p. 705.
- ccc'.—Prefrontals two; scales in 17 to 23 rows; not more than three smooth; usually with longitudinal lines, sometimes spotted or unicolor.
Thamnophis.—p. 787.
- bb'.—Anal plate divided.
 cccc.—Pupil round; rostral not free at edges.

dddd.—Rostral normal; scales in not more than 21 rows.

Natrix.—p. 783.

dddd².—Rostral produced and turned up at tip; scales in more than 21 rows.

Heterodon.—p. 654.

cccc².—Pupil vertical; rostral with free edges; scales in 19 rows.

Phyllorhynchus.—p. 692.

Genus 26. *Diadophis*

Diadophis BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, Serpents, 1853, p. 112 (type, *punctatus*); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 743.

The body is slender, with long, tapering tail, and slight constriction at neck. The head is flat-topped, with broad, rounded snout. Its plates are normal. The nasal plates very rarely unite above the nostril. There are two preoculars and two postoculars. Temporals are 1+1. A loreal is present. The scales are smooth, in 15 or 17 rows, each with one apical pit. The anal plate is divided, and the urosteges are in two series. The eye is moderately large, with round pupil.

SYNOPSIS OF SPECIES

a.—Scales usually in 15 rows, sometimes 17; smaller; gastrosteges 182 to 212.

D. amabilis.—p. 648.

a².—Scales in 17 rows; larger; gastrosteges 212 to 237.

D. regalis.—p. 652.

141. *Diadophis amabilis* Baird & Girard

WESTERN RING-NECK SNAKE

Plate 61

- Diadophis amabilis* BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, Serpents, 1853, p. 113 (type locality, **San Jose, Cal.**); BAIRD, Rep. Pac. R. R. Surv., Vol. X, 1859, Pt. III, pl. XXXIII, figs. 83; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 164, figs.; COPE, Report, U. S. Nat. Mus., for 1898, 1900, p. 746 (part); BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 70 (part); GRINNELL & GRINNELL, Throop Institute Bulletin, No. XXXV, 1907, p. 38; DITMARS, Reptile Book, 1907, p. 337; GRINNELL, Univ. Cal. Publ. Zool., Vol. 5, No. 1, 1908, p. 164; HURTER, First Ann. Rep. Laguna Marine Lab., 1912, p. 67; ATSATT, Univ. Cal. Publ. Zool., Vol. 12, No. 3, 1913, p. 41; RUTHLING, Copeia, No. 15, 1915; GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 184; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 75; COWLES, Journ. Entomol. & Zool. Pomona College, Vol. XII, No. 3, 1920, p. 66; STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 64.
- Diadophis pulchellus* BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 115 (type locality, **El Dorado Co., Cal.**); BAIRD, Rep. Pac. R. R. Surv., Vol. X, 1859, Pt. III, pl. XXXIII, figs. 85, and Pt. IV, No. 4, p. 11; STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 203.
- Ablabes punctatus (pulchellus)* HALLOWELL, U. S. Pac. R. R. Surv., Vol. X, 1859, Pt. IV, No. 1, p. 24.
- Diadophis punctatus pulchellus* COPE, Proc. Acad. Nat. Sci. Phila., 1860, p. 250; JAN, Elenco syst. degli Ofidi, 1863, p. 49; JAN, Iconogr. génér. Ophid., 15e livr., 1866, pl. VI, fig. 3; COPE, Proc. Acad. Nat. Sci. Phila., 1883, p. 27; TOWNSEND, Proc. U. S. Nat. Mus., Vol. 10, 1887, p. 239.
- Diadophis punctatus* COOPER, Proc. Cal. Acad. Sci., Vol. IV, 1870, p. 71.
- Diadophis punctatus amabilis* COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 37 (part); GARMAN, Mem. Mus. Compr. Zool., Camb., Vol. VIII, 1883, p. 159; YARROW, Bull. U. S. Nat. Mus., 24, 1883, p. 95 (part); TOWNSEND, Proc. U. S. Nat. Mus., 1887, p. 239.
- Diadophis modestus* BOCOURT, Miss. Sci. Mex., 1886, p. 623 (type locality, **California**).

Diadophis amabilis pulchellus COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1891 (1892), p. 616; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 747, fig. 157.

Diadophis amabilis amabilis COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1891 (1892), p. 616; COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 749, fig. 160.

Coronella amabilis BOULENGER, Cat. Snakes Brit. Mus., Vol. II, 1894, p. 207 (part).

Description.—Top of head flattened posteriorly, curving slightly downward to the broad, rounded snout. Rostral plate large, broader than high, hollowed below, and bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of internasals, a pair of prefrontals, a short, broad frontal between two supraoculars, and a pair of long parietals. Anterior and posterior nasals normally distinct, rarely united above nostril. Loreal small and nearly square. Preoculars and postoculars two each. Temporals one followed by one. Seven (rarely eight) superior and eight (rarely seven) inferior labials, sixth (or seventh) upper and fifth (or fourth) lower largest, third and fourth (rarely fourth and fifth) superior reaching eye, first pair of inferior meeting on median line. Genials in two pairs, anterior very slightly, if at all, larger than posterior pair. Scales on body smooth, in 15 or sometimes 17 rows. Anal plate divided. Gastrosteges varying in number from 182 to 212. Urosteges in two series of from 44 to 72. Tail tapering ending in a pointed conical plate.

The color above is olive, brownish, greenish, bluish, or blackish slate, or gray, minutely reticulated, but without definite markings, except a light collar across the neck just behind the head. This collar may be white, yellow, or unicolor with the belly, and is often edged with black or slate. It covers from one and one-half to three transverse rows of scales. The upper part of the head is usually a darker shade of the color of the back. The upper labials are partly

white or yellow. The lower surfaces, including none, one-half, one, one and one-half, or two rows of scales, are white, yellow, rose,* orange, lake,* or coral red—brightest posteriorly—more or less spotted with black at the posterior edges of the gastrosteges and urosteges and under the head.

Length to anus.....	137	166	270	333	366	420
Length of tail.....	32	40	68	66	101	92

Remarks.—Of seven specimens from southern California six have 17 and one 15 rows of scales. All other specimens have 15 rows except a series from Carmel, Monterey County. From this locality we have 14 specimens, of which 11 have 17 and three 15 rows. Specimens from more northern localities usually have 15 rows of scales. If this difference in the number of scale-rows is shown by larger series it will be necessary to divide this species into northern and southern subspecies. The northern form would then be known as *D. amabilis amabilis* (type locality, San Jose, California). The southern subspecies may be called *Diadophis amabilis modestus*.

Distribution.—The Western Ring-neck or “Red-bellied” Snake, lives in all parts of California except the desert area and the hot interior valleys. It ranges north across Oregon, where it has been taken in the Willamette Valley, and west of Hood River, and at Fort Dalles, but I believe, has not been found in any other state. It occurs in northern Lower California.

In California, it has been found in Shasta (Baird on the McCloud River), Butte (Chambers Ravine near Oroville), El Dorado, Mariposa (Mariposa, Varian, Yosemite Valley), Fresno (Fresno probably in mountains), Tulare (Redstone Park, Springville, Colony Mill, Sequoia National Park),

*In formalin.



Diadophis amabilis, Western Ring-neck Snake
Adult male collected at Carmel, Monterey County, California, May, 1914. The collar has been
touched up on the negatives.

Kern (Tejon Pass), Mendocino (Ukiah), Lake (Highland Springs), Napa (Calistoga, Mount Veder), Solano (three miles west from Vacaville), Sonoma (Healdsburg, Sonoma, Petaluma, Monte Rio, Skaggs Springs), Marin (Lagunitas, Manzanita, Mill Valley, Mount Tamalpais), Contra Costa (Mount Diablo, Christy, Redwood Canyon), Alameda (Berkeley, Oakland, East Oakland), San Mateo (Redwood City), Santa Clara (Palo Alto, San Jose, Los Gatos), Santa Cruz (Santa Cruz, Soquel Creek), Monterey (Carmel), Santa Barbara (Los Alamos), Los Angeles (Arroyo Seco Canyon, Glendora, Sierra Madre, Claremont, Santa Catalina Island), San Bernardino (San Bernardino, Colton, Ontario, Santa Ana Canyon at 6,400 feet, San Bernardino Mts. at 4,000 and 5,500 feet), Riverside (Strawberry Valley at 5,500 feet in the San Jacinto Mts., Alessandro), Orange (Laguna Beach), and San Diego (San Diego, between Carlsbad and Oceanside, Poway, Witch Creek), counties.

In Lower California, this snake has been taken at San Matios Pass near the northern end of the San Pedro Martir Mountains, and on San Martin Island.

Habits.—*Diadophis amabilis* is most often found under boards or logs in moist localities, sometimes even in salt marshes. One specimen had eaten a half-grown tree-toad (*Hyla regilla*). Nothing is known of its breeding habits. Grinnell & Grinnell say it is fairly common in the canyons and hills of Los Angeles County. They found it, in August, feeding on the young of *Hyla*, and, in spring, coiled up in cavities under rocks. Regarding one captured June 9, 1906, Grinnell states (1908): "When thoroughly alarmed and its escape into the bush for which it headed was prevented, the snake twisted its tail into a tight cork-

screw, the vermilion urostegial surface outermost. This caudal contrivance shown out with conspicuous brilliancy, and *might* have some protective significance as a warning mark."

142. *Diadophis regalis* Baird & Girard

SONORAN RING-NECKED SNAKE

Diadophis regalis BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, Serpents, 1853, p. 115 (type locality, **Sonora, Mexico**); BAIRD, U. S. Mex. Bound. Surv., Vol. II, 1859, pl. 22, pl. XIX, fig. 2; BAIRD, Rep. Pacific R. R. Surv., Vol. X, 1859, pl. XXXIII, fig. 86; COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 623; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 38; GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, pp. 73, 159; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 97; COCKERELL, American Naturalist, Vol. XXX, April, 1896, p. 326; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 615 (part); VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 347; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 744 (part); BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 70; STEJNEGER, Proc. U. S. Nat. Mus., Vol. XXV, 1902, p. 151; BRANSON, Kansas Univ. Sci. Bull., Vol. II, No. 13, 1904, p. 407 (part); BAILEY, N. Amer. Fauna, No. 25, 1905, pp. 28, 35, 45; STRECKER, Proc. Biol. Soc. Washington, Vol. XXI, 1908, p. 73; STONE, Proc. Acad. Nat. Sci. Phila., 1911, p. 231; ELLIS & HENDERSON, Univ. Colorado Studies, Vol. X, No. 2, 1913, p. 101, pl. IV, figs. 21, 22; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 415; STRECKER, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 37; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 76.

Diadophis pulchellus YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 538.

Diadophis punctatus amabilis YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 96 (part).

Diadophis arnyi YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 96 (part).

Diadophis punctatus regalis COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 80.

Diadophis regalis regalis COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 615; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 744, fig. 155.

- Coronella regalis* BOULENGER, Cat. Snakes Brit. Mus., Vol. II, 1894, p. 208.
Diadophis regalis arnyi COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 745, fig. 156 (part).
Diadophis punctatus DITMARS, Reptile Book, 1907, p. 338 (part).

Description.—Top of head flattened posteriorly, curving slightly downward to the broad, rounded snout. Rostral rather large, much broader than high, bounded behind by internasal, anterior nasal and first labial plates. Plates on top of head are a pair of internasals, a pair of prefrontals, a rather short, broad frontal, two rather narrow supraoculars, and a pair of large, long parietals. Anterior and posterior nasals distinct or united above nostril. One loreal, small and nearly square. Preoculars two, rarely one. Postoculars two. Temporals usually one followed by one, sometimes 1+2. Supralabials normally seven, rarely eight, the fifth and sixth usually largest, the third and fourth normally reaching eye. Infralabials usually eight or nine, the first pair meeting on the midline. Genials in two pairs, the posterior shorter. Scales on body smooth, in 17 rows. Anal plate divided. Gastrosteges in the type and Arizonan specimens varying in number from 212 to 237. Urosteges in two series of from 58 to 72.

The body is unicolor, greenish or grayish brown, usually with, but sometimes without, a light transverse collar on the neck. The head is brownish or olive above. The labials are lighter, marked with dark brown or black. The lower surfaces and the outer row of scales are whitish, yellow, orange or red, often with black spots on the head, first row of scales, and gastrosteges.

Length to anus.....	470	578	620
Length of tail.....	100	79	119

Distribution.—The Sonoran Ring-necked Snake has

been found in Texas, New Mexico, and Arizona, and ranges south over the tableland of Mexico to the state of Vera Cruz. In Arizona, it has been collected near Camp Apache, Navajo County; Camp Grant, Graham County; Fort Lowell and Sabino Canyon, Pima County; Fort Huachuca, and Ramsey and Miller canyons in the Huachuca Mountains, Cochise County; Otero, Sycamore, and Baboquivari canyons in the Baboquivari Mountains, Pima County; and Fort Mohave, Mohave County. The last locality is so far from the others as to make one suspect that the specimen may have been secured at some distance from the old fort.

This species has been recorded from "Utah."

The National Museum has a specimen labeled Santa Magdalena, Sonora.

Habits.—The specimen from Ramsey Canyon was found just before dusk, July 29, 1912, as it was entering a hole by the side of a fence post. It contained a fine large *Tantilla wilcoxi* which it must have just eaten. This *Diadophis* is the largest species of the genus.

Genus 27. *Heterodon*

Heterodon LATREILLE, Hist. Nat. Rept., Vol. 4, 1802, p. 32 (type, *platirhinus=contortrix*); BOULENGER, Cat. Snakes Brit. Mus., Vol. II, 1894, p. 153; COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 760.

The body is rather thick, with short tail and little if any constriction at neck which is capable of lateral expansion by the ribs. The snout is short, with large, prominent, recurved rostral. The upper head plates are normal except that small plates are often present between the rostral and frontal, either between the internasals and prefrontals or substituted for them. The nasal plates are distinct. Loreals are present. A ring of scales surrounds the eye separating it from

the labials. Temporals numerous. The scales are keeled, with two apical pits. The anal plate is divided. The urosteges are in two series. The eye is of moderate size, with round pupil. The dentition is dicranterian. There are four North American species, of which one occurs in Arizona.

143. *Heterodon nasicus* Baird & Girard

WESTERN HOG-NOSE SNAKE

Plate 62

- Heterodon nasicus* BAIRD & GIRARD, Stansbury's Exp. Surv. Great Salt Lake, 1852, p. 352 (type locality, **Texas**); BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. 1, Serp., 1853, p. 63 (type from **Rio Grande**); HALLOWELL, Sitgreaves' Exped. Zuñi and Colorado Riv., 1853, p. 147; BAIRD & GIRARD, Marcy's Exp. Red River, 1854, p. 193, pl. 4; HALLOWELL, Proc. Acad. Nat. Sci. Phila., 1856, p. 249; BAIRD, Rep. Pacific R. R. Surv., Vol. X, 1859, p. 19, 41; BAIRD, U. S. Mexican Bound. Surv., Vol. II, Rept., 1859, p. 18, pl. XI, fig. 1; HAYDEN, Trans. Am. Philos. Soc., 1862, p. 177; JAN, Elenco Syst. degli Ofidi., 1863, p. 46; JAN & SORDELLI, Iconogr. Génér. Ophid., 10e livr., 1865, Pl. V, fig. 1; COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 307; ALLEN, Proc. Boston Soc. Nat. Hist., 1874, p. 69; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 644; BOULENGER, Cat. Snakes Brit. Mus., Vol. II, 1894, p. 156; COCKERELL, Amer. Nat., Vol. XXX, 1896, p. 326; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 90; BROWN, Proc. Acad. Nat. Sci. Phila., 1903, p. 551; BRANSON, Kansas Univ. Sci. Bull., Vol. II, No. 13, 1904, p. 376, fig. 10; BAILEY, N. Amer. Fauna, No. 25, 1905, pp. 28, 35, 45; MOZLEY, Trans. Kansas Acad. Sci., Vol. VI, reprint, 1906, p. 34; DITMARS, Reptile Book, 1907, p. 384, pl. CXV; ELLIS & HENDERSON, Univ. Colorado Studies, Vol. X, No. 2, 1913, p. 95, pl. VI; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 393; STRECKER, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 41; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 77; RUTHVEN, Occas. Papers Mus. Zool. Univ. Michigan, No. 66, 1919, p. 2.
- Heterodon kennerlyi* KENNICOTT, Proc. Acad. Nat. Sci. Phila., 1860, p. 336 (type locality, **Rio Grande & Sonora**); JAN & SORDELLI, Iconogr. Génér. Ophid., 10e livr., Pl. V, fig. 2.
- Heterodon simus nasicus* COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 43; YARROW, Surv. W. 100th Meridian, Vol. V, 1875, p. 555; COUES,

- Surv. W. 100th Meridian, Vol. V, 1875, p. 611; COUES & YARROW, Bull. U. S. Geol. Surv. Terrs., Vol. IV, 1878, p. 270; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 141; TAYLOR, Ann. Rep. Nebr. State Board Agricult. for 1891, 1892, p. 349; CRAGIN, Trans. Kansas Acad. Sci., Vol. VII, reprint, 1906, p. 115.
- Heterodon simus kennerlyi* COUES & YARROW, Bull. U. S. Geol. Surv. Terrs., Vol. IV, 1878, p. 271; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 141.
- Heterodon nasicus kennerlyi* COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 773.
- Heterodon nasicus nasicus* COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 645; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 774, fig. 168.

Description.—Head short, little distinct from neck, rather broad, with elongate, recurved rostral. Eye moderately small. Tail short. Rostral large, produced forward and upward, bounded behind by first labial, anterior nasal, and a number of small plates representing the internasals. Plates on top of head are from nine to twenty-five small scutes representing the internasals and prefrontals, a frontal, a pair of supraoculars, and a pair of parietals. Anterior and posterior nasals distinct. Usually two or three small loreals. Preoculars and postoculars numerous, joined by a series of suboculars which separate eye from labials; about 10 or 11 scales around eye. Temporals small, numerous, about four in first row. Supralabials usually eight, very high, sixth and seventh largest. Infralabials about 10 or 11, rarely 12, third usually largest, first pair meeting on median line. Genials in one pair, or posterior very small. Scales on body in 23 rows, keeled except in outer rows. Anal plate divided. Gastrosteges varying in number from 128 to 150. Urosteiges in two series of from 32 to 47.

The color above is grayish brown, yellowish gray, or yellow, dorsally. Along the back is a series of dark blotches. These are rather small, often shorter than broad, subquadrate or rounded, more or less indistinctly margined



Heterodon nasicus, Western Hog-nosed Snake
Adult female collected near Ramsey Canyon, Huachuca Mountains, Cochise County, Arizona,
June, 1926.

with black, and may number about forty on the body and ten on the tail. These blotches may be nearly obsolete. On the sides are from two to four series of alternating dark spots, more or less distinct. The lower surface is yellowish white with black blotches on the gastroteges, which usually are entirely black centrally, as are the urostegees. The head is light brown above with a narrow light streak across the frontal and supraocular plates. A second similar but less distinct streak just behind the rostral extends down in front of the eye. There are three dark blotches on the nape and an oblique one behind the eye.

A living snake of this species, from Arizona, was colored as follows: The color above is a dull brownish yellow. The dark markings on the head and the lower series of lateral spots are olive brown. The dorsal blotches and the upper lateral series are dark brown with black spots on the bases of some of the scales. The chin, gular region, the tips of the gastroteges and the edges of the lateral scales are white. The centers of the scales of the lowest lateral row are pinkish brown. The upper labials are pale straw yellow. The lower surfaces of body and tail are marbled with deep lemon yellow and black. The iris is reddish brown. The tongue is black.

Length to anus.....	165	267	455	470	533	532
Length of tail.....	32	38	100	63	76	100

Distribution.—This snake occurs from southwestern Iowa, Kansas and Nebraska, west to Montana and south to Texas, New Mexico, Arizona and northern Mexico. Baird and Girard (1853) recorded one as having been collected in California by Dr. William Gambel. This specimen probably was mislabeled. In Arizona this species has been collected at Fort Whipple, at White River Canyon, at Mineral Springs, Sulphur Spring Valley, Wilcox, and in "Southern Arizona." We recently secured a specimen from the

flat opposite Ramsey Canyon, Huachuca Mountains, Cochise County.

The National Museum has a specimen labeled "Sonora."

Genus 28. *Coluber*

Coluber LINNÆUS, Syst. Nat., Ed. 10, Vol. 1, 1785, p. 216 (type, *constrictor*).

Bascanion BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, Serpents, 1853, p. 93 (type, *constrictor*).

Masticophis BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, Serpents, 1853, p. 98 (type, *ornatus*).

The body is very long and slender, with long whip-like tail. The head is distinct from the neck, large, long, with flattened top and rounded snout. Its plates are normal. The nasal plates are not united. There are two (rarely one) preoculars and two postoculars. Temporals are normally 2+2. A loreal is present. The scales are smooth, in 15, 17 or 19 rows, usually with two (0-3) apical pits. The anal plate normally is divided (rarely undivided in *C. flagellum flagellum* and its western subspecies). Urosteges are in two series. The eye is very large, with round pupil.

Four species are known to be Californian. Young of the first two are blotched, of the others, striped. Three of these species range into other western states and the fourth into Lower California. A fifth species lives in the Cape Region of Lower California, a sixth occurs from southeastern Arizona south into Mexico, and a seventh is confined to Clarion Island.

SYNOPSIS OF SPECIES

- a.—Scales in seventeen rows.
- b.—No distinct longitudinal light lines in adults.
- c.—Gastrosteges fewer than 185; urosteges not more than 102.

Coluber constrictor mormon.—p. 660.

c'.—Gastrosteges more than 185; urosteges not fewer than 93.

d'.—Not from Clarion Island.

Coluber flagellum piceus.—p. 664.

d².—Clarion Island only.

Coluber anthonyi.—p. 673.

b'.—Distinct longitudinal lines present on sides of body, no dark cross-bars on back of neck.

cc.—Two lateral light stripes anteriorly, not continued to tail; lateral scales of second, third, and often first, rows with central brown lines; gastrosteges 196 to 207, urosteges 128 to 138.

C. semilineatus.—p. 675.

cc².—A single light yellow or white line along scales of third and fourth lateral rows; lateral scales without central brown lines.

dd.—Lateral light line not broken anteriorly.

e.—Lateral light line yellowish, of uniform width from neck to tail; dark markings present on lips, chin and throat.

C. lateralis.—p. 678.

e'.—Lateral light line pure white, with slight enlargements at intervals of from four to seven scales; no dark markings on lips, chin and throat.

C. barbouri.—p. 681.

dd².—Lateral light line yellowish, broken up anteriorly, absent or indefinite posteriorly.

C. aurigulus.—p. 683.

a'.—Scales in fifteen rows.

C. t. tæniatus.—685.

144. *Coluber constrictor mormon* (Baird & Girard)

WESTERN YELLOW-BELLIED RACER

Plate 63

Coluber mormon BAIRD & GIRARD, Stansbury's Expl. Great Salt Lake, Appendix C, Rept., 1852, p. 351 (type locality, **Valley of the Great Salt Lake, Utah**).

Masticophis mormon BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. 1, Serpents, 1853, p. 101; STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 208.

Bascanion vetustum BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. 1, Serp., 1853, p. 97 (type locality, **San Jose, Calif.**); GIRARD, U. S. Explor. Exped., Herp., 1858, p. 127, pl. VIII, figs. 12-19; BAIRD, Rep. Pac. R. R. Surv., Vol. X, No. 4, 1859, p. 11; BAIRD, Rep. Pac. R. R. Surv., Vol. X, 1859, pl. 36, fig. 6; COOPER, Rep. Pac. R. R. Surv., Vol. XII, 1859, pt. 2, p. 301; LORD, Naturalist Vancouver Island, Vol. II, 1866, pp. 3, 304; STEJNEGER, N. Amer. Fauna, No. 5, 1891, p. 110.

Bascanium flaviventris COPE, Ann. Rep. U. S. Geol. Surv. Terrs., 1871, (1872), p. 468.

Bascanium constrictor flaviventris YARROW & HENSHAW, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 213; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 110; GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, p. 147 (part); NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.

Coryphodon constrictor vetustum JAN, Elenco Sist. degli Ofidi, 1863, p. 64; JAN, Iconogr. Génér. des Ophid. 22e livr., pl. 4, figs. 1-2.

Bascanium constrictor vetustum COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 40; YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 541; TOWNSEND, Proc. U. S. Nat. Mus., Vol. X, 1887, p. 240.

Bascanion constrictor vetustum VAN DENBURGH, Occas. Papers, Cal. Acad. Sci., V, 1897, p. 183, figs.; McLAIN, Critical Notes, 1899, p. 11; GRINNELL & GRINNELL, Throop Institute Bulletin, No. XXXV, 1907, p. 43; STONE, Proc. Acad. Nat. Sci. Phila., 1911, p. 231; RICHARDSON, Proc. U. S. Nat. Mus., Vol. 48, 1915, p. 427; RUTHVEN & GAIGE, Occas. Papers, Mus. Zool. Univ. Mich., No. 8, 1915, p. 29; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 5, 1915, p. 107; DICE, Univ. Cal. Publs. Zool., Vol. 16, No. 17, 1916, pp. 310, 312.

- Bascanium constrictor* COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1891 (1892), p. 624 (part).
- Zamenis constrictor* BOULENGER, Cat. Snakes Brit. Mus., Vol. I, 1893, p. 387 (part); COPE, Report U. S. Nat. Mus., 1898, 1900, p. 791 (part).
- Zamenis constrictor flaviventris* DITMARS, Reptile Book, 1907, p. 285, pl. LXXXIX, fig. 2; RUTHLING, Copeia, No. 15, 1915.
- Coluber constrictor vetustus* GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 189; COWLES, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, 1920, p. 66; STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 64.
- Coluber constrictor flaviventris* STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 79 (part); BLANCHARD, Copeia, 1921, No. 90, p. 6.
- Coluber constrictor mormon* VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Vol. XI, 1921, pp. 28, 36, 40, 44.

Description.—Head rather long, with flattened top and and rounded snout. Rostral plate large, about as high as wide, hollowed below, and bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head, a pair of internasals, a pair of prefrontals, supraocular and part of upper preocular of each side, long frontal, and a pair of large parietals. Anterior and posterior nasals distinct. Loreal well-developed. Preoculars normally two, but sometimes united. Postoculars two, upper a little larger than lower. Temporals normally two followed by two, but may be 2+3, 1+2, 2+1, or 1+1. Seven or eight superior and eight, nine, or seven inferior labials, next to last of upper and fifth (or fourth) of lower largest, third and fourth or fourth and fifth superior reaching eye, first pair of inferior meeting on median line. Genials in two pairs, equal or either pair a little larger. Scales on body smooth, in 17 rows. Anal plate divided. Gastrosteges varying in number from 162 to 181. Urosteges in two series of from 79 to 102.

The color above in adults is green, olive, or yellowish

or reddish brown, changing to green (or blue) on the lower rows of scales and the tips of the gastrosteges. There are no dark or light markings but the skin between the scales is often black. The head and tail are unicolor with the body. The lower surfaces are yellow or, rarely, white, unspotted.

Young are colored like adults on the tail and the posterior part of the back, but anteriorly are spotted, blotched or cross-banded with brown of a shade darker than the ground-color. These dark markings spread and blend until the adult coloration is assumed. Dark spots are present also on the tips of the gastrosteges and sides of the head.

Length to anus.....	203	314	526	626	636	647
Length of tail.....	64	103	196	217	192	209

Distribution.—The Western Yellow-bellied or "Blue" Racer ranges over the whole length of California, but, I believe, has never been taken in the desert regions of the southeast. It occurs also in Oregon, Washington, British Columbia, Idaho, Nevada, and Utah.

In California, it has been collected in San Diego (Agua Caliente at 3,400 feet) San Bernardino, Los Angeles, (between Bixby and Signal Hill, Claremont), Santa Barbara (Santa Cruz Island), Kern (Fort Tejon, Kernville), Fresno, Mariposa (Yosemite Valley, three miles northeast from Coulterville), El Dorado (Fyffe, 5,000 feet), Placer (Red Point), Lassen (Honey Lake), Butte (Chamber's Ravine near Oroville, four miles southeast from Chico), Yolo (Rumsey), Monterey (Monterey, Carmel), Santa Cruz (Soquel, Glenwood), Santa Clara (Los Gatos, San Jose, Palo Alto, Stanford University, Searsville Summit), San Mateo (Pescadero, Woodside), San Francisco, (Golden Gate Park), Alameda, (San Leandro, Berkeley), Contra Costa (Crockett, San Pablo Creek), Marin (Muir Woods, Mill Valley, Sausalito, Camp Taylor), Solano (three miles



Coluber constrictor mormon, Western Yellow-bellied Racer
Collected in Provo Canyon, Wasatch Mountains, Wasatch County, Utah, May, 1913.

west from Vacaville), Napa (two miles southwest from Napa), Sonoma (Freestone, Healdsburg, Camp Meeker, Skaggs Springs, Monte Rio, Nine miles west from Cazadero), Mendocino (three miles west from the summit of Mount Sanhedrin, three miles west from Castle Peak, Covello, Willits, Comptche), Humboldt (Garberville), Shasta (McCloud River, Sweet Briar Camp), Siskiyou (Sisson, Lower Klamath Lake), Modoc (Alturas, Goose Lake Meadows, Sugar Hill, Dry Creek and Parker Creek in the Warner Mountains), and Lassen (Grasshopper Lake, Honey Lake) counties.

In Oregon, it has been secured at Warner Lakes, Che-waucan Valley, Summer Lake, ten miles south from Paisley, all in Lake County; at Fort Klamath and Klamath Falls, Klamath County; Grants Pass, Josephine County; at Drain and in the Camas Mountains, Douglas County; Elmira, Lane County; seven miles south from Independence, Polk County; Antelope and The Dalles, Wasco County; Elgin, Union County; and in the Willamette Valley, Kuwapin Valley, and near the John Day River.

In Washington, it has been collected in Whatcom (Sumas), Pierce (Fort Steilacoom), Chelan (Chelan), Klickitat (Lyle), Yakima (North Yakima), Walla Walla (Fort Walla Walla), Whitman (Almota), Lincoln (Sprague), and Stevens (Springdale), counties.

Lord records it from Sumas and Chelukweyuk prairies and from the boundary line east of the Cascades.

In Idaho, this racer has been collected near Coeur d'Alene, Kootenai County; Boise, Ada County; near Atlanta, Elmore County; Big Butte, Butte County; the mouth of the Bruneau River, Owyhee County; and Upper Salmon Falls, Gooding County.

Utah specimens are at hand from Fort Douglas, Salt Lake County; Provo Canyon, Wasatch Mountains, Wasatch

County; Ogden, Weber County; and Bountiful, Davis County.

Nevada records are Ruby Mountains, and the vicinity of Carlin, Elko County; the Cortez Range, Eureka County; Holbrook, Douglas County; Ormsby County; and Wadsworth, Washoe County.

Remarks.—The fact that more than half the specimens from west of the Rocky Mountains have eight labials while those from farther east usually have seven causes us to continue to regard them as distinct subspecies.

Habits.—Like other members of its genus, the western Yellow-bellied Racer is a skillful climber, and often runs through the tops of the bushes at almost as great a speed as when upon the ground. It is frequently found, however, in open country or in fields of growing grain, the grassy margins of rivers, or moist meadows. It is a very graceful, gentle snake.

Lord says, "Its favourite haunt appears to be in the thin brush skirting the edges of open prairie land, and the principal part of its time in the summer appears to be passed in the bushes, up the stems of which it climbs with great ease and celerity; when there, it lazily basks away its time coiled round a branch. I suspect tree frogs and insect larvæ constitute its usual food."

145. *Coluber flagellum piceus* (Cope)

WESTERN WHIP SNAKE

Plates 64, 65 and 66

Herpetodryas flavigularis HALLOWELL, Rep. Pac. R. R. Surv., Vol. X, 1859, p. 12; HEERMANN, Rep. Pac. R. R. Surv., Vol. X, 1859, p. 24.

Masticophis testaceus COPE, Proc. Acad. Nat. Sci. Phila., 1866, pp. 305, 312.

Drymobius testaceus, COOPER, Proc. Cal. Acad. Sci., Vol. IV, 1870, pp. 68, 76.

- Bascanium flagelliforme piceum* COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 40; COPE in YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 617; YARROW & HENSHAW, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 214.
- Bascanium flagelliforme testaceum* COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 40; YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 542; COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 617; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 112 (part); COPE, Proc. Amer. Philos. Soc., 1885, p. 284; BELDING, West Amer. Scientist, Vol. III, No. 24, 1887, p. 89; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 71; DUMÉRIEUX et BOCOURT, Miss. Sci. au Mex., Pt. III, Rept., p. 705, pl. XLVIII, figs. 4, 4a.
- Coluber flagelliformis testaceus* GARMAN, Mem. Mus. Compr. Zool., Vol. VIII, No. 3, 1883, p. 148 (part).
- Bascanium testaceum* COPE, Proc. Acad. Nat. Sci. Phila., 1883, pp. 11, 29, 32.
- Bascanium laterale*, COPE, Proc. U. S. Nat. Mus., Vol. XII, 1889, p. 147.
- Bascanium piceum*, COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 625 (type locality, **Camp Grant, Arizona**).
- Bascanium flagelliforme* COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 625 (part).
- Zamenis flagelliformis* BOULENGER, Cat. Snakes Brit. Mus., Vol. I, 1893, p. 389 (part).
- Bascanium flagellum frenatum* STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 208 (type locality, **Mountain Spring, Colorado Desert, San Diego County, California**); VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 147; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 347; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., No. V, 1897, p. 186; VAN DENBURGH, Proc. Acad. Nat. Sci. Phila., 1897, p. 463; McLAIN, Critical Notes, 1899, p. 11; STEJNEGER, Proc. U. S. Nat. Mus., Vol. XXV, 1902, p. 155; GRINNELL & GRINNELL, Throop Institute Bulletin, No. XXXV, 1907, p. 43; RUTHVEN, Bull. Amer. Mus. Nat. Hist., Vol. XXIII, 1907, p. 575; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 154; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 416; ATSAIT, Univ. Cal. Publ. Zool., Vol. 12, No. 3, 1913, p. 42; RICHARDSON, Proc. U. S. Nat. Mus., Vol. 48, 1915, p. 427; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 5, 1915, p. 100; CAMP, Univ. Cal. Publ. Zool., Vol. 12, No. 17, 1916, p. 532.

- Zamenis lateralis fuliginosus* COPE, Amer. Naturalist, Vol. XXIX, 1895, p. 679 (type locality, **Santa Margarita Island, Lower California, Mexico**); COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 809.
- Bascanion piceum* VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1896, p. 1006; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 347; RUTHVEN, Bull. Amer. Mus. Nat. Hist., Vol. XXIII, 1907, p. 574; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 416.
- Zamenis flagellum* MOCQUARD, Nouv. Arch. Mus. Hist. Nat., Paris, Ser. 4, Vol. I, 1899, p. 323.
- Zamenis flagellum flagellum* COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 799 (part); TERRON, Mem. y Rev. Soc. Cient., Antonio Alzate, Vol. 39, 1921, pp. 165, 170.
- Zamenis flagellum frenatus* BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 60.
- Bascanion flagellum* MEEK, Field Columbian Mus., Zool. Ser., Vol. VII, No. 1, 1906, p. 15.
- Zamenis flagelliformis frenatus* DITMARS, Reptile Book, 1907, p. 288.
- Zamenis flagelliformis piceus* DITMARS, Reptile Book, 1907, p. 288.
- Bascanion flagellum* STONE, Proc. Acad. Nat. Sci. Phila., 1911, p. 231.
- Bascanion laterale fuliginosum* VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 133, 145.
- Zamenis flagelliformis frenatus* RUTHLING, Copeia, No. 15, 1915.
- Coluber flagellum frenatus* GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 190; COWLES, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, 1920, pp. 65, 66; STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 64.
- Coluber flagellum piceus* STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 79; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 28, 36, 52, 64.

Description.—Head rather long, with flattened top, and narrow rounded snout. Rostral plate large, high, hollowed below, and bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of internasals, a pair of prefrontals, supraocular and part of upper preocular of each side, a long frontal, and a pair of large parietals. Anterior and posterior nasals distinct. Loreal well developed. Preoculars normally two, but sometimes



Coluber flagellum piccus, Western Whip Snake or Red Racer
Adult male collected near Campo, San Diego County, California, June, 1915.

united. Postoculars two, upper a little larger, very rarely united. Temporals normally two followed by two, but rarely 2+1, 1+2, 2+3, or 1+1. Eight or nine (rarely seven or 10, superior and 10 or 11, or rarely eight or nine, inferior labials, seventh or eighth upper and fifth lower largest, fourth and fifth or fifth and sixth superior reaching eye, first pair of inferior meeting on median line. Genials in two pairs, posterior pair a little larger. Scales on body smooth, in 17 rows. Anal plate almost always divided, rarely entire. Gastrosteges varying in number from 188 to 213. Urosteges in two series of from 99 to 128. Third, fourth and fifth urosteges of one specimen not divided.

The general color is whitish, grayish, ochraceous, brownish, straw yellow, or black, usually lightest at the edges of the scales, often spotted with brown or black at their tips or bases. Across the nape are several (3 to 7) brownish or blackish bands, often more or less blended. Faint indications of longitudinal lines may sometimes be seen along the sides. The lower surfaces are pale yellow or white more or less spotted anteriorly with black, gray, brown, or yellow. These spots usually form one row along each side of the anterior gastrosteges.

Young are more or less distinctly cross-barred above with gray, brown or black, and show a light line or blotch along the side of the face. The latter mark is often retained by adults.

Ruthven describes the color of a specimen from Tucson, Arizona, as follows:

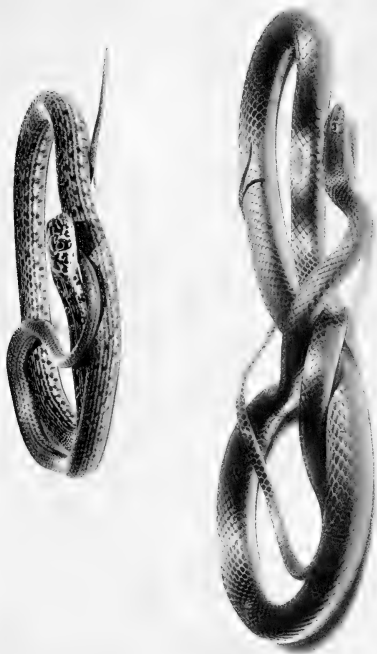
"Above, except for a short distance anteriorly, the color is yellowish brown, relieved by small, mostly concealed bars of whitish that margin each scale on either side of the base. On the anterior half of the body, the base of nearly every scale is black, although the light lines are still present, occasionally being of a pinkish tint. On the neck the light marks

tend to break up the ground color into cross bands, but only five or six of these are distinct, the anterior four being nearly solid black. On either side of the belly there is a series of blotches similar in color to the dorsal surface, except anteriorly where they are black. Between this series of gastrostegal spots and the first row of scales, which also has the color of the dorsal surface, is a white line that includes the tips of the gastrosteges and the lower edge of the first row of dorsal scales. Similarly the light marks on the bases of the scales of the first and second rows are somewhat better developed than those above, which also results in the appearance of a narrow light longitudinal line, but this is very indefinite. The top of the head is light brown, the sides considerably variegated with yellow. The belly is light yellow, with the marginal series of blotches mentioned above. Interior to these blotches there is also, for about the anterior four-fifths of the length, a second row of small spots. The throat is also light yellow, and thickly spotted with black. The ventral surface of the tail is a light orange tint, immaculate."

The general coloration of living specimens often is quite red.

Certain specimens taken near Camp Grant and Tucson, Arizona, and at Ensenada, La Paz, San Pedro, San Bartolo, and Triunfo, Lower California, are black or blackish. Such was the type of Cope's *Bascanium piceum*. Two specimens from Tucson were jet black with the lower surfaces a beautiful coral pink. Ruthven describes a black specimen, from Tucson, as follows:

Body and tail above, broadly including the ends of the ventral scutes, blue black without markings. Head dark brown with a few irregular reddish markings above. The loreals, preoculars and postoculars, and first six supralabials have bright orange yellow centers. Anterior part of throat



Coluber flagellum piceus, Western Whip Snake

FIG. 1. Young collected near Fort Tejon, Kern County, California, April, 1914.

FIG. 2. Adult, black phase, collected at Tucson, Pima County, Arizona, June, 1912.

marbled with bright yellow and black. Throat black with scattered spots of yellowish orange. About the twentieth gastrostege the light color increases in amount and the black becomes restricted to small blotches that become fewer posteriorly, only a few small, widely scattered spots being present on the posterior three-fourths of the body length and none on the tail. For most of the length the belly is a yellow orange tint, becoming a dark orange tint on the posterior one-fourth of the body and on the tail.

Length to anus.....	303	541	723	840	1095	1300	1365
Length of tail.....	96	185	242	300	345	430	435

Remarks.—There has long been doubt as to whether the black specimens are merely melanistic individuals or really represent a distinct species. There seem to be no structural differences. Scale-counts and proportions are the same. Dark specimens occur in Lower California and on Tiburon Island as well as in Arizona. All this favors regarding them as a melanistic phase of the Red Racer, but the fact that two black specimens were found mating, near Tucson, is very interesting, since it would seem to indicate that they may really represent a distinct species. The final answer to this question must await additional evidence, but it seems best, for the present, to regard the black and the red snakes as one species.

Distribution.—The Western Whip Snake or Red Racer has its true home in the deserts of Arizona, Nevada, Utah, California and Lower California, but ranges into northern Sonora (Hermosillo), and the San Joaquin Valley and coast region of southern California.

In California, it has been taken in Imperial (Fort Yuma, Colorado Desert, Pilot Knob), San Diego (Mountain Spring, Campo, San Diego, Agua Caliente, San Felipe Val-

ley), Riverside (Riverside, San Jacinto, Palm Springs, mouth of Palm Canyon San Jacinto Mts., Cabazon, Coachella, Mecca, Horn Mine in the Turtle Mountains, Blythe), San Bernardino (Needles, Ludlow, Barstow, five miles south from Lovic, Hesperia, Ontario), Los Angeles (Pasadena, Drum Barracks, Claremont), Inyo, (Furnace Creek Ranch, Bennett Wells, Death Valley, Panamint Valley, Deep Spring Valley, Keeler, Owens Valley, two miles north from Independence), Kern (Kern River at Bodfish, Isabella, Weldon, Tehachapi Mountains, Bakersfield, one mile north from Edison, McKittrick), San Luis Obispo (Carrizo Plain seven miles southeast from Simmler), Tulare (Earlinart), Fresno (Fresno), and Mariposa (Yosemite Valley) counties.

In Nevada, it has been secured at Vegas Valley, Overton, and Las Vegas, Clark County, and at Winnemucca Lake, Washoe County.

Arizonan specimens have been collected five miles north from Laguna and ten miles below Cibola, and at Yuma and Papago Wells, Yuma County; at Cave Creek and Gila Bend, Maricopa County; Fort Whipple, Prescott, Yavapai County; Camp Grant, Graham County; near Tucson, Fort Lowell, the Catalina and the Baboquivari Mountains, Pima County, Fort Apache, Navajo County; Fort Huachuca and Douglas, Cochise County; Fort Buchanan, Calabasas, and on the flat below the mouth of the canyon between Agua Caliente and Madera Canyon, Santa Cruz County.

Utah specimens have been recorded as collected in "Middle Utah," and at Salt Lake. I have received one taken four miles northwest of St. George, Washington County.

In Lower California, it has been taken at San Felipe Bay, Joruncho Ranch, San Quentin, San Pedro Martir Mountains, east base of the Cocopah Mountains, Rosarito,

Parral, Ensenada, San Ignacio, Santa Rosalia, and San Luis Gonzales Bay, in the northern part of the peninsula, and at Cape San Lucas, La Paz, San José del Cabo, Miraflores, San Pedro, Triunfo, San Bartolo, Agua Caliente, and Todos Santos, in the Cape Region, on Santa Margarita Island, on the west coast, and on San Jose, Monserrate, Coronado, Ildefonso, and Tiburon islands in the Gulf of California.

Habits.—The “Red Racer,” like its relatives, is remarkable for the quickness of its movements. It climbs trees and bushes with great agility. Grinnell & Grinnell give the following notes on its habits:

“According to our experience the Red Racer is an inhabitant exclusively of the hot gravelly washes along the bases of the mountains. As with most of our snakes, it was more common ten or fifteen years ago than now. Yet within the past year, 1906, we know of three having been seen in the arroyo near Pasadena.

“The Red Racer is possessed of remarkable powers of locomotion, far exceeding in this respect any others of our snakes. And yet to the onlooker this rapidity of movement is accomplished with very little apparent effort. There is a very inconspicuous undulatory bending of the body; none of the violent squirming exhibited by a garter snake or king snake. One catches sight of a Red Racer generally after it is in motion. Perhaps it is seen gliding quickly across an open piece of ground between bushes. If one catches glimpses of portions of the snake’s body between the plant stems, it is only to see them rapidly diminish in diameter until they disappear entirely. The impression is given all along the line that the snake is growing quickly smaller, like some stereopticon effect. This illusion leaves one with a sense of bewilderment often lasting long enough to result in all trace of the snake being lost. Sometimes the racer will

stop abruptly in some thicket while still in sight. Then a more satisfactory view of it may be obtained, but we have never known a Red Racer to allow himself to be noosed.

"Although usually seen on the ground, this snake is a good climber, and is not infrequently discovered in bushes and trees. One day last May, Adriaan Van Rossem, one of our pupils in zoology, found a woodpecker's nest-hole in a tree-trunk. The nest then contained four eggs. The site was again visited a few days later, when upon climbing to the nest instead of the eggs it was found to be occupied by a Red Racer. The snake was routed out; and since no vestige of the eggs was found, it was inferred that the snake had eaten them. We have heard of several other instances of the nest-robbing habit of this reptile, so that the lessening numbers of the Red Racer may be somewhat of a blessing to the bird population of our region."

Little is known regarding the food of this snake, but it probably eats birds and eggs as well as mammals and lizards. Stejneger records one which had eaten a mouse (*Sitomys*). Ruthven mentioned one which was seen to capture a lizard (*Cnemidophorus melanostethus*), and Cowles saw one seize a *Cnemidophorus tessellatus tessellatus*.

Mr. Slevin says that, in the Cape Region of Lower California, brush fences around the numerous little ranch houses furnished excellent hiding places for this racer. Several of the specimens taken were found in these fences where they lay stretched out at full length awaiting their prey. Lizards, to escape their natural enemies, the hawks, sought refuge here and seldom would a snake have to wait long before it would have several chances to secure a meal. This species, with the exception of the water snake, was the most abundant serpent met with. They were not found above the floor of the desert and were generally confined to the more brushy portions. Their food consisted of the nu-



Fig. 1. *Coluber lateralis*, California Racer

Collected at La Crescenta, Los Angeles County, California, May, 1915

Fig. 2. *Coluber flagellum piceus*, Western Whip Snake

Black phase, collected at Tucson, Arizona, June, 1912.

Fig. 3. *Coluber flagellum piceus*, Western Whip Snake

Red phase, collected near Campo, San Diego County, California, June, 1915

merous lizards found in the cactus belt. One specimen had a full grown *Dipsosaurus* in its stomach. Another had eaten a *Cnemidophorus*, and another, a mouse. A fourth had the tail of a *Dipsosaurus* in its stomach. A fifth was taken in a brush pile just after it had caught a *Verticaria*. The tail of the lizard was protruding from the snake's mouth. A specimen taken at San José del Cabo was six feet in length. A cactus spine over an inch long was pulled out of a specimen taken at Miraflores.

Mr. Slevin found one near Blythe, Riverside County, California, about six feet up in a mesquite where it was swallowing a young dove which it had just removed from the nest.

146. *Coluber anthonyi* (Stejneger)

CLARION ISLAND RACER

Bascanion anthonyi STEJNEGER, Proc. U. S. Nat. Mus., Vol. 23, 1901, p. 715 (type locality, Clarion Island, Revilla Gigedo Islands, Mexico); VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 3, Zool., Vol. 4, No. 1, 1905, p. 27; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 133, 147.

Coluber anthonyi STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 78.

Description.—Head rather long, with flattened top. Eye very large, its horizontal diameter equaling its distance from nostril, or two-thirds length of frontal. Snout rather prominent, the tip extending considerably beyond lower jaw. Rostral large, prominent, portion seen from above nearly equals length of suture between internasal or one-half length of suture between prefrontals. Frontal long and narrow, its greatest width anteriorly equaling that of supraoculars, its width at a line between centers of eyes much less than width of supraoculars at same line, its length equals its distance from tip of snout and exceeds length of

parietals. Supraoculars large, broadly in contact, with prefrontal, separating frontal from preocular. Parietals very short, shorter than frontal, less than twice length of suture between prefrontals, the suture between parietals much shorter than distance from tip of snout to frontal. Loreal rather large, longer than high. Preoculars two. Postoculars two. Temporals two followed by two. Eight superior and seven inferior labials, seventh and eighth upper largest, fourth and fifth reaching eye. Genials in two pairs, posterior about as long as anterior but narrower. Scales on body in 17 rows, smooth, with two apical pits. Anal plate divided. Gastrosteges varying in number from 186 to 204. Urosteges in two series of from 93 to 112.

The color above is walnut brown, deepest toward the tip of each scale, with narrow blackish brown, linear spots, never longer than a scale, sparsely and irregularly scattered over the back and sides. The head is more uniformly pale walnut brown, with a few irregularly scattered blackish dots, and a few obscure dusky marblings on the lores and labials. The lower surfaces are pale, irregularly sprinkled with slate-colored dots. Toward the head these dots become more evident and are collected in two parallel longitudinal zones. The chin and throat are more definitely but irregularly marked with larger spots of the same color.

In a younger example the color above is more grayish and entirely uniform, without the blackish spots. The lower surfaces are pale, unicolor, with no markings except a few dusky dots on the neck. The sides of the head are brownish like the top, with the indication of a dusky longitudinal band on the upper halves of the supralabials. The lower halves of the supralabials, the throat, a band from the nostril to the eye, and the postocular plate, are yellow.

In other specimens the dark markings on the chin, throat, and fore neck are well developed, and the dusky

markings on the rest of the underside are very dense, leaving only a pale line on the angle of the belly, or are condensed into two fairly distinct parallel longitudinal bands with a pale zone down the middle of the body.

Length to anus.....	1090
Length of tail.....	360

Distribution.—This snake has been found only on Clarion Island of the Revilla Gigedo group, off the western coast of Mexico.

147. *Coluber semilineatus* (Cope)

SONORAN RACER

Plate 67

- Bascanium taniatum laterale* YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 543 (part).
- Bascanium semilineatum* COPE, Proc. U. S. Nat. Mus., Vol. 14, 1892, p. 626 (type locality, **Colorado River and Camp Grant, Arizona**); VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 347; VAN DENBURGH, Proc. Acad. Nat. Sci. Phila., 1897, p. 463; STEJNEGER, Proc. U. S. Nat. Mus., Vol. XXV, 1902, p. 155; STONE, Proc. Acad. Nat. Sci. Phila., 1911, p. 231; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 417.
- Zamenis semilineatus* GÜNTHER, Biol. Centrali-Amer., Rept., 1894, p. 121, pl. XLVI, fig. A; COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 805, fig. 417.
- Coluber semilineatus* STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 80.

Description.—Head long, with flattened top, and narrow, rounded snout. Rostral plate large, high, hollowed below, and bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of internasals, a pair of much larger prefrontals, supraocular and part of upper preocular of each side, long frontal, and pair of large parietals. Anterior and posterior nasals distinct.

Loreal well developed. Preoculars two or one. Postoculars two. Temporals normally two followed by two, sometimes 1+2 or 2+3. Supralabials eight (rarely nine or seven), fourth and fifth reaching eye, seventh usually largest. Inferior labials ten, (rarely nine or eleven), fifth usually largest, first pair meeting on median line. Genials in two pairs, posterior longer. Scales on body smooth, in 17 rows. Anal plate divided. Gastrosteges varying in number from 195 to 211. Urosteges in two series of from 127 to 147.

The color above, for about the anterior third of the body, is olive or bluish gray, becoming yellowish or grayish brown on the posterior two thirds of the body and on the tail. A few or many of the scales may be marked basally with white or yellow, especially on the anterior half of the body, and throughout the whole length many or almost all of the scales may have central dark markings in the form either of lines or spots. Along the third and fourth rows of lateral scales, anteriorly, is a very distinct and definite clear yellow or white stripe, edged with dark brown, and separated, by a stripe of the ground color, from a second, similar light stripe along the scales of the first and second rows. This lower light stripe sometimes is only partially marked off, by a dark line or row of spots, from the light color of the belly. All these stripes become obsolete and disappear on the posterior half of the body. The head is olive above, grayish posteriorly and brownish toward the snout, unmarked. The temporal region is grayish olive. The oculars, loreal, nasals, labials, and lower half of the rostral are yellow. A black line runs along the upper border of the supralabials and across the middle of the rostral. The nasals, loreal and oculars are margined with black. There is no yellow temporal spot. The lower surfaces are light yellow, unmarked.

A female specimen in life had the upper surface of the



Coluber semilineatus, Sonoran Racer
Adult female collected near Tucson, Pima County, Arizona, and seven eggs laid June 7, 1920.

head and neck a bright blue-gray, tinged with pinkish gray on the snout and supraoculars and changing gradually to olive and then to brown on the body and tail. The lateral dark markings were black anteriorly, becoming olive and then yellowish brown posteriorly. The light lateral stripes are white anteriorly but soon change to a bright straw-yellow behind the neck. The markings on the side of the head are white and black. The lower surfaces of the head and neck are white, but, from the fifteenth gastrostege to the tip of the tail, the color below is bright lemon yellow. There is a small orange spot near the middle of each gastrostege, from the 10th to the 22nd. The iris is brown with golden dots, and a narrow yellow line around the pupil. The tongue is black.

Length to anus.....	780	806	820	835	886
Length of tail.....	342+	375+		358	396+

Distribution.—This racer is common in parts of south-eastern Arizona, and ranges thence south into Mexico.

In Arizona, it has been collected in the San Luis Mountains on the Mexican boundary line, and probably at Cave Spring. It has been recorded from Camp Grant, Graham County, and Fort Bowie, Cochise County. I have seen specimens from Pima County, taken at the Steam Pump in the foothills of the Catalina Mountains about 18 miles north from Tucson, on the grounds of the Carnegie Desert Laboratory at Tucson, and in Sawmill, Stone Cabin and Madera canyons in the Santa Rita Mountains; from Santa Cruz County, collected in Agua Caliente Canyon and in the vicinity of Pete Mountain in the Santa Rita range, and at Harshaw in the Patagonia Mountains; and from Cochise County, secured in Miller, Ramsey, Carr, Brown, and Gardner canyons in the Huachuca Mountains. One was secured at San Pedro Bay, Sonora, Mexico.

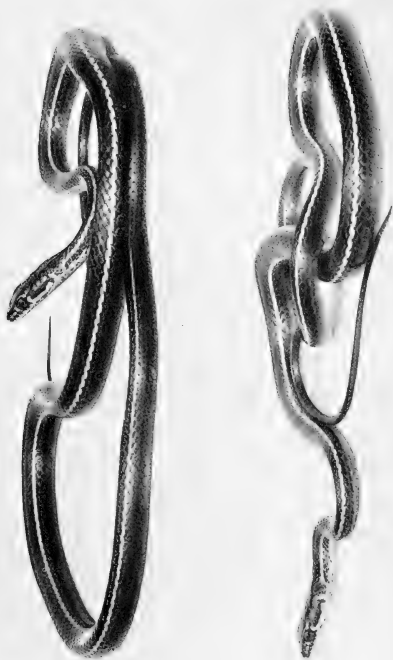
Habits.—One specimen is reported as found at a nest of Woodhouse's Jay, where it was swallowing a young bird. A female captured near Tucson, Arizona, and sent alive to San Francisco, laid, on June 7, seven eggs which measured 37x19, 38x19, 38x19, 39x19, 40x19, 43x19, and 43x18mm. They were enclosed in leathery shells roughened with granules. Development in them had just begun, as blood vessels could be seen by transmitted light.

148. *Coluber lateralis* (Hallowell)

CALIFORNIA RACER

Plates 66, 68, and 69

- Leptophis lateralis* HALLOWELL, Proc. Acad. Nat. Sci. Phila., Vol. VI, 1853, p. 237 (type locality, California); HALLOWELL, Rep. Pac' R. R. Surv., Vol. X, Rept., 1859, p. 13, pl. IV, fig. 3a-3c.
- Drymobius lateralis* COOPER, Proc. Cal. Acad. Sci., Vol. IV, 1870, p. 64.
- Bascanium tæniatum laterale* COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 40; YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 543; YARROW & HENSHAW, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 215; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 113 (part); TOWNSEND, Proc. U. S. Nat. Mus., Vol. 10, 1887, p. 240.
- Coluber tæniatus* GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, p. 148 (part).
- Bascanium laterale laterale* COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1891, (1892), p. 628.
- Bascanion laterale* STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 209; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 188; GRINNELL & GRINNELL, Throop Institute Bulletin, No. XXXV, 1907, p. 45; ATSATT, Univ. Cal. Publ. Zool., Vol. 12, No. 3, 1913, p. 43.
- Zamenis tæniatus* BOULENGER, Cat. Snakes Brit. Mus., Vol. I, 1893, p. 390 (part); MOCQUARD, Nouv. Arch. Mus. Hist. Nat., Paris, Ser. 4, Vol. I, 1899, p. 324.
- Zamenis lateralis lateralis* COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 807.



Coluber lateralis, California Racer
Collected at La Crescenta, Los Angeles County, California, May, 1913.

- Zamenis lateralis* BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 61 (part);
DITMARS, Reptile Book, 1907, p. 288; RUTHLING, Copeia, No. 15,
1915.
- Coluber lateralis* GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17,
No. 10, 1917, p. 190; STEJNEGER & BARBOUR, Check List N. Amer.
Amph. Rept., 1917, p. 80; COWLES, Journ. Entomol. & Zool., Pomona
College, Vol. XII, No. 3, 1920, p. 66; STEPHENS, Trans. San Diego
Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 64; VAN DENBURGH &
SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 59; NELSON,
Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.

Description.—Head long, with flattened top and narrow, rounded snout. Rostral plate large, about as high as broad, hollowed below, and bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of internasals, a larger pair of prefrontals, supraocular and part of upper preocular of each side, a long and posteriorly narrow frontal, and a pair of very large parietals. Anterior and posterior nasals distinct. Loreal rather large, rarely with a small plate below it. Preoculars two, upper much larger than lower. Postoculars two (or three), nearly equal. Temporals two followed by two, rarely 2+3, 1+2, or 1+1. Eight, or rarely seven or nine, superior and nine or ten (rarely eight) inferior labials, seventh (or sixth) upper and fifth lower usually largest, fourth and fifth (or third and fourth) upper reaching eye, first pair of lower meeting on median line. Genials in two pairs, posterior larger than anterior. Scales on body smooth, in 17 rows. Anal plate divided. Gastrosteges varying in number from 186 to 202. Urosteges in two series of from 111 to 133. Tail very long and slender.

The color above, including the tips of the gastrosteges and urosteges, is dark brown, palest on the tail. A single light yellow or white line extends along each side, on the third and fourth rows of scales, to, or a little beyond, the base of the tail. This line is often bordered with black,

and its scales are sometimes tipped with orange-rufous. The sides of the head are spotted with yellow. All the lower surfaces and the upper labials are yellow, spotted on the head and anterior gastrosteges with gray, slate or brown. The anterior gastrosteges are sometimes washed with orange-rufous, and in life the lower surfaces may be beautiful bright rose pink.

Length to anus.....	632	725	742	787	804	968
Length of tail.....	275	311	329	338	396	

Distribution.—The Californian Racer appears to be confined to those parts of California which lie to the west of the Sierra Nevada and the Mohave and Colorado deserts, and to parts of Lower California.

In California, it has been taken in Shasta (Baird), Sonoma (seven miles west from Cazadero), Lake (Mount Saint Helena), Contra Costa (Summit of Mount Diablo), Alameda (Mills College), Santa Clara (Jasper Ridge near Stanford University, Black Mountain, Los Gatos, Berryessa, Bell's Station in Pacheco Pass), Monterey (Carmel Valley, Metz), Placer (Lander near Colfax), Mariposa (Pleasant Valley, vicinity of Coulterville), Fresno (Fresno, Minkler), Tulare (Three Rivers), Kern (Fay Creek six miles north of Weldon, Walker Pass, Fort Tejon), Ventura (Mount Pinos), Santa Barbara (Santa Barbara), Los Angeles (Los Angeles, Tujunga River, La Crescenta, Claremont, Sierra Madre, Placerita Canyon, mouth of San Gabriel Canyon near Azusa), Orange (Santa Ana Canyon), Riverside (Banning at 2200 feet, near Cabazon at 1800 feet, Riverside, San Jacinto, Strawberry Valley at 6000 feet in the San Jacinto Mountains, Kenworthy at 4500 feet), and San Diego (Oak Grove, Agua Caliente, Santa Isabel, Chula Vista, Witch Creek, Poway, Dulzura, Campo) counties.



Coluber lateralis, California Racer
Killing a Prairie Rattlesnake (*Crotalus scottianus*) in Kreyenhagen Canyon, near Coalinga,
California. Photograph, by Allen G. Nichols, presented by Dr. J. C. Branner.

Lower Californian specimens have been recorded from San Ignacio, Mulege, and Santa Rosalia.

Habits.—Grinnell & Grinnell have published the following note on the habits of this snake as observed by them in Los Angeles County: "This is a very common snake in the uplands and foothill districts of the county. It is seldom seen in the open, but stays in brushy places where its agile movements render it difficult to capture.

"The striped racer is a good climber, and we have often seen it many feet above the ground in scrub oaks or wild lilac bushes. A curious habit is that of lying in a rigid coil on top of a leafy branch. We have found several in such positions and supposed them to be lying in wait for any insects or birds which might happen to come within striking distance. The snakes are then loth to move and can be closely approached and even caught. But when once aroused they glide swiftly out of reach and sight."

A photograph, reproduced in Plate 69, shows a snake of this species killing a rattlesnake, *Crotalus oreganus*.

149. **Coluber barbouri** Van Denburgh & Slevin
ESPIRITU SANTO ISLAND RACER

Coluber barbouri VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, No. 6, 1921, p. 98 (type locality, **Isla Partida, Espiritu Santo Island, Gulf of California, Mexico**).

Description.—Head long, with flattened top and narrow, rounded snout. Rostral plate large, about once and a third as high as broad, hollowed below, and bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of internasals, a larger pair of prefrontals, supraocular and part of upper preocular of each side, a long and posteriorly narrow frontal, and a pair of very large parietals. Anterior and posterior nasals dis-

tinct. Loreal rather large, with no small plate below it. Preoculars two, upper much larger than lower. Postoculars two, nearly equal. Temporals two followed by two. Eight superior and nine or ten inferior labials, seventh upper and fifth lower largest, fourth and fifth upper reaching eye, first pair of lower meeting on median line. Genials in two pairs, posterior much larger than anterior. Scales on body smooth, in 17 rows. Anal plate divided. Gastrosteges 193. Urosteges in two series of 130. Tail very long and slender.

The color above, including the tips of the gastrosteges and urosteges, is dark grayish olive brown, palest on the head and tail. A single white line extends along each side, on the third and fourth rows of scales, onto the base of the tail. This line is narrowly bordered with black, and shows slight enlargements at intervals of from four to seven scales, on the anterior half of the body. The sides of the head are spotted with white. The upper portions of the supralabials are blackish brown. The lips, chin and throat are white, without dark markings, but faintly washed with pink. The anterior gastrosteges are suffused with rose pink. The other lower surfaces are yellowish white with faint gray cloudings laterally.

Length to anus.....	774
Length of tail.....	374+

Remarks.—This species is closely related to both *Coluber lateralis* and *Coluber aurigulus*. The only specimen known is an adult female.

Distribution.—This snake was found on Isla Partida, Espiritu Santo Island, Gulf of California, Mexico, May 30, 1921.

150. *Coluber aurigulus* (Cope)

CAPE SAN LUCAS RACER

- Drymobius aurigulus* COPE, Proc. Acad. Nat. Sci. Phila., 1861, p. 301
(type locality, **Cape St. Lucas, Lower California**).
- Bascanium aurigulum* COPE, Bull. U. S. Nat. Mus., No. 1, 1875, pp. 40, 92; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 113, 191; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 71; BELDING, West Amer. Scientist, Vol. III, No. 24, 1887, p. 99.
- Coluber flagelliformis* var. *aurigulus* GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, pp. 44, 148; GARMAN, Bull. Essex Inst., Vol. XVI, No. 1, 1884, p. 26.
- Bascanion laterale aurigulum* COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 629.
- Bascanion aurigulum* VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 149.
- Zamenis aurigulus* COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 810, fig. 179; TERRON, Mem. y Rev. Soc. Cient. Antonio Alzate, Vol. 39, 1921, p. 164.
- Coluber aurigulus* STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 78; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 52; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.

Description.—Head long, with flattened top and narrow, rounded snout. Rostral rather large, about as high as broad, hollowed below, and bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of internasals, a much larger pair of prefrontals, supraocular and part of preocular of each side, a long frontal very narrow posteriorly, and a pair of very large parietals. Anterior and posterior nasals distinct. Loreal large and elongate. Preoculars three, the upper largest. Postoculars two. Temporals two followed by two, or 1+2. Supralabials eight, fourth and fifth reaching eye, seventh and eighth largest. Infralabials ten, fifth largest, first pair meeting on median line. Genials in two pairs, posterior longer. Scales on body smooth, in 17 rows. Anal plate divided.

The color above is dark brown, becoming black anteriorly. The head is light brown, shaded with yellow. A narrow yellow streak runs from the eye to the snout. A spot on the temporal region, one on the postoculars, all of the labials, the chin, and the anterior part of the abdomen are bright golden yellow, unspotted, as are also the sides of the neck and the anterior fourth of the body up to the fifth row of scales. On the second and third rows of scales of the latter region is a broken black band interrupted at intervals of about seven scales. This black band where present forms the lower border of a yellow lateral stripe. It finally becomes continuous, and with a band upon the first row almost excludes the yellow ground color upon the middle and posterior parts of the body. The tendency of this coloration is to produce two series of alternating yellow and black spots along the anterior part of the sides. The belly is dirty yellowish, unspotted.

Length to anus.....697

Length of tail.....348

Distribution.—Only two specimens of this snake have been collected. One was secured by John Xantus, at Cape San Lucas, the other by Gustav Eisen, at San José del Cabo, Lower California, Mexico.

Remarks.—This racer is closely related to *C. lateralis* and resembles it in coloration, but has the lateral stripe broken anteriorly.

151. *Coluber tæniatus tæniatus* (Hallowell)

WESTERN STRIPED RACER

Plate 70

- Leptophis tæniata* HALLOWELL, Proc. Acad. Nat. Sci. Phila., Vol. 6, 1852, p. 181 (type locality, **New Mexico, west of Rio Grande**); HALLOWELL, Sitgreaves' Zuñi and Colorado Riv., 1853, pp. 133, 146, pl. XIII (XII).
- Masticophis tæniatus* BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, Serpents, 1853, p. 103; BAIRD, Rep. Pac. R. R. Surv., Vol. X, Rept., 1859, p. 20, pl. XXIII, pl. XXXII, fig. 76; COOPER, Rep. Pac. R. R. Surv., Vol. XII, 1860, p. 302; JAN, Elenco Sist. degli Ofidi, 1863, p. 64; JAN, Iconogr. Génér. Ophid., Vol. II, 22e livr., pl. V, fig. 1; COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 305.
- Drymobius tæniatus* COPE, Proc. Acad. Nat. Sci. Phila., 1860, p. 561.
- Bascanium tæniatum tæniatum* COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 40; YARROW & HENSHAW, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 215; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 112.
- Bascanium tæniatum laterale* YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 543 (part).
- Bascanium tæniatum* COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 616; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1891 (1892), p. 629.
- Coluber tæniatus* GARMAN, Mem. Mus. Compr. Zool. Cambr., Vol. VIII, No. 3, 1883, pp. 46, 148 (part); GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 192.
- Bascanium tæniatum* STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 210; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 190; CARY, N. Amer. Fauna, No. 33, 1911, p. 27; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 157; TAYLOR, Univ. Cal. Publ. Zool., Vol. 7, No. 10, 1912, p. 353; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 417; RICHARDSON, Proc. U. S. Nat. Mus., Vol. 48, 1915, p. 428; RUTHVEN & GAIGE, Occas. Papers Mus. Zool. Univ. Mich., No. 8, 1915, p. 28; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 5, 1915, p. 107.
- Bascanium tæniatus* BOCOURT, Miss. Sci. au Mexique, Pt. III, Rept., p. 703, pls. XLV, figs. 5, XLVIII, fig. 8.

- Zamenis taniatus* BOULENGER, Cat. Snakes Brit. Mus., Vol. I, 1893, p. 390 (part); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 815; DITMARS, Reptile Book, 1907, p. 289, pl. XC, fig. 2; ELLIS & HENDERSON, Univ. Colorado Studies, Vol. X, No. 2, 1913, p. 105.
- Zamenis taniatus taniatus* BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 62.
- Coluber taniatus taniatus* STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 80; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 28, 36, 40, 45.

Description.—Head long, with flattened top and rounded snout. Rostral plate large, about as high as broad, hollowed below, and bounded behind by internasal, anterior nasal and first labial plates. Plates on top of head are a pair of internasals, a pair of prefrontals, supraocular and part of upper preocular of each side, a long frontal, and a pair of large parietals. Anterior and posterior nasals distinct. Loreal longer than high. Preoculars two, upper much larger than lower, rarely united. Postoculars two, nearly equal. Temporals two followed by two, sometimes 1+2 or 1+1. Eight, or rarely seven, superior, and nine or 10 (rarely seven) inferior labials, seventh of upper and fifth of lower largest, fourth and fifth upper reaching eye, first pair of lower meeting on median line. Genials in two pairs, anterior smaller than posterior. Scales on body smooth, in fifteen rows. Anal plate divided. Gastrosteges varying in number from 198 to 215. Urosteges in two series of from 114 to 157.

The color above is grayish or yellowish brown, palest on the tail, the scales of the sides more or less yellow, and with narrow dark lines along the middle of each row. These dark lines are sometimes present on the dorsal scales as well as on those of the sides, and a wider line often runs along the tips of the gastrosteges. The yellow of the lateral scales is variable in intensity, and sometimes—especially in



Coluber tenuis tenuis, Western Striped Racer
Collected near Gazelle, Siskiyou County, California, May, 1913.

young—forms a distinct line along the third and fourth rows of scales. All of these lines fade out on the tail. The head is spotted with yellow. The lower surfaces are yellow or yellowish white, marked with slate or black anteriorly and along the tips of the gastrosteges, and often more or less tinted, especially posteriorly, with delicate rose pink.

Length to anus.....	772	803	859	910	940	971
Length of tail.....	339	350	358	366+	418	362

Distribution.—This species ranges from Texas, New Mexico and Colorado west to California, and north to Idaho.

In Arizona, it has been secured at Fort Whipple and Prescott, Yavapai County; Oak Creek, Coconino County; and at Carr's Ranch, Sierra Ancha, Gila County.

In Utah, specimens have been collected at Ogden, Weber County; Fort Douglas, Salt Lake County; Provo, Utah County; Kanosh and Cove Fort Millard County, Bakers Canyon, Beaver County; near Rush Lake, Iron County; and Bluff City, San Juan County.

In Idaho, it has been taken between Bliss and the Snake River, Gooding County, and at Boise, Ada County.

In Nevada, this species has been taken in White Pine (Antelope Springs), Ormsby (Carson), Washoe (Pyramid Lake, Little High Rock Creek), Elko (Carlin), Humboldt (Quinn River Crossing at 4100 feet; Big Creek at 5000 feet, and Leonard Creek at 4700 feet, in the Pine Forest Mountains), and Nye (Pablo Creek at 6,200 feet in the Toiyabe Mountains), counties.

In Oregon, it has been found on the Snake River.

In California, it seems to be fairly common in Inyo County (Maturango Spring, Argus Range, Coso Valley, Coso Mountains, Panamint Mountains), and has been se-

cured also in Mono (Benton), Kern (Walker Basin), Shasta (Baird, Canoe Creek), and Siskiyou (Gazelle) counties.

Habits.—These snakes usually are found in sagebrush. They move with great swiftness either on the ground or in the bushes. When secured they sometimes fight vigorously, coiling themselves about the limbs of the bushes, biting, and resisting capture to the utmost (Taylor). The stomach of one specimen contained an adult *Cnemidophorus tigris* (Ruthven & Gaige).

Genus 29. *Salvadora*

Salvadora BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 104 (type, *grahamiae*).

Phimothyra COPE, Proc. Acad. Nat. Sci. Phila., 1860, p. 566 (type *grahamiae*).

The body is very long and slender, with long whip-like tail. The head is distinct from the neck, large, long, flat-topped, with truncate snout. Its plates are normal, except the rostral, which is very large and has free lateral edges. The nasal plates are distinct. Two preoculars, two postoculars, and a loreal are present. Temporals are 1+2, 2+2, 2+3, or 3+3. The scales are smooth, in 17 rows, with two apical pits. The anal plate is divided. Urosteges are in two series. The eye is large, with round pupil.

152. *Salvadora hexalepis* (Cope)

WESTERN PATCH-NOSED SNAKE

Plate 71

Salvadora grahami JAN, Iconogr. Génér. Ophid., 2e livr., 1860, pl. III, fig. 1; COOPER, Proc. Cal. Acad. Sci., Vol. IV, 1870, p. 66.

Phimothyra grahamiae COPE, Proc. Acad. Nat. Sci. Phila., 1861, p. 300; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 38 (part); YARROW, Rept. Surv. W. 100th Merid., Vol. V, 1875, p. 538; COUES, Rept. Surv. W. 100th Merid., Vol. V, 1875, p. 620; COPE, Proc. Acad.

- Nat. Sci. Phila., 1883, p. 14; YARROW Bull. U. S. Nat. Mus., No. 24, 1883, p. 98 (part); BELDING, West. Amer. Scientist, Vol. III, No. 24, 1887, p. 98.
- Phimothyra hexalepis* COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 304 (type locality, **Fort Whipple, Arizona**).
- Phimothyra grahamiæ hexalepis* COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 620; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 15.
- Salvadora grahamiæ hexalepis* COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 38; GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, pp. 39, 145; STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 205.
- Salvadora grahamiæ* COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 72 (part); COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 619 (part); VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 146; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1896, p. 1006; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 347; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 181; McLAIN, Contributions to Neotropical Herpetology, 1899, p. 3; MOCQUARD, Nouv. Arch. Mus. Hist. Nat., Paris, Ser. 4, Vol. I, 1899, p. 325; COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 818, fig. 183 (part); McLAIN, Critical Notes, 1899, p. 11; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 63 (part); MEEK, Field Museum Nat. Hist., Zool. Series, Vol. VII, No. 1, 1906, p. 15; DITMARS, Reptile Book, 1907, p. 292, pl. XCI, fig. 1 (part); VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 150; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 413; AYSATT, Univ. Cal. Publ. Zool., Vol. 12, No. 3, 1913, p. 42; RUTHLING, Copeia, No. 15, 1915; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 5, 1915, p. 100; TERRON, Mem. y Rev. Soc. Cient. Antonio Alzate, Vol. 39, 1921, pp. 165, 169.
- Salvadora hexalepis* STEJNEGER, Proc. U. S. Nat. Mus., Vol. XXV, 1902, p. 154; RUTHVEN, Bull. Am. Mus. Nat. Hist., Vol. XXIII, 1907, p. 577; GRINNELL & GRINNELL, Throop Institute Bulletin, No. XXXV, 1907, p. 42, fig. 18; GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 189; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 81; COWLES, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, 1920, p. 66; STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 64; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 28, 37, 52, 65; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.

Description.—Head flat-topped or slightly rounded, and snout projecting and very blunt. Temporal regions not swollen. Rostral plate very large, prominent, recurved on top of snout, with free lateral edges, and bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of internasals, a pair of prefrontals, a frontal, supraocular of each side, and a pair of rather short, rounded parietals. Anterior and posterior nasals distinct. Loreal small, but sometimes divided. Preoculars two or one. Postoculars two or three. Temporals normally two followed by three, rarely 1+2, 2+2, or 3+3. Eight or nine, or rarely ten, superior and about 10 (nine to 12) inferior labials, sixth or seventh or seventh and eighth superior and fifth or sixth inferior largest, fourth and fifth or fifth and sixth superior, or small detached portions of them, reaching eye, first pair of inferior meeting on median line. Two pairs of genials, posterior equal to or smaller than anterior. Scales on body smooth, thin, in 17 or rarely 19 rows. Anal plate divided. Gastrosteges varying in number from 174 to 213. Urosteges in two series of from 67 to 108.

The upper surface of the head is grayish or yellowish brown, without dark or light markings. The ground color of the body is drab, yellow, light brown, or plumbeous, with one or two narrow black, slate, brown, or olive longitudinal bands. These bands fade out on the tail, and may extend onto the sides of the head. Sometimes they widen and merge; in other specimens the upper band is partially broken up into spots; while in one the bands are represented by blackish shades at the bases of the scales. The upper lip and all the lower surfaces are yellow or yellowish white, the tail and posterior part of the body sometimes with an orange or reddish cast.



Salvadora hexalepis, Western Patch-nosed Snake
Collected near Camjio, San Diego County, California, June, 1915.

Length to anus.....	235	258	340	652	695	850
Length of tail.....	63	60	98	215	189	290

Distribution.—The western form of the Patched-nosed Snake has been found in Utah, Nevada, Arizona, California, Sonora, and Lower California.

In Utah, it has been taken in Cottonwood Canyon, and perhaps at Ogden (Yarrow), though Cope says that the latter locality needs confirmation.

In Nevada, specimens have been secured at Las Vegas and in the valley of the Virgin River near St. Thomas and Bunkerville, Clark County, and at Sutcliffe, Pyramid Lake, Washoe County.

In Arizona, it has been found at Mowry in the Patagonia Mountains, Fort Buchanan, Calabasas, and Nogales, Santa Cruz County; Fort Huachuca, and Carr and Ramsey canyons in the Huachuca Mountains, near Fairbank, and in Rucker Canyon in the Chiricahua Mountains, Cochise County; in the foothills of the Catalina Mountains, and about Tucson, Pima County; Fort Whipple, Yavapai County; thirty miles northwest of Phoenix, Maricopa County; ten miles below Cibola and near Yuma, Yuma County; and near White River Canyon, Mohave Village, and San Pedro River.

In Sonora, it has been collected at Guaymas and Sierra Blanca, as well as on Tiburon Island, in the Gulf of California.

In Lower California, it occurs in the northern part of the peninsula in the San Pedro Martir Mountains and at San Matias; in the central portion, near Comondu, Santa Rosalia and San Ignacio; and in the Cape Region at La Paz, Cape San Lucas, San José del Cabo, Santa Anita, Agua Caliente and Sierra San Lazaro.

In California, this snake has been collected in Inyo

(Panamint Mountains, Maturango Spring and Shepherd Canyon in the Argus Range, Amargosa Borax Works), Los Angeles (Arroyo Seco near Pasadena, San Gabriel Mountains, Sierra Madre), San Bernardino (Ontario, Lytle Creek, and near San Bernardino), Riverside (San Jacinto, San Jacinto Mountains, Riverside, Banning at 2200 feet, Riverside Mountain Colorado River); San Diego (Valle de las Viejas) and Imperial (10 miles east from Holtville, Cane Spring), counties.

Habits.—Almost nothing is known of the habits of this snake. They probably resemble those of the racers. One was found partly buried in sand. Grinnell and Grinnell note:

In August one was found climbing with agility through wild lilac bushes; when pursued it took refuge in a scrub oak where it poised rigid along a branch and among some adjacent leaves.

Dr. Coues mentions one, secured at Fort Whipple, which had eaten a whip-tailed lizard (*Cnemidophorus*).

Genus 30. *Phyllorhynchus*

Phyllorhynchus STEJNEGER, Proc. U. S. Nat. Mus., Vol. XIII, 1890, p. 151 (type, *browni*); COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 821.

Lytorhynchus BOULENGER, Cat. Snakes Brit. Mus., Vol. I, 1893, p. 414 (part).

The body is rather small, with short tail. The head is a little broader than the neck. The rostral plate is very much enlarged, has free lateral borders, and is produced backward on the upper surface to the prefrontals, completely separating the internasals. The nasal plates are distinct. Loreals are present. The supralabials are separated from the eye by suboculars. The scales are keeled or smooth, without pits. The anal plate is divided. Urosteges are in

two series. The eye is large, with vertical pupil. Palatine teeth are present. Maxillary dentition is dicranterian.

Two species are known. They may be recognized by the following:

SYNOPSIS OF SPECIES

a.—Scales keeled on posterior two-thirds of body; tail one-eighth total length; about 13 to 46 dark spots between head and tip of tail; no lateral spots.

P. browni.—p. 693.

a'.—Scales all smooth; tail about one-eleventh total length; about 23 to 48 dark spots between head and tip of tail; one or two rows of lateral spots.

P. decurtatus.—p. 695.

153. *Phyllorhynchus browni* Stejneger

BROWN'S LEAF-NOSED SNAKE

Phyllorhynchus browni STEJNEGER, Proc. U. S. Nat. Mus., Vol. XIII, 1890, p. 152, fig. (type locality, **Tucson, Arizona**); COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 618; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 821, fig. 184; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 64; DITMARS, Reptile Book, 1907, p. 293, VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3; 1913, p. 393; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 81.

Lytorhynchus browni BOULENGER, Cat. Snakes Brit. Mus., Vol. I, 1893, p. 417.

Description.—Head short, rather high, little distinct from neck. Temporal regions not swollen. Rostral very prominent, broad, with free lateral edges, recurved on top of snout, completely separating internasals, and partially prefrontals, bounded behind by prefrontal, internasal, nasal, and first labial plates. Frontal and parietals rather short. Supraoculars comparatively small. Anterior and posterior nasals distinct. Nostril overhung by prominent lower edge

of internasal plate. True loreal short and high; small supraloreal and subloreal plates present. About three preoculars, four postoculars, and two suboculars complete the orbital ring. Temporals three followed by three. Supralabials six, last two largest, none reaching eye. Infralabials nine, first and fifth largest, first pair meeting on median line. Genials in one pair only. Scales on body in 19 rows, those on anterior third nearly smooth, gradually becoming distinctly keeled on posterior two-thirds of body. Anal plate not divided. Gastrosteges 159. Urosteges in two series of 31.

The color above is white with from 13 to 46 seal-brown blotches between the head and the tip of the tail. These blotches become paler posteriorly. The first blotch begins three scales behind the parietals, is of a uniform dark color, rather long and shaped nearly like an hour glass, its anterior border being concave and the anterior lateral corners produced to the angle of the mouth. A broad dark line crosses the interorbital space and is continued on the posterior supralabials to nearly meet the extended corner of the first dorsal blotch. The other dorsal blotches are more nearly square, with rounded corners. Their borders are darker than their central portions, where the dark color is only powdered over the white ground. The white interspaces are faintly powdered with brown on the sides. The lower surfaces are white, without markings.

Length to anus.....283

Length of tail.....42

Distribution.—Only four specimens are known. All were collected near Tucson, Arizona.

Habits.—Unknown. The first two specimens were collected by Mr. Herbert Brown. Mr. Karl P. Schmidt writes

me that two others, males, were taken together at night, July 24, 1916, at the San Xavier Mission, near Tucson, Arizona.

154. *Phyllorhynchus decurtatus* (Cope)

LOWER CALIFORNIA LEAF-NOSED SNAKE

Plate 72

- Phimothya decurtata* COPE, Proc. Acad. Nat. Sci. Phila., 1868, p. 310 (type locality, the upper part of Lower California); COPE, Bull. U. S. Nat. Mus., No. 1, 1875, pp. 38, 92; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 15, 99; BELDING, West Amer. Scientist, Vol. III, No. 24, 1887, p. 98.
- Salvadora decurtata* GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, pp. 39, 145; GARMAN, Bull. Essex Inst., Vol. XVI, 1884, p. 25; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 72; BOCOURT, Miss. Sci. au Mex., Rept., 11e livr., 1888, p. 663.
- Phyllorhynchus decurtatus* STEJNEGER, Proc. U. S. Nat. Mus., Vol. XIII, 1890, p. 154; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 618; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 145; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 823, fig. 186; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 64; DITMARS, Reptile Book, 1907, p. 293; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 81; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 52, 66; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115; ATSATT, Copeia, 1921, No. 96, p. 38; TERRON, Mem. y Rev. Soc. Cient. Antonio Alzate, Vol. 39, 1921, pp. 164, 170.
- Lyorhynchus decurtatus* BOULENGER, Cat. Snakes Brit. Mus., Vol. I, 1893, p. 417.

Description.—Head short, not high, little distinct from neck. Temporal regions not swollen. Rostral very prominent, broad, with free lateral edges, recurved on top of snout, completely separating internasals, in contact with prefrontals, bounded behind by prefrontal, internasal, anterior nasal, and first labial plates. Frontal short. A pair of large parietals. Supraoculars comparatively small. Anterior and

posterior nasals distinct. Loreals three, true loreal one, short and high; one or two small subloreal. Two or three preoculars, two or three postoculars and one or two suboculars complete the orbital ring. Temporals two, three, or four followed by about three. Supralabials six, two or three posterior largest, none reaching eye. Infralabials nine, first and fifth largest, first pair meeting on median line. Genials in one pair, or posterior pair small. Scales on body in 19 rows, everywhere smooth. Anal plate not divided. Gastroteges varying in number from 161 to 183. Urostegees in two series of from 26 to 35.

The color above is whitish with from 23 to 48 chocolate-brown blotches between the head and the tip of the tail. These blotches are more or less irregular in size and shape but their borders usually are more or less concave in front and behind. The blotches are paler centrally, where the brown color is merely sprinkled over the white ground. Along the sides are smaller brown spots, two or three scales in diameter, in a more or less double series, usually alternating with the dorsal blotches. A broad dark line crosses the head on the prefrontals and is continued down and back through the eye to a point above the angle of the mouth. There are a few irregular spots on the posterior portion of the frontal, the parietals, the anterior portion of the neck, and some of the supralabials. The lower surfaces are white, without markings.

Length to anus.....	272	321	363
Length of tail.....	28	29	40

Distribution.—Only five specimens of this snake have been found. The original one was brought from the "upper part of Lower California" by Mr. William M. Gabb. Mr. Belding and Mr. Slevin each secured one at La Paz near the southern end of the peninsula. The fourth specimen



PLATE 7. FIG. 1. *Uta stansburiana*, L. (Snake). (Side view.) (See also Plate 2, Fig. 1, for same head and tail.)

was collected by Mr. Herbert Brown at Yuma, Arizona. Miss Atsatt recently recorded the finding of one in the wash from Tahquitz Creek, near Palm Springs, Riverside County, California.

Remarks.—This and the preceding may eventually be found to be one species. There is little if any difference except in the keeling of the scales.

Habits.—Miss Atsatt very kindly has furnished me with a photograph of the snake found at Tahquitz Creek, and the following notes on the habits:

“The specimen of *Phyllorhynchus decurtatus* lived until July. It is now in the Museum of Vertebrate Zoology of the University of California. During the period it was under observation if it was in a box of sand open to the light it spent most of the time under the sand. When it was dug out of the loose sand and placed on top it soon reburied itself. When stimulated by light or other means the snake could bury itself completely in two or three minutes. Several times attempts were made at digging a hole. Perhaps it digs its own tunnel under a rock. Light rather than heat seemed to be the stimulus to produce hiding in sand. Food was persistently rejected although some beaten egg was licked off snout when the snake could not reach a surface on which to rub it off. Several times water was drunk from the end of a pipette.”

Genus 31. *Elaphe*

Coluber BOIE, Isis von Oken, 1826, p. 209 (type, *C. flavescens*); COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 39; BOULENGER, Cat. Snakes Brit. Mus., Vol. II, 1894, p. 24; COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 825.

Elaphe FITZINGER in Wagler, Descr. Icon. Amphib., Pt. 3, 1833, text to plate 27 (type, *E. parreysii*=*quatuorlineata*); STEJNEGER, Bull. U. S. Nat. Mus., No. 58, 1907, p. 307.

Scotophis BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, Serpents, 1853, p. 73 (type, *Coluber alleghaniensis*).

The body is rather long and moderately slender, subcylindric, with tail elongate and tapering. The head is distinct from the neck, large, long, with flattened top and rounded snout. Its plates are normal. The nasal plates are not united. Usually one or two preoculars, two postoculars, and a loreal. Scales on body keeled or smooth, usually with two apical pits. The anal plate is divided. Urosteges are in two series. The eye is moderately large, with round pupil. Maxillary teeth about equal in size.

A large number of species have been described from Europe, Asia and America. They usually have been referred to under the generic name *Coluber*. Two species have been found within the geographic limits of the present work. They may be distinguished by the following

SYNOPSIS OF SPECIES

a.—Gastrosteges more than 265; urosteges fewer than 95; supralabials 10 or 11.

E. rosaliæ.—p. 698.

a'.—Gastrosteges fewer than 265; urosteges more than 95; supralabials eight or nine.

E. chlorosoma.—p. 700.

155. *Elaphe rosaliæ* (Mocquard)

YELLOW SNAKE

Coluber rosaliæ MOCQUARD, Nouv. Arch. Mus. Hist. Nat., Paris, Ser. 4, Vol. I, 1899, p. 321, pl. 12, figs. 1, 1a-b (type locality, Santa Rosalia, Lower California, Mexico).

Elaphe rosaliae STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 84; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 52, 66; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, p. 114.

Description.—Head long, distinct from neck, with somewhat flattened top, and elongate snout. Body rather slender, a little compressed laterally. Tail tapering, rather short. Rostral large, much broader than high, recurved but little above, bounded behind by internasal, anterior nasal and first labial plates. Plates on top of head are a pair of internasals, a much larger pair of prefrontals, a frontal, in contact with preocular, much broader anteriorly than behind, a pair of supraoculars very narrow anteriorly, and a pair of large parietals. Anterior and posterior nasals distinct. True loreal single, elongate, with a subloreal. Preoculars two, the lower small. Postoculars three. Temporals small and numerous, three, four or two, in the first row. Supralabials 10 or 11, ninth largest, fifth or sixth reaching eye. Inferior labials 13 or 12, seventh largest, first pair meeting on median line. Genials in two pairs, the posterior much smaller. Scales on body rather small, short, smooth, with two apical pits, in 33 or 34 rows, those of the outer rows somewhat larger. Anal plate divided. Gastrosteges varying in number at least from 277 to 286. Urosteges in two series of from 83 to 84 (two females).

The color above is a uniform olive or reddish brown without dark markings, becoming yellowish or greenish towards the gastrosteges. The edges of the scales are a little darker. The lower surfaces are grayish or greenish yellow.

Length to anus.....	718	1030
Length of tail.....	135	201

Distribution.—This snake is known from only two specimens. The type was obtained near Santa Rosalia, in the

middle portion of Lower California. Mr. Slevin secured one at the spring of San Bartolo in the Cape Region.

Habits.—Mocquard states: "Ce serpent vit dans les buissons, sur lesquels il se tient ordinairement perché et se meut avec une grande agilité."

Our specimen was found on the sand in the arroyo at San Bartolo.

156. *Elaphe chlorosoma* (Günther)

Mexican Green Snake

Coluber chlorosoma GÜNTHER, *Biologia Centrali-Americana*, Rept., 1894, p. 115, pl. 41 (type locality, **Atoyak and Amula in Guerrero and San Ramon in Jalisco, Mexico**).

Elaphe chlorosoma STONE, *Proc. Acad. Nat. Sci. Phila.*, 1811, p. 231; STEJNEGER & BARBOUR, *Check List N. Amer. Amph. Rept.*, 1917, p. 82.

Description.—Head long, distinct from neck, with somewhat flattened top, and elongate snout. Body, rather slender, a little compressed laterally. Tail tapering, rather short. Rostral large, much broader than high, recurved but little above, bounded behind by internasal, anterior nasal and first labial plates. Plates on top of head are a pair of internasals, a much larger pair of prefrontals, a frontal usually in contact with preocular and much broader anteriorly than behind, a pair of supraoculars very narrow anteriorly, and a pair of large parietals. Anterior and posterior nasals distinct. True loreal single, elongate, without subloreal. Preoculars one. Postoculars two. Temporals small and numerous, about three in the first row. Supralabials eight or nine, seventh largest, fifth and sixth or fourth and fifth, reaching eye. Inferior labials eleven, fifth and sixth largest, first pair meeting on median line. Genials in two pairs, the posterior longer but very narrow. Scales on body rather small, short, smooth, with two apical pits; in 33 rows, those of the

outer rows somewhat larger. Anal plate divided. Gastroteges varying in number at least from 246 to 260. Urostegees in two series of from 107 to 113.

The color above is uniform greenish olive. On stretching the skin the base of each scale may be seen to be black, with a whitish spot on each side of the scale. The lower parts are uniform whitish, or yellow. There are no definite markings even in young specimens.

Length to anus.....	660	965
Length of tail.....		280

Distribution.—Originally described from specimens from Guerrero and Jalisco, Mexico, this snake has since been found in the Santa Rita Mountains, Santa Cruz County, Arizona. Dr. Stone has recorded the two specimens taken there by Dr. H. A. Pilsbry, in 1910. One of these was secured in Agua Caliente Canyon, at an altitude of 6,000 feet.

Genus 32. Arizona

Arizona KENNICOTT, U. S. Mex. Bound. Surv., Vol. II, 1859, Rept., p. 18 (type, *elegans*); VAN DENBURGH, Proc. Acad. Sci., Ser. 3, Vol. 4, 1906, p. 66.

The body is long and slender, with tail of moderate length. The neck is constricted somewhat, so that the head is distinct. The snout is long, rounded, and but little lower than the flat top of the head. The cephalic plates are normal. The nasals rarely unite above the nostril. One (or two) preocular, two (or one) postoculars, and a loreal are present. Temporals are 2+3 or 2+4. The scales are smooth, in 27 to 31 rows. The anal plate is single. Urostegees are in two series. The eye is moderately large, with pupil nearly round in many alcohol specimens but vertically elliptic in life.

157. *Arizona elegans* Kennicott

FADED SNAKE

Plates 66 and 73

- Arizona elegans* KENNICOTT, U. S. Mex. Bound. Surv., Vol. II, 1859, Rept., p. 18, pl. 13 (type locality, "Rio Grande," Texas, and "between Arkansas and Cimarron," Oklahoma); BAIRD, Rep. Pac. R. R. Surv., Vol. X, 1859, p. 42; BOCOURT, Miss. Sci. Mex., Rept., 11e livr., 1888, p. 676; COCKERELL, American Naturalist, Vol. XXX, April, 1896, p. 326; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 193, figs.; McLAIN, Critical Notes, 1899, p. 11; BROWN, Proc. Acad. Nat. Sci., Phila., 1903, pp. 549, 553; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 3, Vol. 4, 1906, p. 66; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 150; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 417; ATSATT, Univ. Cal. Publ. Zool., Vol. 12, No. 3, 1913, p. 43; STRECKER, Baylor Bulletin, Vol. XVIII, No. 4, p. 34; GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 192; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 85; STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 64; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 52, 67.
- Pityophis elegans* COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 39; YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 541; COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 618; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 16, 108.
- Rhinechis elegans* COPE, Proc. Amer. Philos. Soc., Vol. XXIII, 1886, p. 284; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 72; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 638; COPE, Amer. Nat., Vol. XXX, 1896, p. 1014; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 863; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 52; DITMARS, Reptile Book, 1907, p. 314, pls. XCVI, fig. 2, XCVII, figs. 1, 4.
- Coluber arizonæ* BOULENGER, Cat. Snakes Brit. Mus., Vol. II, 1894, p. 66.

Description.—Head flat-topped or slightly rounded, with snout projecting and rather narrow. Temporal regions not swollen. Rostral plate very large, prominent, recurved between internasals on top of snout, and bounded behind by internasal, anterior nasal, and first labial plates. Plates on



Arizona elegans, Faded Snake
Collected near Campo, San Diego County, California, June, 1915.

top of head, a pair of internasals, a pair of prefrontals, a frontal, supraocular of each side, and a pair of large parietals. Anterior and posterior nasals usually distinct, but sometimes united above nostril. Loreal elongate. One or two preoculars and two or one postoculars. Temporals normally two followed by three, sometimes 2+4 or 2+5, lower scale of first row often elongate. Eight, or rarely seven or nine, superior and 11 to 15, usually 13, inferior labials, sixth or seventh superior and seventh or eighth inferior usually largest, fourth and fifth superior normally reaching eye, first pair of inferior meeting on median line. Two pairs of genials, posterior narrower and shorter or but little longer than anterior. Scales on body smooth, thin, in 27 to 31 rows. Anal plate not divided. Gastrosteiges varying in number from 209 to 227. Urosteiges in two series of from 45 to 59.

The ground color is pale brown or yellowish gray, lighter near the middle of the back, along which is a series of dark-edged brown or gray blotches. The sides are marbled with similar but smaller blotches in more or less alternating rows. The tail is similarly colored. In young, a dark streak runs from the eye, to the corner of the mouth, and another between the eyes, crossing the posterior edges of the prefrontal plates as in *Pituophis*. These streaks are faded or absent in adults. The lower surfaces are a beautiful pale yellowish white, without markings.

The colors in life of an adult male taken at Yuma, March 19, 1912, were as follows: The head is light olive with darker olive markings. The lower surfaces and two or three rows of lateral scales are white. The scales between the blotches on the sides and along the middle of the back are yellowish with whitish edges and with reddish brown markings near the base of each scale. The dark blotches are in part blackish brown, in part deep olive.

Length to anus.....	231	282	730	860	870	917
Length of tail.....	33	33	122	160	125	145

Distribution.—This beautiful snake has been taken in Texas, Oklahoma, New Mexico, Arizona, California, and Lower California.

In Mexico, it ranges south to the city of Chihuahua. It occurs in both Upper and Lower Sonoran zones.

In Arizona, it has been taken near Tucson, Pima County; at Camp Grant, Graham County; on the mesa south of Fort Mohave, Mohave County; near Phoenix, Maricopa County; and at Yuma, Yuma County.

In Lower California, it probably is confined to the northern end of the peninsula, where it has been secured at Ensenada, San Tomas, and San Quintin.

In California, the most northern localities are Fresno, Fresno County, and McKittrick, Kern County. Farther south, it has been found in Los Angeles (Alhambra), San Bernardino (near Ontario), Riverside (Riverside, San Jacinto), and San Diego (between Carlsbad and Oceanside, Warner's Ranch, Pacific Beach, west slope of coast range on San Diego wagon road, Campo, and Vallecito), counties, and on the Mohave Desert.

Habits.—A captive individual ate a Brown-shouldered Lizard (*Uta stansburiana*). A fine male dug out of a hole in a sand hill east of Yuma, Arizona, contained a *Dipsosaurus dorsalis* which it had eaten.

Genus 33. *Pituophis*

Pituophis HOLBROOK, N. Amer. Herpet., Ed. 2, Vol. IV, 1842, p. 7 (type, *melanoleucus*).

Churchillia BAIRD & GIRARD, Stansbury's, Exped. Gt. Salt Lake, 1852, p. 350 (type, *bellona*).

The body is long but rather stout, with tail of moderate length. The neck usually is slightly constricted, so that the

head appears little distinct from it. The snout is long, narrowly rounded, and projecting beyond the lower jaw. The head plates show many variations, but when typical are normal except that there are four prefrontals. The nasals usually are distinct. One or two preoculars, two to four postoculars, and a loreal are present. Temporals are many and very variable. The scales are in 27 to 37 rows, the dorsals keeled, some of the lateral rows smooth. The anal plate is single. Urosteges are in two series. The eye is large, with round pupil.

The snakes of this genus are popularly known as Gopher or Bull Snakes. Seven kinds occur within the geographical limits of this work. The differences between them are set forth in the following table of averages and synopsis of species and subspecies.

Table of Average Differences in *Pituophis*

Average No. of	<i>catenifer</i>	<i>heermanni</i>	<i>annectens</i>	<i>deserticola</i>	<i>stejnegeri</i>	<i>rutilus</i>	<i>vertebralis</i>
Specimens	103	28	69	28	29	16	15
Gastrosteges	*217 †220	*219 †224	*228 †231	*234 †239	*233 †235	*227 †237	244
Urosteges	* 69 † 64	* 68 † 60	* 76 † 70	* 64 † 59	* 66 † 60	* 63 † 57	62
Scale-rows	31.1	31.3	32.4	32.3	29	32.1	34
Preoculars	2-2	2-2	2-2	2-2	1-1	1-1	2-2
Supralabials	8	8	8	8	8	8	9
Body blotches	70	58	74	56	58	46	44
Tail blotches	21.4	15	22.8	15.4	16.5	12.5	11

*Males. †Females.

SYNOPSIS OF SPECIES AND SUBSPECIES

- a.—Coloration on anterior half of body not largely red.
- b.—The number of gastrosteges less the number of dorsal blotches on body and tail rarely exceeds 151.
- c.—Gastrosteges fewer (200 to 230), average fewer than 225; urosteges fewer (51 to 80), average in males 70, females 63), scale rows usually (70 to 75%) not more than 31.
- d.—Dorsal blotches more numerous on body (56 to 93, average 70) and tail (14 to 30, average 21.4).
P. c. catenifer.—p. 707.
- d'.—Dorsal blotches fewer on body (48 to 70, average 57.6) and tail (13 to 19, average 15).
P. c. heermanni.—p. 715.
- c'.—Gastrosteges more numerous (217 to 243), average more than 225; urosteges more numerous (62 to 85, average in males 76, females 70); scale-rows usually (63%) more than 31. Dorsal blotches numerous on body (54 to 89, average 74) and tail (14 to 29, average 22.8).
P. c. annectens.—p. 719.
- b'.—The number of gastrosteges less the number of dorsal blotches on body and tail usually exceeds 151; gastrosteges more than 220.
- cc.—The sum of the number of scale-rows and of preoculars on both sides of head rarely exceeds 33; usually one preocular.
P. c. stejnegeri.—p. 729.
- cc'.—The sum of the number of scale-rows and of preoculars on both sides of head usually exceeds 33.
- dd.—The sum of the number of caudal blotches and preoculars of both sides of head usually exceeds 16; usually two preoculars; posterior dorsal blotches not distinctly reddish.
P. c. deserticola.—p. 725.

dd'.—The sum of the number of caudal blotches and preoculars of both sides of head rarely exceeds 16; usually one preocular; posterior dorsal blotches often distinctly reddish or red-brown.

P. c. rutilus.—p. 733.

a'.—Coloration on anterior half of body largely red. Gastrosteges 233 to 257; scales usually in 35 or 33 rows; dorsal blotches few (average 44 on body, 11 on tail); supralabials usually nine or more.

P. vertebralis.—p. 737.

158. *Pituophis catenifer catenifer* (Blainville)

COAST GOPHER SNAKE

Plate 74

Coluber catenifer BLAINVILLE, Nouv. Ann. Mus. Hist. Nat., Vol. IV, 1835, p. 290, pl. 26, figs. 2-2b (type locality, California); BOULENGER, Cat. Snakes Brit. Mus., Vol. II, 1894, p. 67 (part).

Pituophis catenifer BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 69; GIRARD, U. S. Explor. Exped., Herp., 1858, p. 135, pl. VIII, figs. 1-7; GÜNTHER, Cat. Colub. Snakes Brit. Mus., 1858, p. 87; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 195 (part); VAN DENBURGH, Proc. Amer. Philos. Soc., Vol. XXXVII, No. 157, p. 140; McLAIN, Critical Notes, 1899, p. 11; DITMARS, Reptile Book, 1907, p. 320, pl. XCIX, fig. 2 (part); VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. III, 1912, p. 158 (part); VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. IV, 1914, p. 136; STORER, Copeia, 1916, No. 35, p. 74.

Pituophis Wilkesii BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 71 (type locality, Puget Sound, Oregon); GIRARD, U. S. Explor. Exped., 1858, p. 137, pl. IX, figs. 1-7; LORD, Naturalist Vancouver Island, Vol. II, 1866, p. 307 (part).

Pityophis catenifer COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 39; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 641 (part); COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 876 (part).

Pityophis sayi sayi YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 105 (part).

- Pityophis sayi bellona* YARROW & HENSHAW, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 212 (part); YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 106 (part).
- Pityophis catenifer catenifer* BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 53 (part).
- Pituophis catenifer catenifer* GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 193 (part); STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 85; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. IX, 1919, p. 211, pls. XI, XII, fig. 1 (part); VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. X, No. 1, 1920, p. 13.

Description.—Head rather flat-topped or rounded, with snout projecting and rather narrow. Temporal regions not swollen. Rostral plate very large, prominent, not very narrow but often recurved between internasals on top of snout; bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of internasals, four, two, one, three, five, six, or eight prefrontals, a frontal, supraocular of each side, and a pair of parietals. Anterior and posterior nasals usually distinct, sometimes united. Loreal usually elongate. One or usually two preoculars, and two to five, usually three, postoculars. Tips of some labials often cut off, forming suboculars or loreals. Seven to 10, usually eight, and 10 to 14, usually 13 or 12, inferior labials, next to last superior and sixth or seventh inferior usually largest in its series, fourth or fifth superior usually reaching eye, first pair of inferior meeting on median line. Temporals in first row varying from two to six, usually four or three, very variable. Two pairs of genials, anterior much larger than posterior. Scales on body in 29 to 33 rows, usually 31, keeled except in a varying number (about three to 10) of rows on each side. Anal plate not divided. Gastrosteges varying in number from 200 to 230, males having from 207 to 230, females from 200 to 230.



Pitophis catenifer catenifer, Coast Gopher Snake.
Collected near Wild Cat Creek, South Fork of Scott River, near Callahan, Siskiyou County,
California, May, 1913.

Urosteges in two series of from 53 to 79, males having from 59 to 79, females from 53 to 78.

The ground color is pale brown or yellowish gray, sometimes obscured by the spreading of the blotches or the presence of dark marks along the keels of its scales. Along the middle of the back between the head and a point over the anus is a series of from 56 to 93 (average 70) dark brown or black blotches. On the upper surface of the tail are from 14 to 30 (average 21.4) dark blotches. There are several series of smaller alternating dark blotches or spots on the sides. These spots sometimes tend to unite to form longitudinal lines. Across the top of the head, between the preocular plates, is a line of black or brown. A similar line runs down from the center of the eye and another back and down from the upper postocular plate. The lower surfaces are yellowish white, usually maculated with black or brown.

Length to anus.....	315	660	820	860	1200	1260
Length of tail.....	52	135	165	170	270	210

Variation.—One specimen has no loreal plates; the other 103 all have the normal loreal 1—1. The preoculars are 2—2 in seventy-nine, or 78%; 1—1 in seventeen, or 16%; and 1—2 in six, or 6%. The postoculars are 3—3 in seventy-one, or 69%; 3—4 in eighteen, or 17%; 4—4 in eleven, or 11%; 4—5 in one, or 1%. 2—3 in one, or 1%; and 2—2 in one, or 1%. The temporals are 4—4 in thirty-nine, or 38%; 3—3 in twenty-six, or 25%; 3—4 in twenty-one, or 20%; 4—5 in nine, or 9%; 2—3 in three, or 3%; 2—2 in three, or 3%; 5—5 in one, or 1%; and 2—4 in one, or 1%. The supralabials are 8—8 in fifty-six, or 54%; 8—9 in twenty-seven, or 26%; 9—9 in fourteen, or 14%; 9—10 in three, or 3%; 7—8 in two, or 2%; and 10—10 in one, or 1%. The infralabials are 13—13 in thirty-two, or 31%; 12—12 in twenty-two, or 21%; 12—13 in nine-

teen, or 18%; 11—12 in nine, or 9%; 13—14 in seven, or 7%; 11—11 in six, or 6%; 11—13 in three, or 3%; 10—10 in three, or 3%; 14—14 in one, or 1%; and 10—11 in one, or 1%. The scale-rows are 31 in sixty-nine, or 68%; 33 in twenty, or 20%; and 29 in twelve, or 12%; the average is 31.1 rows. The gastrosteges vary in number from 200 to 230, males having from 207 to 230, females from 200 to 230; the average in 54 males is 217, in 46 females is 220. The urosteges vary from 53 to 79, males having from 59 to 79, females from 53 to 78; the average in 53 males is 69, in 45 females, 64.

The dark blotches between head and anus in 75 specimens vary from 56 to 93, the average being 70. On the tail, in 83 specimens, they vary from 14 to 30, and average 21.4.

Distribution.—The Coast Gopher Snake occupies a rather narrow strip of territory along the Pacific Coast of the United States from British Columbia (Sumass) and Puget Sound to Santa Barbara County, California. The eastern limit of its range in the far north is not known, but does not include eastern Washington, where other subspecies occur.

In Washington, gopher snakes taken at Puget Sound, Fort Steilacoom, Wenass River, and at Meadow Creek in Chelan County, probably belong to this subspecies, but have not been recently examined.

In southern Oregon, it occurs near Roseburg and in the Camas Mountains, in Douglas County, but not near Klamath Falls, Klamath County, where it is replaced by *P. catenifer heermanni*.

In California, it occupies the coast ranges and valleys east to the western edges of the Sacramento and San Joaquin valleys, where it intergrades with and, farther east, is re-

placed by *P. catenifer heermanni* in the north and *P. catenifer deserticola* in the south. Still farther south, it probably intergrades with *P. catenifer annectens* in Santa Barbara or Ventura County. It has been taken in Siskiyou (Fort Jones, Callahan, Mt. Shasta), Humboldt (Garberville), Trinity (Yolla Bolly Mountain), Mendocino (ten miles south from Willits), Lake (Middletown, Kelseyville, Lower Lake), Sonoma (Petaluma, Duncan Mills, Guerneville, Monte Rio), Napa (Napa), Solano (Buddha Canyon), Marin (Inverness, Point Reyes Station, Mailliard, Mt. Tamalpais, Lagunitas, Manzanita, San Anselmo), Contra Costa (Walnut Creek, Antioch, Contra Costa, San Pablo Valley, Mt. Diablo, Moraga Valley), Alameda (Berkeley, Oakland, Haywards), San Francisco, San Mateo (Millbræ), Santa Clara (Palo Alto, Stanford University, Sunnyvale, San Jose, Los Gatos, Alma, Coyote, Coyote Creek), Santa Cruz (Glenwood, Corralitos, Soquel), San Benito (San Juan), Monterey, Carmel, Bradley, Soledad, Coburn, Welby, Metz), San Luis Obispo (San Miguel, Pismo, Edna, Indian Creek, San Juan River, Source of the Salinas River), and Santa Barbara (Santa Cruz Island) counties.

Habits.—The Gopher or Bull Snake is the largest as well as one of the most abundant of Californian serpents. Individuals more than six feet long are rarely found. These are usually very gentle and show little resentment even when roughly handled. The younger snakes, however, sometimes strike fiercely, but of course harmlessly. This snake shares with many others the curious habit of rapidly vibrating the tip of its tail when excited; an action which sometimes, when the tail happens to strike upon dry leaves or grass, produces a sound not unlike the warning whir of the rattlesnake. Its food, so far as is known, consists of small mammals, of which gophers are said to form a large part.

Young birds also sometimes are eaten. On one occasion a half-grown snake of this kind was found in an aviary where domestic canaries were breeding. The snake had crawled into the cage through the half-inch mesh of the wire netting without difficulty. After having dined on the contents of a nest, however, the diameter of the snake was so much increased that it could not escape and was killed. When I opened it I found three nearly fledged young canaries.

I once saw a Boyle's Milk Snake kill and eat a *Pituophis c. catenifer* which was only about three inches shorter than itself. See plate No. 82 for photographs.

A female gopher snake which I had in captivity had been captured a few days before "in a marsh near Palo Alto," Santa Clara County, California. During the next few days this snake lay almost motionless in a small box in my office in the California Academy of Sciences. On the afternoon of July 13, however, it became very restless and seriously injured its snout in attempting to find some hole through which it might escape from its prison. The next morning—July 14—to my surprise, several eggs were in the box, and the number was added to at intervals until by noon of the next day, 19 eggs had been laid.

The eggs when first laid are covered with a loose, soft, sticky, parchment-like white membrane. This quickly dries and hardens, shrinking upon the substance of the egg until quite tense and cementing each egg to the others upon which it is laid. After the membranous shell has become dry it ceases to shrink, and if the substance of the egg be reduced, as by evaporation, wrinkles appear upon its surface. However, the softness of the shell and its power to shrink upon its contents are restored by the application of water.

The eggs as laid formed a great cluster surrounded by the coiled body of the snake. The latter hissed fiercely

when the eggs were removed, although she had not shown the slightest resentment when handled on previous days.

Mr. Tracy I. Storer has published the following notes on an "albino" snake of this subspecies:

"The specimen under discussion was captured in a dormant state at Pescadero, a coastal locality in San Mateo County, California, early in November, 1913, on black adobe soil where gopher snakes were said to be fairly common. The snake was kept alive for more than a year and is now in the reptile collection of the Department of Zoology of the University of California.

"The coloration of a typical gopher snake seems to be made up of three distinct materials; a yellow deposit found generally distributed in the scales of the body and forming the ground color, and two darker pigments, a red and a black, occurring locally and forming the contrasted part of the color pattern. The yellow pigment is present in the scales of the albino specimen as is also (in part at least) the red, but the black is entirely lacking. Upon the anterior portion of the body, where ordinarily the black and red together form brown spots only the red is present, and on the tail where a normal specimen is black, only pale bluish or uncolored areas are to be seen. The iris and tongue which are normally dark shared in the loss of color and were of a light pinkish cast. Evidently the factor controlling the formation and deposition of black pigment failed of operation throughout the entire body.

"Accompanying this abnormality in coloration there were irregularities in scale pattern, especially on the head, which suggests that whatever cause operated to prevent the formation of black pigment also may have had some effect on scale formation. Several of the head scales are of quite different shape than those found on a normal specimen, and some show suggestions of divisions which were not com-

pleted. There are four postoculars, where but three normally occur. The body scales, save for the interpolation of an incomplete gastrostege which extends but half way across the body, are quite typical and numerically are within the limits given by Cope.

"This snake was kept in captivity for more than a year, confined in a glass terrarium with a screened top. It was provided with water and at intervals small white mice were fed to it; one of these bit the snake on the head and produced a "scalp" wound. One morning after the animal had been in captivity for about four months the skin on the preorbital portion of its head was seen to be free from the scales beneath. Some straw was placed in the terrarium and within a few minutes the snake was working rapidly back and forth through the straw, freeing itself from the old skin. At the place where its body was just being freed from the skin, violent muscular expansions and contractions were being executed. The surface of the snake's body and the outside, originally the inside, of the sluffed skin were noticeably moist as a result of the secretion which had been poured out to assist in moulting. For several weeks previous to moulting the snake had been quite sluggish, remaining coiled in one corner of the terrarium and refusing food. During this time its eye became gradually dulled and the skin was seen to be free from the body in several places. Immediately after the moult the animal became very active."

159. *Pituophis catenifer heermanni* (Hallowell)

VALLEY GOPHER-SNAKE

Plate 75

- Pityophis Heermanni* HALLOWELL, Proc. Acad. Nat. Sci. Phila., Vol. VI, 1853, p. 236 (type locality, **Cosumnes River, California**).
- Pityophis vertebralis* HALLOWELL, Rep. Pacific R. R. Surv., Vol. X, 1853, Pt. IV, p. 14.
- ? *Pituophis Wilkesii* LORD, Naturalist Vancouver Island, Vol. II, 1866, p. 307 (part).
- Pityophis sayi bellona* YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 106 (part); TOWNSEND, Proc. U. S. Nat. Mus., Vol. 10, 1887, p. 239 (?).
- ? *Pityophis catenifer* TOWNSEND, Proc. U. S. Nat. Mus., Vol. 10, 1887, p. 239.
- Pituophis catenifer* VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 195 (part).
- Pityophis catenifer catenifer* BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 53 (part).
- Pituophis catenifer catenifer* GRINNELL & CAMP, Univ. Cal. Publ. Zool. Vol. 17, No. 10, 1917, p. 193 (part); VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. IX, 1919, p. 211 (part); DICE, Univ. Cal. Publs. Zool., Vol. 16, No. 17, 1916, pp. 303, 307, 308, 310 (?).
- Pituophis catenifer heermanni* VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. X, No. 1, 1920, p. 16, pl. 1, fig. 2.
- Pituophis catenifer deserticola* BLANCHARD, Copeia, 1921, No. 90, p. 5.

Description.—Head somewhat flat-topped, with snout projecting and rather narrow. Temporal regions not swollen. Rostral plate very large, prominent, not very narrow, often recurved between internasals on top of snout; bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of internasals, a variable number of prefrontals (normally four), a frontal, supraocular of each side, and a pair of parietals. Anterior and posterior nasals usually distinct. Loreal usually elongate. Preoculars usually two, occasionally one. Postoculars normally

three, sometimes four or five. Supralabials usually eight sometimes nine, rarely seven or 10. Infralabials usually 13, sometimes 12, 14 or 11. Temporals of first row varying from two to six, usually four. Genials in two pairs, anterior larger. Scales on body in 29 to 35 rows, usually 31; keeled except in a varying number of rows on each side. Anal plate not divided. Gastrosteges varying in number from 209 to 231, males having from 209 to 231, females from 218 to 231. Urosteges in two series of from 55 to 74, males having from 61 to 74, females from 55 to 66.

The ground color is pale brownish or grayish yellow, sometimes obscured by the spreading of the blotches or the presence of dark marks along the keels of the scales. Along the middle of the back between the head and the anus is a series of from 48 to 70 (average 58) dark brown blotches. On the upper surface of the tail are from 13 to 19 (average 15) blotches. There are several series of smaller alternating dark blotches on the sides. These spots and blotches often are edged with darker brown or black, and tend to become blackish on the tail. Across the top of the head, between the preocular plates, is a narrow band of brown. A similar line runs down from the center of the eye, and another back and down from the upper postocular plate. The lower surfaces are yellow or yellowish white, usually blotched with black or brown.

Length to anus.....	548	838	877	906	974	1022
Length of tail.....	82	148	174	153	177	175

Variation.—The loreal is 1—1 in all of the 28 specimens. The preoculars are 2—2 in twenty-six, or 93%; and 1—1 in two, or 7%. The postoculars are 3—3 in twenty-three, or 85%; 4—4 in three, or 11%; and 4—5 in one, or 4%. The temporals are 4—4 in eleven or 45%; 3—4 in five, or 21%; 5—5 in three, or 13%; 3—3 in three, or



Pituophis catenifer heermanni, Valley Gopher Snake
Collected five miles south from Madera, Madera County, California, May, 1920.

13%; 4—6 in one, or 4%; and 2—3 in one, or 4%. The supralabials are 8—8 in twelve, or 48%; 8—9 in eight, or 32%; and 7—7, 7—8, 9—9, 9—10, and 10—10, each in one, or 4%. The infralabials are 13—13 in twelve, or 50%; 12—12 in six, or 25%; 14—14 in two, or 8%; 12—13 in two, or 8%; and 12—14, and 11—14 each in one, or 4%. The scale rows are 31 in thirteen, or 46%; 33 in eight, or 29%; 29 in six, or 21%; and 35 in one, or 4%; the average is 31.3 rows. The gastrosteges vary in number from 209 to 231, males having from 209 to 231, females from 218 to 231; the average in 16 males is 219, in twelve females, 224. The urosteges vary from 55 to 74, males having from 61 to 74, females from 55 to 66; the average in fifteen males is 68; in eleven females is 60.

The dark blotches between head and anus in 28 specimens vary from 48 to 70, the average being 57.6. On the tail, in 32 specimens, they vary from 13 to 19, and average 15.

Distribution.—This subspecies occupies the Klamath region in Oregon, and, in California, the Sacramento Valley, the northern part of the San Joaquin Valley, and the western slope of the Sierra Nevada, except in the southern end of the range. Along the western edge of its territory it intergrades with *P. catenifer catenifer*, and in the south with *P. catenifer desertyicola*.

Washington specimens recorded by Dr. Blanchard as *P. c. desertyicola* seem to me to belong to this subspecies. They were collected in Okanogan (Omak Lake) and Spokane (Marshall) counties. It is probable that those secured by Dice in Walla Walla (Wallula) and Columbia counties also belong here. The same may be true of specimens from Colville, Stevens County, Fort Walla Walla, Walla Walla County, and Almota, Whitman County.

In Oregon, *P. c. heermanni* has been taken near Klamath Falls, Klamath County. The positive identification of gopher-snakes which have been collected at The Dalles, Wasco County, Willows, Gilliam County, Heppner, Morrow County, Umatilla, Umatilla County, Burns, Harney County, and Juntura, Malheur County, must await re-examination of the specimens. Those from Malheur and Harney counties may not improbably be *P. c. deserticola*.

California specimens have been collected in Modoc (Canby, Goose Lake Meadows, Sugar Hill, between Alturas and Davis Creek, Dry Creek in the Warner Mts.), probably Shasta (McCloud River), Tehama (Tehama), Glenn (Fruto, Winslow), Butte (between Live Oak and Gridley), Yolo (Grand Island Landing), Placer (Lander near Colfax), El Dorado (Fyffe, Riverton), San Joaquin (Tracy), Merced (Los Baños, Snelling), Mariposa (between Kinsley and MaCauley's Stage Station, Coulterville, Pleasant Valley), Madera (five miles south from Madera), and Fresno (King's River, Dunlaps, Clovis) counties.

Remarks.—The snakes which are here referred to *Pituophis catenifer heermanni* are intermediate in characters between *P. catenifer catenifer* and *P. catenifer deserticola*. They agree with the former subspecies in the small number of their gastrosteges, and with the latter in the possession of fewer dorsal spots. Individual variation, of course, often makes it impossible positively to identify single specimens, but real geographic variation, nevertheless, is evident in series of specimens, and it seems best to recognize this difference by name.

160. *Pituophis catenifer annectens* (Baird & Girard)

SAN DIEGAN GOPHER SNAKE

Plate 76

- Pituophis annectens* BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, 1853, p. 72 (type locality, San Diego, California).
- Pityophis sayi sayi* YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 105 (part).
- Pityophis sayi bellona* STREETS, Bull. U. S. Nat. Mus., No. 7, 1877, p. 40; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 106 (part); COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 872 (part).
- Pityophis catenifer* COPE, Proc. Acad. Nat. Sci. Phila., 1883, p. 29; COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 876 (part).
- Pituophis catenifer* VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 195 (part); GRINNELL & GRINNELL, Throop Inst. Bull., No. XXXV, 1907, p. 46, fig. 20; GRINNELL, Univ. Cal. Publ. Zool. Vol. 5, No. 1, 1908, p. 165; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. III, 1912, pp. 149, 150; ATSATT, Univ. Cal. Publ. Zool., Vol. 12, No. 3, 1913, p. 43; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. IV, 1914, p. 141; RUTHLING, Copeia, 1916, No. 37, p. 91; STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 64.
- Pituophis catenifer desertyicola* VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. IV, 1914, p. 142.
- Pituophis catenifer catenifer* GRINNELL & CAMP, Univ. Cal. Publ., Zool., Vol. 17, No. 10, 1917, p. 193 (part); COWLES, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, 1920, p. 66.
- Pituophis catenifer annectens* VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. IX, 1919, p. 216 (part); VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. X, No. 1, 1920, p. 17, pl. 1, fig. 2; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 52, 67; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 130.

Description.—Head somewhat flat-topped, with snout projecting and rather narrow. Temporal regions not swollen. Rostral plate very large, prominent, not very narrow, often recurved between internasals on top of snout; bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of internasals, a variable

number of prefrontals (normally four), a frontal, supra-ocular of each side, and a pair of parietals. Anterior and posterior nasals usually distinct. Loreal usually elongate. Preoculars usually two, sometimes one. Postoculars normally three, sometimes four, two or five. Supralabials usually eight, sometimes nine. Infralabials usually 13, sometimes 14 or 12, rarely 11, 10 or 15. Temporals of first row varying from two to six, usually four. Genials in two pairs, anterior larger. Scales on body in 29 to 35 rows, usually 33; keeled except in a varying number of rows on each side. Anal plate not divided. Gastrosteges varying in number from 217 to 243, males having from 217 to 243, females from 218 to 240. Urosteges in two series of from 62 to 85, males having from 62 to 85, females from 62 to 83.

The ground color is yellow or grayish or brownish, usually much obscured by the spreading the the blotches and the presence of dark marks on the keels of the scales. Along the middle of the back, from the head to a point over the anus, is a series of from 54 to 89 (average 74) dark brown or black blotches. The blotches of the median dorsal series usually are comparatively small, while those of the upper lateral series are large for that series and usually are irregularly blended with the median series. This blending is most marked anteriorly, where it often obscures the pattern. On the upper surface of the tail are from 14 to 29 (average 22.8) dark brown or black blotches or cross-bars, usually discrete. On the sides are other series of dark brown or black spots, which may show a tendency to form broken longitudinal bands anteriorly. The usual head bands are present, but often are not very distinct. The top of the head is yellowish brown spotted or marbled with dark brown. The spaces between the dark dorsal blotches are yellow or light brown, sometimes with an orange tinge pos-



Pituophis catenifer amnecetus, San Diego Gopher Snake
Collected at Warren's Ranch near Campo, San Diego County, California, May, 1920

teriorly, and usually have dark marks on the keels of the scales. The lower surfaces are yellow or yellowish white, more or less spotted or blotched with black or dark brown, especially near the ends of some of the gastrosteges and urosteges. The dark marks on the urosteges may form a pair of dark longitudinal subcaudal streaks.

Length to anus.....	305	910	930	1160	1190	1320
Length of tail.....	60	195	193	230	218	245

Variation.—Sixty-nine specimens all have loreals 1—1. The preoculars are 2—2 in forty-four, or 64%; 1—1 in twenty, or 29%; and 1—2 in five, or 7%. The postoculars are 3—3 in forty, or 59%; 4—4 in thirteen, or 19%; 3—4 in eleven, or 16%; and 2—3, 2—4, 4—5, and 5—5 each in one. The temporals are 4—4 in twenty-three or 34%; 3—3 in fifteen, or 22%; 3—4 in twelve, or 18%; 4—5 in five, or 7%; 5—5 in five, or 7%; 3—5 in two, or 3%; and 2—2, 2—3, 2—4, 4—6, and 5—6 each in one. The supralabials are 8—8 in thirty-three, or 48%; 9—9 in nineteen, or 27%; and 8—9 in seventeen or 25%. The infralabials are 13—13 in thirty-four, or 49%; 13—14 in ten, or 14%; 12—12 in eight, or 12%; 12—13 in seven, or 10%; 14—14 in three, or 4%; 11—13 in two, or 3%; and 10—11, 11—11, 11—12, 12—14, and 14—15 each in one. The scale rows are 33, in thirty-seven, or 54%; 31 in twenty-five, or 36%; 35 in six, or 9%; and 29 in one, or 1%; the average is 32.4 rows. The gastrosteges vary in number from 217 to 243, males having from 217 to 243, females from 218 to 240; the average in 43 males is 228, in twenty-five females, 231. The urosteges vary from 62 to 85, males having from 62 to 85, females from 62 to 83; the average in thirty-nine males is 76, in twenty-four females, 70.

The dark blotches between head and anus in 71 speci-

mens vary from 54 to 89, the average being 74. On the tail, in 65 specimens, they vary from 14 to 29, and average 22.8.

Distribution.—This subspecies occupies the coast region of southern California and northern Lower California, and has been found on some of the islands off the coast. We have examined specimens from Santa Barbara (Santa Barbara), Ventura (Pine Creek), Los Angeles (Charter Oak, Cold Water Canyon, La Crescenta, Pasadena, Mount Wilson, Sierra Madre, Claremont), San Bernardino (Ontario), Riverside (Colton, San Bernardino Mountains, Riverside, San Jacinto, San Jacinto Mountains), and San Diego (Warner Pass, Agua Caliente, Cahuilla Valley, Julian, Cuyamaca Mountains, Campo), counties, California, and from Ensenada, San Martin Island and South Coronado Island, Lower California.

It is probably this subspecies of gopher-snake which has been observed but not captured on Santa Catalina Island. Those of Santa Cruz Island, however, are *Pituophis catenifer catenifer*.

Remarks.—This subspecies may be known by its large number of gastrosteges and urosteges, and its numerous dorsal blotches. It seems to be confined to the region west of the desert areas, and probably intergrades with *P. catenifer deserticola* along the western edge of the desert. Intergradation with *P. catenifer catenifer* probably occurs in or about Santa Barbara County.

Habits.—“This is the most often met with of all our snakes, and, taken on the whole, has the most favorable reputation with the ordinary run of people. Most ranchers and country people have learned to recognize in the gopher

snake an efficient destroyer of those pests of the farm, gophers and squirrels, and accordingly seldom offer injury willfully.

“But with city people who now and then drive into the country it is different. The gopher snake has an unfortunate habit of crawling out into open roads, especially on warm spring days, evidently with the purpose of basking in the grateful sunshine. Along comes the city man with his instinctive but unreasonable fear and hatred for snakes in general, and he attacks the harmless and slow-moving gopher snake to the usual destruction of the latter. So often one sees the mangled remains along roadsides that it seems a wonder that there are any gopher snakes whatever left.

“It is very evident that snakes are far less common than they used to be 20 years ago; at the same time gophers and ground squirrels are in many districts more of a pest than ever before; and the reason is obvious. In commendable contradistinction to the deplorable thoughtlessness of the average person is the good sense of the occasional farmer who actually invites the gopher snakes to make their homes on his land. We know of a few such who bring to their ranches every snake they can readily capture. And we have been repeatedly assured that many an old gopher who had proved too wise for traps and apparently immune to poison, had finally met his Waterloo in the long gullet of a gopher snake.

“The snake is introduced into the burrow of the rodent and disappears. In a few hours he reappears, languidly crawling into the sunshine, while a huge bulge about two-thirds the way along his mottled body gives proof of what has happened down in the dark underground galleries.

“The school teachers and pupils of the county can do a good turn by advertising the good services of snakes in general, recommending their protection on grounds of eco-

nomie value. This appeals to many people who would never admit the inhumanity of killing a snake.

"This snake, sometimes called 'bull snake,' especially by people who have just come from the East, is not in the least poisonous, tho we have known large examples to inflict sufficiently effective bites to draw blood.

"This snake grows to large size; the largest specimens which we have ourselves measured were 52, 58, and 62 inches long, respectively. Larger ones are often reported.

"The gopher snake has the curious habit of vibrating its tail rapidly when excited, and if it happens to be among dry leaves or weed stems the sound is not unlike the whirl of the rattlesnake.

"The gopher snake hides away during the winter months in rock piles, and possibly in holes in the ground. We know nothing of its breeding places or habits." (Grinnell and Grinnell.)

Mr. Paul Ruthling notes: "One 64-inch Pacific Bull Snake that was brought to me was handled too much. A slight touch of *mal de mer* resulted in his vomiting four full-grown gophers, none of which was more than slightly digested. On another occasion more than a dozen mice had the misfortune to run foul of a mouse trap I had set for living mice. These same mice had the additional misfortune all to find their way into the stomach of a good-sized hungry Pacific Bull Snake.

"Taking it all in all, the good done by the Pacific Bull Snake has already earned him the protection of many ranchers and far outweighs any harmful depredations his lack of discretion may at times mislead him to make."

161. *Pituophis catenifer deserticola* (Stejneger)

DESERT GOPHER SNAKE

- Pituophis bellona* COOPER, Proc. Cal. Acad. Sci., Vol. IV, 1870, p. 66.
- Pityophis sayi bellona* COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 39 (part); YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 540; YARROW & HENSHAW, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 212 (part); YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 106 (part); COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 641 (part); COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 872 (part); DITMARS, Reptile Book, 1907, p. 320 (part).
- Pityophis sayi sayi* YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 105 (part).
- Pityophis catenifer* COPE, Proc. Acad. Nat. Sci. Phila., 1883, p. 18.
- Pituophis catenifer* STEJNEGER, N. Amer. Fauna, No. 5, 1891, p. 110; STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 206; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. III, 1912, p. 158 (part).
- Pityophis catenifer* COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 876 (part).
- Pityophis catenifer bellona* BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 54 (part).
- Pituophis catenifer deserticola* STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 206 (type locality, **Great Basin and the southwestern deserts**); VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 198; MEEK, Field Mus. Nat. Hist., Zool. Ser., Vol. VII, No. 1, 1906, p. 15 (part); TAYLOR, Univ. Cal. Publ. Zool., Vol. 7, No. 10, 1912, p. 354; RICHARDSON, Proc. U. S. Nat. Mus., Vol. 48, 1915, p. 427; RUTHVEN & GAIGE, Occas. Papers Mus. Zool. Univ. Mich., No. 8, 1915, p. 31; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. V, 1915, p. 107; GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, p. 193; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 86; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. X, No. 1, 1920, p. 19; STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 64; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 28, 37, 52; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 126.
- Pituophis catenifer annectens* VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. IX, 1919, p. 216 (part).

Description.—Head somewhat flat-topped or rounded with snout projecting and rather narrow. Temporal regions not swollen. Rostral plate very large, prominent not very narrow but often recurved between internasals on top of snout; bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of internasals, a variable number of prefrontals (normally four), a frontal, supraocular of each side, and a pair of parietals. Anterior and posterior nasals usually distinct, sometimes united. Loreal usually elongate. One or usually two preoculars; and three or four, usually three, postoculars. Tips of some labials may be cut off forming suboculars or loreals. Supralabials usually eight, sometimes nine or 10. Infralabials usually 13, sometimes 12 or 14. Temporals of first row varying from two to six, usually four. Genials in two pairs, anterior much larger than posterior. Scales on body in 29 to 37 rows, usually 33 or 31, keeled except in a varying number of rows on each side. Anal plate not divided. Gastrosteges varying in number from 223 to 263, males having from 224 to 252, females from 223 to 263. Urosteges in two series of from 50 to 72, males having from 58 to 72, females from 50 to 67.

The ground color is pale yellow or grayish yellow, sometimes more or less obscured by the spreading of the blotches or the presence of dark keels on the scales, especially laterally and anteriorly. Along the middle of the back, from the head to a point over the anus, is a series of from 46 to 66 (average 55) dark brown blotches. These blotches may be blackish or actually black on the neck and toward the tail, and may be more or less margined with black throughout. On the upper surface of the tail are from 12 to 21 (average 15.4) dark brown or black blotches or cross-bars. The dorsal blotches on the anterior part of the body may be rounded, but they soon become more or less quadrate

posteriorly and may be so even on the neck. There are several series of smaller, alternating blotches or spots on the sides. Across the top of the head between the preocular plates is a narrow, brown band, often more or less faded. A similar band runs down and back from the upper postocular, and there is a brown or black spot below the eye. The top of the head is grayish or yellowish brown, marbled with dark brown on the parietal and frontal plates. The spaces between the dark dorsal blotches on the posterior part of the body are grayish or yellowish or light brown, sometimes with an orange tinge, usually without dark marks on the keels of the scales. Anteriorly dark keels often are present on the scales of the interspaces. The lower surfaces are yellow or yellowish white with brown or black spots, chiefly on the lateral portions of each second, third or fourth gastrostege and urostege. In some specimens there are central marblings. Rarely, there may be one median, or two lateral, longitudinal subcaudal dark bands.

Length to anus.....	380	492	570	720	765	1155
Length of tail.....	65	90	98	122	130	168

Variation.—Twenty-eight specimens from California and western Nevada show the following variations. The loreals are 1—1 in all. The preoculars are 2—2 in twenty-four, or 86%; 1—2 in two, or 7%; and 1—1 in two, or 7%. The postoculars are 3—3 in twenty-two, or 79%; 4—4 in five, or 18%; and 3—4 in one, or 3%. The temporals are 3—4 in eleven, or 39%; 4—4 in five, or 18%; 4—5 in four, or 14%; 5—5 in three, or 11%; and 2—3, 3—3, 3—5, 5—6, and 6—6 each in one, or 3%. The supralabials are 8—8 in seventeen, or 61%; 8—9 in six, or 21%; 9—9 in four, or 14%; and 8—10 in one, or 4%. The infralabials are 13—13 in thirteen, or 46%; 12—12 in six, or 21%; 12—13 in four, or 14%; 12—14 in two, or 7%; 13—14 in two, or

7%; and 14—14 in one, or 4%. The scale-rows are 33 in eleven, or 39%; 31 in eleven, or 39%; 35 in three, or 11%; 29 in two, or 7%; and 37 in one, or 4%; the average is 32.3 rows. The gastrosteges vary in number from 223 to 263, males having from 224 to 252, females from 223 to 263; the average in twelve males is 234, in sixteen females, 239. The urosteges vary from 50 to 72, males having from 58 to 72, females from 50 to 67; the average in twelve males is 64, in fifteen females, 59.

The dark blotches between head and anus in 28 specimens vary from 46 to 66, the average being 55. On the tail they vary from 12 to 21, and average 15.4.

Distribution.—In California this subspecies occupies the Colorado and Mohave deserts and the southern end of the San Joaquin Valley. It ranges north and east over most of Nevada.

From Nevada I have examined specimens of this subspecies from Humboldt (Thousand Creek Flat, Virgin Valley, Big Creek Pine Forest Mountains), Washoe (Pyramid Lake, Nixon), Ormsby (Carson), Lander (Austin), Elko (Carlin), Nye (Peavine Creek, Toiyabe Mountains, Round Mountain at 6,300 feet), and Esmeralda (Palmetto Mountains), counties.

Californian specimens examined have been collected in Imperial (Silsbee), Riverside (Mecca), San Bernardino (Victorville, Hesperia), Mono (Benton), Kern (Walker Pass, Tehachapi Mountains, Isabella, Delano, Bakersfield, Buttonwillow), and San Luis Obispo (Simmler, Poso, Palo Prieto, Shandon) counties.

Remarks.—Some of the specimens from the San Joaquin Valley and eastern San Luis Obispo county approach more or less closely to the characters of *P. catenifer heer-*

manni and *P. catenifer catenifer*. No sharp lines can be drawn between the subspecies, for one changes gradually into another. *P. catenifer catenifer*, with its fewer gastrosteges and many blotches, *P. catenifer heermanni*, with fewer gastrosteges and fewer spots, and *P. catenifer deserticola* with more gastrosteges and fewer spots, all intergrade.

As yet, too few specimens from Idaho are at hand to enable one to state to which subspecies they should be referred. They may perhaps belong here, but the few specimens I have seen seem more like the snakes of Utah than like those of Nevada.

162 *Pituophis catenifer stejnegeri* Van Denburgh

UTAH GOPHER SNAKE

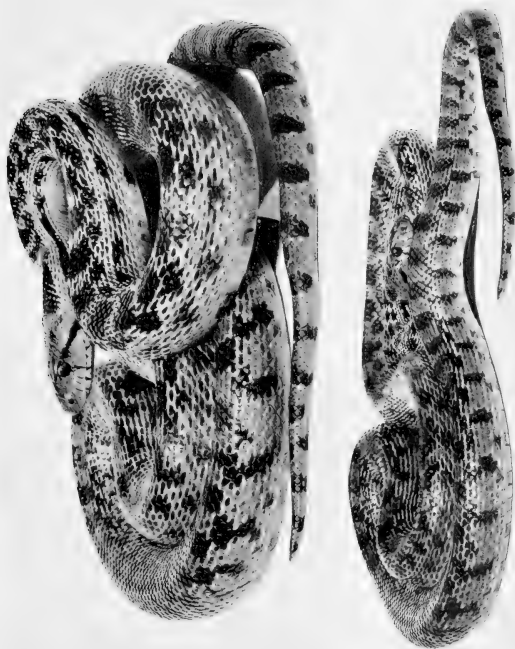
Plate 77

- Pityophis bellona* COPE, Ann. Rep. U. S. Geol. Surv. Terrs., 1871 (1872), p. 468.
- Pityophis sayi bellona*, COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 39 (part); YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 540 (part); YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 106 (part); COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 872 (part).
- Pityophis sayi sayi* YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 105 (part).
- Pityophis catenifer bellona* BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 54 (part).
- Pituophis catenifer deserticola* VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 5, No. 4, 1915, p. 107, pl. 14, fig. 5; PACK, Copeia, 1919, No. 68, p. 16.
- Pituophis catenifer annectens* VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 9, 1919, p. 216 (part).
- Pituophis catenifer stejnegeri* VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. X, No. 1, 1920, p. 21, pl. 2, fig. 1 (type locality, **Fort Douglas, Salt Lake County, Utah**); (?) VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 40, 45.

Description.—Head somewhat flat-topped, with snout projecting and rather narrow. Temporal regions not swol-

len. Rostral plate very large, prominent, not very narrow, often recurved between internasals on top of snout; bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of internasals, a variable number of prefrontals (normally four), a frontal, supraocular of each side, and a pair of parietals. Anterior and posterior nasals usually distinct. Loreal usually elongate. Preoculars usually one, occasionally two. Postoculars usually three, often two. Supralabials usually eight, often nine. Infralabials usually 13, often 12, sometimes 11 or 14. Temporals of first row varying from two to five, usually four. Genials in two pairs, anterior larger. Scales on body in 27 to 33 rows, usually 29, keeled except in a varying number of rows on each side. Anal plate not divided. Gastrosteges varying in number from 223 to 241, males having from 227 to 241, females from 223 to 240. Urosteges in two series of from 55 to 71, males having from 58 to 71, females from 55 to 62.

The ground color is pale brownish or grayish yellow, sometimes more or less obscured by the spreading of the blotches or the presence of black or dark brown marks along the keels of its scales. Along the middle of the back, from the head to a point over the anus, is a series of from 50 to 68 (average 58) dark blotches. These blotches are brown on the central part of the body but are black anteriorly and posteriorly. On the upper surface of the tail are from 14 to 20 (average 16.5) blackish blotches. On the anterior portion of the body the blotches are more or less rounded, but posteriorly they tend to become quadrate. There are several series of alternating, often more or less confluent, dark blotches or spots on the sides. Across the top of the head, between the preocular plates, is a moderately narrow brown band, very definite and well-defined. There are similar bands or spots below the center of the eye and run-



Pituophis catenifer stepnegeri, Utah Gopher Snake
Adult male collected in Trovo Canyon, Wasatch Mountains, Wasatch County, Utah, May, 1913.

ning back and down from the upper postocular plate. The top of the head posteriorly has a few small, scattered, dark spots. The spaces between the dark dorsal blotches on the posterior portion of the body are yellow or orange yellow, usually somewhat obscured by dark brown streaks along the keels of the scales. The lower surfaces are yellow or yellowish white with irregular spots or blotches of dark brown or black on the gastrosteges and urosteges. There is no definite median subcaudal black band.

Length to anus.....	758	800	863	1028	1125	1125
Length of tail.....	126	148	168	179	190	207

Variations.—Twenty-nine specimens from Utah show the following variations. The loreals are 1—1 in all. The preoculars are 1—1 in twenty-one, or 87%; and 2—2 in three, or 13 % of those undamaged. The postoculars are 3—3 in twelve, or 52%; 2—2 in ten or 43%; and 2—3 in one, or 4%. The temporals are 3—4 in ten, or 43%; 4—4 in seven, or 31%; 4—5 in three, or 13%; 3—3 in one, or 4%; 2—3 in one, or 4%; and 3—5 in one, or 4%. The supralabials are 8—8 in thirteen, or 56%; 8—9 in five, or 22%; and 9—9 in five, or 22%. The infralabials are 13—13 in eight, or 38%; 12—13 in five, or 24 %; 12—12 in four, or 18%; 11—11 in two, or 9%; 11—12 in one, or 5%; and 13—14 in one, or 5%. The scale-rows are 29 in fifteen, or 56%; 31 in seven, or 26%; and 27 in five, or 18%; the average is 29 rows. The gastrosteges vary in number from 223 to 241, males having from 227 to 241, females from 223 to 240; the average in twenty-two males is 233, in five females, 235. The urosteges vary from 55 to 71, males having from 58 to 71, females from 55 to 62; the average in twenty-three males is 66, in five females, 60.

The dark blotches between head and anus in 29 speci-

mens vary from 50 to 68, the average being 58. On the tail they vary from 14 to 20, and average 16.5.

Distribution.—Utah specimens of this subspecies are at hand from Weber (Ogden), Salt Lake (Fort Douglas), Wasatch (Wasatch Mountains), Grand (Thompson), Millard (Kanosh), and Iron (Rush Lake), counties. Gopher Snakes have also been recorded from Utah (Provo), Millard (seven miles south of Kanosh, Fillmore), Beaver (Beaver), Iron (Rush Lake) and Washington (Beaverdam Mountains, Rockville), counties, Utah. Those from southwestern Utah may perhaps be *P. c. deserticola*.

Three snakes from Boise, Ada County, and Blue Lakes, Twin Falls County, Idaho, and one from Wallula, Walla Walla County, Washington, may belong here rather than with *P. catenifer deserticola*, but their final disposition must await additional material. They have 29 and 31 scale-rows and one or two preoculars (50% each), and gastrosteges from 231 to 244. Dr. Stejneger has recorded specimens of *Pituophis* from Big Butte and Arco, Butte County, Idaho. A gopher-snake, in the National Museum, collected at Indian Valley, Adams County, may belong here, and, one from Bear Lake, Bear Lake County, doubtless is this subspecies.

Habits.—Mr. Herbert J. Pack has published the following notes on the habits of this snake:

“In the summer of 1913, when the circumstance occurred, field mice were very numerous in an alfalfa field, where Mr. Merrill was working. A part of the communication follows:

“There were some young boys working with me and one of them ran on to a large Blow Snake with its head and about two-thirds of its body under a pile of hay. This boy

hit it with his fork. As soon as I saw what he was doing I called him, but it was too late. I told him of the good the snake was doing and as he questioned it, I took the snake by the tail, made a whip cracker of it, [and killed it]. We took 35 small mice from its body. It seemed to like the very young mice best as nearly all of them were without hair, although some were one-third grown. This snake was five feet three inches long and was very large.

“Just how many mice this snake was consuming daily is difficult to state, as digestion in reptiles usually proceeds more slowly than in the higher vertebrates. Nevertheless, observations generally have proved the beneficial habits of the Bull Snake, and every available source should be utilized in acquainting the public with these facts, as well as in affording protection to this useful reptile.”

163. *Pituophis catenifer rutilus* Van Denburgh
ARIZONA GOPHER SNAKE
Plate 78

- Pityophis bellona* COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 305.
Pityophis sayi sayi YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 105 (part); COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 870 (part).
Pityophis sayi bellona COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 39 (part); COUES, Surv. W. 100th Merid., V, 1875, p. 617; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 106 (part); COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 641 (part); COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 872 (part).
Pituophis sayi VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. VI, 1896, p. 348.
Pituophis catenifer bellona BROWN, Proc. Acad. Nat. Sci., Phila., 1901, p. 54 (part).
Pituophis catenifer deserticola STEJNEGER, Proc. U. S. Nat. Mus., Vol. XXV, 1892, p. 153; RUTHVEN, Bull. Am. Mus. Nat. Hist., Vol. XXIII, 1907, p. 584 (part); STONE, Proc. Acad. Nat. Sci. Phila., 1911, p. 232; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. III, 1913, p. 418.

Pituophis catenifer annexens VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. IX, 1919, p. 216 (part).

Pituophis catenifer rutilus VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. X, No. 1, 1920, p. 24, pl. 2, fig. 2 (type locality, Tucson, Pima County, Arizona).

Description.—Head somewhat flat-topped, with snout projecting and rather narrower. Temporal regions not swollen. Rostral plate very large, prominent, not very narrow, often recurved between internasals on top of snout; bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of internasals, a variable number of prefrontals (normally four), a frontal, supraocular of each side, and a pair of parietals. Anterior and posterior nasals usually distinct. Loreal usually elongate. Preocular usually one, occasionally two. Postoculars usually three, often four, sometimes five. Supralabials usually eight, often nine, rarely 10. Infralabials usually 12, often 13, sometimes 11 or 14. Temporals of first row varying from two to five, usually four. Genials in two pairs, anterior larger. Scales on body in 29 to 35 rows, usually 33, keeled except in a varying number of rows on each side. Anal plate not divided. Gastroteges varying in number from 221 to 258, males having from 221 to 237, females from 227 to 258. Urostegeges in two series of from 50 to 66, males having from 57 to 66, females from 50 to 60.

The ground color is pale yellow or grayish yellow, sometimes more or less obscured by the spreading of the blotches or the presence of dark keels on the scales, especially laterally and anteriorly. Along the middle of the back, from the head to a point over the anus, is a series of from 37 to 55 (average 46) reddish brown blotches. The brown of these blotches becomes darker and redder posteriorly. These blotches often are margined with black. On the upper surface of the tail are from 10 to 14 (average 12.5) dark red-



Pituophis catenifer rattilus, Arizona Gopher Snake
Collected in Miller Canyon, Huachuca Mountains, Cochise County, Arizona, June, 1920.

dish brown blotches or cross bands. On the anterior part of the body the blotches tend to be more or less rounded, posteriorly they are more quadrate, or are wider with concave anterior and posterior borders. There are two or three series of alternating, often more or less confluent, dark blotches or spots on the sides. Across the top of the head between the preocular plates is a narrow brown band, more or less obsolete in adults. There are similar bands or spots below the center of the eye and running back and down from the upper postocular plate. The top of the head is light brownish yellow, speckled with black. The spaces between the dark dorsal blotches on the posterior part of the body are light yellowish or grayish orange, usually without dark marks on the keels of the scales. The lower surfaces are yellow or yellowish white, with irregular spots or blotches of light or dark brown on the gastrosteges and urosteges. There is no definite median subcaudal dark band.

Length to anus.....	456	1050	1115	1130	1140
Length of tail.....	68	154	153	183	165

Variation.—Sixteen specimens from Arizona show the following variations. The loreals are 1—1 in all. The preoculars are 1—1 in ten or 62%; 2—2 in five, or 31%; and 1—2 in one, or 6%. The postoculars are 3—3 in six, or 37%; 3—4 in five, or 31%; 4—4 in four, or 25%; and 4—5 in one, or 6%. The temporals are 4—4 in seven, or 47%; 3—3 in three, or 20%; 3—4 in two, or 13%; 4—5 in two, or 13%; and 2—3 in one or 7%. The supralabials are 8—8 in eight or 50%; 8—9 in three, or 19%; 9—9 in three or 19%; 9-10 in one, or 6%; and 8-10 in one, or 6%. The infralabials are 12—12 in nine, or 60%; 13—13 in three, or 20%; 13—14 in one, or 6%; 14—14 in one, or 6%; and 11—11 in one, or 6%. The scale-rows are 33 in eight, or 50%; 31 in six, or 37%; 29 in one, or

6%; and 35 in one, or 6%; the average is 32.1 rows. The gastrosteges vary in number from 221 to 258, males having from 221 to 237, females from 227 to 258; the average in six males is 227, in nine females, 237. The urosteges vary from 50 to 68, males having from 57 to 68, females from 50 to 60; the average in six males is 63.5, in nine females, 57.

The dark blotches between head and anus in 16 specimens vary from 37 to 55, the average being 46. On the tail they vary from 10 to 14, and average 12.5.

Distribution.—I have examined specimens of the Arizona Gopher Snake taken at Yuma, Yuma County; the Colorado River above Bill Williams River, Mohave County; Cave Creek, Maricopa County; Fort Lowell and the Santa Cruz River near Tucson, Pima County; and the vicinity of Hereford and Ramsey, Carr and Miller canyons in the Huachuca Mountains, Cochise County, Arizona. Specimens of *Pituophis* from Arizona have been recorded or collected at Oak Orchard, Camp Grant, Wilton Springs, Tucson, Gila River, White River Canyon, Prescott, Walnut, Fort Whipple, Fort Verde, Grand Canyon, Colorado Chiquito, Canyon Diablo, Camp J. A. Packer, Fort Mohave, and at Las Gijas, Pima County.

Remarks.—The specimens from Mohave and Yuma counties, and a specimen from Silsbee, Imperial County, California, (referred to *P. c. deserticola*) show more or less intergradation between the Arizona and the Desert Gopher Snakes. These specimens have very many gastrosteges, while those from extreme southeastern Arizona have fewer. Indeed, some of the latter have so few as to indicate intergradation with the gopher snakes of New Mexico which Ruthven has referred to *P. c. sayi* but which may possibly

require recognition as a distinct subspecies, *P. sayi affinis* (Hallowell).

Habits.—Ruthven states that a large specimen, secured near Tucson about sun down on August 22, had recently swallowed an adult ground squirrel. These snakes live both on the desert plains near sea level and in mountain canyons to an altitude of at least 5,300 feet.

164. *Pituophis vertebralis* (Blainville)

SAN LUCAN GOPHER-SNAKE

Coluber vertebralis BLAINVILLE, Nouv. Ann. Mus. Hist. Nat., Vol. IV, 1838, p. 293, pl. 27, figs. 2-2b (type locality, California); BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 152.

Pituophis vertebralis DUMÉRIL et BIBRON, Erpétologie Générale, Vol. VII, p. 238; BOCOURT, Miss. Sci. au Mex., Reptiles, p. 672, pl. XLVII, figs. 1-1d; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. V, p. 150; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 86; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. X, No. 1, 1920, p. 27; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 52, 67; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.

Pityophis haematois COPE, Proc. Acad. Nat. Sci. Phila., 1860, p. 342 (type locality, Cape St. Lucas).

Pityophis vertebralis COPE, Proc. Acad. Nat. Sci. Phila., 1860, p. 342; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, pp. 39, 92; YARROW, Bull. U. S. Nat. Mus., No. 24, p. 107; GARMAN, Bull. Essex Inst., Vol. XVI, 1884, p. 27; COPE, Bull. U. S. Nat. Mus. No. 32, 1887, p. 72; BELDING, West Amer. Scientist, Vol. III, No. 24, p. 98; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 642; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 879; TERRON, Mem. y Rev. Soc. Cient. Antonio Alzate, Vol. 39, 1921, pp. 164, 170.

Pityophis melanoleucus vertebralis JAN, Elenco sist. degli Ofidi, 1863, p. 59; JAN, Iconogr. génér. Oph., 22e livr., 1867, pl. 1, fig. 3.

Pityophis catenifer GARMAN, Mem. Mus. Compr. Zool. Cambr., Vol. VIII, No. 3, 1883, pp. 52, 150 (part).

Coluber catenifer BOULENGER, Cat. Snakes Brit. Mus., Vol. II, 1894, p. 67 (part).

Coluber catenifer var. *vertebralis* MOCQUARD, Nouv. Arch. Mus. Hist. Nat., 4e Ser., I, 1899, p. 320.

Description.—Head large, rather flat above, with snout projecting and rather narrow. Temporal regions not swollen. Rostral plate very large, prominent, not very narrow, more or less recurved between internasals on top of snout; bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of internasals, usually four prefrontals, a frontal, supraocular of each side, and a pair of parietals. Anterior and posterior nasals distinct. Loreal usually elongate. Preoculars usually two, rarely one. Postoculars three. Supralabials usually nine, often 10, rarely eight. Infralabials usually 12, often 13, rarely 14 or 16. Temporals of first row varying from three to five, usually four. Genials in two pairs, anterior larger. Scales on body in 31 to 35 rows, usually 35, keeled except in a variable number of lateral rows. Anal plate not divided. Gastrosteges varying in number from 233 to 257, males having from 239 to 245, females from 247 to 257. Urosteges in two series of from 57 to 67, males having 63 and 64, females from 57 to 63.

The ground color is pale yellow, sometimes suffused with red. Along the middle of the back, from the head to a point over the anus, is a series of from 39 to 48 (at least) dark blotches (average 44). Anteriorly these blotches are bright red, sometimes with scattered blackish scales, which in one young specimen preponderate. On about the posterior third of the body the blotches become jet black. On the upper surface of the tail are from ten to 12 black blotches or cross-bars. There are two or three series of alternating lateral blotches or spots, red anteriorly and black posteriorly; the upper series often confluent with the dorsal

blotches. The head is yellowish olive anteriorly and laterally, reddish above, without dark bands or other markings. The keels of the scales of the dorsal interspaces may be dark red. The lower surfaces are whitish or greenish yellow, marked near the ends of some gastrosteges, anteriorly with red or pink, posteriorly with black. The urosteges are yellow marked with jet black in such a way as to form an irregular median subcaudal streak.

Length to anus.....	824	950	1080	1170	1250
Length of tail.....	120	137	168	190	163

Variation.—Fourteen specimens show the following variations. The loreal is 1—1 in all counted (six). The preoculars are 2—2 in thirteen, or 93%; 1—1 in one, or 7%. The postoculars are 3—3 in fourteen, or 100%. The temporals in five specimens are 4—4 in three, or 60%; 3—4 in one, or 20%, and 4—5 in one, or 20%. The supralabials are 9—9 in seven, or 50%; 9—10 in five, or 36%; 8—9 in one, or 7%; and 8—10 in one, or 7%. The infralabials are 12—12 in seven, or 50%; 13—13 in three, or 22%; 13—14 in two, or 14%; 12—13 in one, or 7%; and 14—16 in one, or 7%. The scale-rows are 35 in seven, or 54%; 33 in four, or 31%; 34 in one, or 7%; and 31 in one, or 7%; the average is 34 rows. The gastrosteges in fifteen specimens vary from 233 to 257, the average being 244; two males average 242, four females average 250. The urosteges in fourteen specimens vary from 57 to 67; the average being 62; two males average 63, and three females, 60.

The dark blotches between head and anus in six specimens vary from 39 to 48, the average being 44. On the tail in six specimens they vary from 10 to 12, and average 11.

Distribution.—This species is restricted to the southern portions of Lower California, while the northern end of that peninsula is inhabited, along its western coast, by *Pituophis catenifer annectens*, and probably farther east by *Pituophis catenifer deserticola*, although this last subspecies has not yet been reported from Mexico.

Pituophis vertebralis, however, ranges some distance to the north of the Cape Region, where it is very common. It has been collected at Agua Caliente, San Antonio, San Bartolo, San Pedro, San José del Cabo, Cabo San Lucas, Miraflores, and La Paz, all in the Cape Region, and at Comondu, San Ignacio, Arroyo de Santa Agueda, and Ballenas Bay. Gopher-snakes have been taken on Santa Margarita Island.

Remarks.—This species most resembles brightly colored examples of the Arizona Gopher Snake. There is, however, very much more red in the coloration of *P. vertebralis* and a greater average number of scale-rows and supralabial and preocular plates. Moreover, the Arizona snakes are only reddish or maroon, not bright red, and are most reddish posteriorly where the Lower Californian snakes are black. The bright red coloration of *P. vertebralis* is in itself sufficient to render easy its recognition from all other gopher-snakes.

Genus 34. *Lampropeltis*

Lampropeltis FITZINGER, *Systema Reptilium*, 1843, p. 25 (type, *getulus* Schlegel = *holbrookii*).

Ophibolus BAIRD & GIRARD, *Cat. N. Amer. Rept.*, Pt. 1, *Serpents*, 1853, p. 82 (type, *sayi*).

Bellophis LOCKINGTON, *Proc. Cal. Acad. Sci.*, Vol. VII, 1877, p. 52 (type, *zonata*).

The body is rather thick, with short tail, and little if any constriction at neck. The snout is broad and high. The upper head-plates are normal. The nasal plates are

distinct. One (rarely two) preocular and two (rarely one or three) postoculars are present, as is also a small loreal plate. Temporals are normally 2+3, rarely 1+2, 1+3, 2+2, 2+4, or 3+4. The scales are smooth, in 21 or 23 (or 24) rows, each with two apical pits. The anal plate is undivided, but the urosteges are in two series. The eye is of moderate size, with round pupil.

SYNOPSIS OF SPECIES

a.—Some red in coloration.

b.—Urosteges not more than 61 (41 to 61); snout not entirely whitish.

c.—Whitish cross-bands on body and tail usually fewer than 30, (25 to 40); snout entirely blackish, or yellowish at sides; gastrosteges 176 to 212. Utah and eastern Arizona.

L. *triangulum gentilis*.—p. 743.

c'.—Whitish cross-bands on body and tail usually more than 30 (23 to 57; snout blackish; gastrosteges 198 to 222. California.

L. *zonata*.—p. 748.

b'.—Urosteges not fewer than 61 (61 to 79); snout entirely whitish; gastrosteges 216 to 235. Arizona.

L. *pyromelana*.—p. 746.

a'.—No red in coloration; white and black or brown.

bb.—Color in transverse blotches or rings; no longitudinal markings.

cc.—Dark areas uniformly black or brown to gastrosteges, without light markings on lateral scales.

d.—Scales of white rings *usually* without dark edges.

L. *getulus boylii*.—p. 752.

d'.—Scales of white rings edged with black or brown (except in young).

e.—Prefrontals less than half white; frontal without white or with only a narrow transverse bar at anterior end; no white on parietals; infralabials usually nine.

L. getulus yumensis.—p. 757.

e'.—Prefrontals more than half white; frontal with prominent white markings or at least a central white spot; each parietal spotted with white; infralabials usually ten.

L. getulus conjuncta.—p. 760.

cc'.—Dark areas not uniformly black or brown to gastrosteges, the lateral scales having light centers.

L. getulus splendida.—p. 763.

bb'.—A longitudinal dorsal light or dark stripe or band, complete or interrupted.

ccc.—Longitudinal dorsal markings, white, yellow or cinnamon, lighter than the dark ground color.

dd.—Snout, gastrosteges and urosteges not chiefly or uniformly dark brown or black; light markings white or yellowish.

L. californiæ.—p. 765.

dd'.—Snout, gastrosteges and urosteges chiefly or uniformly brownish black, light markings pale brown or cinnamon.

L. nitida.—p. 767.

ccc'.—Longitudinal dorsal band purplish brown like the ground color; lateral scales all with light centers; lower surfaces chiefly black.

L. catalinensis.—p. 769.

The harmless king snakes, of the genus *Lampropeltis*, frequently are confused with the poisonous coral snakes of the genus *Micrurus* or *Elaps* owing to the fact that both are marked with rings of red, black and white or yellow. It is easy to distinguish the poisonous species from the harm-

less king snakes by coloration alone, since the red is next to the black in the harmless snakes and not in the poisonous species.

165. *Lampropeltis triangulum gentilis* (Baird & Girard)

WESTERN KING SNAKE

- Ophibolus gentilis* BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. 1, Serpents 1853, p. 90 (type locality, North Fork, Red River, near Sweet-water Creek, Wheeler County, Texas); BAIRD & GIRARD, Marcy's Rep. Expl. Red River, Ex. Doc. House of Rep., 33rd. Congress, 1853 (1854), p. 229, pl. VIII; BAIRD, Pac. R. R. Surv., Vol. X, Pt. III, No. 1, 1859, pl. XXX, fig. 64; MOZLEY, Trans. Kansas Acad. Sci., Vol. VI, reprint, 1906, p. 35.
- Lampropeltis doliata* COPE, Proc. Acad. Nat. Sci. Phila., 1860, p. 256 (part).
- Lampropeltis multistriata* KENNICOTT, Proc. Acad. Nat. Sci. Phila., 1860, p. 328 (type locality, Fort Lookout, South Dakota).
- Ophibolus multistriatus* COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 36; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1891, p. 611.
- Ophibolus doliatus gentilis* COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 36; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 90; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 75; CRAGIN, Trans. Kansas Acad. Sci., Vol. VII, reprint, 1906, p. 118; DITMARS, Reptile Book, 1907, pp. 340, 348, pl. 106, fig. 1; COCKERELL, Univ. Colorado Studies, Vol. VII, No. 2, 1910, p. 131; ELLIS & HENDERSON, Univ. Colorado Studies, Vol. X, No. 2, 1913, p. 91, pl. IV, fig. 23; ELLIS & HENDERSON, Univ. Colorado Bull., Vol. XV, No. 6, 1915, p. 261; STRECKER, Baylor Bulletin, Vol. XVII, No. 4, 1915, p. 38.
- Ophibolus doliatus annulatus* YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 537; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 90 (part).
- Ophibolus multistriata* COUES & YARROW, Bull. U. S. Geol. Surv. Terr., Vol. IV, 1878, p. 284; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 909, fig. 225.
- Ophibolus triangulus* var. *gentilis* GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, pp. 66, 155.
- Lampropeltis multistriata* STEJNEGER, Proc. U. S. Nat. Mus., Vol. XIV, 1891, p. 502.

- Coronella gentilis* BOULENGER, Cat. Snakes Brit. Mus., Vol. II, 1894, p. 201 (part?).
- Ophibolus doliatus syspustus* COPE, Proc. Acad. Nat. Sci. Phila., 1893, p. 387 (**Hennessy, Oklahoma**).
- Osceola doliata gentilis* COPE, Rep. U. S. Nat. Mus., for 1898, 1900, p. 894, fig. 218.
- Lampropeltis pyrrhomelana celanops* STEJNEGER, Proc. U. S. Nat. Mus., Vol. XXV, 1902, p. 153 (type locality, **Mesilla Valley, New Mexico**); STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 89.
- Lampropeltis doiiatus gentilis* BRANSON, Kansas Univ. Sci. Bull., Vol. II, No. 13, 1904, p. 402, figs. 25, 25a.
- Lampropeltis triangulum gentilis* STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 90; BLANCHARD, Occas. Papers Mus. Zool. Univ. Michigan, No. 87, 1920, pp. 6, —; BLANCHARD Bull. U. S. Nat. Mus., No. 114, 1921, p. 165, fig. 72.

Description.—Top of head slightly flattened posteriorly, curving downward to broad, rounded snout. Rostral plate large, broader than high, hollowed below, and bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of internasals, a pair of prefrontals, a short, broad frontal between two supraoculars, and a pair of large parietals. Anterior and posterior nasals distinct. Loreal present. One preocular. Two (or rarely one) postoculars. Temporals normally two followed by three. Seven or eight superior and nine, eight or ten inferior labials, fifth and sixth superior and fifth inferior usually largest, third and fourth superior reaching eye, first pair of inferior meeting on median line. Genials in two pairs, anterior larger than posterior. Scales on body smooth, thin, imbricate, usually in 21, or sometimes 23 or 19, rows. Anal plate not divided. Gastrosteges varying in number from 176 to 212. Urosteges in two series of from 31 to 53.

The snout is blackish, sometimes more or less relieved with gray or white markings. A white spot may be present on the parietal plate anteriorly and the posterior edges of

these plates are involved in a white ring which ring crosses the occiput and includes the posterior temporals and the last labial plate before joining the white of the throat. The rest of the top and sides of the head are blackish, usually mottled with red or white on the snout. Behind the first white ring is one of black, sometimes incomplete below, followed by one of red, and in turn by others of black, white, black, red, black, white, and so on, the whole body and tail being encircled by from 25 to 40 white or yellowish rings between which are rings of black more or less divided and replaced by blotches or rings of red or pink. The proportion of black to red varies greatly. Some of the white rings may be incomplete or alternate, and they usually are broader below.

In life, the light rings vary from light gray to bright yellow, and the red from brownish or brick red to scarlet.

Length to anus.....	223
Length of tail	38

Distribution.—This snake is said to range from south central Texas to South Dakota, thence west to Utah and eastern Arizona.

Dr. Garman recorded it from Utah but gave no definite locality. The only Utah specimen I have seen is a young female collected in Cedar City Canyon, Iron County, given to me by Mr. Herbert Pack. Blanchard records it also from Provo, Utah County, Utah.

I have seen no specimens from Arizona, but Stejneger and Blanchard record it from "eastern Arizona" and Yarrow's specimen from Camp Apache represented this subspecies.

166. *Lampropeltis pyromelana* (Cope)

ARIZONA KING SNAKE

Plate 79

- Ophibolus pyromelanus* COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 305 (type locality, **Arizona**).
- Ophibolus pyrrhomelas* COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 37 (part); YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 537, pl. XIX; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 91; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, 610 (part); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 907, fig. 224.
- Ophibolus pyromelas* COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 619.
- Ophibolus getulus* var. *pyromelanus* GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, p. 67.
- Ophibolus getulus* var. *pyrrhomelas* GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, p. 157.
- Lampropeltis pyrrhomelas* COCKERELL, Amer. Nat., Vol. XXX, 1896, p. 326; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. VI, 1896, p. 347.
- Ophibolus zonatus* BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 79 (part); DITMARS, Reptile Book, 1907, pls. CIII, fig. 6, CVII, fig. 1; TUCKER, Danger. Poison. Snakes U. S., 1912, p. 1, pl. I, fig. 1.
- Lampropeltis pyrrhomelana* STEJNEGER, Proc. U. S. Nat. Mus., Vol. XXV, 1902, p. 152; STONE, Proc. Acad. Nat. Sci. Phila., 1911, p. 231; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 415; BLANCHARD, Occas. Papers Mus. Zool. Univ. Michigan, No. 87, 1920, pp. 7, -; BLANCHARD, Bull. U. S. Nat. Mus., No. 114, 1921, p. 231, fig. 71.
- Lampropeltis pyromelana pyromelana* STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 88.

Description.—Top of head slightly flattened posteriorly, curving downward to broad, rounded snout. Rostral plate large, broader than high, hollowed below, and bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of internasals, a pair of prefrontals, a short, broad, irregularly wedge-shaped frontal between two supraoculars, and a pair of large parietals. Anterior and posterior nasals distinct. A small loreal usually



Lampropeltis pyromelana, Arizona King Snake
Adult female from Carr Canyon, Huachuca Mountains, Cochise County, Arizona, June, 1926.

present. One preocular. Two or three postoculars. Temporals normally two followed by three, sometimes 2+4. Seven (rarely eight) superior and nine, 10, 11 or 12 inferior labials, fifth and sixth superior and fifth inferior usually largest, third and fourth superior reaching eye, first pair of inferior meeting on median line. Genials in two pairs, anterior larger than posterior. Scales on body smooth, thin, imbricate, usually in 23, sometimes 25, rows. Anal plate not divided. Gastroteges varying in number from 216 to 235. Urostegeges in two series of from 71 to 79.

The snout is yellowish white, unmarked or slightly spotted. The middle third of the head is black. A yellowish white band crosses the back of the head, involving the tips of the parietal plates, and joining the white of the throat. Behind this white one is a half ring of black, followed in turn by another of red. The whole body is similarly marked, being encircled by from 39 to 47 white rings* between which are rings of black more or less divided and replaced by blotches or rings of red or pink. The proportion of black to red varies greatly in different specimens, as does also the intensity of the red. The colors of the back and sides are continued, somewhat irregularly, onto the lower surfaces. The white rings are little if at all broader on the sides than on the back.

Length to anus.....	688	830
Length of tail.....	147	185

Distribution.—This snake occurs in Arizona, Utah, New Mexico and northern Mexico. It probably is confined to the mountain ranges and coniferous forests.

In Utah, it has been taken at Granger, Salt Lake County, and at 7,000 feet in Beaver Canyon, Beaver County.

*Not counting the 10 to 16 on the tail.

Arizona specimens have been recorded from Mohave (Hualapai Mountains, pine belt at 5,800-6,300 feet), Cococino (Oak Creek), Yavapai (Prescott, Fort Whipple), Navajo (White River Canyon, Fort Apache), Gila (Carr's Ranch, Sierra Ancha at 5,410 feet), Pima (pine zone at 7,000 feet in Bear Canyon, on Mount Lemmon, Catalina Mountains, Madera Canyon, Santa Rita Mountains), Graham (Graham Mountains), Cochise (Fort Huachuca, Huachuca Mountains at 6,000 feet, and in the pine belt in Ramsey and Carr Canyons, near the mine at Bisbee, and near Tombstone), Santa Cruz (Harshaw, Patagonia Mountains), counties.

Habits.—Nothing is known of the habits of this snake.

167. *Lampropeltis zonata* (Lockington)

CALIFORNIA KING SNAKE

Plate 80

- ? *Coluber* (*Zacholus*) *zonatus* BLAIN, Nouv. Ann. du Mus., Vol. IV, 1835, p. 293 (type locality, **California**); BAIRD & GIRARD, Cat. N. Amer. Reptiles, Pt. 1, Serpents, 1853, p. 153.
- Ophibolus pyrrhomelas* COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 37 (part); COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 610 (part); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 907 (part).
- Bellophis zonatus* LOCKINGTON, Proc. Cal. Acad. Sci., Vol. VII, 1877, p. 52 (type locality [**Santa Barbara**], **Northern California**).
- Ophibolus getulus multicinctus* YARROW, Proc. U. S. Nat. Mus., Vol. V, 1882, p. 440 (type locality, **Fresno, California**); YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 94.
- Ophibolus triangulus* var. *zonatus* GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, p. 156.
- Coronella multifasciata* BOCOURT, Miss. Sci. au Mex., Rept., 10e livr., 1886, p. 616, pl. XL, figs. 2-2c (type locality, **California**).
- Coronella zonata* BOULENGER, Cat. Snakes Brit. Mus., Vol. II, 1894, p. 202.
- Lampropeltis zonata* VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 167, fig.; McLAIN, Critical Notes, 1899, p. 11; MEEK, Field Columb. Mus., Zool. Ser., Vol. VII, No. 1, 1906, p. 15.

- Ophibolus zonatus* BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 79; DITMARS, Reptile Book, 1907, p. 357, pl. CIII, figs. 7, 10, pl. CVII, fig. 2; RUTHLING, Copeia, 1915, No. 15.
- Lampropeltis pyrrhomelana multicincta* STEJNEGER, Proc. U. S. Nat. Mus., Vol. XXV, 1892, p. 153; GRINNELL & GRINNELL, Throop Institute Bulletin, No. XXXV, 1907, p. 39, fig. 16; GRINNELL, Univ. Cal. Publ. Zool., Vol. 5, No. 1, 1908, p. 165; ATSAIT, Univ. Cal. Publ. Zool., Vol. 12, No. 3, 1913, p. 41.
- Lampropeltis pyromelana multicincta* GRINNELL & CAMP, Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 184; HALL & GRINNELL, Proc. Cal. Acad. Sci., Ser. 4, Vol. 9, No. 2, 1919, p. 60; COWLES, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, 1920, p. 66; STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 64.
- Lampropeltis pyromelana multicincta* STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 89; STORER, Copeia, No. 97, 1921, p. 44.
- Lampropeltis multicincta* BLANCHARD, Occas. Papers Mus. Zool Univ. Michigan, No. 87, 1920, pp. 5-; BLANCHARD, Bull. U. S. Nat. Mus., No. 114, 1921, p. 222, fig. 75.

Description.—Top of head slightly flattened posteriorly, curving downward to broad, rounded snout. Rostral plate large, broader than high, hollowed below, and bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head, a pair of internasals, a pair of prefrontals, a short, broad, irregularly wedge-shaped frontal between two supraoculars, and a pair of large parietals. Anterior and posterior nasals distinct. A small loreal present, but sometimes united with prefrontal. Two postoculars and one (or rarely two) preocular. Temporals normally two followed by three, sometimes 1+2, 1+3, 2+3 or 2+4. Seven (rarely six or eight) superior and nine (rarely eight or 10) inferior labials, fifth and sixth superior and fifth (or fourth) inferior largest, third and fourth superior reaching eye, first pair of inferior meeting on median line. Genials in two pairs, anterior larger than posterior. Scales on body smooth, thin, imbricate, often in 21 usually in 23,

very rarely in 25 rows. Anal plate not divided. Gastrosteges varying in number from 198 to 222. Tail short but slender. Urosteges in two series of from 45 to 61.

The snout may be black, white or spotted. The middle third of the head is black. A white band crosses the back of the head, involving the tips of the parietal plates, and joining the white of the throat. Behind this white one is a full or half ring of black, followed in turn by another of red. The whole body is similarly marked, being encircled by from 25 to 43 white rings* between which are rings of black more or less divided and replaced by blotches or rings of red or pink. The proportion of black to red varies greatly in different specimens, as does also the intensity of the red. This color is sometimes present anteriorly only, and is usually absent near the tip of the tail. The colors of the back and sides are continued, somewhat irregularly, onto the lower surfaces. The white areas, and more rarely the red ones also, are sometimes tinged with dull yellowish brown. The white rings are little if at all broader on the sides than on the back.

Length to anus.....	288	486	560	607	695	722
Length of tail.....	46	71	97	111	118	124

Distribution.—This brilliant snake seems to prefer the moister, cooler portions of California, such as are occupied by coniferous forests. It has been taken in San Diego (vicinity of San Diego), Riverside (Strawberry Valley at 6,000 feet in the San Jacinto Mountains, Banning), San Bernardino (San Bernardino Mountains, Upper Santa Ana at 5,500 feet), Los Angeles (Sierra Madre, vicinity Pasadena, San Gabriel Mountains, Placerita Canyon, Little Tejuanga Canyon, Arroyo Seco Canyon, Claremont), Ventura (Matilija), Santa Barbara (Santa Barbara), Inyo (Mount

*Not counting the 5 to 11 on the tail.



Lampropeltis zonata, California King Snake
Collected on the South Fork of Scott River near Callahan, Siskiyou County, California, May, 1913.

Whitney at 8,000 feet), Tulare (Hot Springs at 8,000 feet, Heaven's Gate near Little Kern River Lake), Fresno (Kings River Canyon), Tuolumne (Hodgdon's), Mariposa (Yosemite Valley), El Dorado (Riverton, Fyffe, Kyburz), Plumas (Keddie), Santa Cruz (Soquel, Santa Cruz, Glenwood, Wrights), Santa Clara (Mt. Hamilton), Napa (Mount St. Helena), and Siskiyou (Callahan), counties, California.

Habits.—Very little is known of the habits of this snake. It is rather slow in movement and is perfectly harmless, although popularly believed to be very deadly. When handled roughly it, like most other snakes, will bite, at times almost fiercely, but even when the sharp little teeth enter the skin deeply enough to draw blood no unpleasant complications result. Its bad reputation probably results from its resemblance in coloring to the venomous Coral Snake or Elaps (*Micrurus*). The pattern of the King Snakes differs from that of the Coral Snakes in having the red separated from the white (or yellow) by black. In the poisonous Coral Snakes the red and white (yellow) bands are side by side.

The King Snake is said to destroy many rattlers and other snakes. I have never been able to verify this, although I have tried with captive specimens. Boyle's Milk Snake sometimes kills and eats snakes, so it is not improbable that the King Snake may have the same habit. One of my specimens had eaten two Blue-bellied Lizards (*Sceloporus o. occidentalis*).

168. *Lampropeltis getulus boylii* (Baird & Girard)

BOYLE'S MILK SNAKE

Plates 81 and 82

- Ophibolus boylii* BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, Serp. 1853, p. 82 (type locality, El Dorado Co., Cal.); BAIRD, Rep. Pac. R. R. Surv., Vol. X, 1859, Rept., p. 11, pl. 30, fig. 57; COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 305.
- Coronella balteata* HALLOWELL, Proc. Acad. Nat. Sci. Phila., Vol. VI, 1853, p. 236; HALLOWELL, Rep. Pac. R. R. Surv., Vol. X, pt. 4, 1857, pp. 14, 24, pl. V (type locality, "El Paso Creek and Benicia; also intermediate places," California).
- Lampropeltis boylii* COPE, Proc. Acad. Nat. Sci. Phila., 1860, p. 255; COOPER, Proc. Cal. Acad. Sci., Vol. IV, 1873, p. 79; STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 204; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. V, 1896, p. 1006; VAN DENBURGH, Occas. Papers, Cal. Acad. Sci., V, 1897, p. 169; McLAIN, Critical Notes, 1899, p. 11; MEEK, Field Columb. Mus., Zool. Ser., Vol. VII, No. 1, 1905, p. 15; GRINNELL & GRINNELL, Throop Inst. Bull., No. XXXV, 1907, p. 41, fig. 17; GRINNELL, Univ. Cal. Publ. Zool., Vol. 5, No. 1, 1908, p. 165; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 150; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 415; ATSATT, Univ. Cal. Publ. Zool., Vol. 12, No. 3, 1913, p. 41; CAMP, Univ. Cal. Publ. Zool., Vol. 12, No. 17, 1916, p. 531; PEMBERTON, Condor, 1916, p. 233; GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 186; BENTLEY, Copeia, No. 75, 1919, p. 90; COWLES, Journ. Entomol., Pomona College, Vol. XII, No. 3, 1920, p. 66.
- Coronella getulus* var. *boylii* JAN, Elenco Sist. degli Ofidi, 1863, p. 47.
- Coronella getulus* var. *pseudogetulus* JAN, Elenco Sist. degli Ofidi, 1863, p. 47; JAN, Iconogr. Génér. Ophid., 12e livr., pl. VI, fig. 2.
- Ophibolus getulus boylii* COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 37; YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 538 (part); COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 618 (part); COUES & YARROW, Bull. U. S. Geol. Geog. Surv. Terr., Vol. IV, 1878, p. 283; GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, pp. 69, 157; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 92 (part); COPE, Proc. Acad. Nat. Sci. Phila., 1883, pp. 14, 29; TOWNSEND, Proc. U. S. Nat. Mus., Vol. 10, 1887, p. 239; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 613; COPE, Report U. S. Nat. Mus for 1898, 1900, p. 919 (part); BROWN, Proc. Acad. Nat.

Sci. Phila., 1901, p. 78; DITMARS, Reptile Book, 1917, pp. 341, 363, pls. CIII, fig. 9, CVIII, fig; DITMARS, Reptiles World, 1910, p. 271; RUTHLING, Copeia, 1915, No. 15.

Coronella getula BOULENGER, Cat. Snakes Brit. Mus., Vol. II, 1894, pl. 97 (part).

Lampropeltis boylii boylii STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 87.

Lampropeltis getulus boylii BLANCHARD, Occas. Papers Mus. Zool. Univ. Michigan, No. 87, 1920, pp. 3, -; STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 64; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 28, 52; NELSON Mem. Nat. Acad. Sci., Vol. XVI, 1921, p. 114; BLANCHARD, Bull. U. S. Nat. Mus., No. 114, 1921, p. 75, fig. 27.

Description.—A larger and stouter snake than *L. zonata*. Top of head slightly flattened posteriorly, curving downward to the broad rounded snout. Temporal regions rarely if ever swollen. Rostral plate large, little broader than high, hollowed below, and bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of internasals, a pair of prefrontals, a short, broad, irregularly wedge-shaped frontal, supraocular of each side, and a pair of large parietals. Anterior and posterior nasals distinct. A small loreal present, but very rarely united with posterior nasal. One preocular and two (rarely one) postoculars. Temporals normally two followed by three, but may be 2+2, 2+4, or 3+4. Seven or rarely eight superior and nine, rarely eight or 10, inferior labials, fifth and sixth superior and fifth or fourth inferior largest, third and fourth superior reaching eye, first pair of inferior meeting on median line. Genials in two pairs, anterior much larger than posterior. Scales smooth, thin, imbricate, in 23 or rarely 25 rows. Anal plate not divided. Gastrosteges varying in number from 206 to 254. Urosteges in two series of from 41 to 62, a few of the first sometimes undivided.

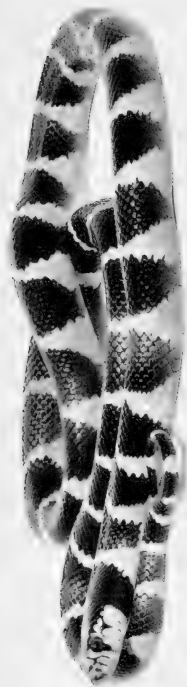
The snout and sides of the head are yellow or white,

more or less spotted or blotched with dark brown along the edges of the plates. The nape and the top of the head behind the prefrontal plates are dark brown or black, with a varying number of white or yellow spots, one of which is very constantly present just behind the parietal plates. The body and tail are marked with great blotches or rings of brown or black, separated by narrower rings of yellow or white. These white rings are much broader on the sides than near the middle of the back, and vary in number from 23 to 39 on the body and five to 10 on the tail. The markings of the sides are continued onto the lower surfaces.

Length to anus.....	317	383	586	733	921	954
Length of tail.....	44	56	93	129	118	135

Distribution.—Boyle's Milk Snake is common in almost all parts of California except, perhaps, the deserts and the higher mountains. It has been recorded also from southern Nevada, Utah, northwestern Arizona, and northwestern Lower California.

In California, it has been taken in San Diego (San Diego, Campo, La Mesa, Fall Brook, Twin Oaks, Santa Margarita, Vallecito, Poway Corners, San Dieguito Valley, Jacumba Hot Springs, Jarupa Mountains, La Puerta Valley), Riverside (San Jacinto Mountains opposite Cabazon and opposite Banning, San Jacinto, Hemet Lake, at 4,400 feet, Riverside, Juniper Mountains), San Bernardino (lower Santa Ana Canyon at 2,000 feet, Ontario, Turtle Mountains, Providence Mountains at 4,500 feet, Needles), Los Angeles (Pasadena, Gardena, Tujunga Wash east of San Fernando, San Gabriel Wash near Azusa, Claremont, Lankershim, Los Angeles, Bairdstown, Redondo Beach, mouth of San Gabriel River, Avalon, Catalina Island), Ventura (Piru), Kern (Fort Tejon, Tehachapi Mountains, Kern Valley), Inyo (Farrington Ranch, Laws, Lone Pine, Wild Rose



Lampropeltis getulus boylii, Boyle's Milk Snake
Fig. 1. Collected near Lave creek canyon, Tehachand Mountains, Kern County, California.
Fig. 2. Collected near Los Gatos, Santa Clara County, California, July, 1914.

Springs at 4,060 feet, Beveridge Canyon), Tulare (East Fork Kaweah River, Giant Forest, Sequoia National Park, Three Rivers), Fresno (Wheatville, Stanley, Fresno), Mariposa (Pleasant Valley, Dudley), Merced (Gadwall), San Joaquin (Forest Lake), Calaveras (Mokelumne Hill), El Dorado (altitude 2,000 feet), Placer (Applegate), Santa Barbara (Santa Barbara), San Luis Obispo (Morro), Monterey (Jolon), Santa Clara (Coyote, Los Gatos, Mount Hamilton, San Jose, Palo Alto), Alameda (Haywards, Alameda, Oakland, Piedmont), San Francisco, Marin (San Anselmo, San Geronimo, Mount Tamalpais, Camp Taylor), Solano (Benicia, three miles west from Vacaville), Napa (St. Helena, Calistoga, Mount Veder), Yolo (Rumsey), Tehama (Tehama), Sonoma (Healdsburg, eight miles west from Cazadero, Guerneville, Warm Creek Springs near Skaggs Springs, El Verano), Mendocino (four miles west from Mount Sanhedrin, Irishes), Trinity (Weaverville), and Shasta (Fort Reading, Redding, Baird, McCloud River, Delta, Ingot), counties.

In Arizona, it has been secured at Cave Creek, Maricopa County; Fort Verde, Fort Whipple, and Date Creek, Yavapai County; and at 3,500 feet near Hackberry, and near Cottonia, Mohave County.

In Utah, it has been taken at Saint George and Bellevue, Washington County.

Nevada specimens have been collected at St. Thomas and Overton, Muddy Valley, Clark County, and the Current school district in Nye County.

In Lower California, it has been recorded from Cape Colnett, San Quentin, San Salada Canyon, and the foothills of the San Pedro Martir Mountains, and near Ensenada.

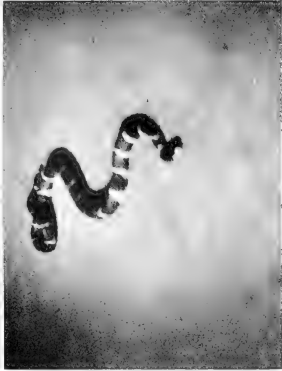
Habits.—The black and white king snake is most abundant where the country is covered with chaparral and where

small streams are numerous. It usually is very gentle, but sometimes fights its captor most fiercely, rarely, however, being able to draw blood with its small teeth. I have twice found it swallowing the contents of quails' nests, and once observed one crawling along the ground and looking up into the bushes for nests of small birds. Several times while I watched, its quick eyes detected nests three or four feet above it, but although the snake immediately climbed up to these, it did not obtain a meal, for the nests which it examined had been abandoned by their builders or robbed by some earlier comer.

While I was watching a man spade up a small plot of ground, he killed two gophers (*Thomomys*) and threw them a few feet away. A few minutes later a snake of this species appeared, went directly to the spot where the gophers lay side by side, and swallowed first the adult and then the half grown one. It took no notice of our presence, and after completing its hearty meal disappeared in the direction whence it had come.

Dr. Merriam notes (N. Amer. Fauna No. 7) that several were secured in dense thickets of *Atriplex torreyi* at Overton, Nevada. About dark they began to emerge from these retreats, making a great noise in crawling over the dry leaves, and were soon found in the open.

A specimen preserved in the collection of the University of California, had partially swallowed a rattlesnake about two feet long. Plate 82 shows a Boyle's Milk Snake eating a Coast Gopher Snake which it had just killed.



Lampropeltis gettys boylei, Boyle's Milk Snake
 Individual 35 inches long killing and eating a Coast Gopher Snake (*Chionophis centifer centifer*)
 33 inches long at Los Gatos, Santa Clara County, California
 FIG. 1 Method of killing
 FIG. 2 Swallowing frog
 FIG. 3 Two snakes in one

169. *Lampropeltis getulus yumensis* Blanchard

DESERT MILK SNAKE

- Ophibolus boylii* BAIRD, U. S. Mex. Bound. Surv., Vol. II, 1859, p. 20.
Lampropeltis boylii conjuncta COPE, Proc. Acad. Nat. Sci. Phila., 1861,
p. 301 (part).
Coronella getulus splendida JAN, Iconog. Génér. Ophid., livr. 12, 1865,
pl. 6, fig. 1.
Ophibolus getulus boylii YARROW, Surv. W. 100th Merid., Vol. V, 1875,
p. 538 (part); YARROW, Bull. U. S. Nat. Mus., No. 24, 1883,
p. 92 (part); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 919
(part); BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 78 (part).
Lampropeltis conjuncta VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4,
Vol. 3, 1912, p. 154; GRINNELL & CAMP, Univ. Cal. Publs. Zool.,
Vol. 17, No. 10, 1917, p. 187; HALL & GRINNELL, Proc. Cal. Acad.
Sci., Ser. 4, Vol. 9, No. 2, 1919, p. 48.
Lampropeltis boylii conjuncta STEJNEGER & BARBOUR, Check List N.
Amer. Amph. Rept., 1917, p. 87 (part).
Lampropeltis getulus yumensis BLANCHARD, Occas. Papers Mus. Zool.
Univ. Michigan, No. 70, 1919, p. 6 (type locality, **27 miles west
of Indian Oasis, Pima County, Arizona**); BLANCHARD, Occas.
Papers Mus. Zool. Univ. Michigan, No. 87, 1920, pp. 4, -; VAN
DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921,
p. 52; BLANCHARD, Bull. U. S. Nat. Mus., No. 114, p. 66, fig. 28.

Description.—Similar to *L. g. boylii*. Top of head slightly flattened posteriorly, curving downward to the broad rounded snout. Temporal regions rarely if ever swollen. Rostral plate large, little broader than high, hollowed below and bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of internasals, a pair of prefrontals, a short, broad frontal, supraocular of each side, and a pair of large parietals. Anterior and posterior nasals distinct. Loreal a little longer than high. One preocular and two (rarely one) postoculars. Temporals normally two followed by three, but may be 1+3, 2+4, or 3+4. Seven, or rarely eight, superior and nine, or rarely 10, inferior labials; fifth and sixth super-

ior, and fifth or fourth inferior largest, third and fourth superior reaching eye, first pair of inferior meeting on median line. Genials in two pairs, anterior much larger than posterior. Scales smooth, thin, imbricate, in 23 or rarely 25 rows. Anal plate not divided. Gastrosteges varying in number from 212 to 248. Urosteges in two series of from 44 to 57.

The ground color of the head is black. Across the prefrontals and internasals is a broad transverse bar of white. The rostral is white with a black border on the sides and above. The nasals, loreal, oculars, and sometimes temporals have whitish central spots. The labials and genials are whitish with blackish edges. The white markings on the prefrontals and internasals occupy not more than half the area of these plates. Beneath the eye there usually is a rather conspicuous enlargement of the dark borders of the third and fourth labial plates. Light markings on the posterior portion of the head are infrequent. The pattern on the body, like that of *L. getulus boylii*, is of whitish rings on a black or dark brown ground color, but the scales of the white rings are marked basally with brown or black, which sometimes extends irregularly over the scales so as to greatly obscure the rings. The latter are narrow on the back, one to two and a half scales in width, widening on the sides to about two to five scales, and traversing the belly. The rings may be broken on the midline above or below, and alternate for a greater or less distance. They vary in number from 29 to 42 on body and tail. The belly usually is crossed by the continuation of the black and white rings, but the whitish ventral plates usually are conspicuously marked at their bases with dark brown. Rarely, the belly and head are without whitish markings.

Length to anus.....	753	883	924	1030	1062	1220
Length of tail.....	120	112	95	142	142	174

Remarks.—This snake is so similar in appearance to *L. g. conjuncta* of the Cape Region of Lower California that I regarded them as identical. According to Blanchard, however, this resemblance is only apparent, and these two subspecies need never be confused, that indeed they are not even related directly,—only through *boylei* can *conjuncta* be derived from *yumensis*. *L. g. conjuncta* “shows closer affinities with *boylei* than with this form in the pattern and scalation of the head, and in the fact that its young are indistinguishable in the coloration of the white rings from the young and adults of *boylei*; and that the basal shading of the white scales, which has resulted in the confusion of the southern Arizona specimens with those from the Cape Region, may well have been derived by *conjuncta* directly from *boylei*, since the latter shows this character sporadically throughout its range.” *L. getulus yumensis* “intergrades with *L. getulus splendida* (Baird & Girard) in the vicinity of Tucson, Arizona, and east and south of there. In the region of the Florence River, in Arizona, it passes into *L. getulus boylei* (Baird & Girard), and in Imperial County or eastern San Diego County, California, it likewise intergrades with this form.”

Distribution.—The Desert Milk Snake has been recorded from Arizona, California, Lower California, and Sonora.

In Arizona, it is confined to the southern portions of the state, where it has been secured in Graham (Ash Creek, Calva, San Carlos Indian Reservation, Fort Grant), Pima (Tucson, Fort Lowell, 27 miles west from Indian Oasis), and Yuma (Yuma, Colorado River 10 miles below Cibola), counties.

In California, it has been secured only along the Colorado River at Pilot Knob, Fort Yuma, and five miles north-

east of Fort Yuma, in Imperial County; and near Coachella, Riverside County.

In Lower California, the only record is Volcano Lake. In Sonora, it has been taken at San Domingo.

170. *Lampropeltis getulus conjuncta* (Cope)

SAN LUCAN MILK SNAKE

- Lampropeltis boylii* COPE, Proc. Acad. Nat. Sci. Phila., 1860, p. 255.
Lampropeltis boylii conjuncta COPE, Proc. Acad. Nat. Sci. Phila., 1861, pp. 301, 305 (part) (type locality, **Cape St. Lucas**); Mc LAIN, Contr. Neotrop. Herpet., 1899, p. 5; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 87 (part).
Ophibolus getulus conjunctus COPE, Bull. U. S. Nat. Mus., No. 1, 1875, pp. 37, 92; YARROW & HENSHAW, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 212; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 78.
Ophibolus getulus boylii YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 92 (part); BELDING, West Amer. Scientist, Vol. III, No. 24, 1887, p. 98; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 919 (part); Terron, Mem. y Rev. Soc. Cient. Antonio Alzate, Vol. 39, 1921, pp. 165, 171.
Lampropeltis conjuncta VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 142.
Lampropeltis getulus conjuncta BLANCHARD, Occas. Papers Mus. Zool. Univ. Michigan, No. 70, 1919, pp. 6, 10; BLANCHARD, Occas. Papers Mus. Zool. Univ. Michigan, No. 87, 1920, pp. 4, —; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 52, 68; NELSON, Mem. Nat. Acad. Sci., Vol. XIV, 1921, pp. 114, 115; BLANCHARD, Bull. U. S. Nat. Mus., No. 114, 1921, p. 89, fig. 21.

Description.—Similar to *L. g. boylii*. Top of head slightly flattened posteriorly, curving downward to the broad, rounded snout. Temporal regions rarely if ever swollen. Rostral plate large, little broader than high, hollowed below, and bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of internasals, a pair of prefrontals, a short, broad frontal, supraocular of each side, and a pair of large parie-

tals. Anterior and posterior nasals distinct. Loreal a little longer than high. One preocular and usually two postoculars. Temporals normally two followed by three. Seven superior, and 10, or rarely nine or 11, inferior labials; fifth and sixth superior, and fifth or fourth inferior largest; third and fourth superior reaching eye; first pair of inferior meeting on median line. Genials in two pairs, anterior much larger than posterior. Scales smooth, thin, imbricate, in 23 or rarely 25 rows. Anal plate not divided. Gastrosteges varying in number from 228 to 240. Urosteges in two series of from 46 to 54.

The ground color of the head is black. The rostral is white with a black border on the sides and above. The nasals, loreal, oculars, and sometimes temporals have whitish central spots. The labials and genials are whitish with blackish edges. The white markings on the prefrontals and internasals occupy not more than half the area of these plates. The frontal plate has prominent whitish markings, or at least whitish spots. Each parietal plate has one or more white spots. Beneath the eye there usually is a rather conspicuous enlargement of the dark borders of the third and fourth labial plates. Light markings on the anterior two rows of temporals are usually present. The pattern on the body, like that of *L. getulus boylii*, is of whitish rings on a black or dark brown ground color, but the scales of the white rings are marked basally with brown or black, which sometimes extends irregularly around the scales so as to obscure the rings. The latter are narrow on the back, one to two and a half scales in width, widening on the sides to about two to five scales, and traversing the belly. The rings may be broken on the midline above or below, and alternate for a greater or less distance. They vary in number from 30 to 40 on body and tail. The belly usually is crossed by the continuations of the black and white rings,

but the whitish ventral plates usually are conspicuously marked at their bases with black or dark brown.

The young of this subspecies are not distinguishable from those of *L. g. boylii*. All the larger individuals agree in having the scales of the white rings marked basally with black or dark brown. This black edging seems to appear first upon those scales which are nearest the median dorsal line, and to extend to the lateral ones and over more and more of the surface of each scale as the snake increases in size.

Length to anus.....	740	748
Length of tail.....	96	101

Remarks.—This snake is so similar in appearance to *L. g. yumensis* that I regarded them as identical. According to Blanchard, however, this resemblance is only apparent, and these two subspecies need never be confused. He states that they are not even related directly. *L. g. conjuncta* shows closer affinities with *boylii* than with *yumensis*, “in the pattern and scalation of the head, and in the fact that its young are indistinguishable in the coloration of the white rings from the young and adults of *boylii*; and that the basal shading of the white scales, which has resulted in the confusion of the southern Arizona specimens with those from the Cape Region, may well have been derived by *conjuncta* directly from *boylii*, since the latter shows this character sporadically throughout its range.”

Distribution.—The known range of this subspecies, as restricted by Dr. Blanchard, is confined to the Cape Region of Lower California. The type was taken by John Xantus near Cape San Lucas. Mr. Belding found this snake at La Paz. I have seen specimens from San José del Cabo. It has been taken also at Santa Anita.

71. *Lampropeltis getulus splendida* (Baird & Girard)

SONORAN MILK SNAKE

- Ophibolus splendidus* BAIRD & GIRARD, Cat. N. Amer. Reptiles, Pt. 1, Serpents, 1853, p. 83 (type locality, **Sonora, Mexico**); BAIRD, U. S. Mex. Bound. Surv., Vol. II, Rept., 1859, p. 20, pl. 14, BAIRD, Rep. Pac. R. R. Surv., Vol. X, 1859, p. 43, pl. 30, fig. 58; COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 310; STRECKER, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 39.
- Ophibolus sayi* BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. 1, Serpents, 1853, pp. 85, 159 (part); MARCY, Explor. Red River, 1854, p. 199, pl. VII; COPE, Proc. U. S. Nat. Mus., Vol. II, 1888, p. 398.
- Lampropeltis splendida* COPE Proc. Acad. Nat. Sci. Phila., 1860, p. 255; COCKERELL, American Naturalist, Vol. XXX, April, 1896, p. 326; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. VI, 1896, p. 347; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 89.
- Coronella getulus* var. *splendida* JAN, Elenco Sist. degli Ofidi, 1863, p. 47; JAN, Iconogr. Génér. Ophid., 12e livr., 1865, pl. 6, fig. 1.
- Ophibolus getulus splendida* COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 37; COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 619; GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, p. 157; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 93; COPE, Proc. U. S. Nat. Mus., Vol. 14, 1891, p. 613; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 918, fig. 229.
- Ophibolus getulus sayi* BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 77; BROWN, Proc. Acad. Nat. Sci. Phila., 1903, p. 550.
- Lampropeltis getulus splendidus* WRIGHT, Proc. Acad. Nat. Sci. Phila., 1915, p. 148.
- Lampropeltis getulus splendida* BLANCHARD, Occas. Papers Mus. Zool. Univ. Michigan, No. 87, 1920, pp. 2, -; BLANCHARD, Bull. U. S. Nat. Mus., No. 114, 1921, p. 26, figs. 29, 30.

Description.—Similar to *L. g. boylii*. Top of head slightly flattened posteriorly, curving downward to the broad, rounded snout. Temporal regions rarely if ever swollen. Rostral plate large, little broader than high, hollowed below, and bounded behind by internasal, anterior nasal and first labial plates. Plates on top of head are a pair of internasals, a pair of prefrontals, a short, broad frontal, supraocular of each side, and a pair of large parie-

tals. Anterior and posterior nasals distinct. Loreal a little longer than high. One preocular. Two postoculars. Temporals normally two followed by three. Seven or rarely eight superior and nine, or sometimes 10 or 11, inferior labials; fourth, fifth and sixth superior, and fourth and fifth inferior largest; third and fourth superior reaching eye. Genials in two pairs, anterior much larger than posterior. Scales smooth, thin, imbricate, in 23 or sometimes 25 rows. Anal plate not divided. Gastrosteges varying in number from 207 to 225. Urosteges in two series of from 43 to 56.

The general color is black or blackish brown and yellowish white, so arranged that most of the lateral scales are black, each with a sharply defined white or yellow elongate central spot. Some of the dorsal scales are similarly marked, but often these are so grouped as to leave a series of solidly black dorsal blotches some 41 to 85 in number on body and tail. The lower surfaces are whitish, marbled with black. Sometimes lateral dark blotches alternating with the dorsal ones are more or less evident. The top of the head is black with white markings on the rostral, internasal, and prefrontal plates. Similar spots appear on the nasals, loreal, and oculars. The labials are light with dark edges.

Distribution.—This subspecies is said to range from Texas west into Arizona and south into Mexico (Sonora).

Arizona specimens have been recorded as taken in Pima (Tucson, Fort Lowell), Santa Cruz (Fort Buchanan), and Cochise (Fort Huachuca, Babacomari Creek), counties.

Habits.—One specimen, shot near Fort Lowell, was found in a tree in the river bottom. It probably was looking for birds' nests.

172. *Lampropeltis californiæ* (Blainville)

CALIFORNIA MILK SNAKE

Plate 83

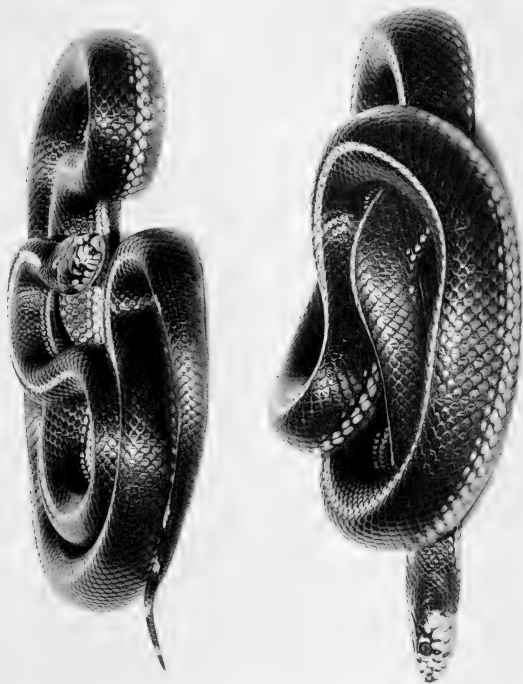
- Coluber* (*Ophis*) *Californiæ* BLAINVILLE, Nouv. Ann. du Mus., Vol. IV, 1835, p. 292, pl. XXVII, figs. 1-1b (type locality, **California**); BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. 1, Serp., 1853, p. 153.
- Coronella californiæ* DUMÉRIL & BIBRON, Erpét. Génér., Vol. VII, 1854, p. 623.
- Coronella getulus* var. *californica* JAN, Elenco Sist. degli Ofidi, 1863, p. 47; JAN, Iconogr. Génér. Ophid., 14e livr., 1865, pl. 5, fig. 3.
- Ophibolus californiæ* COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 37; COPE, Report U. S. Nat. Mus. for 1898, 1900, pl. XIX, fig. 8.
- Ophibolus getulus eiseni* YARROW, Proc. U. S. Nat. Mus., Vol. V, 1882, p. 439 (type locality, **Fresno, California**); YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 94.
- Ophibolus getulus californiæ* GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, p. 157; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 614; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 922, fig. 231; BROWN, Proc. Acad. Nat. Sci., Phila. 1901, p. 78; DITMARS, Reptile Book, 1907, pp. 341, 363.
- Coronella getula* BOULENGER, Cat. Snakes Brit. Mus., Vol. II, 1894, p. 197 (part).
- Lampropeltis californiæ* VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 172, fig.; McLAIN, Critical Notes, 1899, p. 11; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, pp. 149, 151; GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 187; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 87; HALL & GRINNELL, Proc. Cal. Acad. Sci., Ser. 4, Vol. 9, No. 2, 1919, p. 54; STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 64; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 52; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, p. 114.
- Lampropeltis californiæ californiæ* BLANCHARD, Occas. Papers Mus. Zool. Univ. Michigan, No. 87, 1920, pp. 3, -; BLANCHARD, Bull. U. S. Nat. Mus., No. 114, 1921, p. 94, fig. 22.

Description.—Similar to *L. g. boylii* in everything but color. Top of head slightly flattened posteriorly, curving downward to broad rounded snout. Temporal regions rarely

if ever swollen. Rostral plate large, little broader than high, hollowed below, and bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of internasals, a pair of prefrontals, a short, broad, irregularly wedge-shaped frontal, supraocular of each side, and a pair of large parietals. Anterior and posterior nasals distinct. A small loreal, rarely absent. One preocular and two (rarely one or three) postoculars. Temporals normally two followed by three. Seven (or eight) superior and eight, nine or 10 inferior labials, fifth and sixth superior and fifth inferior largest, third and fourth superior reaching eye, first pair of inferior meeting on median line. Genials in two pairs, anterior much larger than posterior. Scales smooth, thin, imbricate, in 23 (or 25 or 24) rows. Anal plate not divided. Gastrosteges varying in number from 226 to 241. Urosteges in two series of from 47 to 60.

This is a very peculiar snake which may prove to be a mere variation of *Lampropeltis g. boylii*, from which it does not differ in size, form, or scale characters. There is an immense amount of variation in the color pattern; indeed, this is rarely alike in any two specimens. The head is not colored differently from that of *L. g. boylii*, except that there often is more yellow near the posterior edges of the parietal plates. Along the sides of the body are more or less broken longitudinal lines or bands of white or yellow. Above these the coloration is dark brown to the median line, along which is a single, definite, narrow line, or a series of small spots or blotches, or both. The tail is dark brown, spotted above with white or yellow. The gastrosteges are yellow or white, unicolor or blotched with brown as in *L. g. boylii*.

Length to anus.....	277	342	1044
Length of tail.....	44	49	140+



Lampropeltis californica, California Milk Snake
Collected near Campo, San Diego County, California, June, 1915.

Distribution.—The California Milk Snake has been found in San Diego (Carlsbad, Campo, Point Loma, San Dieguito Valley, Poway, Orcutt, Santa Ysabel, La Mesa, Cuyamaca, Witch Creek, Dulzura, Julian), Riverside (San Jacinto), San Bernardino (Waterman Canyon, San Bernardino Mountains), Los Angeles, and Fresno (Fresno, Jameson, Firebaugh), counties, California, and at San Ysidra Ranch northern Lower California.

173. *Lampropeltis nitida* Van Denburgh
LOWER CALIFORNIA MILK SNAKE

- Ophibolus californiae* COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 79.
Lampropeltis nitida VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. V, 1895, p. 143, pl. XIV (type locality, **San Jose del Cabo, Lower California, Mexico**); STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 88; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 52, 68; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.
Lampropeltis californiae nitida BLANCHARD, Occas. Papers Mus. Zool. Univ. Michigan, No. 87, 1920, pp. 3, -; BLANCHARD, Bull. U. S. Nat. Mus., No. 114, 1921, p. 103.

Description.—Head little distinct from neck, considerably depressed, with broadly rounded snout. Rostral plate large, hollowed below, and bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of internasals, a pair of prefrontals, a rather short frontal, supraocular of each side, and a pair of large parietals. Anterior and posterior nasals distinct. A small loreal. One preocular. Two postoculars. Temporals normally two followed by three. Seven superior labials, third and fourth reaching eye. Nine or 10 inferior labials, fifth largest, first pair meeting on median line. Genials in two pairs, anterior very much larger than posterior. Scales smooth, thin, imbricate, in 23 rows. Anal plate not divided. Gastrosteges 227. Urosteges in two series, 56 in number.

The back and sides are blackish brown; the former, with a rather indistinct longitudinal line composed of cinnamon colored spots upon the centers of the scales of the median series, and upon the inner edges of those forming the first row on each side of this series; the latter, with a few scales of the first and second rows dotted, centrally, with cinnamon or yellowish white. A band of cinnamon crosses the nape. The gulars, genials and inferior labials, are blackish brown with paler centers. The plates on the top and sides of the head are brownish black, with faintly indicated dots of raw umber upon the loreal, pre- and post-ocular plates, and near the posterior edges of the supra-oculars and parietals. There are six cinnamon colored blotches on the upper surface of the tail. The gastrosteges and urosteges are entirely brownish black, with the exception of the first 10 gastrosteges, which show faint cinnamon colored dots.

A small specimen (290 mm.) has, on the sides, rather numerous cinnamon colored blotches or enlargements of a similarly colored longitudinal line. This line is of about the width of one row of scales, and occupies the tips of the gastrosteges and the lower half of each scale of the first series.

Length to anus.....	840
Length of tail.....	125

Distribution.—The three known specimens were secured at San José del Cabo, Lower California, Mexico.

174. *Lampropeltis catalinensis* Van Denburgh & Slevin
SANTA CATALINA ISLAND MILK SNAKE

Lampropeltis catalinensis VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 397 (type locality, Santa Catalina Island, Gulf of California, Mexico).

Description.—Similar in size and form to *L. californiæ*. Top of head slightly flattened posteriorly, curving downward to the broad rounded snout. Temporal regions rarely if ever swollen. Rostral plate large, little broader than high, hollowed below, and bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of internasals, a pair of prefrontals, a short, broad, irregularly wedge-shaped frontal, supraocular of each side, and a pair of large parietals. Anterior and posterior nasals distinct. A small loreal. One preocular and two postoculars. Temporals normally two followed by three. Eight superior and nine inferior labials, seventh superior and fifth inferior largest, fourth and fifth superior reaching eye, first pair of inferior meeting on median line. Genials in two pairs, anterior much larger than posterior. Scales smooth, thin, imbricate, in 23 rows. Anal plate not divided. Gastroteges 228. Urostegeges 63; in two series.

The ground color above is dark purplish brown, similar to that of some specimens of *L. californiæ*. There are no transverse markings. The ground color forms a dark longitudinal dorsal band about five scales wide extending from the head to the end of the tail. Along the middorsal line, at nearly regular intervals of three or four scales, are small yellowish white spots on single scales. All of the lateral scales are yellowish white with narrow purplish brown borders. The head is dark purplish brown above and laterally with small yellowish white markings on the internasals, prefrontals, temporals, oculars, loreals, nasals, rostral, and

labials. The lower surfaces are chiefly black, boldly marbled with yellowish white laterally on most of the gastrosteges and centrally on a few. The distal urosteges and the genials and gulars are yellowish white with black or dark brown margins.

The colors in life were purple, black and bright canary yellow.

Length to anus.....920

Length of tail.....56

Distribution.—Santa Catalina Island, Gulf of California, Mexico.

Remarks.—This beautiful snake is known only from a single adult male which was dug out from the center of a decayed fallen cactus. Its coloring is quite different from that of any other known species, although the lower surfaces are somewhat suggestive of *L. nitida* and the spotted sides remind one of *L. g. splendida*.

Genus 35. *Contia*

Contia BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, Serpents, 1853, p. 110 (type, *mitis*).

Lodia BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, Serpents, 1853, p. 116 (type, *tenuis*).

Eirenis JAN, Elenco Sist. d. Ofidi, 1863, p. 48.

The body is rather stout for so small a snake, with short, tapering, pointed tail, and slight constriction at neck. The head is flat-topped, with broad, rounded snout. Its plates are normal except that the anterior and posterior nasals usually are united above, or both above and below, the nostril. Usually one preocular and two postoculars are present. Temporals are 1+2. There is one loreal. The

scales are smooth, in 15 or 17 rows, each with one apical pit. The anal plate is divided, and the urosteges are in two series. The eye is small, with round pupil.

175. *Contia tenuis* (Baird & Girard)

SHARP-TAILED SNAKE

Calamaria tenuis BAIRD & GIRARD, Proc. Acad. Nat. Sci. Phila., Vol. VI, 1852, p. 176 (type locality, **Puget Sound**).

Contia mitis BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. 1, Serpents, 1853, p. 110 (type locality, **San Jose, California**); GIRARD, U. S. Explor. Exped., Herp., 1858, p. 125, pl. X, figs. 6-12; BAIRD, Rep. Pac. R. R. Surv., Vol. X, 1859, pl. XXXVI, fig. 7; COPE, Proc. Acad. Nat. Sci. Phila., 1860, p. 251; COPE, Proc. Acad. Nat. Sci. Phila., 1861, p. 74; COOPER, Proc. Cal. Acad. Sci., Vol. IV, 1870, p. 64; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 36; GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, 1883, pp. 93, 164; BOCOURT, Miss. Sci. au Mex., Rept., 1883, p. 557, pl. XXXIV, fig. 3; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 87; TOWNSEND, Proc. U. S. Nat. Mus., Vol. 10, 1887, p. 239; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 601; BOULENGER, Cat. Snakes Brit. Mus., Vol. II, 1894, p. 267; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 162; Mc LAIN, Critical Notes, 1899, p. 11; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 68; COPE, Report, U. S. Nat. Mus. for 1898, 1900, p. 925; DITMARS, Reptile Book, 1907, p. 332, pl. CI, fig. 2; GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 183.

Lodia tenuis BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 116 (type locality, **Puget Sound, Or.**); GIRARD, U. S. Explor. Exped., Herp., 1858, p. 122, pl. IX, figs. 8-11; BAIRD, Rep. Pac. R. R. Surv., Vol. X, 1859, pl. XXXVI, fig. 8; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 36; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 602.

Homalosoma mite JAN, Arch. Zool. Anat. Phys., Vol. II, 1862, pp. 33, 35; JAN, Elenco syst. degli Ofidi, 1863, p. 36; JAN, Iconogr. génér. des Ophid., 13e livr., 1865, pl. IV, fig. 1.

Ablabes purpureocauda GÜNTHER, Cat. Colub. Snakes, Brit. Mus., 1858, p. 245 (type locality, **California**).

Contia tenuis STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 91.

Description.—Head wide, with flattened top and broad, rounded snout. Rostral plate large, high, hollowed below, and bounded behind by internasal, nasal and first labial plates. Plates on top of head, a pair of internasals, a pair of prefrontals, a frontal broad in front but pointed behind, a long supraocular on each side, and a pair of large parietals. Anterior and posterior nasal plates frequently united above or both above and below, nostril. Loreal small and nearly square. Normally one preocular, but two very rarely present. Postoculars two, rarely one. Temporals one followed by two, rarely 1+1. Seven (very rarely six) superior and seven inferior labials, sixth upper and fourth lower largest, third and fourth upper bordering eye, first pair of lower meeting on median line behind the small triangular mental. Genials in two pairs, anterior much larger than posterior. Scales on body smooth, in 15 rows. Anal plate divided. Gastrosteges varying in number from 147 to 186. Urosteges in two series of from 27 to 57. Tail short, conical, ending in a sharply pointed plate.

The color above is grayish or yellowish brown, usually very finely punctulated or reticulated with slate or black, with or without a light yellowish or brownish line along each side. The scales below these lines are sometimes spotted with black. In very young specimens a continuous black line along each side takes the place of these spots, while a similar line runs along the middle of the back. The sides of the head show these lateral black lines more or less distinctly. The tail is colored like the back, except that its upper surface is sometimes suffused with red. The lower surfaces are grayish or yellowish white, transversely barred with black on the anterior half of each gastrostege and (often) urostege.

Length to anus.....	106	176	238	240	299	330
Length of tail.....	22	27	57	37	78	83

Distribution.—This harmless little snake occurs principally in the transition zone, overlapping into the adjoining zones. It has been recorded from Puget Sound, Washington, and from Oregon, but no specimens have been collected in these states in recent years. Boulenger records one from Vancouver Island, B. C.

In California it occurs in the Sierra Nevada and coast ranges. So far as I know, it has not been taken south of Tulare and Monterey counties. The counties in which it has been collected are Tulare (Kaweah at 1,000 feet), Fresno ([mountains near] Fresno), Amador (five miles east from Carbondale), El Dorado (Fyffe), Butte, Shasta (Baird), Humboldt (Carlotta), Mendocino (Eel River Bridge, Comptche), Sonoma (Petaluma, Agua Caliente), Napa (St. Helena), Marin, Alameda (Berkeley, Piedmont, Alameda, Haywards), San Mateo (Menlo Park, Woodside, La Honda, Pescadero Creek), Santa Clara (Palo Alto, Stanford University, Phelps Lake, San Jose), Santa Cruz (Big Basin, Wrights), and Monterey (Carmel).

Genus 36. *Rhinocheilus*

Rhinocheilus BAIRD & GIRARD, N. Amer. Rept., Pt. I, Serp., 1853, p. 120 (type, *lecontei*); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 930.

The body is rather slender, with short, tapering tail. The head is slightly distinct from the neck, and ends in a narrow snout which projects far beyond the lower jaw. The head plates are normal. The nasal plates rarely unite above the nostril. One (or two) preoculars and two (or three) postoculars are present, as is also a small loreal. Temporals are normally two followed by three. The scales are smooth, in seventeen to twenty-five rows, with apical pits. The anal plate is divided. Urosteges are in one series,

except usually toward the end of the tail. The eye is of moderate size, with round pupil. Two species are known, the second being Mexican.

176. *Rhinocheilus lecontei* (Baird & Girard)

LONG-NOSED SNAKE

Plate 84

Rhinocheilus lecontei BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. 1, Serp., 1853, p. 120 (type locality, **San Diego, California**); BAIRD, Rep. Pac. R. R. Surv., Vol. X, 1859, Pt. III, pl. XXIII, figs. 90; BAIRD, U. S. Mex. Bound. Surv., Vol. II, 1859, p. 21, pl. XX; JAN, Arch. Zool. Anat. Phys., Vol. II, 1863, p. 217; COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 304; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 36; JAN, Congr. génér. des Ophid., 48e livr., 1876, pl. III, fig. 1; LOCKINGTON, Amer. Naturalist, 1880, p. 295; GARMAN, Mem. Mus. Compr. Zool. Cambr., Vol. VIII, No. 3, 1883, p. 73; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 88; BOCOURT, Miss. Sci. au Mex., 1886, p. 602, pl. XL, figs. 7-7d; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 606; GÜNTHER, Biol. Centr.-Amer., Rept., 1893, p. 100; BOULENGER, Cat. Snakes Brit. Mus., Vol. II, 1894, p. 212; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 142; COCKERELL, American Naturalist, Vol. XXX, April, 1896, p. 326; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 346; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 174, figs; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 931, fig. 236; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 86; STEJNEGER, Proc. U. S. Nat. Mus., Vol. XXV, 1902, p. 155; BROWN, Proc. Acad. Nat. Sci. Phila., 1903, p. 551; BRANSON, Kansas Univ. Sci. Bull., Vol. II, No. 13, 1904, p. 404, fig. 26; BAILEY, N. Amer. Fauna, No. 25, 1905, pp. 28, 47; DITMARS, Reptile Book, 1907, p. 375; STRECKER, Proc. Biol. Soc. Washington, Vol. XXI, 1908, p. 75; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 154; HURTER, First Ann. Rep. Laguna Marine Lab., 1912, p. 67; VAN DENBURGH & SLEVIN, Proc. Cal. Sci., Ser. 4, Vol. 3, 1913, p. 413; ATSATT, Univ. Cal. Publ. Zool., Vol. 12, No. 3, 1913, p. 42; RUTHLING, Copeia, No. 21; 1915, p. 32; STRECKER, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 40; GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 188; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 91; COWLES, Journ. Entomol. & Zool. Pomona College, Vol. XII, No. 3, 1920, p. 66; STEPHENS, Trans. San Diego

Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 64; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 40, 45, 52; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.

Description.—Head rounded and snout projecting and pointed. Temporal regions not swollen. Rostral plate large, prominent, recurved on top of snout, and bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head, a pair of internasals, a pair of prefrontals, a broad frontal, supraocular of each side, and a pair of rather short, rounded parietals. Anterior and posterior nasals usually distinct, but sometimes united above nostril. Loreal small, elongate, sometimes entering orbit. One or rarely two preoculars and two or rarely three, postoculars. Temporals normally two followed by three, rarely 2+2, 1+3, or 2+4. Eight (rarely seven or nine) superior and eight, nine or 10 inferior labials, seventh (or eighth) superior and fifth (or sixth) inferior largest, fourth and fifth (or fifth and sixth) superior reaching eye, first pair of inferior meeting on median line. One or two pairs of genials, posterior very narrow when present. Scales on body smooth, thin, in 23 or rarely 25 rows. Anal plate not divided. Gastrosteges varying in number from 186 to 216. Urosteges in one series, or more often in one series anteriorly and two posteriorly, of from 40 to 55.

The snout is yellowish more or less marked with black. Back of this the head is black or brown, often spotted with yellow or white. Across the back is a series of large black or brown blotches; 20 to 34 on the body and 6 to 12 on the tail. These blotches may be rounded, pointed, or truncate on the sides, and are from one and one-half to three times as long as the intervals which separate them. These intervals are brick red, orange, yellow, or white, and usually are continuous with the white or yellow of the lower surfaces.

The lateral scales which fall within the dark blotches often have light centers, while those in the light intervals are similarly spotted with black or brown. Small black or brown blotches are sometimes present on the sides midway between the larger ones. The lower surfaces are yellow or white, unicolor or marbled with black or brown.

Length to anus.....	275	310	490	496	520	800
Length of tail.....	43	51	70	73	83	140

Distribution.—This curiously colored snake ranges from California across Arizona, New Mexico, and Northern Mexico to Kansas and Texas.

In Arizona, it has been taken near Topock, Mohave County; Fort Whipple, Camp Verde, Yavapai County; Camp Grant, Graham County; Tucson, Pima County; Nogales and Fort Buchanan, Santa Cruz County; Fort Huachuca, Cochise County; Yuma, Yuma County; and in the Pinal Mountains.

In California, it has been found in Mendocino (Mt. Sanhedrin), San Benito (Bear Valley), Madera (five miles south from Madera), Fresno (Fresno), Kings (Tulare Lake), Tulare (White River), San Luis Obispo (Carrizo Plain), Kern (Fort Tejon), Inyo (Independence), Los Angeles (Pasadena, Claremont, Belvedere), San Bernardino (San Bernardino), Riverside (Cabazon at 1,700 feet, Dos Palms Spring at 3,500 feet in the Santa Rosa Mountains), Orange (Laguna Beach), and San Diego (San Diego), counties.

I have received a specimen from St. George, Washington County, Utah.

I have also seen a typical specimen in the Hurter collection (now in the U. S. National Museum) which Mr. Hurter assured me had been collected for him at South Range, Glens Ferry, Elmore County, Idaho.



Rhinocellus lecontei, Long-nosed Snake
Collected near Fort Tejon, Kern County, California, April, 1914.

Mr. Lockington recorded this snake as having been collected by Mr. W. J. Fisher, "at or to the south of Magdalena Bay," Lower California. The National Museum has specimens from Ensenada and Salt Slough.

Genus 37. *Ficimia*

Ficimia GRAY, Cat. Snakes Brit. Mus., 1849, p. 80 (type, *olivacea*).
Gyalopion COPE, Proc. Acad. Nat. Sci. Phila., 1860, p. 243 (type, *canum*).

The body is rather stout, with short tail. The head is but little distinct from the neck. The snout is acute and the rostral plate turns up at the tip so that its upper surface is concave. The internasals are very small and are separated by the rostral which extends back to the prefrontals. The nasal and first labial plates usually are united, a groove extending from the nostril to the second labial. There is no loreal. Frontal, supraocular and parietal plates are normal. One preocular. The scales are in seventeen rows, smooth, with pits. The anal is divided. The maxillary teeth are small, equal, not grooved. The eye is of moderate size, with round pupil.

177. *Ficimia cana* (Cope)

PUG-NOSED SNAKE

Gyalopion canum COPE, Proc. Acad. Nat. Sci. Phila., 1860, p. 243 (type locality, **Fort Buchanan, Arizona**).

Gyalopion canum COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 36; COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 624, pl. XVIII, figs. 2, 2a; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 14, 88; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 603; COPE, Amer. Naturalist, Vol. XXX, 1896, p. 1014; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 947; RUTHVEN, Bull. Am. Mus. Nat. Hist., Vol. XXIII, 1907, p. 587.

Ficimia cana GARMAN, Mem. Mus. Compr. Zool., Camb., Vol. VIII, 1883, pp. 83, 161; BOULENGER, Cat. Snakes Brit. Mus., Vol. II, 1894, p. 272; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 84;

DITMARS, Reptile Book, 1907, p. 372; STRECKER, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 40; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 93.

Description.—Body rather stout, with short tail. Head broad, short, depressed, but little distinct from neck. Snout acute and turned upward at tip. Rostral plate acute, produced forward and upward, its upper surface concave, recurved on top of snout, separating the internasals widely, and broadly in contact with prefrontals. Internasals very small. Anterior nasal merged with first labial. Posterior nasal merged with anterior, or distinct. No loreal, prefrontal in contact with second labial. Frontal, supraocular and parietal plates normal. One preocular. Two postoculars. Temporals one followed by two, or 2+3. Supralabials seven, third and fourth reaching eye. Inferior labials seven to nine, fourth usually largest, the first pair meeting on median line. One or two pairs of genials, posterior very small when present. Scales on body smooth, broad, in 17 or 19 rows. Anal divided. Gastrosteges varying in number from 129 to 146. Urosteges in two series of from 28 to 36.

The color above is light brownish gray crossed by a series of transverse brown bands or blotches. These blotches may be edged with black. They may extend down to the gastrosteges, becoming narrower on the sides, and may tend to divide into a dorsal and two lateral series of spots anteriorly. On the middle of the body a series of lateral bars may alternate with the dorsal ones. The brown dorsal blotches between head and anus vary from 31 to 40. There are eight or nine similar transverse spots on the tail. The first blotch on the neck is large and is extended forward medially to the parietals. The head is olive gray with a broad brown band across the parietals and including the tip of the frontal. A second band extends between the eyes

across the line of meeting of the prefrontal, supraocular, and frontal plates and is continued below the eye to the margin of the mouth, embracing all of the fourth labial. The four anterior infralabials have dark margins. The belly is white or yellowish, without markings.

Length to anus.....	117	135	165	293
Length of tail.....	28	20	23	57

Distribution.— This snake is known only from five specimens. These are the type from Fort Buchanan in southeastern Arizona, a second specimen labeled merely Southern Arizona, one from El Paso, Texas, one found dead on the shore of Lake Walters at the White Sands, west of Alamogordo, New Mexico, and one secured in Montezuma Canyon, Huachuca Mountains, Cochise County Arizona.

Genus 38. *Hypsiglena*

Hypsiglena COPE, Proc. Acad. Nat. Sci. Phila., 1860, p. 246 (type, *ochrorhynchus*).

Pseudodipsas PETERS, Mon. Berl. Acad., 1860, p. 521.

Comastes JAN, Elenco Sist. Ofid., 1863, p. 102.

The body is small, with moderate, slender tail. The head is distinct from the neck by reason of the swollen temples, which in old individuals are greatly enlarged. The snout is rounded and rather prominent. The head plates are normal. The nasals rarely unite above the nostril. Two (or three) preoculars and two postoculars are present, as is also a loreal. Temporals are normally one followed by two. The scales are smooth, in 19 or 21 rows, with apical pits. The anal plate is divided. Urosteges are in two rows. The eye is of moderate size or small, with vertically elliptic pupil.

178. *Hypsiglena ochrorhynchus ochrorhynchus*

SPOTTED NIGHT SNAKE

Plate 85

- Hypsiglena ochrorhynchus* COPE, Proc. Acad. Nat. Sci. Phila., 1860, p. 246 (type locality, **Cape San Lucas, Lower California, Mex.**); COPE, Bull. U. S. Nat. Mus., No. 1, 1875, pp. 38, 92; LOCKINGTON, Amer. Naturalist, Vol. XIV, 1880, p. 295; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 15, 97; GARMAN Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, pp. 80, 161; COPE, Proc. Acad. Nat. Sci. Phila., 1883, p. 32; GARMAN, Bull. Essex. Inst., Vol. XVI, No. 1, 1884, p. 30; CRAGIN, Bull. Washburn Laborat., Vol. 1, 1884, p. 8; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 78; BELDING, West Am. Scientist, Vol. III, No. 24, 1887, p. 98; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 617; STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 204; BOULENGER, Cat. Snakes Brit. Mus., Vol. II, 1894, p. 209; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 145; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 178, fig.; MOCQUARD, Nouv. Arch. Mus. Hist. Nat., Paris, Ser. 4, Vol. 1, 1899, p. 325; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 953, fig. 245; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 87; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 3, Zool., Vol. 4, No. 5, 1906, p. 65; DITMARS, Reptile Book, 1907, p. 329, pl. CI, fig. 1; GRINNELL, Univ. Cal. Publ. Zool., Vol. 5, No. 1, 1908, p. 165; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 414; ATSATT, Univ. Cal. Publ. Zool., Vol. 12, No. 3, 1913, p. 42; RUTHLING, Copeia, No. 15, 1915; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 5, No. 4, 1915, p. 106; GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, p. 188; BENTLEY, Copeia, No. 61, 1918, p. 83; COWLES, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, 1920, p. 66; STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 64; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.
- Hypsiglena chlorophæa* COPE, Proc. Acad. Nat. Sci. Phila., 1860, p. 247 (type locality, **Fort Buchanan, Ariz.**); STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 205; MOCQUARD, Nouv. Arch. Mus. Hist. Nat., Paris, Ser. 4, Vol. I, 1899, p. 325; MOCQUARD, Miss. Sci. au Mexique, Pt. III, Rept., 1908, p. 869, pl. 69, figs. 1, 1a-d.

- Hypsiglena ochrorhyncha* var. *chlorophæa* COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 304; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 38; COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 622; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 15, 97; GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, p. 161.
- ? *Hypsiglena texana* STEJNEGER, N. Amer. Fauna, No. 7, 1894, p. 205 (type locality, **between Laredo and Camargo, Tex.**); STRECKER, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 40.
- Hypsiglena venusta* MOCQUARD, Nouv. Arch. Mus. Hist. Nat., Paris, Ser. 4, Vol. I, 1899, p. 327 (type locality, **Santa Rosalia and San Ignacio, Lower California, Mexico**).
- Hypsiglena ochrorhynchus ochrorhynchus* STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 93; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 28, 52, 68.
- ? *Hypsiglena ochrorhynchus texana* STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 93.

Description.—Head flat-topped or slightly rounded, and snout projecting. Temporal regions usually swollen. Rostral plate large, prominent, recurved on top of snout, and bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of internasals, a pair of prefrontals, a frontal, supraocular of each side, and a pair of rather short, rounded parietals. Anterior and posterior nasals usually distinct, but sometimes united above nostril. Loreal small, but often elongate. Two (or one or three) preoculars, the lower often very small. Two postoculars. Temporals normally one followed by two, rarely 2+2, or 1+1. Eight (rarely seven or nine) superior and ten (or nine) inferior labials, sixth or seventh superior and fifth or sixth inferior largest, fourth and fifth or fifth and sixth superior reaching eye, first pair of inferior meeting on median line. Genials in two pairs, posterior equal to or a little larger or smaller than anterior. Scales on body smooth, thin, in 21 or rarely 23 rows. Anal plate divided. Gastrosteges varying in number from 160 to 191. Urosteges in two series of from 38 to 66.

The ground color above is yellowish white so thickly sprinkled with minute brown or black dots as to present an ashy or olivaceous appearance. Along the middle of the back is a single or double series of more or less alternate and confluent blotches of brown or black. On the sides are two or three or four alternating series of small brown or black spots. There are two or three elongate dark blotches on the nape, each lateral one being produced forward as a narrow band across the side of the face. These nuchal blotches often unite to form a dark transverse band or collar. The top of the head, the labials, and the genials are spotted with brown. The gastrosteges are yellowish or white, immaculate. The urosteges are sometimes speckled with gray or brown.

Length to anus.....	137	282	284	318	325	447
Length of tail.....	21	60	56	47	60	76

Distribution.—This little snake was originally described from specimens collected in Lower California. Since then it has been taken in California, Arizona, Nevada, and Utah. Specimens from Texas have been described as *H. texana*.

In Lower California, it has been secured at Cape San Lucas, San Jose del Cabo, La Paz, Sierra San Lazaro, and San Francisquito, Sierra Laguna, all in the Cape Region, and at Mulege, San Ignacio, Santa Rosalia, and Puerto Escondido in the central region, as well as on Tortuga, San Marcos, Carmen and Isla Partida near Angel de la Guardia islands in the Gulf of California.

In California, it has been found in San Diego (San Diego Cuyamaca Mountains, Witch Creek), Riverside (San Jacinto, Strawberry Valley at 5,000 feet), San Bernardino (Santa Ana Canyon at 5,500 feet, Lovic, Hesperia), Los Angeles (near Los Angeles, Claremont, Mt. Wilson), Inyo (Shepherd Canyon, Argus Range, Alabama Hills three miles west



Hypsiglena ochrorhynchus ochrorhynchus, Spotted Night Snake
Collected at Hesperia, San Bernardino County, California, September, 1913.

from Lone Pine), Santa Clara (Los Gatos), and Contra Costa (near Christy) counties.

The only Nevada record is of a specimen from the vicinity of Carrant, Nye County.

In Utah, two specimens have been taken near Fort Douglas, Salt Lake County.

Arizonan records are more numerous, and indicate its presence at Camp Grant, Graham County; Nigger Jim Canyon, Huachuca Mountains, Cochise County; Fort Buchanan, and Nogales, Santa Cruz County; Fort Whipple, and Prescott, Yavapai County; Bright Angel Creek, Coconino County; Phoenix and Cave Creek, Maricopa County; and in Pima County near Tucson, Gunsight, and in the foothills of the Catalina Mountains 18 miles north of Tucson.

In Sonora, it has been found at Guaymas.

Habits.—Almost nothing is known regarding the habits of this little snake. It probably is nocturnal and usually is found under stones. Grinnell mentions one found in a clover patch at about four in the afternoon.

Genus 39. *Natrix*

- Natrix* LAURENTI, Synopsis Reptilium, 1768, p. 73 (type *vulgaris* = *natrix*).
Tropinotus KUHLE, Isis von Oken, 1822, p. 473.
Tropidonotus BOIE, Isis von Oken, 1826, p. 205 (type, *natrix*).
Rhabdophis FITZINGER, Syst. Rept., 1843, p. 27 (type, *subminiatus*).
Steiropphis FITZINGER, Syst. Rept., 1843, p. 27 (type, *chrysargus*).
Hydrophilophis SCHMIDT, Abh. Naturw. Ver. Hamburg, Vol. II, Pt. 2.
Nerodia BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, Serpents, 1853, p. 38 (type, *sipedon*).
Regina BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, Serpents, 1853, p. 45 (type, *leberis*).
Amphisma DUMÉRIL & BIBRON, Erpét. Génér., Vol. VII, 1854, p. 724 (type, *stolatum*).
Bothrodytes COPE, Proc. Amer. Philos. Soc., Vol. XXIII, 1886, p. 495 (type, *subminiatum*).

Ceratophallus COPE, Amer. Naturalist, Vol. XXVII, 1893, p. 483 (type, *vittata*).

Diplophallus COPE, Amer. Naturalist, XXVII, 1893, p. 483 (type, *piscator*).

The body is not very elongate, fairly thick, with moderately long tapering tail, and head large and distinct from neck. The head plates are normal, two internasals, two prefrontals, a frontal, supraoculars and a pair of parietals being present. Two nasals. Preoculars one, two or rarely three. Postoculars two to four. The temporals usually are 1+2, or 1+3. A loreal is present. The scales are keeled, have two scale-pits, and are arranged in from 19 to 23 rows. The anal plate is divided. Urosteges are in two series. The eye is moderate or large, with round pupil. Maxillary teeth generally longer posteriorly, without grooves. A large number of species are known from Europe, Asia, Africa, and America, only one occurs in the area included in this work.

179. *Natrix valida* (Kennicott)

WESTERN WATER SNAKE

Regina valida KENNICOTT, Proc. Acad. Nat. Sci. Phila., 1860, p. 334 (type locality, **Durango, Mexico**); COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 74.

Tropidonotus tephropleura, COPE, Proc. Acad. Nat. Sci. Phila., 1860, p. 341 (type locality, **Cape St. Lucas**).

Tropidonotus celano COPE, Proc. Acad. Nat. Sci., Phila. 1860, p. 341 (type locality, **Cape St. Lucas**); COPE, Proc. Acad. Nat. Sci. Phila., 1861, p. 298.

Tropidonotus validus validus COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 42; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 132; BELDING, West Amer. Scientist, Vol. III, No. 24, 1887, p. 99.

Tropidonotus validus celano COPE, Bull. U. S. Nat. Mus., No. 1, 1875, pp. 42, 93; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 133; BELDING, West Amer. Scientist, Vol. III, No. 24, 1887, p. 99.

Tropidonotus validus tephropleura YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 133; BELDING, West Amer. Scientist, Vol. III, No. 24, 1887, p. 98.

- Tropidonotus leberis validus* GARMAN, Mem. Mus. Compr. Zool. Camb., Vol. VIII, No. 3, pp. 28, 143.
- Regina valida celano* COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 74.
- Natrix valida valida* COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 670; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 984, figs. 258, 259.
- Natrix valida celano* COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 670; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 986, fig. 260.
- Tropidonotus validus* BOULENGER, Cat. Snakes Brit. Mus., Vol. I, 1893, p. 237; GÜNTHER, Biologia Cent.-Amer., 1894, p. 134; MOCQUARD, Nouv. Arch. Mus. Hist. Nat., 4e Ser., Vol. I, 1899, p. 329; DITMARS Reptile Book, 1907, p. 245.
- Natrix valida* VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. V, 1895, p. 152; VAN DENBURGH, Proc. Acad. Nat. Sci. Phila., 1897, p. 464; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 97; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 52, 68; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.
- Natrix celaeno* VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. V, 1895, p. 154.

Description.—Head distinct from neck, flat-topped, with rather narrow, rounded snout, and temporal regions sometimes swollen. Rostral large, bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of internasals, a pair of prefrontals, a long frontal, supraocular of each side, and a pair of large parietals. Anterior and posterior nasals distinct. One loreal. Preoculars one or two, or very rarely three. Postoculars usually three, sometimes two. Temporals normally one followed by two, sometimes 1+3. Supralabials eight, or very rarely seven, fourth and fifth reaching eye, sixth and seventh largest. Infralabials usually ten, sixth largest, first pair meeting on median line. Genials in two pairs, posterior longer than anterior. Scales on body in 19 rows, all keeled except occasionally in outer row. Anal plate divided. Gastrosteges varying in number from 139 to 154. Urosteges in two series of from 65 to 83.

The color above is uniform light grayish, yellowish, or brownish olive, with more or less distinct blackish markings laterally upon the bases of many of the scales of the fourth and fifth, and sometimes of the first and eighth, rows. The lower surfaces are pale grayish yellow, the tips of the gastrosteges being tinged with the color of the back.

A second type of coloration, shown by certain melanistic specimens, has been described (*Natrix celæno*) but doubtless is only an individual variation. In it the ground color both above and below is grayish black. A lighter stripe of bluish gray extends along the side from the neck to the tail. Anteriorly this stripe occupies the second, third, and part of the first, rows of scales, and sometimes shows irregular dorsal expansions or vertical bars separated by interspaces of the blackish ground color about one and a half or two scales wide. Posteriorly the lateral stripe usually becomes darker and more indistinct and may or may not involve the scales of the first row. The lower surfaces are grayish black often marbled with lighter.

Some specimens are more or less intermediate between the two types of coloration. Some show, more or less distinctly, seven longitudinal stripes, alternating light and dark, from head to tail.

Length to anus.....	432	540	575	620	682	687
Length of tail.....	149	163	183	180	208	250

Distribution.—*Natrix valida* was first described by Robert Kennicott, in 1860, from a specimen collected in Durango, Mexico. It has since been found in other parts of the Mexican mainland. It probably does not occur in the United States. Professor Cope recorded a specimen (U. S. Nat. Mus. No. 4650) as having been collected in Rabeh Valley, Utah, but recent examination shows that this specimen is a *Thamnophis o. vagrans* with a divided anal plate.

In Lower California, it was first secured by Xantus near Cape San Lucas. It appears to be the most abundant snake of the country immediately surrounding San Jose del Cabo, and has been taken also at Miraflores, Agua Caliente, and Santiago, all in the Cape Region. Mr. Belding's specimens, recorded by Yarrow as taken at La Paz, really came from the San Jose River (Belding MS.).

Habits.—This is a true water snake. Individuals had eaten pollywogs and small fish (*Mugil brasiliensis*).

Genus 40. *Thamnophis*

Thamnophis FITZINGER, Syst. Rept., 1843, p. 26 (type, *saurita*).

Eutainia BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 24 (type, *saurita*).

The body is more or less elongate, usually rather slender, with moderately long, tapering tail, and head distinct from neck. The cephalic plates are normal. The nasals are not united. One or two (rarely three) preoculars, and one to four, usually three, postoculars are present. The temporals are normally 1+2, but may be 1+1, 1+3, 1+4, 2+2, or 2+3. A loreal normally is present, rarely absent. The scales are keeled, in 17 to 23 rows. The anal plate normally is undivided, but in rare individuals is divided as in the genus *Natrix*. There are no scale pits. The urosteges are in two series. The eye is moderate or small, with round pupil.

Fourteen kinds of garter-snakes from Western North America now are recognized. Although the several species and subspecies may often be distinguished at a glance by one familiar with their several characters, the amount of individual variation is so great that it is quite impossible to make a key which will properly refer all specimens. The following synopsis will, I believe, usually serve its purpose, but should not be trusted too implicitly.

SYNOPSIS OF SPECIES AND SUBSPECIES

- a.—Lateral light stripe anteriorly not involving scales of the fourth row.
- b.—Lateral stripe anteriorly upon scales of the second and third rows.
- c.—Supralabials normally seven.
- d.—Eye large, posterior genials much longer than anterior, infralabials usually 10, scale-row 19—19—17.
- e.—Gastrosteges (146 to 170) and urosteges (66 to 95) average fewer in number (156—166 and 76 to 85).
- f.—Coloration lighter, with broader light lines.
T. sirtalis parietalis.—p. 792.
- f'.—Coloration usually darker both above and below, lines often narrower.
T. sirtalis concinnus.—p. 795.
- e'.—Gastrosteges (156 to 177) and urosteges (74 to 97) average more numerous (163 to 169 and 83 to 90), coloration lighter than in f'.
- d'.—Eye much smaller, posterior genials about equal to anterior, infralabials usually fewer than 10, scale-rows usually 17—17—15.
T. ordinoides ordinoides.—p. 812.
- c'.—Supralabials normally eight.
- dd.—Scales usually in not more than 19 rows.
- ee.—Gastrosteges average more than 160, eye large, posterior genials longer.
T. eques.—p. 808.
- ee'.—Gastrosteges average fewer than 160, eye small, genials subequal.
T. ordinoides atratus.—p. 817.
- dd'.—Scales usually in more than 19 rows.

eee.—Dorsal line present over most of body.

ff.—Dorsal line very distinct with sharply defined borders not invaded by dorsal spots, little dark pigmentation on gastrosteges.

T. ordinoides elegans.—p. 824.

ff'.—Dorsal line with borders invaded by dorsal spots, dark pigmentation of gastrosteges often present.

g.—Preocular single, dorsal spots and dark pigmentation of gastrosteges usually very prominent.

T. ordinoides vagrans.—p. 829.

g'.—Usually two preoculars, dorsal spots and pigmentation of gastrosteges usually less evident.

T. ordinoides biscutatus.—p. 834.

eee'.—Dorsal line usually absent, or short, or indistinct.

fff.—Remnant of dorsal line usually present, preocular single, infralabials often more than 10.

T. ordinoides couchii.—p. 838.

fff'.—No dorsal line, often more than one preocular, infralabials rarely more than 10.

gg.—Lateral lines usually present, dorsal spots fewer, or absent.

T. ordinoides hammondii.—p. 843.

gg'.—Lateral lines usually absent, dorsal spots very numerous and prominent.

T. angustirostris.—p. 855.

b'.—Lateral stripe anteriorly upon scales of the third row only, light postoral crescents present.

T. marcianus.—p. 849.

a'.—Lateral light stripe anteriorly involving the scales of the fourth row.

T. megalops.—p. 852.

The following facts also will be of aid in the determination of specimens:

1. Any red in the coloration indicates that the specimen belongs to one of the subspecies of *T. sirtalis* or to *T. o. ordinoides* or *T. o. atratus*.

2. Red on the upper surface of the head seems to be peculiar to the subspecies of *T. sirtalis*.

3. Red on the belly or in the dorsal line is distinctive of *T. o. ordinoides* and *T. o. atratus*, or rarely *T. s. parietalis*.

4. The members of the *sirtalis* group have a much larger eye and longer posterior genials than are found in the subspecies of *T. ordinoides*, with the possible exception of *T. o. hammondii*.

5. The members of the *sirtalis* group practically always have 19—19—17 rows of scales and a single preocular.

6. In the subspecies of *T. ordinoides* 21 rows of scales are almost always present, except in *T. o. ordinoides* and *T. o. atratus*.

7. Two preoculars are most frequent in *T. angustirostris* and *T. o. biscutatus*, but are frequent in *T. o. hammondii* and *T. o. ordinoides*.

8. Absence of the dorsal stripe occurs only in four of the subspecies of *T. ordinoides*—viz., *hammondii*, *couchii*, *ordinoides*, and *atratus*,—and is usual in only *hammondii* and *couchii*.

The garter-snakes are the most abundant of our serpents. Where conditions are especially favorable they may be found in vast numbers. They are ovoviviparous, and a single female has been known to produce as many as 78 to 80 young or as few as four at a time. Mating occurs in the spring. The young are born in July, August or September. They are extruded singly, each coiled within its

fetal membrane. After lying quietly for a few seconds, the young snake struggles, thrusts its head through the membrane, yawns once or twice, thrusts out its tongue, and crawls off, becoming at once very lively. As soon as the body becomes dry, the skin is shed, exuviation often beginning within 15 minutes after the young snake has been ushered into the world. Occasionally the young snake is unsuccessful in rupturing the sac, and smothers. (Ruthven.)

These snakes are sometimes found in dry fields, but seldom far from water. One usually encounters them along the edges of streams, ponds or lakes, or in moist meadows. Many are so aquatic as really to deserve the name "water-snake." They frequently swim on or under the surface of rivers and ponds, and at Buena Vista Lake I have seen them in patches of tules a considerable distance from shore. Their food consists largely of fishes, tadpoles, frogs and toads. Occasionally insects, salamanders, worms, fledgling birds (blackbirds), and very rarely small mammals and snakes are eaten. A specimen of *T. ordinoides couchii* had caught a six inch trout.

Individual snakes, especially in spring, sometimes are quite aggressive. On one occasion, while I was crossing a small grassy pasture, three or four large *Thamnophis sirtalis infernalis* came toward me hissing and striking wildly in the air. Their fierce attitude and combined attack evidently were intended to frighten me away, but I was unable to discover the cause of their excitement. On another trip I shot a *Thamnophis ordinoides couchii* in a patch of tules in Buena Vista Lake. This snake was nearly five feet in length and the shot merely stunned it long enough for me to grab the snake by the tail. It instantly recovered, tried to pull away into the tules, and, finding that it could not escape, turned upon me, and, with open mouth and many hisses, came right into the boat. Although I knew, of

course, that it was a perfectly harmless snake, its sudden aggressiveness combined with its horrid appearance nearly secured its release before I could overcome my instinctive repugnance.

180. *Thamnophis sirtalis parietalis* (Say)

PRAIRIE GARTER SNAKE

Coluber parietalis, SAY, Long's Exped. Rocky Mts., Vol. I, 1823, p. 186 (type locality, **West side of the Missouri River three miles above the mouth of Boyer's River**).

Eutaenia parietalis COPE, Ann. Rep. U. S. Geol. Surv. Terrs., 1871 (1872), p. 468.

Eutaenia ornata YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 553.

Thamnophis parietalis VAN DENBURGH, Occas. Papers Cal. Acad. Sci., Vol. V, 1897, p. 200 (part); ELLIS & HENDERSON, Univ. Colorado Studies, Vol. X, No. 2, 1913, p. 86, pl. IV, fig. 19; ELLIS & HENDERSON, Univ. Colorado Bull., Vol. XV, No. 6, 1915, p. 261.

Eutaenia sirtalis parietalis TAYLOR, Ann. Rep. Nebr. State Board Agric. for 1891, 1892, p. 325; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1077 (part); BRANSON, Kansas Univ. Sci. Bull., Vol. II, No. 13, 1904, p. 366, fig. 5; DITMARS, Reptile Book, 1907, p. 237, pl. LXXII, fig. 1 (part).

Thamnophis sirtalis parietalis RUTHVEN, Bull. U. S. Nat. Mus. No. 61, 1908, p. 166 (part); COCKERELL, Univ. Colorado Studies, Vol. VII, No. 2, 1910, p. 131; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 5, No. 4, 1915, p. 108; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 103 (part); VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 8, No. 6, 1918, p. 190; RUTHVEN, Occas. Papers Mus. Zool. Univ. Michigan, No. 66, 1919, p. 3; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 40.

Description.—Head distinct from neck, flat-topped, with narrow, rounded snout, and temporal regions sometimes swollen. Eye large. Rostral plate large, bounded behind by internasal, anterior nasal and first labial plates. Plates on top of head, a pair of internasals, a pair of prefrontals, a frontal, supraocular of each side, and a pair of parietals.

Anterior and posterior nasals distinct. One loreal. One preocular and normally three postoculars. Temporals normally one followed by two, sometimes 1+1, or 1+3. Seven or rarely eight superior and nine or 10 inferior labials; the fifth or sixth superior and fifth, sixth or seventh inferior largest; the third and fourth or fourth and fifth superior reaching the eye; the first pair of inferior meeting on the median line. Two pairs of genials, the posterior considerably longer than the anterior. Scales on the body in 19—19—17 rows, all keeled, the outer feebly. Anal plate not divided. Gastrosteiges varying in number at least from 157 to 168. Urosteiges in two series of from 74 to 87.

The ground color above is olive or olive-brown, varying shades of brown, or blackish brown, usually with more or less red on the sides, chiefly on the skin between the scales, but involving the latter to a greater or less extent in different individuals. There are three longitudinal light lines, one on the middle of the back and one along the second and third rows of scales of each side. These lateral lines sometimes blend with the light coloration of the belly. Dark brown or blackish spots often are present between the dorsal and lateral lines when the ground color is light enough to cause them to show. The dorsal line usually is bluish, but may be yellow. The belly may be bluish, yellowish or grayish white or rarely red. The dorsal stripe averages broader and the belly lighter than in *T. sirtalis concinnus*, resembling in these respects *T. sirtalis infernalis*.

Length to anus	276	437	489	597	675	678
Length of tail	90	153	167	178	202	190

Variation.—In twelve specimens from Utah the loreal is 1—1 in all. The preoculars are 1—1 in all. The postoculars are 3—3 in all. The temporals are 1+2—1+2 in eight, or 66%; 1+2—1+3 in three, or 25%; and

1+1—1+2 in one, or 8%. The supralabials are 7—7 in nine, or 75%; 7—8 in two, or 17%; and 8—8 in one, or 8%. The infralabials are 10—10 in seven, or 58%; 9—9 in four, or 33%; and 9—10 in one, or 8%. The scale-rows are 19—19—17 in all. The gastrosteges vary in number from 157 to 168, males having from 164 to 168, females from 157 to 166; the average in five males is 165.4, in seven females, 161.1. The urosteges vary from 74 to 87, males having from 84 to 87, females from 74 to 79; the average in four males is 85.2, in four females, 76.

Distribution.—This snake inhabits the great plains, ranging west from Minnesota, Iowa and Missouri, to Utah and perhaps eastern Nevada and southern Idaho. The specimens at hand are insufficient to show the western limits of the range of this subspecies and where and how it meets, or merges with, or is replaced by, *T. sirtalis concinnus* and *T. sirtalis infernalis*. The last named form ranges east at least to the western edge of Nevada, while *T. sirtalis concinnus* seems to occur as far east as northern Idaho or, possibly, Montana. Many more specimens are needed from southern Idaho, eastern Oregon, and all parts of Nevada, to throw light on these questions.

I have examined Utah specimens from Cache (Bear River at Logan), Davis (Woods Cross), Salt Lake (Fort Douglas), and Utah (Spanish Fork), counties, and it probably is this snake which has been reported from Iron (Rush Lake) and Utah (Provo), counties.

I also have specimens from Bear Lake (Bear Lake) County, Idaho.

181. *Thamnophis sirtalis concinnus* (Hallowell)

NORTHWESTERN GARTER SNAKE

- Tropidonotus concinnus* HALLOWELL, Proc. Acad. Nat. Sci. Phila., Vol. VI, 1852, p. 182 (type locality, **Oregon Territory**).
- Eutainia pickeringii* BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. 1, Serp., 1853, p. 27 (type locality, **Puget Sound**); GIRARD, U. S. Explor. Exped., Herp., 1858, p. 150, pl. XIII, figs. 14-20; LORD, Naturalist Vancouver Island, Vol. II, 1866, p. 306 (part).
- Eutainia concinna* BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. 1, Serp., 1853, p. 146; LORD, Naturalist Vancouver Island, Vol. II, 1866, p. 306.
- Eutania sirtalis tetratenia* COPE, U. S. Explor. Surv. W. 100th Merid., Vol. V, 1875, p. 546 (part); COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 664 (**Puget Sound, Wash., and Pitt River, Cal.**) (part); COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 1080 (part).
- Eutania sirtalis concinna* COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 664; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1081.
- Eutania sirtalis pickeringii* COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 665, COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1082; DITMARS, Reptile Book, 1907, p. 238, pl. LXXII, fig. 2.
- Eutania sirtalis trilineata* COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 665, ("**Port Townsend, Oregon and Fort Benton, Mont.**") (part?); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1083 (part?).
- Thamnophis parietalis pickeringii* VAN DENBURGH, Occas. Papers, Cal. Acad. Sci., V, 1897, p. 204.
- Thamnophis sirtalis concinnus* RUTHVEN, Bull. U. S. Nat. Mus., No. 61, 1908, p. 173; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 103; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 8, No. 6, p. 192; SMITH, Copeia, 1920, No. 88, p. 102; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 40, 45.
- Thamnophis sirtalis parietalis* BLANCHARD, Copeia, 1921, No. 90, p. 6.

Description.—Head distinct from neck, flat topped, with narrow, rounded snout. Temporal regions sometimes swollen in old specimens. Eye large. Rostral plate large, bounded behind by internasal, anterior nasal and first labial plates.

Plates on top of head, a pair of internasals, a pair of prefrontals, a frontal, supraocular of each side, and a pair of parietals. Anterior and posterior nasals distinct. One loreal. One preocular and normally three, rarely two or four, postoculars. Temporals normally one followed by two, sometimes 1+1 or 1+3. Seven or rarely eight, superior and nine to 11, normally 10, inferior labials, the fifth or sixth superior and fifth, sixth or seventh inferior largest, the third and fourth or fourth and fifth superior reaching eye, the first pair of inferior meeting on the median line. Two pairs of genials, posterior longer than anterior. Scales in 19—19—17 rows, all keeled except sometimes the first row on each side. Anal plate not divided. Gastrosteges varying in number from 146 to 170, males having from 150 to 170, females from 146 to 167. Urosteges in two series of from 66 to 95, males having from 70 to 95, females from 66 to 91.

This subspecies differs from *T. s. parietalis* in darker color only. Some specimens approach the typical form in having red blotches on the sides. The normal coloration is, however, fairly constant. The ground color above is deep blackish brown or black, with three light longitudinal lines. These lines are often very narrow, but may be as wide as in the typical *T. sirtalis parietalis*, and may be white, grayish, bluish, greenish, or pale yellow. The median dorsal line may fade out posteriorly, and the lateral lines may be very faint. A narrow black line sometimes runs along the tips of the gastrosteges. The top of the head often is blackish, but may be red; its sides are light. The lower surfaces are bluish black, slate, or greenish, lighter anteriorly, the throat being yellowish white.

Length to anus	165	410	500	540	650	690
Length of tail	51	125	180	160	190	215

Variation.—Two hundred and thirty-six specimens show the following variations: The loreal is 1—1 in all. The preoculars are 1—1 in two hundred and thirty-six and 2—2 in one. The postoculars are 3—3 in two hundred and fifteen or 92%; 3—4 in thirteen, or 5%; 2—3 in four, or 2%; 4—4 in one, and 2—2 in one. The temporals are 1+2—1+2 in two hundred and twenty-one, or 94%; 1+1—1+2 in five, or 2%; 1+2—1+3 in four, or 2%; 1+1—1+1 in four, or 2%; and 1+3—1+3 in one. The supralabials are 7—7 in one hundred and eighty-three, or 77%; 7—8 in forty-one, or 17%; and 8—8 in fourteen, or 6%. The infralabials are 10—10 in one hundred and sixty-nine, or 71%; 9—10 in forty-one, or 17%; 9—9 in fifteen, or 6%; 8—9 in eight, or 3%; 8—10 in two, or 1%; and 10—11 in two, or 1%. The scale-rows are 19—17—17 in all specimens. The gastrosteges vary in number from 146 to 170, males having from 150 to 170, females from 146 to 167; the average in ninety-nine males is 164.3, in one hundred and eighteen females, 156.4. The urosteges vary from 66 to 95, males having from 70 to 95, females from 66 to 91; the average in eighty males is 84.2, in eighty-eight females, 76.8.

While a dark style of coloration with a tendency toward narrow lines is characteristic of this subspecies, this type of coloration is by no means constant. Specimens similar in color to the type of *pickeringii* seem to be very rare even in the far north. In general, the difference from *T. sirtalis parietalis* and *T. sirtalis infernalis* lies in an increase in the dark pigment, both dorsally and ventrally, rather than in a marked narrowing of the lines or a reduction in the amount of red in the coloration.

Some specimens from Oregon are no darker than Californian *T. sirtalis infernalis*, and show red heads and often much red on the body. Others are quite dark. Upon the

whole, and notwithstanding wide individual variation everywhere, it may be said that the coloration becomes lighter toward the south and is gradually changed to that of *T. sirtalis infernalis*. This color change seems to occur more rapidly (i.e., farther north) than the change in number of gastrosteges.

Distribution.—This northern form of the Pacific Garter Snake inhabits the coast region of British Columbia, Washington, Oregon, and California south to San Francisco Bay, intergrading toward the south and east in California with *T. sirtalis infernalis*. In the far north it ranges east to Idaho, or possibly to Montana.

I have examined specimens:

From British Columbia, collected at Union Bay, Bayne Island, Vancouver Island (Alberni Valley), and Lillooet River Valley. It has been taken at Sumass and Chelukweyuk prairies, Bella Coola, Comax Lake, Lund, Gabriola Island, Donald, Kaslo, and Union Bay.

From Idaho, from Washington (Weiser), Ada (Boise), Boise (Payette Lake), and Jerome (Blue Lakes) counties.

From Washington, from Clallam (Neah Bay, Lake Crescent), Jefferson (Port Townsend), San Juan (San Juan Islands), Whatcom (Glacier), Snohomish (Index, Darrington), King (Seattle), Chehalis (Quiniault and Melbourne), Mason (Lake Cushman), Pierce (Steilacoom, Mount Rainier, Longmire), Pacific (Holcomb and South Bend), Lewis (Toledo), Clark (Vancouver), Skamania (Stevenson, Carson), Klickitat (Trout Lake), Yakima (Indian Reservation, North Yakima, Mabton), Chelan (Stekekin, Chelan), Stevens (Springdale), and Whitman (Pullman), counties.

From Oregon, from Clatsop (Olney and Gearheart), Tillamook (Garibaldi, Tillamook, Trask River), Yamhill

(road to Nestucea between Grand Ronde and Dolph), Lincoln (road between Chitwood and Siletz River), Benton (road between Pioneer and Siletz River, Alsea River near Alsea), Linn (Albany), Lane (Elmira, June Lake and Siuslaw River, Junction Lake and Deadwood Creek), Coos (South Fork Coos River, Sumner, Coquille, Empire, Myrtle Point), Douglas (Takeneitch Creek, Camas Mountains), Curry (Langlois, Sixes River, Port Orford, Elk Creek, Flores Creek, Rogue River, Harbor), and Jackson (Battle Creek near Eagle Point) counties.

From California, from Del Norte (Smith River, Crescent City, Requa), Siskiyou (Sisson), Shasta (Burney Creek), Humboldt (Redwood Creek, Orick, Carlotta, Maple Creek, Samoa, Eureka), Mendocino (Covelo, Garcia River, Sherwood, Willets, Mendocino, Albion River near Comptche), Sonoma (Kidd Creek, Skaggs Springs), Napa (Napa), and Marin (Inverness, Point Reyes Station, Tocaloma, Willow Camp) counties.

It is evident that *T. sirtalis concinnus* is not confined to the extreme northwest, but, on the contrary, occupies a strip close to the coast nearly or quite to San Francisco Bay. In the extreme north *T. sirtalis concinnus* ranges east far from the coast, for the specimens from northern Idaho are of this dark race and it is very possibly may be that Cope's type of *trilineata* from Fort Benton, Montana, also belongs here. A little farther south, however, *concinnus* does not range far from the ocean, as is shown by the specimens from Klamath County, Oregon, and Modoc County, California, which represent the race *T. sirtalis infernalis*.

Remarks.—Although there is much variation in the amount of dark pigment and in the width of the dorsal line, these characters are sufficiently constant to serve for the

recognition of *concinus* as a subspecies distinct from *parietalis*.

T. sirtalis concinns differs from *T. sirtalis infernalis* in coloration in the same respects as from *T. sirtalis parietalis*. It also differs from *T. sirtalis infernalis* in having a smaller number of gastrosteges and urosteges. As we pass south and east from the range of *concinns* in California and southern Oregon we find a definite increase in the number of ventral plates. The snakes from the northwest coast have fewer gastrosteges and urosteges than the snakes from farther south and east in California. The greater difference is in the gastrostege counts, and these might perhaps be used alone, but the combination of gastrostege and urostege counts helps to bury individual variation. In a comparison of this kind it is, of course, necessary to separate the sexes, for the females have much lower counts than the males. The average count in males from Washington is 245.5, the average in males from central and southern California ranges from 255 to 265; the extremes of variation in the latter area being 251 and 270, while in Washington specimens they are only 239 and 250. Similar differences are found in the counts of female specimens, the Washington average being 230.1, as against central and southern California averages of from 243.7 to 248. Intermediate localities show some intermediate counts, but in general it may be seen that the difference is quite great and constant enough to serve well for the separation of a southwestern race, *T. sirtalis infernalis*, from the northern subspecies, *T. sirtalis concinns*. This difference in gastrosteges is clearly shown in Figure 1.

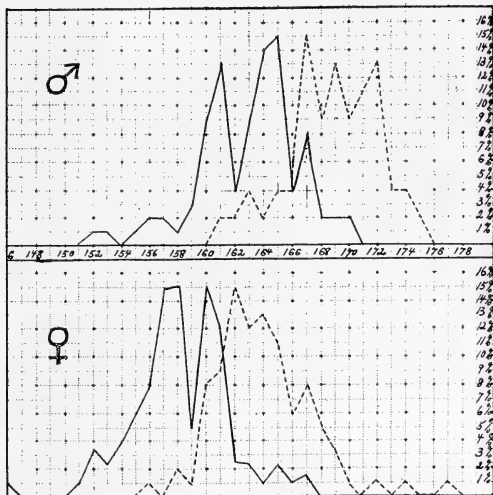


Figure 1

Fig. 1. This chart shows the number of gastrosteges in specimens of *Thamnophis sirtalis concinnus*, represented by a continuous line, and *Thamnophis sirtalis infernalis*, represented by a broken line. The upper half of the chart shows the counts in males, the lower half the counts in females. The chart shows the percentage of the total number of specimens of each sex having each number of gastrosteges, and brings out clearly the fact that in *T. s. infernalis* these scutes are more numerous than in *T. s. concinnus*.

T. sirtalis concinnus may be readily distinguished from *T. ordinoides ordinoides* of the same regions, by its larger eye, and more numerous scales

Habits.—This snake probably does not differ in habits from its close relatives.

182. *Thamnophis sirtalis infernalis* (Blainville)

PACIFIC GARTER SNAKE

Plate 86

- Coluber infernalis* BLAINVILLE, Nouv. Ann. du Mus., Vol. IV, 1835, p. 291, pl. XXVI, figs. 3-3a (type locality, California).
- Eutainia infernalis* BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. 1, Serp., 1853, p. 26; GIRARD, U. S. Explor. Exped., Herp., 1858, p. 148, pl. XIV, figs. 11-16; BOCOURT, Bull. Soc. Zool. Fr., 1892, p. 40 (part).
- Eutania sirtalis tetratenia* COPE, U. S. Explor. Surv. W. 100th Merid., Vol. V, 1875, p. 546 (part) (no locality); TOWNSEND, Proc. U. S. Nat. Mus., Vol. 10, 1887, p. 240; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 664 (Puget Sound, Wash., and Pitt River, Cal.) (part); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1080 (part).
- Eutania sirtalis parietalis* YARROW & HENSHAW, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 216; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 664 (part); COPE, Report U. S. Nat. Mus., 1898, 1900, p. 1077 (part); DITMARS, Reptile Book, 1907, p. 237 (part).
- Tropidonotus sirtalis* var. *parietalis* GARMAN, Mem. Mus. Compr. Zool., Vol. VIII, No. 3, 1883, pp. 25, 139 (part).
- Tropidonotus ordinatus* var. *infernalis* BOULENGER, Cat. Snakes Brit. Mus., Vol. I, 1893, p. 207 (part).
- Thamnophis parietalis* STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 214; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., Vol. V, 1897, p. 200 (part); GRINNELL & GRINNELL, Throop Inst. Bull., No. XXXV, 1907, p. 48.
- Thamnophis sirtalis parietalis* RUTHVEN, Bull. U. S. Nat. Mus., No. 61, 1908, p. 166 (part); GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, p. 181 (part); STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 103 (part).
- Thamnophis sirtalis infernalis* VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. VIII, No. 6, 1918, p. 198; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 29.

Description.—Head distinct from neck, flat-topped, with narrow rounded snout, and temporal regions sometimes swollen. Eye large. Rostral plate large, bounded

behind by internasal, anterior nasal, and first labial plates. Plates on top of head: a pair of internasals, a pair of prefrontals, a frontal, supraocular of each side, and a pair of parietals. Anterior and posterior nasals distinct. One loreal. One or rarely two preoculars and from two to four, normally three, postoculars. Temporals normally one followed by two, sometimes 1+1, 1+3, 2+2 or 2+3. Seven, or rarely eight or nine, superior and eight to 11, normally 10, inferior labials, fifth or sixth superior and fifth, sixth, or seventh inferior usually largest, third and fourth or fourth and fifth superior reaching eye, first pair of inferior meeting on median line. Two pairs of genials, posterior longer than anterior. Scales on body in 19, or very rarely 21, rows, all keeled except sometimes the first row of each side. Anal plate not divided. Gastrosteges varying in number from 156 to 175; males having from 161 to 175, females 156 to 174. Urosteges in two series of from 74 to 97; males having from 82 to 97, females 74 to 93; a few of the anterior rarely undivided.

There are three light lines, one on the middle of the back and one along the second and third rows of scales of each side, but the lateral lines not infrequently blend with the color of the belly. The dorsal line usually is bluish, but may be yellow. The belly is bluish or yellowish, or rarely slaty, and may have a black line or series of spots near the tips of the gastrosteges. The head may be brown, olive, or coppery red above, bluish or grayish laterally, yellowish white below. The tail is colored like the back, but less definitely. In some specimens the ground color above is solid black, without a trace of red. In others there are traces of red on the sides, chiefly on the skin between the scales. In several the red is more extensive and forms small irregular blotches on the sides. In a number these blotches are larger, and extend up from the lateral line in definite

and more or less rectangular figures, between which are similarly shaped prolongations downward of the black ground.* Many show the red blotches spread out and blended above, so that the downward prolongations of the ground color have become detached and form a series of black spots separated by red, from the narrow band of ground color remaining on each side of the light dorsal line. In others these black spots have become united and form a black line, so that on each side of the light dorsal line we have a line of black, one of red, another of black, and the light lateral line.† In one specimen the black is almost entirely replaced by red. These color variations are all individual, none geographical.

Length to anus	185	475	565	695	715	870
Length of tail	67	160	190	227	200	210+

Variation.—One hundred and thirty-five specimens show the following variations: The loreal is 1—1 in all. The preoculars are 1—1 in all except one specimen with 1—2 and two with 2—2. The postoculars are 3—3 in ninety-five, or 73%; 3—4 in twenty-five, or 19%; 4—4 in seven, or 5%; 2—3 in three, or 2%; and 2—4 in one, or 1%. The temporals are 1+2—1+2 in one hundred and fourteen, or 88%; 1+2—1+3 in eight, or 6%; 1+1—1+2 in three, or 2%; 1+1—1+1 in one, or 1%; 2+2—2+2 in one, or 1%; 1+3—1+3 in one, or 1%; and 1+2—2+2 in one, or 1%. The supralabials are 7-7 in one hundred and four, or 80%; 7—8 in seventeen, or 13%; 8—8 in eight, or 6%; and 9—9 in one, or 1%. The infralabials are 10—10 in one hundred and ten, or 85%; 9—10 in thirteen, or 10%; 9—9 in three, or 2%; 10—11 in two, or 1%; and 9—8 in two, or 1%. The

*This and the following are the most common forms.

†The *Eutania sirtalis tetratenia* of Cope.



Thamnophis sirtalis infernalis, Pacific Garter Snake
Fig. 1. Collected at Castro, Santa Clara County, California, February, 1914.
Fig. 2. Adult male collected at Pacific Grove, Monterey County, California, May, 1914.

scale-rows are 19—19—17 in one hundred and thirty-four and 19—21—19—17 in one. The gastrosteges vary in number from 156 to 177, males having from 161 to 175, females from 156 to 174; the average in forty-seven males is 168.7, in eighty-one females, 163.7. The urosteges vary from 74 to 97, males having from 82 to 97, females from 74 to 93; the average in thirty-eight males is 89.8, in fifty females, 82.8.

There is much variation in color. Certain types of coloration seem to be more frequent in certain localities than elsewhere. Thus, the majority of the snakes from the San Joaquin and Sacramento valleys and the Klamath region differ in appearance from those from Santa Clara County and the southern coast. Much larger series might perhaps throw light upon these conditions, which now are obscure.

Some specimens have bright red heads. Others, perhaps of the same lot, have no red, or heads that are partially red. The red-headed snakes are of both sexes, various ages, and all sorts of localities.

Distribution.—The Pacific Garter-Snake ranges over most of California excepting the desert areas and the north coast of Del Norte, Shasta, Humboldt, Mendocino, Sonoma, Napa and Marin counties. It is abundant in many parts of this range, and has been reported from western Nevada (Nixon, Pyramid Lake), and southern Oregon (Sycaon Marsh, Lakeview, Klamath Falls, Fort Klamath). I have examined specimens from Modoc (Alturas, Likely, Goose Lake, Davis Creek, Warner Mountains, Cedarville), Butte (Oroville), Sutter (West Butte), El Dorado (Fyffe, Lake Tahoe), Placer (Lake Tahoe), Mariposa (Dudley, Yosemite Valley, Coulterville, Pleasant Valley), Fresno (Fresno), Kern (Isabella, Weldon, Buttonwillow), Merced (Los

Baños, Gadwall, Snelling), San Joaquin (Banta), Contra Costa (Walnut Creek), Alameda (Berkeley), Santa Clara (Palo Alto, Castro, San Jose, Uvas Creek), Santa Cruz (Glenwood), Monterey (Pacific Grove, Seaside, Carmel, Mt. Mars), San Luis Obispo (Edna), San Bernardino (Ontario, Colton), Los Angeles (Los Angeles, Bixby), and Riverside (Riverside) counties.

The following localities are represented each by one specimen. The material being so limited one cannot state positively to which subspecies of *sirtalis* these specimens should be referred, but it is probable that they belong here. Willow Lake, Tehama County, Susanville, Lassen County, and Fallen Leaf Lake, El Dorado County, California, and Nixon, Washoe County, Nevada.

It probably will prove to be impossible to draw any very definite limits to the areas occupied by this form and by *T. sirtalis concinnus*. This must be so, for one gradually changes into the other. The area of intergradation is a broad one, individual variation is great, and opinions may easily differ as to geographical limits. Our own views are expressed in the lists of localities given under each subspecies. These indicate that to *T. sirtalis concinnus* are referred snakes from Del Norte, Siskiyou, Shasta, Humboldt, Mendocino, Sonoma, Napa, and Marin counties, while those from elsewhere in California are regarded as *T. sirtalis infernalis*.

Remarks.—This subspecies differs from both *T. sirtalis parietalis* and *T. sirtalis concinnus* in having a greater number of gastrosteges and urosteges. This is clearly shown in the following table of average counts:

Gastrosteges:	♂	♀
Parietalis	165.4	161.1
Concinnus	164.3	156.4
Infernalis	168.7	163.7
Urosteges:		
Parietalis	85.2	76
Concinnus	84.2	76.8
Infernalis	89.8	82.8

Habits.—These snakes usually are found in moist places or swimming in fresh water ponds or sluggish sloughs. The food is known to consist of small fish, tadpoles, and insects. One specimen had eaten a full-grown toad. Grinnell and Grinnell state that near Bixby, Los Angeles County, dozens were observed May 22, 1904. Sometimes half-a-dozen were together, in corners of old duck-hunters' blinds, voluntarily braided into knots. When handled, this snake, like other members of the genus, makes itself obnoxious by the emission of extremely malodorous matter provided by special glands, doubtless as a means of defense.

Garter-snakes now (1918) are very rare at Pyramid Lake, Nevada. That they formerly were very abundant there is shown by the following note, which probably pertains to this subspecies:

“Along the shores of the large island in Pyramid Lake vast number of *Eutæniæ* are found, comprising this, and, in all probability, several other recognized varieties. During the heated part of the day, the mossy tracts in the tepid, shallow water of the little inlets were thronged with them, as they swam in gentle undulations over the smooth surface or idly basked on the heated rocks along the shore. In no other locality have we ever seen them in such numbers.

When disturbed, they swam boldly out into open water or sought the bottom and hid themselves under the rocks. Though not in the true sense of the word water snakes, the various *Eutæniæ* are all thus quite aquatic in their habits.*

183. *Thamnophis eques* (Reuss)

WHITE-BELLIED GARTER SNAKE

Coluber eques REUSS, Mus. Senckenberg. Abh., Vol. I, 1834, p. 152, pl. 8, fig. 2 (type locality, **Mexico**).

Eutainia dorsalis BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, Serpents, 1853, p. 31 (type locality, **Rio Grande, Texas**).

Eutænia dorsalis COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 41; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 663.

Eutænia ornata YARROW, Rept. U. S. Expl. Surv. W. 100th Merid., Vol. V, 1875, pp. 550, 553; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 122 (part).

Eutænia cyrtopsis KENNICOTT, Proc. Acad. Nat. Sci. Phila., 1860, p. 333 (type localities, **Rinconada, Coahuila, Mexico, Durango, Gila River**); COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 306; COPE, Rept. U. S. Expl. Surv. W. 100th Merid., Vol. V, 1875, p. 546; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 41; COPE, Bull. U. S. Nat. Mus., No. 17, 1880, p. 23; CRAGIN, Bull. Washburn Laborat., Vol. I, 1884, p. 8; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 73; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 656; COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 1049; Bailey, N. Amer. Fauna, No. 25, 1905, pp. 35, 48.

Thamnophis cyrtopsis var. *cyclides* COPE, Proc. Acad. Nat. Sci. Phila., 1861, p. 299 (type locality, "**Cape St. Lucas,**" very improbable).

Tropidonotus collaris JAN, Arch. Zool. Anat. Phys., Vol. III, 1865, p. 209; JAN, Iconographia degli Ofid., Vol. II, 25, 1867, pl. V, fig. 2.

Eutænia cyrtopsis ocellata COPE, Bull. U. S. Nat. Mus., No. 17, 1880, p. 22 (type locality, **Helodes, Texas**); COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 657.

Eutænia pulchrilatus COPE, Proc. Am. Philos. Soc., 1885, p. 174 (type locality, "**uncertain but probably Guanajuato,**" **Mexico**); COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 73; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1062.

*Yarrow and Henshaw, Ann. Rep. Chief of Engineers, Surv. W. 100th Merid., Append. NN, 1878, p. 217.

- Tropidonotus sirtalis* var. *collaris* GARMAN, Mem. Mus. Comp. Zool., Vol. XIII, No. 3, 1883, p. 25.
- Eutania collaris* COPE, Proc. Am. Philos. Soc., Vol. XXII, 1884, p. 173; DUGÉS, La Natureza, Ser. 2, Vol. I, 1888, p. 127, pl. XIII, fig. 16.
- Eutania cyrtopsis collaris* COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 657.
- Eutania aurata* COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 659 (type locality, **Lake Valley, southern New Mexico**).
- Tropidonotus ordinatus* var. *eques* BOULENGER, Cat. Snakes Brit. Mus., Vol. I, 1893, p. 209.
- Eutania eques* COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1049; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 25; DITMARS, Reptile Book, 1907, p. 230, pls. LXVI, fig. 8, LXXI, fig. 1.
- Eutania eques collaris* COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1051.
- Eutania eques aurata* COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1052.
- Thamnophis cyrtopsis* STEJNEGER, Proc. U. S. Nat. Mus., Vol. XXV, 1902, p. 155.
- Eutania sirtalis dorsalis* COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1076.
- Thamnophis eques*, RUTHVEN, Bull. Am. Mus. Nat. Hist., Vol. XXIII, 1907, p. 588; RUTHVEN, Bull. U. S. Nat. Mus., No. 61, 1908, p. 158; STONE, Proc. Acad. Nat. Sci. Phila., 1911, p. 232; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. III, p. 419; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 101; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. VIII, No. 6, 1918, p. 204.

Description.—Head distinct from neck, flat-topped with narrow, rounded snout. Temporal regions sometimes swollen in old individuals. Eye moderate. Rostral plate large, bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head, a pair of internasals, a pair of prefrontals, a frontal, supraocular of each side, and a pair of parietals. Anterior and posterior nasals distinct. One loreal. One or rarely two preoculars. Postoculars normally three, rarely two or four. Temporals

normally one followed by two, sometimes 1+3 or 2+3. Eight or rarely nine, seven or ten superior, and eight to 11, normally 10, inferior labials; usually the fifth, sixth or seventh superior and fifth, sixth or seventh inferior, largest, the fourth and fifth or third and fourth superior reaching eye, the first pair of inferior meeting on the median line. Two pairs of genials, the posterior usually longer than anterior. Scales in nineteen or very rarely 21 rows, all keeled except sometimes the first row on each side. Anal plate not divided. Gastrosteges varying in number from 144 to 180; males having from 166 to 180; females from 144 to 171. Urosteges in two series of from 66 to 97, males having from 85 to 97, females from 66 to 88.

The ground color above is olive or yellowish or reddish brown. Along the middle of the back runs a yellow light line of varying width but usually restricted to the scales of one or one and two half rows. On the second and third rows of scales of each side is a broader yellow or white line. The dorso-lateral region between the light lines may be nearly unicolor, but usually shows, more or less distinctly, two series of dark spots which may encroach upon the dorsal or lateral lines. These spots sometimes unite to form cross-bands anteriorly or may be restricted to the skin between the scales, or show but little on the edges of the scales. The top of the head is usually light brown or olive, sometimes with a yellow pineal spot. The labials are light with dark edges. There is a pair of large dark nuchal blotches. The gastrosteges and urosteges are almost always uniform greenish or grayish white, but sometimes are clouded with dusky, especially near their anterior edges, and show blackish spots near the tips of the gastrosteges. The chin and throat normally are yellowish white.

Length to anus	309	351	407	470	482	489
Length of tail	97	103	134	156	173	173

Variation.—Twenty-one specimens from Arizona have loreals 1—1 in all. The preoculars are 1—1 in all, but one, which has 1—2. The postoculars are 3—3 in all but three which have 3—4. The temporals are 1+2—1+2 in fourteen, 1+2—1+3 in three, 1+3—1+3 in three, and 2+3—2+3 in one. The supralabials are 8—8 in twenty, and 8—9 in one. The infralabials are 10—10 in seventeen, 11—11 in two, 10—11 in one, and 9—10 in one. The scale-rows are 19—19—17 in all but one, which has 21—19—17. The gastrosteges vary in number from 164 to 175, males having from 166 to 175, females from 164 to 171; the average in thirteen males is 170.6, in seven females, 168. The urosteges vary from 77 to 97, males having from 85 to 97, females from 77 to 88; the average in twelve males is 91.7, in six females, 83.5.

Distribution.—This snake occurs in the United States in Arizona, New Mexico and western Texas. Thence it ranges south through Mexico to Guatemala. In Arizona it has been found in the plateau region and about the foothills of various mountain groups. Ruthven has recorded it from Fort Apache, Fort Huachuca, White River Canyon, Sabino Canyon, and Fort Whipple, Arizona. We have examined specimens from Maricopa (Cave Creek), Coconino (Oak Creek), Pima (Catalina Mountains, 18 miles north from Tucson, Sabino Canyon, Catalina Mountains, Sawmill Canyon, Santa Rita Mountains), and Santa Cruz (canyon between Madera and Agua Caliente canyons, Cottonwood Canyon, Agua Caliente Canyon, Gardner Canyon, and Stetson's Dam, all in the Santa Rita Mountains) counties, Arizona. Dr. Stone has recorded this species from Sycamore Canyon, Baboquivari Mountains, Arizona; and Dr. Stejneger from Fort Huachuca, Arizona.

In Sonora, it has been collected at Guaymas and in Guadalupe Canyon.

Remarks.—Specimens from Mexico and Central America seem to differ from those from Arizona and New Mexico in the frequent reduction in the number of supralabials to seven. Since our material is all from Arizona, we are unable to form an opinion as to whether the snakes from these distant localities are really identical in other respects.

184. *Thamnophis ordinoides ordinoides*

(Baird & Girard)

PUGET GARTER SNAKE

Plate 87

Tropidonotus ordinoides BAIRD & GIRARD, Proc. Acad. Nat. Sci. Phila., Vol. VI, 1852, p. 176 (type locality, **Puget Sound**).

Eutainia leptocephala BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. 1, Serp., 1853, p. 29 (type locality, **Puget Sound**); GIRARD, U. S. Explor. Exped., Herp., 1858, p. 151, pl. XIII, figs. 7-13; LORD, Naturalist Vancouver Island, Vol. II, 1866, p. 306.

Eutainia cooperi KENNICOTT, U. S. Pac. R. R. Surv., Vol. XII, Pt. II, 1860, p. 296, pl. XV, fig. 1 (localities **Cathapoot'l** and **Willopah Valleys**).

Thamnophis leptocephala VAN DENBURGH, Occas. Papers Cal. Acad. Sci., Vol. V, 1897, p. 205.

Eutania leptocephala COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 1058.

Eutania sirtalis leptocephala BROWN, Proc. Acad. Sci. Phila., 1903, p. 295 (part); DITMARS, Reptile Book, 1907, p. 239 (part).

Thamnophis leptocephalus olympia MEEK, Field Columbian Mus. Nat. Hist., Zool. Series, Vol. I, 1899, p. 235 (type locality, **Olympic Mountains, Washington**).

Thamnophis rubristriata MEEK, Field Columbian Mus. Nat. Hist., Zool. Series, Vol. I, 1899, p. 235 (type locality, **Olympic Mountains, Washington**).

Thamnophis ordinoides ordinoides RUTHVEN, Bull. U. S. Nat. Mus., No. 61, 1908, p. 147 (part); STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 101; GRINNELL & CAMP, Univ. Cal. Publ., Zool., Vol. 17, No. 10, 1917, p. 179 (part); VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Series 4, Vol. VIII, No. 6, 1918, p. 215, pl. 8.

Description.—Head distinct from neck, flat-topped, with narrow, rounded snout, and temporal regions sometimes slightly swollen. Eye small. Rostral large, bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head: a pair of internasals, a pair of prefrontals, a frontal, supraocular of each side, and a pair of parietals. Anterior and posterior nasals distinct. One loreal, rarely absent. One or two preoculars and three or rarely two postoculars. Temporals normally two followed by two, sometimes 1+1 or 1+3. Superior labials normally seven, rarely six, eight or five. Inferior labials normally eight, rarely nine, seven, six or five. Usually the fifth or sixth superior and fourth, fifth, or sixth inferior labials largest, third and fourth or fourth and fifth superior reaching eye, first pair of inferior meeting on median line. Two pairs of genials, posterior longer than anterior. Scales on body in 17 or 19 rows, all keeled except sometimes the first row of each side. Anal plate not divided. Gastrosteges varying in number from 136 to 162, males having from 138 to 162, females from 135 to 154. Urosteges in two series of from 50 to 81, males having from 56 to 81, females from 50 to 72.

The ground color above is olive or pale blackish brown, dotted and spotted with black along the edges of the scales, and with or without three light longitudinal lines. The lateral lines, when present, are usually grayish or greenish blue, while the dorsal line—which often fades out posteriorly—may be white, gray, blue, yellow, or brick red. A

blackish streak usually runs back from the eye in specimens light enough to show it. The labials are bluish gray or yellowish. The pineal spot is often present on the suture between the parietal plates. The belly may be yellowish, olive, plumbeous, or slate; the throat is yellowish white; the lower surface of the tail is sometimes brick red.

Length to anus	372	395	420	518	560	585
Length of tail	105	112	115	133	164	138

Variation.—Three specimens have no loreal plates; one has a loreal on one side only; the others have the normal loreal 1—1. The preoculars are 1—1 in two hundred and seventy-nine, or 86%; 1—2 in twenty-six, or 8%; and 2—2 in twenty, or 6%. The postoculars are 3—3 in two hundred and eighty-four, or 87%; 2—3 in twenty-four, or 7%; 2—2 in sixteen, or 5%; and 1—2 in one. The temporals are 1+2—1+2 in two hundred and eighty-nine, or 89%; 1+2—1+1 in eighteen, or 6%; 1+2—1+3 in eight, or 2%; 1+1—1+1 in four, or 1%; and 3+3—3+3 in three, or 1%. The supralabials are 7—7 in two hundred and eighty-three, or 85%; 7—8 in twenty, or 6%; 7—6 in nine, or 3%; 8—8 in five, or 2%; 6—6 in four, or 1%; 5—5 in one, and 8—6 in one. The infralabials are 8—8 in one hundred and seventy-nine, or 55%; 9—9 in fifty-eight, or 18%; 8—9 in fifty-four, or 17%; 7—8 in sixteen, or 5%; 7—7 in nine, or 3%; 9—10 in six, or 2%; and 6—7 in two. The scale rows are 17—17—15 or 17—15—15 in two hundred and thirty-six, or 72%; the other 28% all have 19 rows, but the formula may be 17—19—17—15, 17—19—17, 19—19—17, 19—19—15, 162, females from 135 to 154; the average in 118 males in number from 135 to 162, males having from 138 to 17—19—17, or 17—18—19—17. The gastrosteges vary in 149.2, in 158 females it is 144.8. The urosteges vary



Thamnophis ordinoides ordinoides, Puget Garter Snake
Collected at Portland, Multnomah County, Oregon, October, 1916.

from 50 to 81, males having from 56 to 81, females from 50 to 72; the average in 96 males is 70.2, in 128 females it is 60.9.

Distribution.—This beautiful little snake is the common Garter-Snake in British Columbia and Washington in the vicinity of Puget Sound. It has been noted from Western Oregon and from the northwestern corner of California. I have examined specimens from the following localities:

From British Columbia, from Lillooet River Valley, Tahsis Canal and Friendly Cove on Nootka Sound, Golden Eagle Mine on Mount Saunders, Ruppert, Lund, Alberni Valley in Vancouver Island, and Union Bay, Bayne Sound.

From Washington, from Clallam (Forks), San Juan, Whatcom (New Whatcom), Skagit (Mount Vernon), Snohomish (Darrington), King (Seattle), Pierce (Mt. Rainier), Kitsap (Port Orchard), Chehalis (Montesano, Melbourne, Aberdeen), and Pacific (Lebam, Trapp Creek) counties.

From Oregon, from Clatsop (Astoria, Gearheart), Multnomah (Portland), Tillamook (Garibaldi, Trask River, Tillamook, and Nestucea Road), Yamhill (between Grand Ronde and Dolph), Lincoln (Stiletz, Toledo), Benton (Little Elk and Yaquina River, between Chitwood and Siletz River, between Pioneer and Siletz River, Philomath, Alsea), Lane (junction Lake and Deadwood Creek, junction Siuslaw River and Lake Creek, Elmira), Coos (Marshfield, South Fork Coos River, Sumner, Coquille, South Fork Coquille River 20 miles above Myrtle Point, Myrtle Point), Douglas (Camas Mountains, Cow Creek, Drain), Curry (Sixes River, Port Orford, Elk Creek, Flores Creek, Rogue River, Corbin, Goldbeach, Harbor) counties.

From California, from Del Norte (Smith River, Gasquet, Crescent City, Requa) county.

Remarks.—This is the common garter-snake of the northwest coast. It is of small size. The largest specimen examined measures 590 mm. to base of tail. The head is small, not so distinct from the neck as in other races, and the labials are reduced in number.

The coloration is very variable. The dorsal line frequently is absent or developed only on the neck. The lateral lines also may be absent. Specimens may be heavily spotted or without any marking, either lines or spots. The dorsal line usually is yellow, but may be red, and there often is red elsewhere in the coloration, as on the gastrosteges. The lower surfaces often are dark, and the coloration everywhere may be very dusky.

Specimens with heavy spotting and dark pigmentation of the gastrosteges resemble *T. o. vagrans*, but usually may be easily distinguished by their scale characters.

Specimens showing no dorsal line resemble *T. o. couchii*, but here again the scale characters are quite different.

The closest relationship of this sub-species undoubtedly is with *T. o. atratus*, yet there can be no doubt as to the subspecific distinctness of the two forms. The differences in the number of superior and inferior labials, scale-rows and gastrosteges should be sufficient aid toward their correct determination, and the general appearance usually is quite different. Certain specimens, however, are so nearly intermediate in one or more of their characters that students might differ in opinion as to their identity. Such specimens, as set forth under head of *T. o. atratus*, show real geographic intergradation. So far as specimens examined by us show, this intergradation occurs only in Del Norte County, California, where the ranges of the two forms meet and perhaps overlap slightly. Many of the specimens from this county are typical of either one or the other subspecies, —*ordinoides* or *atratus*,—and most of the intergrades seem

to be nearer to the latter type than to the former. South of Del Norte County no tendency toward *T. o. ordinoides* has been observed in *T. o. atratus*, unless it be that the rather frequent absence of the dorsal line in specimens from Humboldt and Mendocino counties may be so regarded.

Our figures show that 14 per cent only of the specimens have two preoculars on one or both sides of the head. Snakes of the *T. o. vagrans* type occur in portions of the area occupied by *T. o. ordinoides*, and often have two preoculars. There seems to be no good reason for calling them *T. o. ordinoides*. It appears much more logical to consider them *T. o. biscutatus*, as was done in 1897, although specimens to show the continuity of range from the Klamath Lakes to Puget Sound are not at hand.

185. *Thamnophis ordinoides atratus* (Kennicott)

COAST GARTER-SNAKE

Plate 88

- Eutainia ordinoides* BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, 1853, p. 33 (not of 1852); GIRARD, U. S. Explor. Exped., Herp., 1858, p. 153, pl. XIV, figs. 1-4?
- Eutainia atrata* KENNICOTT, U. S. Pac. R. R. Surv., Vol. XII, Pt. II, 1860, p. 296 (type locality, California).
- Eutania elegans ordinoides* COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 654; COPE, Report U. S. Nat. Mus., 1898 (1900), p. 1046.
- Eutania infernalis infernalis* COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 657; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1054 (part).
- Tropidonotus ordinatus* var. *infernalis* BOULENGER, Cat. Snakes Brit. Mus., Vol. I, 1893, p. 207 (part).
- Thamnophis infernalis* STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 210.
- Eutania infernalis vidua* COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 658 (type locality, San Francisco, Cal.); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1055.
- Thamnophis elegans* VAN DENBURGH, Occas. Papers Cal. Acad. Sci., Vol. V, 1897, p. 207 (part).

- Eutænia elegans elegans* BROWN, Proc. Acad. Nat. Sci. Phila., 1903, p. 288 (part).
- Eutænia elegans* DITMARS, Reptile Book, 1907, p. 225, pls. LXVI, figs. 3, 5, 11, LXXIX, fig. 1.
- Eutænia elegans infernalis* DITMARS, Reptile Book, 1907, p. 227, pl. LXIX, fig. 2.
- Thamnophis ordinoides elegans* RUTHVEN, Bull. U. S. Nat. Mus., No. 61, 1908, p. 138 (part); STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 102 (part); GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 180 (part).
- Thamnophis ordinoides atratus* VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. VIII, No. 6, 1918, p. 224, pl. 9.

Description.—Head distinct from neck, flat-topped, with rather narrow, rounded snout, and temporal regions sometimes swollen. Eye of moderate size. Rostral large, bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head: a pair of internasals, a pair of prefrontals, supraocular of each side, a frontal, and a pair of parietals. Anterior and posterior nasals distinct. One loreal. One or rarely two preoculars and from two to five (normally three) postoculars. Temporals normally one followed by two, sometimes 1+1, 1+3, or 2+2. Eight, or rarely seven, nine, or 10, superior and 10, or rarely eight, nine or 11 inferior labials, fifth or sixth superior and fifth, sixth or seventh inferior usually largest, fourth and fifth or third and fourth superior usually reaching eye, first pair of inferior meeting on median line. Two pairs of genials, posterior equal to or little longer than anterior. Scales on body in 19 or 21 rows. Anal plate undivided. Gastrosteges varying in number from 140 to 172, males having from 146 to 172, females from 140 to 168. Urosteges in two series of from 52 to 93, males having from 63 to 93, females from 52 to 86.

The head is brown or olive above, never red. The labials are yellow or olive. The chin and throat are yellow



Thamnophis ordinoides, atatus, Coast Garter Snake
Collected near Gilroy Hot Springs, Santa Clara County, California, July, 1915.

or yellowish white. The belly is yellow or olive, sometimes dusky or washed with brick red. The dorsal line is never bluish. There are four distinct types of coloration, each of which might be considered a distinct species if compared with typical specimens of the others, but all of which pass into one another almost imperceptibly when large series are examined. These types are:

(a) The ground color brown with three light lines, a pair of dark nuchal blotches and numerous black or dark brown spots along the sides. This style of coloration is seen in young only, but many of the smallest specimens are unspotted.

(b) Brown above with three longitudinal lines; the dorsal line yellow; the lateral lines and more or less of the belly bright brick red.

(c) There are three lines, the dorso-lateral region is largely red with dark spots, and the belly often is more or less suffused with bright brick red.

(d) Dark olive above with no lateral lines; the dorsal line yellow and very wide, the throat bright yellow, the belly deep olive or slate, with or without a yellow streak along its middle. This is Cope's *E. infernalis vidua*.

None of these forms occurs alone in any one place, and the series of intergradations is complete, so that these cannot be recognized as geographical races. Nevertheless, the form "d" without lateral lines seems to occur nowhere else than on the San Francisco peninsula, and the style "c" is most abundant in Marin and San Francisco counties.

Length to anus	175	450	475	510	540	560
Length of tail	58	155	130	178	163	---

Variation.—Three hundred and sixty-three specimens show variation as follows:

The loreal is 1—1 in all specimens. Preoculars are 1—1

in three hundred and thirty-nine, or 93%; 2—2 in fifteen, or 4%; 1—2 in seven, or 1%; and 2—3 in one. Postoculars are 3—3 in three hundred and twenty-one, or 88%; 3—4 in fifteen, or 4%; 2—3 in ten, or 2%; 2—2 in eight, or 2%; 4—4 in six, or 1%; 4—5 in one, and 1—2 in one. Temporals are 1+2—1+2 in two hundred and eighty, or 77%; 1+2—1+3 in forty-four, or 12%; 1+3—1+3 in sixteen, or 4%; 1+1—1+1 in ten, or 2%; 1+1—1+2 in five, or 1%; 1+1—2+2 in two, 1+2—2+2 in two, 1+1—1+3 in one, and 1+3—2+2 in one. The supralabials are 8—8 in three hundred and nine, or 85%; 7—7 in twenty-six, or 7%; 7—8 in twenty-five, or 6%; 8—9 in one, and 9—9 in one. The infralabials are 10—10 in two hundred and seventy-two, or 75%; 9-10 in forty-four, or 12%; 9-9 in thirty-two, or 8%; 10-11 in five, or 1%; 8—9 in three, 8—10 in three, 11—11 in two, and 8—8 in one. The scale-rows are 19—19—17 in two hundred and fifty-five, or 71%; 19—21—17 in twenty-seven, or 7%; 21—21—17 in twenty-two, or 6%; 19—21—19 in twenty-one, or 6%; 21—21—19 in nine, or 2%; 21—19—17 in six, or 1%; 17—19—17 in four, or 1%; 19—19—19 in three, 19—20—19 in three, 20—21—19 in one, 17—18—17 in one, 19—19—15 in one, and 20—21—17 in one. The gastrosteges vary in number from 140 to 172, males having from 146 to 172, females from 140 to 168; the average in one hundred and fifty males is 158, in two hundred and four females, 153. The urosteges vary from 52 to 93, males having from 63 to 93, females from 52 to 86; the average in 131 males is 81, in 168 females, 74.

It now is well known that variation in the coloration of the snakes of this subspecies is very great. Certain types of coloration may be pointed out as occurring in groups of specimens. The best known of these color types, perhaps, is that in which the general color is dark olive, lateral lines

absent, dorsal line yellow and very broad, throat bright yellow, and belly deep olive or slate with or without a median yellow streak. This is the coloration of the types of this subspecies, which types Cope redescribed as *Eutaenia infernalis vidua*. It is not a common style of coloration in this subspecies since we find it more or less well marked in only twenty-nine of three hundred and sixty-three specimens, or 8%. All of these specimens are from the San Francisco peninsula, that is to say from San Mateo, Santa Clara, Santa Cruz, and Monterey counties. They, however, share this area with snakes of various other styles of coloration, and all sorts of intermediate specimens are to be found, so that this seems to be merely a peculiar color phase, although restricted geographically to a small portion of the range of the subspecies.

In certain specimens the dorsal line is lacking, or very faint or short. This is found most frequently in specimens from Humboldt and Mendocino counties.

Specimens from San Francisco and Marin counties usually may be recognized as such by their coloration, which is of a style not peculiar to these areas, but certainly most frequent there. There are three lines, the dorso-lateral region is largely red with dark spots, and the belly often is more or less suffused with bright brick red.

Perhaps the most frequent style of coloration is that which shows three light lines on a brown or olive ground, with the belly yellow or olive. But, as we have said, individual variation in color is enormous.

Distribution.—The coast garter-snake occupies the coast region of California from Del Norte to Santa Barbara counties. So far as known, the area inhabited by it includes the coast ranges and their valleys, but not the great interior valleys of the state. It occurs in both Transition and Upper

Sonoran zones. I have examined specimens from Oregon, taken near Siskiyou, Jackson County, and from California, from Shasta (Anderson), Del Norte (Gasquet, Requa), Humboldt (Trinidad, Eureka, Ferndale, Alton, Carlotta, Cuddeback, White Thorn, Garberville), Mendocino (Bald Hill, Irishes, Cahto, Covelo, Ten Mile River, Laytonville, Sherwood, Mendocino, Big River, Comptche, Albion River, Roberts Creek near Ukiah, Garcia River, Point Arena, Pieta, Gualala), Lake (Middleton), Yolo (Rumsey), Sonoma (Wheatfield Fork Gualala River, Skaggs Springs, Cazadero, Duncan Mills, Austin Creek, Kidd Creek, Guerneville, Freestone), Napa (Berryessa Creek, St. Helena), Solano (Vacaville), Marin (Inverness, Point Reyes, Tocaloma, Olema, Mill Valley, San Rafael, Sausalito), Contra Costa (Mt. Diablo, Walnut Creek), Alameda (Berkeley, Oakland, San Leandro, Calaveras Valley), San Francisco (Golden Gate Park, Union Square, Presidio), San Mateo (San Bruno, Portola, Woodside, Searsville, Corte Madera Creek, Butano Basin, La Honda, Pescadero), Santa Clara (Stanford University, Palo Alto, Corte Madera Canyon, Stevens Creek, Los Gatos, Santa Clara, San Jose, Smith Creek, Mt. Hamilton, Uvas Creek, Coyote Creek, Gilroy Hot Springs), Santa Cruz (Waddell Creek, Swanton, Felton, Glenwood, Soquel), Monterey (Salinas River near Blanco, Seaside, Pacific Grove, Carmel, San Macento, Garapatos Creek, Mill Creek, Little Sur River, Partington Canyon), San Luis Obispo (Morro, Oceano), and Santa Barbara (Santa Ynez River) counties.

Remarks.—This subspecies formerly was confused with *T. ordinoides elegans* by me and with *T. ordinoides ordinoides* by Brown and Ruthven. It differs from *T. ordinoides elegans* in the smaller average number of its scale-rows and ventral plates, as well as in coloration. The dorsal

line usually is wider than in *T. o. elegans* and there often is more or less red in the coloration, which, so far as we know, is not the case in the mountain snakes.

T. o. atratus differs from *T. o. ordinoides* in being of larger size and in usually having a greater number of upper and lower labials, scale-rows, and gastrosteges. The coloration also is different, although a wide range in pattern and shade is to be seen in both subspecies, and both often show some red coloring.

As regards scale characters, *T. o. atratus* may be considered intermediate between *T. o. ordinoides* and *T. o. elegans*.

The two specimens from Siskiyou, Jackson County, Oregon, and two others from Anderson, Shasta County, California, probably might best be regarded as showing intergradation between this coast form and the *T. o. elegans* of the Sierra Nevada, since they all have 21 rows of scales and somewhat intermediate coloration. The material is inadequate to make this conclusion a positive one, but it is in this region that one would expect to find these subspecies merging.

Certain specimens from Coos County, Oregon, seem to show intergradation between this subspecies and *T. ordinoides biscutatus*. Others from Requa and Crescent City in Del Norte County, California, are intermediate between *T. ordinoides ordinoides* and *T. ordinoides atratus*.

Habits.—This small snake usually is found near water but seldom in it. On cool days it may be discovered under stones or wood. It is unobtrusive and, aside from its malodorous excretion, quite inoffensive. As in other members of the genus, the young are born fully developed. Their number varies greatly in different broods. The food of this subspecies probably consists in the main of small frogs, toads, fish, tadpoles, slugs, small mammals, and an occa-

sional snake. Perhaps insects also are eaten. One male, caught at Berkeley, contained a Western Racer. This is the only instance I recall of a snake having been eaten by a garter-snake.

186. *Thamnophis ordinoides elegans* (Baird & Girard)

MOUNTAIN GARTER-SNAKE

- Eutainia elegans* BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 34 (type locality, **El Dorado County, California**).
- Eutainia elegans* YARROW & HENSHAW, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 116.
- Tropidonotus trivittatus* HALLOWELL, Proc. Acad. Nat. Sci. Phila., Vol. VI, 1853, p. 237 (**Cosumnes River, Cal.**).
- Eutainia elegans brunnea* COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 654 (type locality, **Fort Bidwell, Cal.**); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1037.
- Eutainia elegans lineolata* COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 655 (part), (no type); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1038 (part).
- Thamnophis elegans* VAN DENBURGH, Occas. Papers Cal. Acad. Sci., No. V, 1897, p. 207 (part); GRINNELL, Univ. Cal. Publ. Zool., Vol. 5, No. 1, 1908, p. 167.
- Eutainia elegans elegans* BROWN, Proc. Acad. Nat. Sci. Phila., 1903, p. 288 (part); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1036.
- Thamnophis ordinoides elegans* RUTHVEN, Bull. U. S. Nat. Mus., No. 61, 1908, p. 138 (part); STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 102 (part); GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 180 (part); VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. VIII, No. 6, 1918, p. 235; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 29, 37.

Description.—Head distinct from neck, flat-topped, with narrow, rounded snout, and temporal regions sometimes swollen. Eye moderate. Rostral large, bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head: A pair of internasals, a pair of pre-

frontals, a frontal, supraocular of each side, a pair of parietals. Anterior and posterior nasals distinct. One loreal. One or rarely two preoculars. Two to four, normally three, postoculars. Temporals normally one followed by two, sometimes 1+3 or 1+1. Eight (rarely seven, nine or six), superior and ten (rarely eight, nine or 11), inferior labials, usually the sixth in each series largest, the fourth and fifth superior reaching eye, first pair of inferior meeting on median line. Two pairs of genials, posterior equal to or shorter than anterior. Scales on body in 21 or 19 rows, all keeled. Anal plate not divided. Gastrosteges varying in number from 151 to 179, males having from 159 to 179, females from 151 to 175. Urosteges in two series of from 70 to 101, males having from 78 to 101, females from 70 to 88.

The back is dark brown or blackish, with no, or but little, evident spotting. Dorsal and lateral light stripes are present. The dorsal stripe is narrow, usually about the width of one or one and two half scales, and has well defined straight edges. The gular region and the lower surfaces of body and tail are yellowish or greenish white, rarely much clouded with darker.

A specimen showing the colors in life is described by Dr. Grinnell as follows: "Ventrally the snake is pale greenish blue, the distal margins of the gastrosteges becoming pinkish. The throat, sides of head, and snout, are dull pinkish. Dorsally the snake is almost black, more exactly, perhaps, sooty sepia. A conspicuous median dorsal straw-yellow line runs from the nape to the tip of the tail, though on top of the tail it becomes narrow and faint. This stripe involves the median scale row, and part of the one on either side, especially anteriorly. A small spot of yellow marks the top of the head, involving the median margins of the two parietal plates. Along each side of the snake its

whole length and continuous with the light-colored sides of the head is a pale lemon-yellow stripe, brightest anteriorly and becoming dusky and merging with the ventral color-tract posteriorly. This stripe involves the second and part of the third scale rows above the gastrosteges on either side. The sides of the head exhibit several vertical dusky markings; and the otherwise dark brown back is faintly flecked, along either side of the median stripe and just above the lateral stripes, with whitish scale edgings. There is not a trace of red anywhere. The bright yellow median dorsal stripe is a conspicuous feature in the coloration of this snake."

Length to anus	354	395	420	477	492	570
Length of tail	156	125	133	162	161	132

Variation.—Ninety-seven specimens show the following variations:

The loreal is 1—1 in all. The preoculars are 1—1 in eighty-nine, or 93%; 1—2 in five, or 5%; and 2—2 in two, or 2%. The postoculars are 3—3 in ninety-two, or 95%; 3—4 in four, or 4%; 2—3 in one, or 1%. The temporals are 1+2—1+2 in seventy-one, or 75%; 1+2—1+3 in sixteen, or 17%; 1+3—1+3 in seven, or 7%; and 1+1—1+1 in one, or 1%. The supralabials are 8—8 in ninety-one, or 94%; 7—8 in two, or 2%; 8—9 in one, or 1%; 9—9 in one, or 1%; and 7—6 in one, or 1%. The infralabials are 10—10 in eighty-two, or 85%; 9—10 in ten, or 10%; 9—9 in two, or 2%; 8—10 in one, or 1%; 10—11 in one, or 1%; and 11—11 in one, or 1%. The scale-rows are 19—19—17 in twenty-two, or 23%; all the others (77%) have 21 rows of scales, but the formula varies, being 19—21—19—17 in thirty, 21—19—17 in seventeen, 21—21—17 in twelve, 19—21—17 in twelve, and 20—21—17 in two. The gastrosteges vary from 151

to 179, males having from 159 to 179, females from 151 to 175; the average in fifty males is 171, in forty-six females, 163.4. The urosteges vary from 70 to 101, males having from 78 to 101, females from 70 to 88, the average in forty males is 86.4, in thirty females, 78.5.

Distribution.—This subspecies is a mountain form which seems to be confined to the Sierra Nevada and San Bernardino Mountains. In the Sierra Nevada it has been taken on both the east and west slopes. It seems not to occur at the lower levels. I have examined specimens from the following localities:

In California, from Butte (Oroville), Yuba (Strawberry Valley), Placer (Soda Springs Station 6,500 feet), El Dorado (Fyffe), Tuolumne (Tuolumne Meadows), Mariposa (Tamarack Flat, Yosemite Valley, Yosemite National Park at 7,700 feet), Fresno (Kings River at 5,000 feet), Tulare (Jackass Meadow at 7,750 feet, Monache Meadow at 8,000 feet), Sierra (Sierraville), El Dorado (Fallen Leaf Lake, Tallac, Lake Tahoe), Mono (Farrington's), San Bernardino (San Bernardino Mountains at from 5,000 to 6,700 feet altitude, Seven Oaks, Santa Ana River, Fish Creek, Bear Lake, Sugar Loaf Mountains, West Fork Deep Creek), counties.

In Nevada, from Glenbrook, Douglas County.

Remarks.—*Thamnophis ordinoides elegans* is a dark, distinctly striped form with no, or but little, evident spotting, and usually without dark pigmentation of the gastrosteges. It is closely related to *T. o. vagrans* and to *T. o. couchii*, agrees closely with both in most scale characters, and, at certain points, intergrades with both. Thus, some of the specimens from the Warner Mountains, Modoc County, California, approach the *elegans* type of coloration

in varying degrees, while others are fairly typical of *vagrans*, under which heading they are listed. Apparently the type of Cope's *Eutænia elegans brunnea* from Fort Bidwell, Modoc County, was such an intermediate specimen. Specimens from Grasshopper and Eagle lakes, Lassen County, California, have characters of both *elegans* and *biscutatus* in varying degree. Certain specimens from the Yosemite Valley, Kings River, and Jackass Meadow, are more or less intermediate between *T. o. elegans* and *T. o. couchii*. A few of the specimens from the east slope of the Sierra Nevada also seem to be intergrades. However, the snakes from the higher altitudes in the Sierra Nevada seem to be constantly true to type. Those from the San Bernardino Mountains also show no departure from this type, although their range is in part overlapped by that of *T. o. hammondii*. No one could question the validity of this race as it occurs in these southern mountains, and the fact that intergrades between it and other races occur in the more northern portion of its range should not cause us to refuse it recognition.

We formerly confused this form and the striped race from the coast of California, describing both as *T. elegans*. Although they are rather similar in appearance, they differ in a number of respects. The mountain form usually has twenty-one rows of scales, while the coast subspecies usually has nineteen. The average number of gastrosteges in *T. o. elegans* also is greater, the dorsal line is narrower, and we have never seen any red in the coloration of *T. o. elegans*. Just where and how these two forms meet has yet to be worked out. So far as we now know the one is confined to the interior mountains and the other to the coast region. Between them lies the area occupied by *T. o. couchii* in the north and *T. o. hammondii* in the south. *T. o. couchii* and *T. o. hammondii* are mainly to be found in the Lower and

Upper Sonoran zones, while the striped snakes are more characteristic of the cooler zones of the mountains and coast.

187. *Thamnophis ordinoides vagrans* (Baird & Girard)

WANDERING GARTER-SNAKE

Plate 89

- Eutainia vagrans* BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, Serp., 1853, p. 35 (type locality, **California**); GIRARD, U. S. Explor. Exped., Herp., 1858, p. 154, pl. XIV, figs. 5-10; COPE, Ann. Rep. U. S. Geol. Surv. Terrs., 1871 (1872), p. 467.
- Eutania vagrans vagrans* COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 41; YARROW, Surv. W. 100th Merid., Vol. V, p. 551.
- Eutania Henshawi* YARROW, Proc. U. S. Nat. Mus., Vol. VI, 1883, p. 152 (type locality, **Ft. Walla Walla, Wash.**).
- Eutania elegans lineolata* COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 655 (part).
- Eutania elegans vagrans* COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 656; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1039 (part); DITMARS, Reptile Book, 1907, p. 228, pl. LXX, fig. 1.
- Eutania sirtalis vagrans* TAYLOR, Ann. Rep. Nebr. State Board Agric. for 1891, 1892, p. 325.
- Tropidonotus vagrans* BOULENGER, Cat. Snakes Brit. Mus., Vol. I, 1893, p. 202.
- Thamnophis vagrans* STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 213 (part); VAN DENBURGH, Bull. U. S. Fish Com. for 1894, p. 57; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., Vol. V, 1897, p. 210 (part); VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. III, 1912, p. 158; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. III, 1913, p. 419; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. V, No. IV, 1915, p. 108.
- Natrix valida valida* COPE, Report U. S. Nat. Mus. for 1898, 1900, pp. 984, 986 (part).
- Eutania elegans vagrans* BROWN, Proc. Acad. Nat. Sci. Phila., 1903, p. 290; BRANSON, Kansas Univ. Sci. Bull., Vol. II, No. 13, 1904, p. 364, figs. 4, 4a; CARY, N. Amer. Fauna, No. 33, 1911, pp. 27, 40, 45.
- Thamnophis ordinoides elegans* RUTHVEN, Bull. U. S. Nat. Mus., No. 61, 1908, p. 138 (part); RUTHVEN & GAIGE, Occas. Papers Mus. Zool. Univ., Mich., No. 8, 1915, p. 32; GRINNELL & CAMP, Univ.

Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 180 (part); STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 102 (part); BLANCHARD, Copeia, 1921, No. 90, p. 6.

Thamnophis elegans COCKERELL, Univ. Colorado Studies, Vol. VII, No. 2, 1910, p. 131; ELLIS & HENDERSON, Univ. Colorado Studies, Vol. X, No. 2, 1913, p. 88; ELLIS & HENDERSON, Univ. Colorado Bull., Vol. XV, No. 6, 1915, p. 261; DICE, Univ. Cal. Publs. Zool., Vol. 16, No. 17, 1916, pp. 303, 304, 310, 319, 321.

Thamnophis ordinoides vagrans VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. VIII, No. 6, 1918, p. 240, pl. 10; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 29, 37, 40, 46, 52.

Description.—Head distinct from neck, flat-topped, with narrow rounded snout. Temporal regions sometimes swollen in old specimens. Eye moderate. Rostral plate large, bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head: A pair of internasals, a pair of prefrontals, a frontal, supraocular of each side, and a pair of parietals. Anterior and posterior nasals distinct. One loreal. One preocular, rarely two or three. Postoculars normally three, rarely two or four. Temporals normally one followed by two, sometimes 1+3. Eight, or rarely seven, superior and eight to eleven, normally ten, inferior labials, usually the fifth, sixth or seventh superior, and fifth, sixth or seventh inferior largest, the fourth and fifth or third and fourth superior reaching eye, the first pair of inferior meeting on the median line. Two pairs of genials, the posterior equal to or shorter than anterior. Scales in 21 or very rarely 19 rows, all keeled except sometimes, the first row on each side. Anal plate not divided. Gastrosteges varying in number from 148 to 182, males having 159 to 182, females from 148 to 177. Urosteges in two series of from 67 to 95, males having from 79 to 95, females from 67 to 83.



Thamnophis ordinoides vagans, Wandering Garter Snake
Collected in Provo Canyon, Wasatch Mountains, Wasatch County, Utah, June, 1913.

The ground color above is olive or greenish-yellow or brown. Along the middle of the back runs a yellow line of varying width. On the second and third rows of scales of each side is a similar yellow line. Any or all of these lines may be very indistinct or even absent. On each side of the back are two series of alternating black spots, the upper of which encroach upon the dorsal line. These spots sometimes unite to form a zigzag band along each side, or may be obscured by the darkening of the ground color. The top of the head is usually light brown, with a yellow pineal spot. There is a pair of large dark nuchal blotches. The gastrosteges and urosteges are almost always more or less marbled with black or slate, especially near their anterior edges and along the middle of the belly. The chin and throat normally are yellowish white.

Length to anus	295	342	485	520	525	535
Length of tail	97	117	175	150	160	155

Variation.—In one hundred snakes of this subspecies the loreal is 1—1 in all specimens. Preoculars 1—1 in eighty-one, or 81%; 2—2 in thirteen, or 13%; 1—2 in five, or 5%; and 2—3 in one, or 1%. Postoculars are 3—3 in eighty-eight, or 88%; 2—3 in four, or 4%; 3—4 in four, or 4%; 4—4 in three, or 3%; and 2—2 in one, or 1%. Temporals are 1+2—1+2 in sixty-seven, or 67%; 1+2—1+3 in twenty, or 20%; and 1+3—1+3 in thirteen, or 13%. The supralabials are 8—8 in eighty-nine, or 89%; 7—8 in eight, or 8%; and 7—7 in three, or 3%. The infralabials are 10—10 in eighty-six, or 86%; 9—10 in seven, or 7%; 10—11 in four, or 4%; 9—8 in one, or 1% and 11—11 in one, or 1%. The scale-rows are 21—21—17 in fifty-five, or 55%; 21—19—17 in thirty-three, or 33%; 19—21—19—17 in four, or 4%; 19—21—17

in three, or 3%; 19—19—17 in one, or 1%; 20—21—19—17 in one, or 1%; and 20—21—17—17 in one, or 1%. The gastrosteges vary in number from 148 to 182, males having from 159 to 182, females from 148 to 177; the average in fifty-three males is 174.2, in forty-seven females, 169. The urosteges vary from 67 to 95, males having from 79 to 95, females from 67 to 83; the average in forty-four males is 86, in thirty-five females, 76.

Distribution.—This subspecies, in typical form, is found over eastern Washington and Oregon, ranging thence east across Idaho to Utah, south across Nevada to eastern California in the vicinity of Mono Lake, and to northern Arizona. Positively identified specimens have been taken as follows:

In Washington, in Stevens (Diamond Lake, Springdale), Walla Walla (Prescott, Wallulla), and Columbia (Humpeg Falls) counties.

In Oregon, in Lake (Walker Lake, Buck Creek, Bridge Creek), Harney (Silver Creek, Burns), Malheur (Riverside), Umatilla (Umatilla, Meacham), and Wallowa (Wallowa), counties.

In Idaho, in Bonner (Sand Point, Hope), Kootenai, Shoshone (Wardner), Nez Perce (vic. Lewiston), Lemhi (Salmon Mountains), Washington (Weiser), Valley (Payette Lakes), Custer (Challis Valley), Ada (Boise), Camas (Malad River Canyon), Blaine (Ketchum, Guyer Hot Springs), Butte (Arco), Jerome (Shoshone Falls), Twin Falls (Snake River near Salmon Falls), Cassia (Cottonwood Creek, Albion), Bingham (Fort Hall), Oneida (Malad), and Bear Lake (Bear Lake), counties.

In Utah, in Cache (Logan), Davis (Woods Cross), Salt Lake (Fort Douglas), Wasatch (Provo Canyon), Utah

(Provo), Piute (Marysville), Beaver (Camp Beaver, Indian Creek Canyon in the Tushar Mountains) and Iron (Rush Lake), counties, and at North Creek, Kobeh Valley, and Juab.

In Nevada, in Humboldt (Pine Forest Mountains, Quinn River Crossing, Virgin Valley), Washoe (Winnemucca Lake, Little High Rock Creek), Nye (Smoky Valley), Churchill (Fallon), Lander (Battle Mountain), Eureka (Palisade), and Elko (Elko, Deeth), counties, and at Snake Valley and Pymont.

In California, in Mono (Mono Lake, Walker Lake).

In Arizona, in Coconino (Grand Canyon, San Francisco Mountain, Oak Creek, Winslow), and Yavapai (Prescott, Fort Whipple, Fort Verde), counties.

In Lower California, two specimens have been taken in the San Pedro Martir Mountains.

This subspecies remains remarkably true to its peculiar color characters throughout the vast area which constitutes the greater portion of its range. It is only along the western edge of this area that much variation occurs. Specimens from western Nevada and from eastern California vary towards *T. o. biscutatus*, *T. o. couchii* and *T. o. elegans*, so that it may be said that intergradation with all the forms occurs. Thus, specimens from Humboldt County, Nevada, frequently have two preoculars as in *T. o. biscutatus*, and certain specimens from near Lake Tahoe leave one in doubt as to whether they might best be referred to as *T. o. vagrans*, *T. o. couchii*, or even *T. o. elegans*.

The two specimens from the San Pedro Martir Mountains in northern Lower California, which formerly were referred to *T. hammondii*, are very typical *vagrans* in coloration, but have low labial and gastrostege counts. They constitute by far the most southern record for this subspecies

and offer an interesting problem in distribution, for *T. o. vagrans* has never been taken in southern California.

Habits.—The snakes taken at Elko, Nevada, had been feeding on the larvæ of *Rana pipiens*.

Ruthven and Gaige, who observed this snake in Elko County, Nevada, state: "The species is quite aquatic in its habits. It is generally found in the immediate vicinity of water, and often in the streams or ponds. From the stomachs examined it would appear that most of the food is secured in the water. One specimen had eaten a small toad, and five others had captured fish and tadpoles. It is a voracious feeder. The stomach of one individual contained eight large tadpoles, that of another five fish, and one had eaten a fish 141 mm. in length besides a smaller one. Three pregnant females brought back alive gave birth to eight, ten and 12 young on August 25, September 2 and September 10."

188. *Thamnophis ordinoides biscutatus* (Cope)

KLAMATH GARTER-SNAKE

Plate 90

Eutania biscutata COPE, Proc. Acad. Nat. Sci. Phila., 1883, p. 21 (type locality, **Klamath Lake, Oregon**); COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 651.

Thamnophis vagrans biscutata VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 212; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. III, 1912, p. 158.

Eutania elegans biscutata BROWN, Proc. Acad. Nat. Sci. Phila., 1903, p. 291; DITMARS, Reptile Book, 1907, p. 229.

Thamnophis ordinoides elegans RUTHVEN, Bull. U. S. Nat. Mus., No. 61, 1908, p. 138 (part).

Thamnophis ordinoides biscutatus VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. VIII, 1918, p. 245, pl. 11.

Description.—Head distinct from neck, flat-topped, with narrow, rounded snout, and temporal regions sometimes slightly swollen. Eye of moderate size. Rostral large, bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head: A pair of internasals, a pair of prefrontals, a frontal, supraocular of each side, and a pair of parietals. Anterior and posterior nasals distinct. One loreal. Preoculars usually two, sometimes one, very rarely three. Postoculars normally three, sometimes four, very rarely two or one. Temporals normally one, followed by two, sometimes 1+ 3. Superior labials normally eight, rarely seven. Inferior labials normally ten, rarely nine, 11 or eight. Usually the fifth, sixth or seventh superior and inferior labials largest, the fourth and fifth or third and fourth superior reaching eye, first pair of inferior meeting on median line. Two pairs of genials, posterior about equal in length to anterior. Scales on body in 21 or very rarely, 19 or 23 rows, all keeled except sometimes the first row of each side. Anal plate not divided. Gastrosteges varying in number from 151 to 183, males having from 157 to 183, females from 151 to 176. Urosteges in two series of from 63 to 97, males having from 76 to 97, females from 63 to 91.

The coloration usually is not different from that of typical *Thamnophis ordinoides vagrans*, except that the dorso-lateral regions usually are much darker. Because of this, the spots are less evident, but they may usually be made out. The upper lateral spots invade the edges of the dorsal line as in *T. o. vagrans*. As in that subspecies also the gastrosteges are often marked basally and centrally with black or slate. The dorsal and lateral lines usually are quite distinct. Some specimens, however, are so dark as to conceal the dorsal spots, and one is black everywhere excepting the chin, throat, and a few bits of skin between

the scales, no lines being evident. Some dark specimens resemble, in coloration, certain examples of *T. ordinoides atratus*.

Length to anus	375	455	500	503	550	620
Length of tail	132	135	155	175	175	175

Variation.—The loreal is 1—1 in all specimens examined. Preoculars are 2—2 in one hundred and fifty-nine, or 63%; 1—2 in twenty-five, or 10%; 1—1 in sixty-three, or 25%; and 2—3 in one. Postoculars are 3—3 in two hundred and thirteen, or 80%; 3—4 in twenty-six, or 10%; 4—4 in five, or 2%; 2—3 in three, or 1%; and 4—1 in one. Temporals are 1+2—1+2 in one hundred and ninety, or 77%; 1+3—1+3 in sixteen, or 6%; 1+2—1+3 in thirty-nine, or 15%. The supralabials are 8—8 in two hundred and thirty-two, or 92%; 7—8 in eleven, or 4%; and 7—7 in four, or 1%. The infralabials are 10—10 in two hundred and twenty-two, or 88%; 9—10 in thirteen, or 5%; 9—9 in eight, or 3%; 10—11 in two, and 8—8 in one. The scale-rows are 21—21—17 in two hundred and sixteen, or 87%; 21—19—17 in nine, or 3%; 21—23—17 in six, or 2%; 21—17—17 in three, or 1%; 19—17—17 in three, or 1%; 19—19—17 in two, 19—17—15 in two, 23—19—17 in two, 23—21—19 in one, 17—17—17 in one, and 20—21—17 in one. The gastrosteges vary in number from 151 to 183, males having from 157 to 183, females from 151 to 176; the average in one hundred and twenty males is 171, in one hundred and twenty-three females, 166. The urosteges vary from 63 to 97, males having from 76 to 97, females from 63 to 91; the average in one hundred and twelve males is 84, in one hundred and three females, 77.

Distribution.—This snake was first described from speci-



Thamnophis ordinoides bicinctus, Klamath Garter Snake
Collected on Link River at Klamath Falls, Klamath County, Oregon, June, 1918.



mens collected at Klamath Lake in southern Oregon. I have examined specimens from Vancouver Island, from Lillooet River Valley, British Columbia, the San Juan Islands and King County, Washington, the South Fork of the Coquille River, twenty miles above Myrtle Point, Coos County, Oregon, the Rogue River near Grants Pass, Josephine County, Oregon, Klamath Falls, Klamath County, and Lakeview, Lake County, Oregon, Gasquet, Del Norte County, California, Lower Klamath Lake, Siskiyou County, California, and Davis Creek and Goose Lake, Modoc County, California.

Specimens from northwestern Nevada, as those from the Pine Forest Mountains, Virgin Valley, and Quinn River Crossing, in Humboldt County, appear to be intermediate between this form and true *T. o. vagrans*, the coloration being typical of the latter, while a tendency toward an increase in the number of preoculars is still present. These are listed with *T. o. vagrans*.

Specimens from Grasshopper and Eagle lakes, Lassen County, California, are intermediate between this subspecies and *T. o. elegans*.

Remarks.—These snakes from the Klamath region are very similar to *T. o. vagrans*, but the ground color of the dorso-lateral regions usually is much darker. For this reason the dark spots usually are inconspicuous. Occasional specimens show the spots very distinctly, and in most specimens they may be seen when looked for. These spots invade the dorsal line just as they do in typical *T. o. vagrans*. The chief point of distinction between *T. o. biscutatus* and *T. o. vagrans* is the increase in the number of preoculars. Less than twenty-five per cent of the Klamath specimens do not show this increase on at least one side of the head, so that it must be regarded as a perfectly good sub-

specific character. A small number of the specimens also show an increased number of body scale-rows.

In the region of Puget Sound snakes of the *vagrans* type, a majority of which have two preoculars, are again encountered. We can see no reason for not including them here. It seems best to include here also the snakes from Del Norte County, California, and from Josephine and Coos Counties, Oregon, although the number of specimens from these localities is so small as to leave one in doubt as to the usual number of preoculars, and the coloration is more like that of *T. o. couchii*.

Perhaps nowhere else in the world are snakes so abundant as formerly near Klamath Falls. We counted 180 on a small rock about a yard in diameter in Link River, and, at another point on the same river, caught 14 with one grab with both hands. They feed upon small fish and toads. Most of these snakes are of this subspecies, but a few are *Thamnophis sirtalis infernalis*.

189. *Thamnophis ordinoides couchii* (Kennicott)

GIANT GARTER-SNAKE

Plate 91

- Eutania couchi* KENNICOTT, U. S. Pac. R. R. Surv., Vol. X, Pt. IV, 1859, p. 10 (type locality, **Pitt River, California**).
- Thamnophis hammondi* STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 212; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 212 (part).
- Thamnophis vagrans* STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 213 (part); VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 210 (part).
- Eutania elegans couchii* COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1042 (part).
- Eutania hammondi* COOPER, Proc. Cal. Acad. Sci., Vol. IV, 1870, p. 71; BROWN, Proc. Acad. Nat. Sci. Phila., 1903, p. 295 (part); TOWNSEND, Proc. U. S. Nat. Mus., Vol. 10, 1887, p. 240 (?).

- Thamnophis ordinoides elegans* RUTHVEN, Bull. U. S. Nat. Mus., No. 61, 1908, p. 138 (part); GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 180 (part); STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 102 (part).
- Thamnophis ordinoides hammondii* GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 181 (part).
- Thamnophis ordinoides couchii* VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. VIII, No. 6, p. 251, pl. 12; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 29, 38.

Description.—Head distinct from neck, flat-topped, with narrow rounded snout, and temporal regions sometimes swollen. Eye moderate. Rostral plate large, bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head: a pair of internasals, a pair of prefrontals, a frontal, supraocular of each side, and a pair of parietals. Anterior and posterior nasals distinct. One loreal. One, or rarely two, preoculars, and three, or rarely two, postoculars. Temporals normally one, followed by two, sometimes 1+3, or 1+4. Eight or rarely nine, superior and 10 or 11, rarely nine, inferior labials, usually the sixth superior and fifth, sixth, or seventh inferior largest, the fourth and fifth superior reaching eye, the first pair of inferior meeting on median line. Two pairs of genials, posterior equal to or longer than anterior. Scales on body in 21 or very rarely 19 or 23 rows, all keeled except sometimes the first row of each side. Anal plate not divided. Gastrosteges varying in number from 153 to 181, males having from 160 to 181, females from 153 to 177. Urosteges in two series of from 65 to 99, males having from 77 to 99, females from 65 to 88.

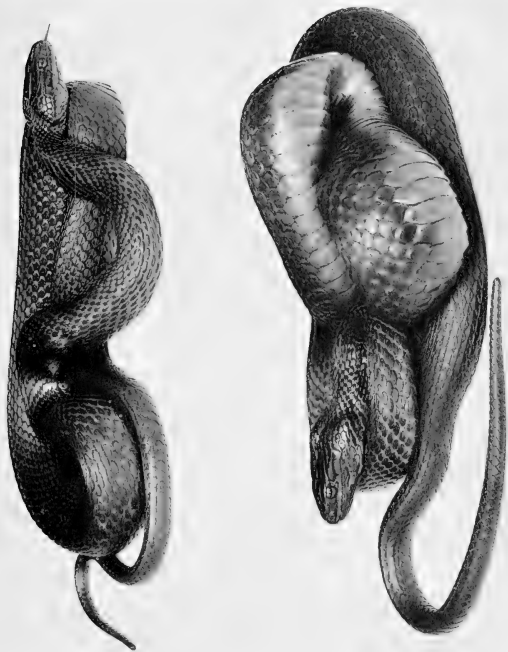
The ground color is grayish, brown or olive, sometimes without any markings, but usually with a dorsal light line on at least a portion of the neck. This line may be very short (a half inch), or may be continued the whole length of the

back, but often is very indistinct. Dorsal spots are present in some specimens and may invade the edges of the dorsal line, if present, or may resemble those of *T. ordinoides hammondii*. The lower surfaces are usually yellowish or greenish gray sometimes more or less uniformly clouded with slate or with dark markings similar to those of *T. ordinoides vagrans*.

Length to anus	357	684	740	827	1095	1096
Length of tail	119	199	—	242	280	311

Variation.—The loreal is 1—1 in sixty-seven specimens. Preoculars 1—1 in fifty-two, or 81%; 2—2 in eleven, or 17%; and 1—2 in one, or 2%; Postoculars 3—3 in fifty-six, or 89%; 2—3 in six, or 9%; and 2—2 in one, or 2%. Temporals 1+2—1+2 in thirty-eight, or 60%; 1+3—1+3 in thirteen, or 20%; 1+2—1+3 in eleven, or 17%; and 1+3—1+4 in one, or 2%. The supralabials are 8—8 in sixty-two, or 95%; and 8—9 in three, or 5%. The infra-labials are 10—10 in forty, or 61%; 11—11 in twelve, or 18%; 9—10 in six, or 9%; 10—11 in five, or 8%; 11—9 in one, or 2%; and 9—9 in one, or 2%. The scale-rows are 21—19—17 in thirty-one, or 48%; 21—21—17 in twenty-four, or 38%; 19—21—19—17 in six, or 9%; 19—19—17 in two, or 3%; and 23—21—17 in two, or 3%. The gastrosteges vary from 153 to 181, males having from 160 to 181, females from 153 to 177; the average in twenty-two males is 172.3, in forty-three females, 167. The urosteges vary from 65 to 99, males having from 77 to 99, females from 65 to 88; the average in fourteen males is 88.4, in thirty-eight females, 81.7.

Distribution.—This subspecies is the common water-snake of the Sacramento and San Joaquin valleys of California from Shasta to Kern counties. It ranges west into



Thamnophis ordinoides couchii, Giant Garter Snake
Collected at Gadsdell, Merced County, California, May, 1918.



Monterey County, where it has been taken in the valleys of the Carmel River and San Antonio and Nacimiento creeks. It ascends the valley of the Kern River to an altitude of some 6,000 feet, and, doubtless, crosses through Walker Pass to the east side of the Sierra Nevada where it occurs in Owens Valley and about Pyramid Lake and Lake Tahoe. Its range lies chiefly in the Lower and Upper Sonoran zones.

I have examined specimens as follows:

From California, Monterey (Carmel Valley, San Antonio Creek near Mission San Antonio, Nacimiento Creek), Shasta (Cottonwood, Long's Ranch Battle Creek), Glenn (Orland, Stoney Creek), Yuba (Strawberry Valley), Placer (Red Point), El Dorado (Fyffe, Riverton), Tuolumne (Priest Hill), Mariposa (Pleasant Valley, Yosemite Valley), Merced (Los Baños, Gadwall), Madera (Raymond), Fresno (Hume, Fresno), Tulare (Trout Meadows, Little Kern River Lake, Trout Creek at 6,000 feet, Cannell Meadows), Kern (Buena Vista Lake, Kern River near Bodfish, Walker's Basin), Inyo (Owen's Valley, Laws), El Dorado (Lake Tahoe, Fallen Leaf Lake, Mt. Tallac), and Placer (Tahoe City) counties.

From Nevada, from Douglas (Glenbrook), and Washoe (Wadsworth, Pyramid Lake), counties.

Remarks.—Certain specimens resemble *T. o. hammondi* rather closely, but the presence of a dorsal line on at least a portion of the neck will usually serve to distinguish them from that form. Sometimes the line is continued along the back, but it often is very indistinct. The gastrostegees seem to be somewhat more numerous than in *T. o. hammondi*, and a similar tendency is apparent in the infralabials, which often are eleven instead of 10. On the other hand, two preoculars are found much less frequently than in *T. o.*

hammondii. Intergradation between these two subspecies is shown by certain specimens from the San Joaquin Valley, but it seems to be individual rather than geographic. It doubtless will become more evidently geographic when specimens are secured from the proper areas.

The relationship of *T. o. couchii* to *T. o. vagrans* is still closer than to *T. o. hammondii*. This is shown by the character of the spotting adjacent to the dorsal line when present, the frequent occurrence of more or less dark pigment on the gastrosteges, and the fact that in many of the specimens of *T. o. couchii* some indication of a dorsal line is present.

In typical *T. o. vagrans*, as it occurs in Idaho, Utah and eastern Nevada, the dorsal line is well marked, the dorsal spots are very evident and invade the edges of the dorsal line, and the gastrosteges almost always are rather heavily pigmented. *T. o. couchii* differs from this type of coloration in the shortness of or indistinctness of its dorsal line, which may be only a half-inch in length, in the less frequent and less extensive pigmentation of the gastrosteges, and in the absence, indefiniteness, or less characteristic arrangement of the dorsal spots. Intergradation between *T. o. couchii* and *T. o. vagrans* is to be looked for in western Nevada.

The relationship between *T. o. couchii* and *T. o. elegans* also is very close. Typical *T. o. elegans* seems to occur only at considerable elevations in the Sierra Nevada and in the mountains of southern California. *T. o. couchii* occupies the lower levels, but extends its range up in the Sierra Nevada so far, at certain points, that it overlaps that of *T. o. elegans*, just as the range of *T. o. hammondii* overlaps that of *T. o. elegans* in the San Bernardino Mountains of southern California. But, while *T. o. hammondii* and *T. o. elegans* seem to remain perfectly distinct and true to character at the places where their ranges meet, specimens showing

intermediate characters are found at the points where *T. o. couchii* and *T. o. elegans* come in contact, as at Jackass Meadows, 7,750 feet, Tulare County, and in the Yosemite Valley. At other places, as at Fallen Leaf Lake, El Dorado County, and at Glenbrook, Nevada, snakes of both types have been taken but no intermediate specimens have been secured.

One specimen had eaten a young blackbird. Another had caught a six-inch trout.

Where conditions are favorable these snakes often attain enormous size. One measures 55.5 inches, of which 12.25 inches represent the tail. Another has the same measurement to anus, but the tail is 1.25 inches shorter. These snakes were secured at Buena Vista Lake, where they live in patches of tules out in the lake and doubtless eat fish. Although they may be seen in considerable numbers sunning themselves on the broken-down tules, they are hard to shoot, for they are very shy and slide into the water at the least alarm. Several were seen which appeared to be larger than any secured by us. The largest specimens sometimes show no lateral lines or other markings. Specimens of similar size occur in the marshes near Los Baños.

190. *Thamnophis ordinoides hammondii* (Kennicott)

CALIFORNIA GARTER-SNAKE

Plate 92

- Eutainia hammondii* KENNICOTT, Proc. Acad. Nat. Sci. Phila., 1860, p. 332 (type localities, San Diego, Fort Tejon, Cal.); COPE, U. S. Explor. Surv. W. 100th Merid., Vol V, 1875, pp. 545, 549.
- Eutania Couchii*, COOPER, Proc. Cal. Acad. Sci., Vol. IV, 1870, p. 68.
- Eutania hammondii* YARROW & HENSHAW, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 215 (part); BROWN, Proc. Acad. Nat. Sci. Phila., 1903, p. 295.
- Eutania marciana* YARROW & HENSHAW, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 216.

- Eutania elegans couchii* COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 656; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1042 (part).
- Tropidonotus ordinatus* var. *hammondii* BOULENGER, Cat. Snakes Brit. Mus., Vol. I, 1893, p. 210.
- Thamnophis hammondii* VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. V, 1896, p. 1008; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., Vol. V, 1897, p. 212 (part); McLAIN, Critical Notes, 1899, p. 12 (part); GRINNELL & GRINNELL, Throop Inst. Bull., No. XXXV, 1907, p. 49; GRINNELL, Univ. Cal. Publ. Zool., Vol. 5, No. 1, 1908, p. 167; RUTHVEN, Bull., U. S. Nat. Mus., No. 61, 1908, p. 133 (part); VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. III, 1912, pp. 149, 150, 151, 152; HURTER, First Ann. Rep. Laguna Marine Lab., 1912, p. 67; ATSATT, Univ. Cal. Publ. Zool., Vol. 12, No. 3, 1913, p. 43; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 101 (part).
- Tropidonotus digueti* MOCQUARD, Nouv. Arch. du Museum d'Hist. Naturelle, Ser. IV, Vol. I, 1899, p. 327 (type localities, **Mulege & San Ignacio, Lower California, Mexico**).
- Thamnophis ordinoides hammondii* GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 181 (part); VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. VIII, 1918, p. 256, pl. 13; COWLES, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, 1920, p. 66; STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 63; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 52; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 130.

Description.—Head distinct from neck, flat-topped, with narrow, rounded snout, and temporal regions not infrequently swollen. Eye large. Rostral large, bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head: a pair of internasals, a pair of prefrontals, a frontal, supraocular of each side, and a pair of parietals. Anterior and posterior nasals distinct. One loreal. One or two or three preoculars, and three (rarely four or two) postoculars. Temporals one followed by two or three. Eight (rarely nine) superior and ten (rarely nine or 11) inferior labials, sixth in each series largest, fourth and fifth superior

reaching eye, first pair of inferior meeting on median line. Two pairs of genials, the posterior usually much longer than anterior. Scales on body in 21, or very rarely 19, rows. Anal plate not divided. Gastrosteges varying in number from 156 to 173, males having from 163 to 173, females from 156 to 171. Urosteges in two series of from 67 to 88, males having from 69 to 88, females from 67 to 82.

The ground color is grayish brown or olive marked, in young specimens, with numerous black spots which usually disappear with age. The dorsal line is always absent, or represented by a yellow spot on the neck. The lateral lines are either distinct or blended with the color of the belly. Black spots are frequently present on the first row of scales and tips of the gastrosteges. The top of the head is olive, with a yellow pineal spot on the line between the parietal plates. Dark nuchal blotches are present. The lower surfaces are whitish or grayish yellow.

A specimen showing the colors in life is described by Dr. Grinnell as follows: Ventrally the snake is dusky yellow anteriorly, becoming dusky posteriorly, finely mottled with slate; there is a pinkish tinge down the middle of the belly. Dorsally the snake is uniformly dark sepia, without any median dorsal stripe; but on each side involving the second row of scales dorsally from the gastrosteges, a dusky yellowish line runs from the yellowish side of the head back to the region of the vent, where it becomes so dusky as to merge with the uniformly sordid color clear around. Along each side, above the lateral stripes, are flecks of whitish between the scales which show when the skin is stretched a little so as to separate the scales. There are also flecks of black, mostly further down the sides, which likewise show clearest when the scales are parted. On the nape of the neck is a dusky yellow dab, which looks as though it might be the remnant of a median dorsal stripe; also there is a

faint occipital spot. The sides of the head are dusky yellowish, with vertical blackish marginings to the supralabials.

Length to anus.....	304	382	440	500	670	870
Length of tail.....	93	109	120	143	180	275

Variation.—The loreal in seventy-five specimens is 1—1 in all. Preoculars 2—2 in thirty-one, or 42%; 1—1 in twenty-seven, or 36%; 2—1 in thirteen, or 18%; 3—3 in two, or 3%; and 2—3 in one, or 1%. Postoculars 3—3 in sixty-six, or 92%; 3—4 in three, or 4%; 4—4 in two, or 3%; and 3—2 in one, or 1%. Temporals 1+2—1+2 in forty-two, or 56%; 1+2—1+3 in twenty-one, or 28%; 1+3—1+3 in twelve, or 16%. The supralabials are 8—8 in all except one specimen which has 8—9. The infralabials are 10—10 in sixty-nine, or 92%; 10—9 in three, or 4%; 9—9 in two, or 3%; and 10—11 in one, or 1%. The scale-rows are 21—21—17 in sixty-two, or 83%; 21—19—17 in eleven, or 15%; 19—21—17 in one, or 1%; and 19—19—17 in one, or 1%. The gastrosteges vary from 156 to 173, males having from 163 to 173, females from 156 to 171; the average in thirty-seven males is 168.1, in thirty-four females, 162.6. The urosteges vary from 67 to 88, males having from 69 to 88, females from 67 to 82; the average in twenty-five males is 81.2, in twenty-one females, 73.1.

Distribution.—This subspecies is the common water-snake of southern California west of the deserts. Where streams run from the western mountains down onto the desert this snake may follow them for some distance, as, to Victorville on the Mohave River, and Palm Canyon at the eastern base of the San Jacinto Mountains. It ranges at least from sea level to an altitude of 8,000 feet. The most northern locality from which we have seen a typical



Thamnophis ordinoides hammondi, California Garter Snake
FIG. 1. Adult, FIG. 2. young, collected at Los Angeles, Los Angeles County, California, May, 1915.

specimen is Oceano, San Luis Obispo County. It occurs also in Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside and San Diego counties, and northwestern Lower California. Its range is chiefly in the Upper Sonoran Zone but extends into the Lower Sonoran and Transition zones.

I have examined specimens from San Luis Obispo (Oceano), Santa Barbara (Santa Inez River), Ventura (Santa Paula), Los Angeles (West Fork San Gabriel River, Pasadena, Los Angeles, Claremont, Rock Creek), San Bernardino (Victorville, Santa Ana Canyon and River, San Bernardino Mts., Ontario, Chino), Riverside (Riverside, San Jacinto Valley, Keen Camp, Hemet Lake, Base of San Jacinto Mts. near Cabazon, Palm Canyon at 800 feet, Tahquitz Valley at 8,000 feet), Orange (Laguna Beach), and San Diego (Agua Caliente, Oak Grove, Carlsbad, Santa Ysabel Valley, Witch Creek, Cuyamaca Mts., Sweet Water Dam, Dulzura, Campo) counties, California.

This snake has been recorded also from northern and central Lower California, Mexico (Comondu, La Guilla, San Antonio, Mulege, San Ignacio, Ensenada, and the mountains near Hanson's Laguna).

Remarks.—*Thamnophis ordinoides hammondii* is a well differentiated subspecies. The dorsal line is completely lacking in all specimens we have examined—even the youngest ones—which had been taken in southern California. Some specimens show a nuchal spot, but none even a short line. Specimens from this area also show little or no black on the belly. The name *hammondii* often has been applied to snakes collected farther north, as in the San Joaquin Valley and the Sierra Nevada. These northern snakes, however, almost invariably have at least some trace of a dorsal line, and often show more or less black on the belly scutes, as in *vagrans*. Their status is discussed in this paper under

the name *T. ordinoides couchii*. *T. o. hammondii* often (62%) has two preoculars on at least one side of the head, while *T. o. couchii* shows no such tendency. *T. o. hammondii*, however, shows no tendency toward an increase in the number of infralabials, while *T. o. couchii* does.

The specimens from San Luis Obispo, Santa Barbara and Ventura counties are perfectly typical *hammondii*. The localities where intergradation with *couchii* occurs cannot yet be defined. They are, doubtless, in southern Kern County. Individual variation, in a very few specimens from the San Joaquin Valley, almost bridges the space between the characters of typical *couchii* and *hammondii*.

In the San Bernardino Mountains *T. o. hammondii* occurs with *T. o. elegans* at altitudes of 5,000 to 7,000 feet. Here the two forms seem to remain true to type, for no intermediate specimens have been taken. *T. o. elegans* seems to be a mountain form while *T. o. hammondii* occupies the lower country as well as higher elevations.

The snakes which formerly were recorded as *T. hammondii* from San Pedro Martir Mountains, on re-examination, prove to be *T. o. vagrans*. *T. o. hammondii* has been recorded by others from San Antonio and La Guilla, Lower California.

So far as is known the ranges of *T. o. hammondii* and *T. marcianus* do not meet.

This snake feeds on tadpoles, frogs and fish.

Captive individuals sometimes change the intensity of their pigmentation very quickly, in accordance with the lightness or darkness of the objects upon which they rest.

191. *Thamnophis marcianus* (Baird & Girard)

MARCY'S GARTER-SNAKE

Plate 93

- Eutainia marciana* BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, 1853, p. 36 (type locality, "Red River, Arkansas" = near Cache Creek, Ok'ahoma).
- Eutania marciana* BAIRD, U. S. Mex. Bound. Surv., Vol. II, Rept., 1859, p. 17; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 41; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 118 (part).
- Eutania nigrolateralis* BROWN, Proc. Acad. Nat. Sci. Phila., 1889, p. 421 (type locality, Tucson, Arizona).
- Tropidonotus ordinatus* var. *marcianus* BOULENGER, Cat. Snakes Brit. Mus., Vol. I, 1893, p. 210.
- Eutania elegans marciana* COPE, Report U. S. Nat. Mus., 1898 (1900), p. 1044; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 24; BAILEY, N. Amer. Fauna, No. 25, 1905, pp. 28, 48; DITMARS, Reptile Book, 1907, p. 229, pls. LXVI, figs. 2, 7, LXX, fig. 2.
- Thamnophis marciana* RUTHVEN, Bull. Am. Mus. Nat. Hist., Vol. XXIII, 1907, p. 589.
- Thamnophis marcianus* RUTHVEN, Bull. U. S. Nat. Mus., No. 61, 1908, p. 58; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. III, 1912, p. 154; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. III, 1913, p. 420; GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 179; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 101; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. VIII, No. 6, 1918, p. 261, pl. 14.

Description.—Head distinct from neck, flat-topped, with narrow, rounded snout, and temporal regions sometimes swollen. Eye moderate. Rostral large, bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head: a pair of internasals, a pair of prefrontals, a frontal, supraocular of each side, and a pair of parietals. Anterior and posterior nasals distinct. One loreal. One or rarely two preoculars. Three or four postoculars. Temporals normally one followed by two or three, sometimes 2+3. Eight, (rarely seven) superior and 10 (rarely

11) inferior labials, usually the sixth in each series largest, the fourth and fifth superior reaching eye, first pair of inferior meeting on median line. Two pairs of genials, posterior usually longer than anterior. Scales on body in 21 or rarely 23 rows, all keeled. Anal plate not divided. Gastrosteges varying in number from 149 to 163, males having from 157 to 163, females from 149 to 159. Urosteges in two series of from 63 to 79, males having from 77 to 79, females from 63 to 67.

The ground color above is light brownish, yellowish or grayish with alternating black spots and large nuchal blotches. Dorsal and lateral light lines are present. The dorsal line is narrow, usually about the width of one or one and two half scales, and may have well defined, straight edges or may be somewhat invaded by the dark dorsal spots. The lateral line is on the scales of the third row only anteriorly, but involves those of both second and third rows posteriorly. The scales of the rows below the lateral line are light in color, often heavily spotted with black, these spots alternating with the two series above. The side of the head is dark with a light patch below and partly surrounding the eye and a yellowish or whitish crescentic mark about the posterior edge of the temporal region. The anterior border of this light crescent usually is narrowly edged with black or dark brown. Blackish marks radiate from the orbit occupying the posterior edges of the superior labial plates. Occasionally all of the superior labials have dark posterior edges and the inferior labials may be similarly marked. There is a light pineal spot margined with black. The lower surfaces are greenish or yellowish white, each gastrostege usually with a blackish spot externally near its anterior edge.

Length to anus.....	266	387	389	574
Length of tail.....	71	122	100	154



Thamnophis marcimus, Mary's Garter Snake
Cal. Acad. Sci. No. 35159, collected at Fairbank, Cochise County, Arizona, August, 1912.

Variation.—Eight specimens have the loreal 1—1 in all. The preoculars are 1—1 in all. The postoculars are 3—3 in two, 3—4 in two, and 4—4 in two. The temporals are 1+3—1+3 in four, 1+2—1+2 in three, and 1+3—2+3 in one. The supralabials are 8—8 in twelve, 7—8 in one. The infralabials are 10—11 in four, and 10—10 in two. The scale rows are 21—19—17 in ten, 21—21—17 in one, 23—23—17 in one, and 21—26 in one. The gastrosteges vary in number from 149 to 162, males having from 157 to 162, females from 149 to 159; the average in six males is 160.5, in eight females, 154.9. The urosteges vary from 63 to 79, males having from 77 to 79, females from 63 to 67; the average in two males is 78, in four females, 64.7.

Distribution.—This garter-snake ranges north from Mexico into the United States. It has been found in Sonora and Arizona, and in California along the Colorado River. It extends its range through Texas to Oklahoma. The details of its distribution through this area are yet to be worked out. As regards Arizona, authentic specimens have been recorded from the vicinity of Tucson and Yuma. At Yuma it occurs on both banks of the Colorado River, and the westernmost limits of its known range are along the banks of this river from Yuma north to Riverside Mountain in Riverside County, California.

We have examined specimens from Fairbank, Cochise County, Tucson, Pima County, Gila Bend, Maricopa County, Yuma, Yuma County, Arizona, Colorado River eight miles east from Picacho, Imperial County, California, and Riverside Mountain, Colorado River, Riverside County, California.

Ruthven examined other specimens with definite localities as follows: Fort Yuma, Imperial County, California; Tucson, Arizona; White Horse Springs and Fort Supply,

Oklahoma; Brownsville, San Diego, Point Isabelle, Reutersville, Cameron County, San Antonio, Eagle Pass, Pecos, San Angelo, Helodes, Jeff Davis County, "South of Clarendon," Kerrville, Texas; and Matamoras and Charco Escondido, Tamaulipas, and Ojo del Diable, Chihuahua, Mexico.

Remarks.—Marcy's Garter-snake may usually be distinguished at a glance by its postoral crescents and the position of its lateral line. The dorsal spots of certain specimens resemble those of certain specimens of *T. o. vagrans*, but usually are larger. The gastrosteges ordinarily lack the dark markings which are so constant in *T. o. vagrans*, but frequently are marked with black laterally. The posterior genials usually are longer than the anterior.

Our specimens from Tucson were caught in mud puddles on the desert a mile or more from the river.

192. *Thamnophis megalops* (Kennicott)

MEXICAN GARTER-SNAKE

Plate 94

Eutania megalops KENNICOTT, Proc. Acad. Nat. Sci. Phila., 1860, p. 330 (type locality, **Tucson and Sta. Magdalena, Arizona**); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1025; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 21; DITMARS, Reptile Book, 1907, p. 221.

Eutania macrostemma KENNICOTT, Proc. Acad. Nat. Sci. Phila., 1860, p. 331 (type locality, **City of Mexico**); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1029.

Eutania flavilabris COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 306 (type locality, **tableland or southern mountains of Mexico**); COPE, Proc. Am. Philos. Soc., 1884 (1885), p. 173.

Eutania insigniarum COPE, Proc. Am. Philos. Soc., 1884 (1885), p. 172 (type locality, **Chapultepec, Mexico**).

Tropidonotus ordinatus var. *macrostemma* BOULENGER, Cat. Snakes Brit. Mus., Vol. I, 1893, p. 212.

Thamnophis megalops RUTHVEN, Bull. U. S. Nat. Mus., No. 61, 1908, p. 44; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. III, 1913, p. 421; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 101; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. VIII, 1918, p. 283, pl. 15.

Description.—Head distinct from neck, flat-topped, with narrow, rounded snout, and temporal regions not infrequently swollen. Eye large. Rostral large, bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head: a pair of internasals, a pair of prefrontals, a frontal, supraocular of each side, and a pair of parietals. Anterior and posterior nasals distinct. One loreal. One preocular, and three or four postoculars. Temporals one followed by two or three. Eight (rarely nine) superior and 10 (rarely nine or 11) inferior labials, sixth in each series usually largest, fourth and fifth superior reaching eye, first pair of inferior meeting on median line. Two pairs of genials, the posterior usually longer than anterior. Scales on body in 21, or rarely 23, rows. Anal plate not divided. Gastrosteges in Arizonan specimens varying in number from 154 to 165. Urosteges in two series of from 72 to 77.

The color above is olive or brown with three more or less distinct longitudinal light lines. The dorsal line varies considerably in width. The lateral line is on the scales of the third and fourth rows anteriorly, of the third or second and third posteriorly. Specimens with a light ground color show, more or less definitely, two series of dark spots between the dorsal and lateral lines, the spots of the upper series rather more indefinite than those of the lower, with which they alternate. In dark specimens these may be obscured. The longitudinal lines are yellow or yellowish white. Dark nuchal blotches are present. The labials are light olive or yellow with dark posterior edges. A light postoral crescent

extends up behind the labials and temporals. The chin and throat are yellow or whitish. The belly is greenish yellow.

A specimen from Tucson, Arizona, was colored in life as follows: The head above is clear olive. The supralabials are straw yellow, the anterior and posterior ones tinged with olive, and all showing posterior edgings of black. The oculars are yellowish olive. The dorsal line is bright ochre anteriorly, becoming dull yellow on the posterior half of the body. The lateral lines are olive yellow on the neck, but posteriorly become grayish yellow and then cream or grayish white. Nuchal blotches are blackish, but are not very evident. The area between the dorsal and lateral lines is clear olive brown, with two rows of nearly concealed blackish blotches separated by concealed light greenish white areas on the skin between the scales. The lower laterals and tips of the gastrosteges are olive brown, a little lighter than the area between the stripes. The lower surfaces are yellowish white on head and neck, grayish or olive white elsewhere, the gastrosteges with concealed black markings laterally.

Length to anus.....	468	512	572	588	590
Length of tail.....	152	152		184	168

Variation.—In six specimens from Arizona the loreal is 1—1 in all. The preoculars are 1—1 in all. The postoculars are 3—4 in three, 3—3 in two, and 4—4 in one. The temporals are 1+2—1+2 in three, 1+3—1+3 in two, and 1+2—1+3 in one. The supralabials are 8—8 in four and 8—9 in two. The infralabials are 10—10 in all six. The scale-rows are 21—19—17 in five, 21—23—21—19 in one. The gastrosteges vary in number from 154 to 162; the average in five females is 158.8. The urosteges vary from 72 to 77; the average in four females is 74.5.



Thamnophis megalops, Mexican Garter Snake
Cal. Acad. Sci. No. 53161, collected at Fairbank, Cochise County, Arizona, August, 1912.

Distribution.—The range of this snake apparently extends over most of the Mexican plateau region and north into southern Arizona and New Mexico. In Arizona, authentic specimens have been taken near Tucson, Pima County, and Hereford, Lewis Springs and Fairbank, Cochise County. The species has been recorded also from Yuma, and Fort Whipple, but these records need confirmation. In New Mexico it has been taken at Duck Creek.

Remarks.—Ruthven has shown that specimens from the southern part of the Mexican plateau exhibit a decided tendency toward a decrease in the number of scale-rows, urosteiges, etc. Notwithstanding this he regards them all as belonging to the same species as Arizonan specimens. This opinion is followed here, as may be seen by reference to the synonymy, but I feel that it may have to be revised later when more material is at hand.

193. *Thamnophis angustirostris* (Kennicott)

BROWN-SPOTTED GARTER-SNAKE

- Eutania angustirostris* KENNICOTT, Proc. Acad. Nat. Sci. Phila., 1860, p. 332 (type locality, **Parras, Coahuila, Mexico**).
- Chilopoma rufipunctatum* COPE, in YARROW, Rept. U. S. Expl. Surv. W. 100th Merid., Vol. V, 1875, p. 544 (type locality, **Southern Arizona**).
- Atomarchus multimaculatus* COPE, Amer. Nat., 1883, p. 1300 (type locality, **San Francisco River, New Mexico, near Arizona boundary**).
- Styrocemus rufopunctatus* COPE, Proc. Amer. Philos. Soc. 1885, p. 387.
- Eutania multimaculata* COPE, Proc. Amer. Philos. Soc., 1885, p. 284; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 665; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1087; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 31.
- Tropidonotus multimaculatus* BOULENGER, Cat. Snakes Brit. Mus., Vol. I, 1893, p. 214.
- Tropidonotus rufopunctatus* BOULENGER, Cat. Snakes Brit. Mus., Vol. I, 1893, p. 214.

Eutania rufopunctata COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 666; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1089; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 31; DITMARS, Reptile Book, 1907, p. 240.

Thamnophis angustirostris RUTHVEN, Bull. U. S. Nat. Mus., No. 61, p. 120; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. III, p. 422; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 100; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. VIII, 1918, p. 264.

Description.—Head distinct from neck, flat-topped, with very narrow, elongate, rounded snout. Eye of moderate size. Rostral large, bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head: a pair of internasals, a pair of prefrontals, supraocular of each side, a frontal, and a pair of parietals. Anterior and posterior nasals distinct. One loreal. Two or rarely three preoculars and three or four postoculars. Temporals normally one followed by one, sometimes 1+2. Eight, or rarely seven or nine, superior and 10, or nine, inferior labials, fifth or sixth superior and sixth or seventh inferior usually largest, fourth or fifth or fourth and fifth superior usually reaching eye, first pair of inferior meeting on median line. Two pairs of genials, posterior equal to or longer than anterior. Scales on body in 21 or rarely 23 rows. Anal plate undivided. Gastrosteges varying in number from 161 to 177, males having from 165 to 177, females from 161 to 170. Urosteges in two series of from 69 to 87, males having from 80 to 87, females from 69 to 82; the anterior urosteges often undivided.

The color above is dark olive or brown with several rows of dark brown spots. These spots are very distinct in young specimens but become less evident with age. There usually are no longitudinal light lines, but lateral lines may show faintly on the second and third rows of scales and a trace of the dorsal line may be present anteriorly. The head is

unicolor above in adults, mottled in young. Each superior and inferior labial with a marginal patch of brown with a darker border. No postoral crescents. Throat yellow. Lower surfaces greenish or bluish gray, with numerous small blackish spots, gastrosteges sometimes with basal dark markings which may form more or less definite dark stripes.

Length to anus.....	254	339	347	389	408	428
Length of tail.....	69	107	110	120	125	146

Variation.—In eighteen specimens from Arizona the loreals are 1—1 in seventeen and 1—2 in one. The preoculars are 2—2 in sixteen, or 89%; 2—3 in two, or 11%. The postoculars are 3—3 in ten, or 56%; and 3—4 in eight, or 44%. The temporals are 1+1—1+1 in nine, or 50%; 1+1—1+2 in eight, or 44%; and 1+2—2+2 in one, or 6%. The supralabials are 8—8 in thirteen, or 72%; 7—8 in two, or 11%; 8—9 in two, or 11%; and 7—7 in one, or 6%. The infralabials are 10—10 in nine, or 53%; 9—10 in four, or 24%; and 9—9 in four, or 24%. The scale rows are 21—19—17 in all. The gastrosteges vary in number from 161 to 177, males having from 165 to 177, females from 161 to 170; the average in eleven males is 171.3, in seven females, 164.9. The urosteges vary from 69 to 87, males having from 80 to 87, females from 69 to 82; the average in eleven males is 84.2, in seven females, 73.9.

Distribution.—This species occurs in the northern part of the Mexican plateau south to Coahuila and Durango and north to portions of southwestern New Mexico and southern and central Arizona. The original Arizonan specimen was labeled merely "Southern Arizona," and no definite locality in that state was recorded until our specimens were secured

at Oak Creek, Coconino County, Arizona. The National Museum has it from Tonto Creek at 6,000 feet, Gila County, Arizona.

Habits.—Oak Creek is a mountain stream running through a deep canyon with many oak trees. Perhaps a thousand feet above the stream is the pine forest of the plateau of central Arizona. These snakes were found in the stream, either on rocks or in the water. Their general appearance is very different from that of most garter-snakes. The absence of lines, the heavy spotting, and the long, narrow head are not suggestive of *Thamnophis*.

Genus 41. **Sonora**

Sonora BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. 1, Serpents, 1853, p. 117 (type, *semiannulata*).

Lamprosoma HALLOWELL, Proc. Acad. Nat. Sci. Phila., 1856, p. 310 (type, *occipitale*).

Chionactis COPE, Proc. Acad. Nat. Sci. Phila., 1860, p. 241 (type, *occipitale*).

The body is small but not very slender, with short tapering tail, and little if any constriction at neck. The snout is long, rounded, and depressed. The head plates are normal except in the union of the anterior and posterior nasals. One preocular, two postoculars, and a loreal are present. Temporals are normally 1+2. The scales are smooth, in fifteen rows. The anal plate is divided, and the urosteges are in two series. The eye is rather small with round pupil. It is stated that grooved teeth are present.

SYNOPSIS OF SPECIES

a.—Snout very much depressed, pointed in profile; rostral plate projecting far beyond lower jaw; back with transverse bars or annuli.

S. occipitalis.—p. 859.

a².—Snout less depressed, rounded in profile; rostral plate projecting less beyond lower jaw.

b.—Back with a series of transverse or dark brown bars.
S. semiannulata.—p. 863.

b².—No transverse dark bars; sides with longitudinal lines made up of dark dashes on the centers of the scales.

S. episcopa.—p. 866.

194. *Sonora occipitalis* (Hallowell)

TRICOLOR GROUND SNAKE

Plate 95

Rhinostoma occipitale HALLOWELL, Proc. Acad. Nat. Sci. Phila., Vol. VII, 1854, p. 95 (type locality, **Mojave Desert**).

Lamprosoma occipitale HALLOWELL, Proc. Acad. Nat. Sci. Phila., 1856, p. 110; BAIRD, U. S. Mex. Bound. Surv., Vol. II, 1859, Rept., p. 21, pl. 21, fig. 1; BAIRD, Rep. Pac. R. R. Surv., Vol. X, Pt. III, 1859, p. 16, pl. XXXV, figs. 6, 7; HALLOWELL, Rep. Pac. R. R. Surv., Vol. X, Pt. IV, No. 1, 1859, p. 15, pl. IV, figs. 2a-c; BO-COURT, Miss. Sci. au Mex., Rept., 1883, p. 558, pl. XXXIV, fig. 6.

Lamprosoma annulatum BAIRD, U. S. Mex. Bound. Surv., Vol. II, 1859, Rept., p. 22 (type locality, **Colorado Desert**).

Chionactis occipitalis COPE, Proc. Acad. Nat. Sci. Phila., 1860, p. 241; COOPER, Proc. Cal. Acad. Sci., Vol. XIV, 1870, p. 66; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 35; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 86; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 605; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 160; COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 941; MEEK, Field Columbian Mus., Zool. Ser., Vol. VII, No. 1, 1906, p. 15; RICHARDSON, Science, N. S., Vol. XXXII, No. 820, 1910, p. 383.

Chionactis occipitalis annulata COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 36; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 86.

Contia occipitalis GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, pp. 91, 164; BOULENGER, Cat. Snakes Brit. Mus., Vol. II, 1894, p. 266; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 68; DITMARS, Reptile Book, 1907, p. 332.

Contia occipitalis var. *annulata* GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, pp. 91, 164.

Sonora occipitalis VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 412; CAMP, Univ. Cal. Publ. Zool., Vol. 12, No. 17, p. 531; GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 182; STEJNEGER & BARBOUR, Check List N. Amer. Rept., 1917, p. 92; STEPHENS, Copeia, No. 54, 1918, p. 34; COWLES, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, 1920, p. 65; STEPHENS, Trans. San Diego Soc. Hist., Vol. III, No. 4, 1921, p. 64; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 52.

Description.—Head but little wider than neck, depressed, temporal regions not much swollen. Snout rather broad, greatly depressed, pointed in profile, produced far beyond lower jaw. Rostral large, broad, low, projecting far beyond mental, very concave below, considerably recurved on top of snout, and bounded behind by internasal, nasal, and first labial plates. Plates on top of head are a pair of internasals, a pair of prefrontals, a frontal, supra-ocular of each side, and a pair of parietals. Anterior and posterior nasals united into a single plate. Loreal usually elongate, often quite small, very rarely absent. One pre-ocular. Two postoculars. Temporals one followed by two. Supralabials usually seven, rarely six, third and fourth reaching eye, fourth or sixth largest. Infralabials usually eight, sometimes seven, fourth largest, first pair meeting on median line. Genials in two pairs, the posterior much smaller. Scales on body smooth, polished, in 15 rows. Anal plate divided. Gastroteges varying in number from 151, to 174. Urostegeges in two series of from 34 to 53.

In alcoholic specimens, the ground color is white, or grayish white. On the head is a more or less crescentic dark brown or black blotch the central portion of which occupies part or all of the parietal plates, and often a portion (none to three-fourths) of the frontal, while the extremities extend to the eyes. On the body between the head and the



Scopelogadon occipitalis, Tricolor Ground Snake

FIG. 1. Cal. Acad. Sci. No. 36154. Collected at Barstow, San Bernardino County, California, May, 1913.

FIG. 2. Alcohollic specimen; collected at Yuma, Yuma County, Arizona, March, 1913.

anus are from 21 to 33 transverse bars or rings of black or dark brown. These black markings do not reach the gastrosteges anteriorly, but become complete rings posteriorly at a distance in front of the anus which varies greatly in different specimens and is not dependent upon age or locality. On the tail are from six to 10 similar dark rings. On the dorsal surface of the body the dark bars or rings usually are much narrower than the intervals which separate them, but in some specimens the interspaces are little or no greater than the black areas. In specimens which have been long in alcohol these intervals are white, but in fresher specimens approximately the middle two-fourths of each interspace is occupied by a transverse orange or yellow or pinkish bar which extends down on the sides to about the second or third row of scales. The ventral surfaces are white, unmarked anteriorly, but posteriorly, at a varying distance from the head, showing blackish spots, bars or rings corresponding to or actually part of the dorsal dark markings. These ventral black marks may begin at a point corresponding to the second dorsal black bar, or may first appear only three or four bars in front of the anus. The lower surface of the tail is crossed by the black caudal rings.

The colors in life of a specimen captured near Yuma, Arizona, March 19, were as follows:

The dark rings were pure black, and between each pair of black rings was a transverse bar or half ring of cadmium orange, of about the same width on the midline as the black rings, and separated from them by a nearly equal space, which was pale lemon yellow. This lemon tint extended down onto the sides, and the lower surfaces were a paler lemon.

Richardson describes a fresh specimen as creamy white in color the dorsal surface being slightly tinged with olive, and crossed by numerous bands of an intense brownish black,

each space between the bands having a large, oval, transverse spot of bright reddish orange. The head was greenish blue above with a median reddish orange stripe on the edges of the internasals and prefrontals.

Length to anus.....	122	225	225	229	268	280	314
Length of tail.....	25	43	60	56	65	74	61

Distribution.—This beautiful little snake was originally described from a specimen secured in the Mohave Desert. A few years later it was recorded from the Colorado Desert. In more recent years it has been collected, in California, in San Diego (La Puerta Valley and Carrizo Creek), Imperial (Calexico, Holtville, Meloland, Imperial, Pilot Knob), Riverside (Blythe Junction, grass fields between Blythe and Mecca), San Bernardino (Barstow), and Inyo (Owens Lake), counties.

In Arizona it has been collected at Camp Mohave, Mohave County, and Yuma and Chrystoval, Yuma County.

Habits.—Several specimens have been dug out from about one or two feet below the surface of desert sand dunes. This fact and the shape of the snout indicate burrowing habits. Beyond this nothing is known. It seems remarkable that a species which seems to spend its life underground should be so beautifully colored.

Mr. Cowles notes a specimen found "traveling out in the open and in the heat of the noon sun, April 3, 1920. It was found on a gravel wash and when approached it struck in all directions, though apparently it did not open its mouth upon striking the hand. It appeared to be blinded by the sun and unable to tell from which direction it was menaced."

195. *Sonora semiannulata* Baird & Girard

BICOLOR GROUND SNAKE

Plate 96

Sonora semiannulata BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. 1, Serpents, 1853, p. 117 (type locality, **Sonora, Mexico**); BAIRD, Rep. Pac. R. R. Surv., Vol. X, Pt. III, 1859, p. 15, pl. XXXIII, fig. 88; BAIRD, U. S. Mex. Bound. Surv., Vol. II, 1859, Rept., p. 21, pl. 19, fig. 3; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 36; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 87; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, p. 411; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 5, No. 4, 1915, p. 100; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 92; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 29, 38.

Contia semiannulata GARMAN, Mem. Mus. Compr. Zool., Vol. VIII, No. 3, 1883, pp. 90, 164.

Contia isozona COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 304 (type locality, **Arizona**); COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 36; YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 537, pl. 18, fig. 1; GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, pp. 92, 164; BOULENGER, Cat. Snakes Brit. Mus., Vol. II, 1894, p. 266.

Contia episcopa isozona COPE, Bull. U. S. Nat. Mus., No. 17, 1880, p. 21; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 87; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 601; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 67; BROWN, Proc. Acad. Nat. Sci. Phila., 1903, p. 553; DITMARS, Reptile Book, 1907, p. 331; STRECKER, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 37.

Chionactis episcopus isozonus COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 939, fig. 239; BRANSON, Kansas Univ. Sci. Bull., Vol. II, No. 13, 1904, p. 416, fig. 34; BAILEY, N. Amer. Fauna, No. 25, 1905, pp. 35, 47; ELLIS & HENDERSON, Univ. Colorado Studies, Vol. X, No. 2, 1913, p. 101.

Chionactis isozonus RICHARDSON, Proc. U. S. Nat. Mus., Vol. 48, 1915, p. 426.

Description.—Head but little wider than neck, rather flat-topped, temporal regions not much swollen. Snout rounded, not greatly depressed, not pointed in profile, pro-

duced moderately beyond lower jaw. Rostral large, broad, not very low, projecting beyond mental much less than in *S. occipitalis*, somewhat recurved on top of snout, and bounded behind by internasal, nasal and first labial plates. Plates on top of head are a pair of internasals, a pair of prefrontals, a frontal, supraocular of each side, and a pair of parietals. Anterior and posterior nasals united into a single plate. Loreal usually longer than high, sometimes small, merged with nasal on one side of one specimen. One preocular. Two postoculars. Temporals one followed by two, or 1+1. Supralabials normally seven, sometimes six, third and fourth reaching eye, next to last largest. Infralabials usually seven, sometimes six or eight, fourth largest, first pair meeting on median line. Genials in two pairs, the posterior much smaller. Scales on body smooth, in 15 rows. Anal plate divided. Gastrosteges varying in number from 149 to 176. Urosteges in two series of from 45 to 53.

The head is light yellowish olive, or pinkish, or orange-red above, with a black or dark brown crescentic blotch on the parietal and frontal plates, extending to the eye as in *S. occipitalis*. In some specimens this blotch is nearly obsolete. On the body between the head and anus are from 23 to 39 transverse black bars. There are from six to 11 similar black bars or rings on the tail. The bars on the body usually do not quite reach the gastrosteges, but may involve their tips. The lateral scales which lie within these black bars have light edges, while the lateral scales in the interspaces often have central or basal dark markings, producing a linear effect similar to that seen on the lateral regions in *S. episcopa*. The interspaces between the black bars usually are but little greater than the bars themselves, but may be much more, even twice as long on the midline. These interspaces dorsally are reddish orange or rose pink in alcoholic specimens, fading to white laterally. The lower surfaces are yellowish



Sonora semiauriculata, Bicolor Ground Snake
Alcoholic specimen Cal. Acad. Sci. No. 17550. Collected at Cave Creek, Maricopa County,
Arizona, April, 1910.

or greenish white, unmarked except on the tail, where the dorsal dark markings may be extended across the urosteges more or less obsoletely.

Length to anus.....	171	194	228	230	260
Length of tail.....	44	44	54	56	

Remarks.—In coloration this snake is more or less intermediate between *S. episcopa* and *S. occipitalis*. Its transverse black bars cause it to resemble the latter, while the tendency toward lateral lines recall the former species. The snout is very different from that of *S. occipitalis* but is like that of *S. episcopa*. *S. semiannulata* may be said to be practically *S. episcopa* with black dorsal cross-bars. Its coloration reminds one in many ways of that of *Rhinocheilus lecontei*.

Distribution.—Originally described from Sonora, this little snake has since been taken in Texas, Kansas, Arizona, Utah, and Nevada.

Arizona specimens have been recorded by Cope from Fort Whipple, Fort Verde, Prescott, and Fort Mohave, and I have seen others from the Huachuca Mountains, Cochise County, and Cave Creek, Maricopa County.

In Utah, it has been taken at Rockville, Kane County, and near St. George, Washington County.

In Nevada, one was captured at Pyramid Lake, Washoe County, and one at Rhyolite, Nye County.

Habits.—Nothing is known concerning the habits of this little snake. The specimen from Pyramid Lake was found under a rock on a rise above the southwest shore of the Lake.

196. *Sonora episcopa* (Kennicott)

STRIPED GROUND SNAKE

- Lamprosoma episcopum* KENNICOTT, U. S. Mex. Bound. Surv., Vol. II, 1859, Rept., p. 22, pl. 8, fig. 2 (type locality, **Eagle Pass and San Antonio to Rio Grande, Texas**); BOCOURT, Miss. Sci. au Mex., Rept., 1883, p. 559, pl. XXXIV, fig. 4.
- Contia episcopa* COPE, Proc. Acad. Nat. Sci. Phila., 1860, p. 251; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 36; COPE, Bull. U. S. Nat. Mus., No. 17, 1880, p. 20; GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, pp. 94, 164, pl. VI, fig. 2; BOULENGER, Cat. Snakes Brit. Mus., Vol. II, 1894, p. 265; MOCQUARD, Nouv. Arch. Mus. Hist. Nat., Paris, Ser. 4, Vol. I, 1899, p. 319; DITMARS, Reptile Book, 1907, p. 331; STRECKER, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 37.
- Homalosoma episcopum* JAN, Arch. Zool. Anat. Phys., Vol. II, 1862, p. 35; JAN, Iconogr. Génér. Ophid., 13e livr., 1865, pl. IV, fig. 2.
- Contia episcopa episcopa* COPE, Bull. U. S. Nat. Mus., No. 17, 1880, p. 21; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 87; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 601; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 67; BROWN, Proc. Acad. Nat. Sci. Phila., 1903, p. 553.
- Contia episcopa torquata* COPE, Bull. U. S. Nat. Mus., No. 17, 1880, p. 21 (type locality, **Northwestern Texas**); COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 601.
- Contia torquata* BOULENGER, Cat. Snakes Brit. Mus., Vol. II, 1894, p. 266.
- Chionactis episcopus episcopus* COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 938.
- Chionactis episcopus torquatus* COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 939.
- Chionactis episcopus* VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. III, 1912, p. 153.
- Sonora episcopa* VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 412; CAMP, Univ. Cal. Publ. Zool., Vol. 12, No. 17, 1916, p. 530; GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 183; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 92; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 52.

Description.—Head wide, with flattened top and rather narrow but not greatly depressed snout. Temporal regions not swollen, but head a little wider than neck. Rostral prominent, broad, high, rounded in profile, projecting considerably beyond lower jaw, hollowed below, not much reverted on top of snout, and bounded behind by internasal, nasal and first labial plates. Plates on top of head are a pair of internasals, a pair of prefrontals, a frontal, supraocular of each side, and a pair of parietals. Anterior and posterior nasals usually united into a single plate. Loreal often quite small. One preocular. Two postoculars. Temporals one followed by two, rarely 1+1. Supralabials normally seven, sometimes six, third and fourth reaching eye, sixth largest. Inferior labials six or seven, second small, fourth largest, first pair meeting on median line behind the small triangular mental. Genials in two pairs, the posterior very small. Scales on body smooth, in fifteen rows. Anal plate divided. Gastrosteges in western specimens varying in number from 157 to 183. Urosteges in two series of from 44 to 57.

The head is pale yellowish brown or orange, with or without a definite or indistinct large dark brown blotch on the parietal and frontal plates. A light vinaceous rufus, pink, or orange band extends along the back from the occiput to the tip of the tail. This band is about four or five scales wide on the body, and two or three on the tail. The scales of the central two or three rows usually show only very faint darker markings, but those of the more lateral rows are marked each with a central dash of dark hair brown, while their margins are whitish. These dark dashes therefore appear as a brown line along the middle of each row of scales, with the exception of a few of the dorsal rows, while the ground color is reddish or pink dorsally and white laterally. The reddish dorsal band may be rendered less

distinct by the presence on the dorsal scales of central dark markings similar to those of the lateral scales.

Length to anus.....	132	270	322	340	371
Length of tail.....	35	59	73	75	86

Distribution.—Originally described from Texas, this little snake has since been found to range west to southeastern California and Lower California.

In California, it has been taken near Heber, Imperial County, and four miles north of Blythe Junction, San Bernardino County.

In Arizona, it has been secured at Yuma, Yuma County. The National Museum is said to have specimens from Kingman, Prescott, Phoenix, and the Santa Catalina Mountains.

In Lower California, it has been found at Santa Rosalia.

Habits.—Practically unknown. Camp reports a specimen found on June 8 at six P. M., coiled beside a stone in front of a hole, into which it abruptly disappeared when approached. The red colors were conspicuous in the living snake from the moment it was discovered. This specimen was caught on a rocky hillside at an elevation of 1,500 feet, four miles north of Blythe Junction.

Genus 42. *Chilomeniscus*

Chilomeniscus COPE, Proc. Acad. Nat. Sci. Phila., 1860, p. 339 (type, *stramineus*).

Bergenia STEINDACHNER, Voyage of the Novara, Vol. V, 1876, p. 92.

The body is stout and cylindrical, with short tail, and without constriction at neck. The snout protrudes far beyond the lower jaw, and is rounded, greatly depressed, and pointed in profile. The internasal is merged in the anterior nasal which, therefore, extends onto the top of the snout.

There is a small posterior nasal, sometimes merged with the anterior. The loreal plate normally is absent, rarely present. The scales are in 13 rows, smooth and with apical pits. The anal plate is divided, and the urosteges are in two series. The eye is small, with round pupil. Maxillary teeth grooved, the last two larger.

Our three snakes of this genus may be distinguished by the following.

SYNOPSIS OF SPECIES

a.—Back crossed by a series of dark bands or rings.

b.—Scales of white dorsal area without central dark spots.

C. cinctus.—p. 869.

b'.—Scales of dorsal white interspaces each with a central dark spot.

C. punctatissimus.—p. 872.

a'.—No transverse dark bands or rings; brownish or yellowish with brown dots on individual scales.

C. stramineus.—p. 874.

197. *Chilomeniscus cinctus* Cope

BANDED BURROWING SNAKE

- Chilomeniscus cinctus* COPE, Proc. Acad. Nat. Sci. Phila., 1861, p. 303 (type locality, **Guaymas, Gulf of California, Mexico**); COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 35; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 86; BELDING, West Amer. Scientist, Vol. III, No. 24, p. 98; COPE Bull. U. S. Nat. Mus., No. 32, 1887, p. 82; COPE Report U. S. Nat. Mus. for 1898, 1900, p. 952; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 85; DITMARS, Reptile Book, 1907, p. 373; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci. Ser. 4, Vol. 3, 1913, p. 410; GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 182; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 52, 70.
- Chilomeniscus ephippicus* COPE, Proc. Acad. Nat. Sci. Phila., 1867, p. 85 (type locality, **Owen's Valley, California**); COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 625, pl. XVIII, figs. 3, 3a; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 35; YARROW, Bull. U. S.

- Nat. Mus., No. 24, 1883, p. 86; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 594; BOULENGER, Cat. Snakes Brit. Mus., Vol. II, 1894, p. 273; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 159; COPE, Report U. S. Nat. Mus. for 1898 (1900), p. 950; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 85; DITMARS, Reptile Book, 1907, p. 372; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 93.
- Carphophis cincta* GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, pp. 100, 166.
- Chilomeniscus stramineus cinctus* COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 594.
- Chilomeniscus stramineus fasciatus* COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 595 (type locality, **La Paz, Lower California**).
- Chilomeniscus stramineus* BOULENGER, Cat. Snakes Brit. Mus., Vol. II, 1894, p. 273 (part).
- Chilomeniscus fasciatus* VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 139; MOCQUARD, Nouv. Arch. Mus. Hist. Nat., Ser. 4, Vol. I, 1899, p. 317; COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 951; MEEK, Field Columbian Mus., Zool. Ser., Vol. VII, No. 1, 1906, p. 14; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 94; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.

Description.—Head rather wide, little distinct from neck. Snout rather broad, rounded, greatly depressed, pointed in profile. Rostral plate very large, broad, prominent, extensively reverted on upper surface of snout, often reaching prefrontals, and otherwise bounded behind by two plates on each side of head, these being a large plate, corresponding to the internasal and nasals merged, and the first supralabial. Plates on top of head are the naso-internasals, a pair of prefrontals, a frontal, supraocular of each side, and a pair of rather short parietals. Posterior nasal small, sometimes merged with anterior nasal and internasal, rarely distinct. A small loreal very rarely present, normally none. One preocular. Two postoculars. Temporals one followed by one. Supralabials seven, third and fourth reaching eye, second, third and fourth high. Inferior labials usually

eight, sometimes nine, seven or six, second smallest, fourth or fifth largest, first pair meeting on median line. Genials in two pairs, posterior much smaller. Scales on body smooth, in 13 rows. Anal plate divided. Gastrosteges varying in number from 108 to 125. Urosteges in two series of from 21 to 29.

The color above is reddish orange, soon fading to white in alcohol, crossed by black or dark brown bars, bands or rings. These dark markings may or may not reach or cross the gastrosteges. They number from 18 to 28 on the body and from three to five on the tail. On the tail they usually are complete rings. The interspaces between the dark markings do not differ much from the dark markings in measurement along the middorsal line. The posterior portion of the head above, including the parietal, frontal and the upper portions of the posterior supralabials are dark brown or black. The lower surfaces are white; where not involved by the dark bars or rings.

Length to anus.....	104	202	225
Length of tail.....	16	33	26

Distribution.—This little burrowing snake probably is confined to the Lower Sonoran Zone. It has been secured in California, Arizona, and Lower California.

In California, it has been found only twice; in Owen's Valley, Inyo County, and near Fort Yuma, Imperial County. It probably occupies most of the intervening desert areas.

In Arizona, it is fairly common in Pima County where it has been collected near Tucson, in the foothills of the Catalina Mountains, and in the Cabali Mountains. It has been secured also at Cave Creek, Maricopa County, and on the Yuma desert near Monument 200 of the Mexican Boundary, and six miles west of Gila Bend.

In Sonora, it has been secured at Guaymas.

In Lower California, it has been taken at La Paz and Todos Santos, in the Cape Region, and, farther north, on Magdalena Island and at Santa Rosalia, Mulege, Ballenas Bay, San Fernando, San Quentin, and San Antonio.

Remarks.—One specimen from Ventana Canyon in the Catalina Mountains, Pima County, Arizona, has a well developed loreal on each side of the head, but in other respects is quite typical. The prefrontal plate may or may not reach the labials. The dark dorsal markings may not extend down to the gastrosteges, may involve them slightly, or may cross them as complete rings. For these reasons I am unable to recognize *C. ehippicus* and *C. fasciatus* as distinct from *C. cinctus*.

Habits.—Almost nothing has been recorded regarding the habits of this little snake. It is said to burrow in the ground and live on the larvæ of ants.

198. *Chilomeniscus punctatissimus*

Van Denburgh & Slevin

ISLAND BURROWING SNAKE

Chilomeniscus punctatissimus VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, No. 6, 1921, p. 98 (type locality, **Isla Partida, Espiritu Santo Island, Gulf of California, Mexico**).

Description.—Head rather wide, little distinct from neck. Snout rather broad, rounded, greatly depressed, pointed in profile. Rostral plate very large, broad, prominent, extensively reverted on upper surface of snout, bounded behind by two plates on each side of head, these being a large plate, corresponding to the internasal and nasals merged, and the first supralabial. Plates on top of head are the naso-internasals, a pair of prefrontals, a frontal, supraocular of each side, and a pair of rather short parietals. Posterior nasal small. No loreal. One preocular. Two post-

oculars. Temporals one followed by one. Supralabials seven, third and fourth reaching eye, second, third and fourth high. Inferior labials eight, second smallest, fourth largest, first pair meeting on median line. Genials in two pairs, Posterior much smaller. Scales on body smooth, in 13 rows. Anal plate divided. Gastrosteges 121. Urosteges 23, in two series.

The color above is creamy white, crossed by dark brown bands, most of which are edged with black. These dark markings extend onto the tips of the gastrosteges. They number 32 on the body and seven on the tail. The dark markings on the upper surface of the tail are as distinct as on the body. On the lower surface of the tail very faint continuations of the dark markings complete the rings. The interspaces between the dark bands do not differ much from the dark markings in measurement along the middorsal line. These interspaces are white, each scale marked with a central spot of grayish brown. The posterior portion of the upper surface and sides of the head, including the parietal, the posterior tip of the frontal, the oculars, and most of the supralabials are blackish brown. The lower surfaces are white except where the dark bars involve the tips of the gastrosteges, or appear faintly on the urosteges.

Length to anus.....	138
Length of tail.....	18

Remarks.—This little snake resembles *C. cinctus*, but lacks the reddish orange dorsal suffusion seen in that species, and the white cross-bands, instead of being unmarked, have each scale spotted centrally with dark brown.

Distribution.—This species is known from one specimen secured on Isla Partida, Espiritu Santo Island, Gulf of California, Mexico.

199. *Chilomeniscus stramineus* (Cope)
DOTTED BURROWING SNAKE

- Chilomeniscus stramineus* COPE, Proc. Acad. Nat. Sci. Phila., 1860, p. 339 (type locality, **Cape St. Lucas, Lower California, Mexico**); COPE, Proc. Acad. Nat. Sci. Phila., 1861, p. 302; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, pp. 35, 92; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 13, 86; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 81; BELDING, West. Amer. Scientist, Vol. III, No. 24, p. 98; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 594 (part); BOULENGER, Cat. Snakes Brit. Mus., Vol. II, 1894, p. 573 (part); VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 138; MOCQUARD, Nouv. Arch. Mus. Hist. Nat., Ser. 4, Vol. 1, 1899, p. 316; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 949; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 94, VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 52; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115; TERRON, Mem. y Rev. Soc. Cient. Antonio Alzate, Vol. 39, 1921, p. 164.
- Carphophis straminea* GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, pp. 99, 166; GARMAN, Bull. Essex Inst., Vol. XVI, No. 1, p. 32.
- Chilomeniscus stramineus stramineus* COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1902, p. 595.

Description.—Head rather wide, little distinct from neck. Snout broad, rounded, greatly depressed, pointed in profile. Rostral plate very large, broad, prominent, extensively reverted on upper surface of snout, usually not reaching prefrontals, bounded behind by the first supralabial and a large plate corresponding to the internasal and nasals merged. Plates on top of head are the naso-internasals, a pair of prefrontals, a frontal, supraocular of each side, and a pair of rather small parietals. Posterior nasal small, sometimes merged with anterior nasal and internasal. No loreal. One preocular. Two postoculars. Temporals one followed by one or two. Supralabials seven, third and fourth reaching eye. Inferior labials usually eight, sometimes seven,

fourth often largest, first pair meeting on median line. Genials in two pairs, posterior much smaller. Scales on body smooth, in 13 rows. Anal plate divided. Gastrosteges varying in number from 112 to 117. Urosteges in two series of from 21 to 26.

The top of the head is grayish dotted with brown. The ground color of the upper surfaces of the body and tail in adult specimens varies from brownish drab to bright yellowish cinnamon. It is cream buff in a younger individual. Dark brown spots are present near the tips of the scales in all specimens, but do not appear upon the first row of scales. They are present rarely upon the scales of the second row, but constantly upon those of the third. The first, second and half of the third rows of scales are yellowish white or straw-color, as are also the gastrosteges.

Length to anus.....	195	196	197	207	237
Length of tail.....	28	30	26	29	35

Distribution.—This beautiful little snake has been found only in the southern part of Lower California. It has been collected at Cape San Lucas, San Jose del Cabo, Miraflores, San Marthe, and La Paz.

Genus 43. **Tantilla**

Tantilla BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. 1, Serp., 1853, p. 131
(type, *coronata*).

Homalocranion DUMÉRIL, Mem. Ac. Sci. Paris, Vol. XXIII, 1853, p. 490.

The body is very slender, with tail of moderate length and no constriction at neck. The snout protrudes a little beyond the lower jaw. The head is very low, and very flat above. Its plates are normal, except that there is no loreal. One preocular and one or two postoculars are present. The scales are smooth, arranged in 15 (or 13)

rows. The anal plate is divided, and the urosteges are in two series. The eye is small, with round pupil.

KEY TO THE SPECIES OF TANTILLA

a.—Gastrosteges more than 165.

T. eiseni.—p. 876.

a¹.—Gastrosteges fewer than 160.

b.—Nuchal light collar crossing behind the parietal plates; gastrosteges 135 to 148.

c.—Nuchal collar one to three rows of scales behind the parietal plates.

T. nigriceps.—p. 878.

c².—Nuchal collar on sixth and seventh rows of scales behind the parietals.

T. planiceps.—p. 880.

b².—Nuchal light collar involving the parietal plates; gastrosteges 148 to 157.

T. wilcoxi.—p. 882.

200. *Tantilla eiseni* Stejneger

CALIFORNIA TANTILLA

Plate 97

Tantilla nigriceps YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 85 (part); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1113 (part);

Tantilla eiseni STEJNEGER, Proc. U. S. Nat. Mus., Vol. XVIII, 1896, p. 117 (type locality, **Fresno, California**); VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 177; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 93; DITMARS, Reptile Book, 1907, p. 391; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. III, 1913, p. 424; RUTHLING, Copeia, No. 15, 1915; GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 194; STEJNEGER & BARBOUR, Check List N. Amer. Rept., 1917, p. 105; STEPHENS, Copeia, No. 54, 1918, p. 34; STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 65; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 52.



Tantilla eisevi, California Tantilla
Collected near Campo, San Diego County, California, June, 1915.

Description.—Head rounded in outline, very flat above rather broad across temporal region, but little distinct from neck. Eyes small. Rostral rather large, broader than high, and bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of small internasals, a pair of prefrontals which are nearly twice as large, a frontal, the supraocular of each side, and a pair of long parietals. Posterior nasal in contact with preocular. No loreal. One preocular. Two postoculars. Temporals elongate, 1+1 or 1+2. Supralabials seven, the last largest, the third and fourth reaching eye. Infralabials seven or rarely six, the first pair not meeting on the midline. Scales smooth, in 15 rows. Anal plate divided. Gastroteges varying in number from 167 to 181. Urostege in two series of from 53 to 68.

The ground color is pale brownish gray or grayish brown, above, the edges of the scales being lighter. The top and sides of the head and the neck for a distance of about two or three scale-lengths behind the parietal plates is dark grayish or blackish brown. Behind this area a narrow whitish transverse band or collar about one scale wide crosses the nape. This may be bordered behind by a few dark dots. The labials and lower surfaces of the head and neck are grayish white. The rest of the lower surfaces are coral red, fading to grayish white in alcohol.

Length to anus.....	207	233	256	283
Length of tail.....	63	74	58	82

Distribution.—Seven specimens of this little snake were collected by Dr. Gustav Eisen near Fresno, Fresno County, California, in 1879. It has since been taken near Mohave, Kern County, Los Angeles, Los Angeles County, and Witch Creek and Campo in San Diego County. Witch Creek is on

the western slope of the Cuyamaca Mountains at an altitude of 2,800 feet and in the Upper Sonoran Zone.

Remarks.—*Tantilla eiseni* has more gastrosteges than any other of our species of *Tantilla*. It differs from *T. planiceps* and *T. wilcoxi* in the position of the white collar.

Habits.—Almost nothing is known regarding the habits of this snake. One was found by Mr. Frank Stephens in the fireplace of his home at Witch Creek. He says it probably had worked its way up along the brick foundation of the fireplace during the night.

201. *Tantilla nigriceps* Kennicott

SONORAN TANTILLA

Tantilla nigriceps KENNICOTT, Proc. Acad. Nat. Sci. Phila., 1860, p. 328 (type locality, **Fort Bliss, New Mexico, and Indianola to Nueces, Texas**); COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 35; YARROW, Bull. U. S. Nat. Mus. No. 24, 1883, p. 85 (part); GARMAN, Mem. Mus. Compr. Zool., Vol. VIII, No. 3, 1883, p. 88; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 598; COCKERELL, American Naturalist, Vol. XXX, April, 1896, p. 326; Mc LAIN, Critical Notes, 1899, p. 11; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1113 (part); BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 93; BROWN, Proc. Acad. Nat. Sci. Phila., 1903, p. 551; BRANSON, Kansas Univ. Sci. Bull., Vol. II, No. 13, 1904, p. 414, fig. 33; CRAGIN, Trans. Kansas Acad. Sci., Vol. VII, reprint, 1906, p. 118; DITMARS, Reptile Book, 1907, p. 391; ELLIS & HENDERSON, Univ. Colorado Studies, Vol. X, No. 2, 1913, p. 106, pl. VII, fig. 34; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 423; ELLIS & HENDERSON, Univ. Colorado Bull., Vol. XV, No. 6, 1915, p. 263.

Scolecophis fumiceps COPE, Proc. Acad. Nat. Sci. Phila., 1860, p. 371.

Homalocranium planiceps BOULENGER, Cat. Snakes Brit. Mus., Vol. III, 1896, p. 226 (part).

Tantilla planiceps STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 105 (part).

Description.—Head rounded in outline, very flat above,

rather broad across temporal region, little distinct from neck. Eye small. Rostral rather large, broader than high, and bounded behind by internasal, anterior nasal and first labial plates. Plates on top of head are a pair of small internasals, a pair of prefrontals, a frontal, the supraocular of each side, and a pair of parietals. Posterior nasal in contact with preocular. No loreal. One preocular. Two, or rarely one, postoculars. Temporals elongate, 1+1. Supralabials seven, the last largest, the third and fourth reaching eye. Infralabials seven, the first pair not meeting on the midline. Anterior genials longer than posterior. Scales smooth, in 15 rows. Anal divided. Gastrosteges varying in number from 135 to 148. Urosteges in two series of from 51 to 64.

The general color above is pale brownish or yellowish gray, unicolor. The upper surface of the head is dark brownish gray becoming blackish brown posteriorly. All of the specimens show a more or less well marked whitish nuchal collar from one to three rows of scales behind the parietals. This collar is from one to one and a half rows of scales wide and is not edged with darker posteriorly. The lower surfaces are coral red, becoming grayish white in alcohol.

In a living specimen the upper surfaces, except of the head, were unicolor, light yellowish hair-brown or brownish straw. The upper surface of the head was dark olive, becoming blackish brown posteriorly. The labials, lower surface of head, and neck to the sixth gastrostege, the tips of all the gastrosteges, and two or three rows of lateral scales on each side, were grayish white. The rest of the lower surfaces from the sixth gastrostege to the tip of the tail were bright coral red.

Length to anus.....	104	130	138	149	160	168
Length of tail.....	33	50	44	55	49	55

Distribution.—This beautiful little snake ranges from Kansas and Texas west to Arizona. In the latter state it has been taken in Pima County, where we found it under stones on the banks of the Santa Cruz River near Tucson, and in Ventana Canyon near the base of the Catalina Mountains. McLain records a specimen taken in the mountains near Tempe, Maricopa County.

I have received a specimen from St. George, Washington County, Utah.

Remarks.—This *Tantilla* is readily distinguished from the Californian *T. eiseni* by its fewer gastrosteges (135 to 148 as against 167 to 181). *Tantilla planiceps* of Lower California has only 138 to 140 gastrosteges, but its nuchal collar is on the sixth and seventh rows of scales behind the parietals. *T. wilcoxi* has a larger number of gastrosteges (148 to 157) and the white collar crosses the parietals.

202. *Tantilla planiceps* (Blainville)

LOWER CALIFORNIA TANTILLA

- Coluber planiceps* BLAINVILLE, Nouv. Ann. Mus. Hist. Nat., Vol. IV, 1835, p. 294, pl. 27, figs. 3-3b (type locality, **California**); BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, Serpents, 1853, p. 154.
- Homalocranion planiceps* DUMÉRIl, Mem. Acad. Sci. Paris, Vol. XXIII, 1852, p. 490; DUMÉRIl et BIBRON, Erpétologie Générale, Vol. VII, 1854, p. 857; JAN, Arch. Zool. Anat. Phys., Vol. II, 1862, pp. 51, 55; JAN, Elenco syst. degli Ofidi, 1863, p. 40; JAN & SORDELLI, Iconogr. génér. des Ophid., 15e livr., 1866, pl. II, fig. 2; BOCOURT, Miss. Sci. Mex., 1883, p. 581, pl. XXXVI, figs. 7-7d; BOULENGER, Cat. Snakes Brit. Mus., Vol. III, 1896, p. 226 (part); MOCQUARD, Nouv. Arch. Mus. Hist. Nat., Ser. 4, Vol. I, 1899, p. 316.
- Tantilla planiceps* COPE, Proc. Acad. Nat. Sci. Phila., 1861, p. 74; COPE, Journ. Acad. Nat. Sci. Phila., 1875, p. 143; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 13, 190; GARMAN, Mem. Mus. Compr. Zool. Cambr., Vol. VIII, No. 3, 1883, pp. 89, 163; GARMAN, Bull. Essex Inst., Vol. XVI, 1884, p. 31; COPE, Bull. U. S. Nat. Mus.,

No. 32, 1887, p. 84; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 598; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 140; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1896, p. 1008; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1113; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 424; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 105 (part); VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 52; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115; TERRON, Mem. y Rev. Soc. Cient. Antonio Alzate, Vol. 39, 1921, p. 164.

Description.—Head rounded in outline, very flat above and rather broad across temporal regions, but little distinct from neck. Eye small. Snout prolonged beyond the lower jaw. Rostral rather large and somewhat recurved on top of snout, bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of small internasals, a pair of prefrontals, a frontal, the supraocular of each side, and a pair of parietals. Posterior nasal united with anterior above nostril, usually in contact with preocular. No loreal. One preocular. Two or rarely one, postoculars. Temporals elongate, 1+1. Supralabials seven, the last largest, the third and fourth reaching eye. Infralabials six, or seven, the first pair in contact on the midline. Scales smooth, in 15 rows. Anal divided. Gastrosteges varying in number from 138 to 141. Urosteges in two series of from 49 to 61.

The top of the head, the temporal regions, and the first five transverse rows of scales on the neck are brown, changing gradually from hair brown on the snout to deep clove brown posteriorly. On the sixth and seventh rows of scales of the neck is a transverse whitish collar about as wide as the length of one scale. The rest of the upper surface is light broccoli brown, slightly vinaceous on the tail. The posterior three-fourths of the ventral surface are coral red,

brightest just in front of the anus. One specimen had the entire lower surface coral red, becoming grayish or yellowish white in alcohol.

Length to anus.....	161	162	167	187	188	193
Length of tail.....	58	58	57	64	63	67

Distribution.—This species is known only from Lower California, Mexico, where it has been collected in the Cape Region near San Jose del Cabo and in the Sierra de la Laguna. It also has been taken north of the Cape Region near Santa Rosalia and San Ignacio.

Remarks.—*Tantilla planiceps* resembles *T. nigriceps* in the number of its gastrosteges, but its nuchal collar is placed farther from the parietal plates.

Habits.—Mocquard states: "Cet ophidien vit dans le sol, où on le rencontre surtout en pratiquant des terrassements."

203. *Tantilla wilcoxi* Stejneger

ARIZONA TANTILLA

Tantilla nigriceps COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1113 (part).

Tantilla coronata VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 346.

Tantilla wilcoxi STEJNEGER, Proc. U. S. Nat. Mus., Vol. XXV, 1902, p. 156 (type locality, **Fort Huachuca, Arizona**); VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 424; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 107.

Description.—Head rounded in outline, very flat above, rather broad across temporal region, but little distinct from neck. Eye moderate. Rostral rather large, broader than high, and bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of small

internasals, a pair of prefrontals, a frontal, the supraocular of each side, and a pair of parietals. Posterior nasal in contact with preocular. No loreal. One preocular. Two postoculars. Temporals elongate, 1+1. Supralabials seven, the last largest, the third and fourth reaching eye. Infralabials seven or six, the first pair not, or but just meeting on the midline. Anterior genials elongate, posterior much shorter. Scales smooth, in fifteen rows. Anal divided. Gastrosteges varying in number from 148 to 157. Urosteges in two series of about 58.

The general color above is pale brownish gray or hair brown. The top and sides of the head are dark brownish gray or slate, the labials being light in color. A whitish transverse collar crosses the nape, involving the posterior portion of the parietals and about two rows of scales on the neck. It is about as wide as the length of two or three scales, and is bordered behind by a dark band of brownish gray about the width of one or one and a half scales, and may be edged with dark brown anteriorly. The color below is coral red, becoming grayish white in alcohol.

Length to anus.....	144	225	264
Length of tail.....		56+	81

Distribution.—This snake is known only from three specimens from the Huachuca Mountains, Cochise County, and one from Mowry, Patagonia Mountains, Santa Cruz County, Arizona.

Remarks.—Nothing is known regarding the habits of this snake. The single specimen in the collection of the California Academy of Sciences was removed from the stomach of a *Diadophis regalis* caught in Ramsey Canyon late in the afternoon of July 29, 1912. This snake may be distinguished from the other members of the genus which

occur within the area under consideration by the number of its gastrosteges and the position of the light nuchal collar. The gastrosteges are more numerous than in *T. nigriceps* and *T. planiceps* but fewer than in *T. eiseni*. The collar does not involve the parietal plates in any of those species.

Genus 44. Trimorphodon

Trimorphodon COPE, Proc. Acad. Nat. Sci. Phila., 1861, p. 297 (type, *T. lyrophanes*); COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1101.

The body is not much elongate, with tail of moderate length. The head is wide, more or less triangular, and very distinct from the slender neck. The snout is more or less truncate. The head plates are normal. The nasals are distinct. There are two loreals, one in front of the other. The preoculars and temporals are numerous. The scales are smooth, in 20 to 27 rows; often in an even number. Posterior maxillary tooth elongate, grooved; anterior teeth elongate; intermediate teeth shorter. The eye is large with vertically elliptic pupil.

This genus includes a number of Mexican species, only one of which occurs within our geographic limits.

204. *Trimorphodon lyrophanes* Cope

LYRE SNAKE

Lycodon lyrophanes COPE, Proc. Acad. Nat. Sci. Phila., 1860, p. 343 (type locality, **Cape St. Lucas, Lower California**).

Trimorphodon lyrophanes COPE, Proc. Acad. Nat. Sci. Phila., 1861, p. 297; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 38; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 15, 98; COPE, Proc. Amer. Philos. Soc., 1886, p. 286; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 68; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 679; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 155; MOCQUARD, Nouv. Arch. Mus. Hist. Nat., Paris, Ser. 4, Vol. I, 1899, p. 330; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1102;

BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 91; STEJNEGER, Proc. U. S. Nat. Mus., Vol. XXV, 1902, p. 157; MOCQUARD, Miss. Sci. au Mexique, Pt. III, Rept., 1908, p. 909, pl. 74, fig. 1, 1a-b; DITMARS, Reptile Book, 1907, p. 389; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 423; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 104; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 52, 70; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.

Description.—Head very distinct from neck, the temporal regions being swollen. Snout rather short, rounded, somewhat projecting. Rostral plate large, broader than high, bounded behind by internasal, anterior nasal and first labial plates. Plates on top of head are a pair of internasals, a pair of prefrontals, a frontal, supraocular of each side, and a pair of rather short parietals. Two loreals placed one in front of the other. Often a small subloreal in the notch between the second and third supralabials, below the posterior loreal, and in front of the inferior preoculars. Preoculars three or two. Postoculars three. Temporals normally three followed by four, sometimes 2+3. Usually nine (rarely seven) superior labials, the sixth or seventh largest, the fourth and fifth reaching eye. About 12 (sometimes 10 or 11) inferior labials, the first pair meeting on the median line. Genials in two pairs, the anterior much larger. Scales on body smooth, in 20, 21, 22, or 23 rows. Anal plate divided. Gastrosteges varying in number at least from 231 to 236. Urosteges in two series of about 70 to 74.

The ground color above is gray. The head is crossed by a more or less indistinct grayish band which involves the anterior part of the prefrontals. The posterior half of these plates and the anterior portion of the supraoculars are crossed by a brown band with very concave posterior border. This band is continued upon the inferior postocular and the sixth supralabial. A broad band begins on each side of the center

of the frontal plate, crosses the supraocular and parietal plates, passes out over the temporal region, and becomes narrower and parallel with its fellow upon the neck. On the parietal plates is a brown spot, elongated posteriorly. The dorsal region is occupied by a series of dark brown, paired blotches, of which there are from 21 to 28 between the head and anus. There is an irregular series of dark lateral spots, alternating, and sometimes confluent, with the dorsal blotches. Anteriorly these lateral spots may form a narrow interrupted band. There are nine or 10 confluent pairs of dark spots on the upper surface of the tail. The entire lower surface is whitish, except that a series of spots involves the tips of certain of the gastral scutes, the spotted scutes being separated by from two to five unmarked ones.

Length to anus.....	588	588	600	835
Length of tail.....	110	108	110	155

Distribution.—This species of *Trimorphodon* has been found only in southern Arizona and in Lower California. In Arizona, it has been secured in the Cayetano Mountains near Calabasas and at Fort Buchanan, Santa Cruz County, at Fort Huachuca, Cochise County, and in the Tucson Range and near Rosemont, Pima County. Lower Californian specimens have been collected at Cape San Lucas, La Paz, San José del Cabo, Sierra San Lazaro, Santa Anita, and Santa Rosalia.

Remarks.—Professor Cope described the teeth as follows:

Seven teeth upon the superior maxillary bone, of which one posterior is elongate and grooved, three central, small and recurved, and three anterior, very long, the first longest and least recurved. The central three are not separated from those anterior and posterior to them by spaces wider

than those existing between themselves. Palatine teeth six, the anterior three the longest, all longer than the pterygoids. The three anterior mandibular teeth longer and more widely spaced than the posterior.

Habits.—Nothing is known of the habits of this snake. A specimen which I kept alive for a time was very pugnacious and would strike wildly when anyone approached its cage. A large female secured at San Jose del Cabo, March 16, 1892, contained eggs which measured 9x21 mm. One of these snakes was found in the thatched roof of a house, at San Jose del Cabo, late in the afternoon as it crawled over the rafters.

Family 14. ELAPIDÆ

The snakes of this family are similar in appearance to those of the *Colubridæ*, from which, however, they differ by their possession of a well developed poison apparatus. The poison fangs are situated, on the maxillary bone, near the front of the mouth, and are so folded as to form a tube for the conduction of the venom into the wound. This apparatus they have in common with the closely related sea-snakes of the family *Hydridæ*. With the latter highly specialized family they form the group *Proteroglypha*.

The *Elapidæ* occur in Africa, Asia, Australia, and both Americas. The family includes the most deadly of all serpents, such as the cobra and its relatives. Many species are said to be viviparous. Only one genus occurs in America.

Genus 45. *Micrurus*

Elaps SCHNEIDER, Hist. Amphib., Vol. II, 1801, p. 289 (part); GÜNTHER, Proc. Zool. Soc. London, 1859, p. 48; BOULENGER, Cat. Snakes Brit. Mus., Vol. III, 1896, p. 411.

Micrurus WAGLER, in SPIX, Serp. Brasil., 1824, p. 48 (type, *spixii*).

The body is cylindrical, elongate, with rather short cylindrical-conic tail. The head is small and not distinct from the neck. The snout is short and rounded. The head plates are normal. The nasal plates are distinct. There is no loreal. Preocular, postocular and temporal plates are present. The scales on the body are smooth, in fifteen rows, without pits. The anal plate usually is divided. The urostegees are in two series throughout or in part. The eye is small, with vertically elliptic or subelliptic pupil. The maxillary bone is very short, and carries no teeth behind the large, anterior, poison fangs.

The numerous species of this genus all are American, and occur from the United States to Brazil and Bolivia. Two species have been found in this country, but only one of these has been secured within the geographical limits of this work. Most of the species are brightly colored, with red and black and yellow rings.

"The functional fang in *Elaps fulvius* is followed by reserve fangs of the same structure as the functional one, but successively smaller. The functional fang is solidly united to the maxillary bone, being directed backward at a permanent angle of about 45 degrees with the latter. Although comparatively smaller than the fangs in the crotalid snakes, that of *Elaps* is large enough to distinguish it at the first glance as different from the solid teeth of the palate and of the lower jaws. In front, at the base of the fang, the opening of the canal is distinctly visible, and on the convex, or anterior, surface of the fang is a shallow groove. The

terminal slit, being the lower opening of the canal, is situated slightly on the outer side of the fang.”

The species of this genus are mostly rather small, retiring in habit, living largely underground, are of rather gentle and amiable temperament, and have rather small mouths and fangs. They seldom are a source of danger to man, although serious effects and even death have resulted from their bites.

The harmless king snakes frequently are confused with the snakes of this genus, owing to the fact that both are marked with rings of red, black and white or yellow. It is easy to distinguish the poisonous species of this genus from the harmless King Snakes by coloration alone, since the red is next to the white (or yellow) rings in the poisonous snakes, while in the harmless species the red is next the black.

205. *Micrurus euryxanthus* (Kennicott)

SONORAN CORAL SNAKE

Elaps euryxanthus KENNICOTT, Proc. Acad. Nat. Sci. Phila., 1860, p. 337 (type locality, **Sonora**); COPE, Proc. Acad. Nat. Sci. Phila., 1861, p. 296; COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 307; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 34; COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 611; STREETS, Bull. U. S. Nat. Mus., No. 7, 1877, p. 40; GARMAN, Mem. Mus. Compr. Zool., Camb., Vol. VIII, No. 3, 1883, pp. 107, 169; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 82; CRAGIN, Bull. Washburn Col. Laborat., Vol. 1, 1884, p. 8; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 86; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 681; STEJNEGER, Report U. S. Nat. Mus. for 1893, 1895, p. 362, pl. 2; BOULENGER, Cat. Snakes Brit. Mus., Vol. III, 1896, p. 415; COPE, Amer. Naturalist, Vol. XXX, 1896, p. 1014; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1125; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 95; STEJNEGER, Proc. U. S. Nat. Mus., Vol. XXV, 1902, p. 157; RUTHVEN, Bull. Am. Mus. Nat. Hist., Vol. XXIII, 1907, p. 589; DITMARS, Reptile Book, 1907, p. 401, pls. CXVII, figs. 3, 4, CXX, fig. 2; MOCQUARD, Miss. Sci. au Mexique, Pt. III, Rept., 1908, p. 921; STONE, Proc. Acad. Nat. Sci. Phila., 1911, p. 232; VAN

DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 425; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, p. 147; VORHIES, Univ. Ariz., Agric. Exper. Station Bull. No. 83, 1917, p. 364.

Micrurus euryxanthus STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 106.

Description.—Head small, with flat top and high, broadly rounded snout. Temporal regions not much wider than neck. Eye very small. Rostral plate large, nearly as high as broad, bounded behind by internasal, anterior nasal, and first labial plates. Plates on top of head are a pair of internasals, a pair of prefrontals, a rather small frontal, supraocular of each side, and a pair of parietals. Anterior and posterior nasals distinct. No loreal. One preocular. Two postoculars. Temporals one followed by two. Supralabials seven, third and fourth reaching eye, seventh small. Infralabials seven, or six, the fourth usually largest, the first pair meeting on midline. Genials in two pairs, very short. Scales on body smooth, in fifteen rows. Anal plate divided. Gastroteges varying in number from 215 to 241. Urostegeges in two series of from 21 to 29.

The entire head is black, with the exception of the posterior extremities of the parietals which are involved in a narrow white or yellow ring around the neck. Behind this white ring is a broad red ring involving about 11 scales, more or less. This is followed by another narrow white or yellow ring, some three or four scales wide, and then a black ring about eight scales in width. The whole body and tail are covered with similar broad red and black rings separated by narrow white or yellow ones. These rings of color encircle the body, and are without spots either above or below. The number of black rings on the body and tail varies from nine to 14.

Length to anus.....	367
Length of tail.....	33

Distribution.—This species has been found north to southern Utah and south in Mexico to Batopilas, in Chihuahua, and Guaymas, in Sonora. It has been taken on Tiburon Island, in the Gulf of California.

In the United States, it has been secured in southern Utah, in Saint George Canyon, near the Arizona line.

In Arizona, specimens have been collected in Cochise (Fort Bowie, Fort Huachuca), Santa Cruz (Nogales), Pima (Tucson, Mineral Hill, Rosemont, Sabino Canyon in the Catalina Mountains), Gila (San Carlos), Yavapai (Fort Whipple, Date Creek), and Mohave (Signal), counties, and at Warsaw Mill on the Mexican boundary line.

Although it seems to be restricted to the Lower Sonoran Zone, its range in Arizona extends up to an altitude of at least 5,000 feet.

Habits.—Unknown.

Family 15. HYDRIDÆ

This family comprises a number of genera of poisonous snakes which are closely related to the *Elapidæ* but are highly specialized in adaptation to their marine life. Only one genus, with a single species, occurs in American waters. The tail is flattened from side to side, short and paddle-shaped. The head plates are large. Both jaws are toothed. The permanently erect poison-fangs are near the front of the mouth, as in the *Elapidæ*. There are no rudiments of limbs or pelvis. The eyes are small. The sea-snakes all are viviparous. Most of the species and genera are found in the tropical or semitropical portions of the Indian and western Pacific oceans.

Genus 46. **Hydrus**

Hydrus SCHNEIDER, Hist. Amph., Vol. I, 1799, p. 233 (type, *bicolor*).

Hydrophis LATREILLE, Hist. Nat. Rept., Vol. IV, 1802, p. 193.

Pelamis DAUDIN, Hist. Nat. Rept., Vol. VII, 1803, p. 357.

Pelamys WAGLER, Syst. Amph., 1830, p. 166.

Elaphrodytes GISTEL, Naturg. Thierr., 1848, p. IX.

The body is rather short, somewhat compressed, with strongly compressed, short, oar-shaped tail. The head is rather narrow and much depressed with long, broadly rounded snout. The nostrils open upward in the large nasal plates on top of the snout. The head plates are large. There are no internasals. The scales on the body are hexagonal or quadrate, juxtaposed. There are no enlarged gastrosteges. The eyes are small with round pupils.

206. **Hydrus platurus** (Linnæus)

BICOLOR SEA-SNAKE

Anguis platura LINNÆUS, Syst. Nat., 12ed., Vol. I 1766, p. 391 (no type locality).

Hydrus bicolor SCHNEIDER, Hist. Amph., Vol. I, 1799, p. 242 (no type locality).

Pelamis bicolor DAUDIN, Hist. Nat. Rept., Vol. VII, 1803, p. 366; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 87.

Hydrus platurus BOULENGER, Cat. Snakes Brit. Mus., Vol. III, 1896, p. 267; STEJNEGER, Bull. U. S. Nat. Mus., No. 58, 1907, p. 439; Mc LAIN, Contributions to Neotropical Herpetology, 1899, p. 5; MOCQUARD, Nouv. Arch. Mus. Hist. Nat., Paris, Ser. 4, Vol. I, 1899, p. 330; MOCQUARD, Miss. Sci. au Mex., Pt. III, Rept., 1908, p. 930.

Description.—Head depressed, flat-topped with long broad snout. Temporal regions not swollen. Rostral plate large, somewhat broader than high, bounded behind by nasal and first labial plates. Plates on top of head are a pair of very large nasals, a pair of prefrontals, a large frontal, supraocular of each side, and a pair of large, long parietal.

tals. Nostrils open upward in large nasal plates. No internasals. Loreal present or absent. Ocular plates variable. Seven to 11 supralabials. Anterior genials sometimes present. Scales on body smooth, hexagonal, juxtaposed, in from 45 to 61 rows. No large gastrosteges or urosteges. Tail short, high and thin, paddle-shaped. In males the scales have central tubercles.

The color above is dark brown or bluish black on about 15 or 17 rows of scales, changing abruptly, along a more or less straight line, to the light yellow, brownish yellow, or yellowish brown of the sides and lower surfaces. The tail is light yellow with dark blotches.

Length to anus.....	528
Length of tail.....	81

Distribution.—This snake occurs nearly everywhere along the coasts and islands of the Indian and warmer portions of the Pacific oceans. It has been found in the Hawaiian and Galapagos islands and is common along the coast of Central America.

Mocquard records two specimens captured in the Gulf of California near Espiritu Santo Island.

Cope mentions it from "Pacific coast Guaymas?"

Habits.—This is a marine species, and probably eats fish.

Family 16. CROTALIDÆ

The *Crotalidæ* or Pit Vipers are represented in western North America by fifteen kinds of rattlesnakes. These are our only poisonous serpents, except the little coral snake (*Elaps* or *Micrurus*), and may be distinguished from the harmless forms by their possession of a pit in the side of the face between the eye and the nostril, and a horny, segment-

ed rattle at the tip of the tail. They are provided with large plates along the belly, and the head is covered with large plates or small scales. The eye is well developed, with vertical pupil. These are no rudiments of limbs. Both jaws bear teeth, and near the front of the upper jaw are large, perforate, erectile poison-fangs.

The two genera which occur in western North America may be distinguished by the following

SYNOPSIS OF GENERA

a.—Top of head covered by large plates which include a frontal and a pair of parietals.

Sistrurus.—p. 905.

a'.—Top of head covered by small scales except sometimes on snout; no large frontal or parietals.

Crotalus.—p. 908.

THE POISON APPARATUS

“It may not be out of place to refer in this connection to the interesting mechanism of the poison apparatus, as it is a matter not very generally known as yet, though clearly set forth by the researches of specialists, notably Dr. S. Weir Mitchell. The venomous fluid to be injected into a wound made by the teeth has nothing to do with the ordinary saliva, as popularly supposed; nor does the forked tongue or any of the numerous small teeth of the mouth take part in the infliction of the wound. The tongue and smaller teeth are essentially the same as in any harmless serpent. The active instruments are a pair of fangs, one on each side of the upper jaw, rooted in the maxillary bones, which bear no other teeth. The fangs vary in size, being sometimes half an inch long. They are somewhat conical and scythe-shaped, with an extremely fine point; the convexity looks forward, the point downward and backward. The fang is

hollow, for transmission of the venom; but the construction of the tube is not as if a hole had been bored through a solid tooth. It is in effect a flat tooth with the edges rolled over together till they meet, converting an exterior surface, first into a groove, finally into a tube. This is shown, on microscopic examination of a section of the tooth, by the arrangement of the dentine. Unlike an ordinary tooth, the fang is movable, and was formerly supposed to be hinged in its socket, since it is susceptible of erection and depression. But the tooth is firmly socketed, and the source of this movement is the maxillary bone itself, which rocks to and fro by a singular contrivance. The maxillary is a small, stout, triangular bone, movably articulated above with a smaller one, the lachrymal, which is itself hinged upon the frontal. Behind, the maxillary articulates with the palatal and pterygoid, both of which are of rod-like shape, and are acted upon by the spheno-ptyergoid muscle, the contraction of which pushes them forward. This forward impulse of the palatal and pterygoid is communicated to the maxillary, against which they abut, causing the latter to rotate upon the lachrymal. In this rocking forward of the maxillary, the socket of the fang, and with it the tooth itself, rotates in such manner that the apex of the tooth describes the arc of a circle, and finally points downward instead of backward. This protrusion of the fang is not an automatic motion, consequent upon mere opening of the mouth, as formerly supposed, but a volitional act, as the reverse motion, namely, the folding back of the tooth, also is; so that, in simply feeding, the fangs are not erected. The folding back is accomplished by the ecto-ptyergoid and spheno-palatine muscles, which, arising from the skull behind as a fixed point of action, in contracting draw upon the jaw-bones in such a way that the maxillary, and with it of course the fang, are retracted, when the tooth is folded back with an action comparable to the

shutting of the blade of a pocket-knife. All the motions of the fangs are controlled by these two sets of antagonistic muscles, one of which prepares the fangs for action, while the other stows them away when not wanted.

“The fangs, when not in use, are further protected by a contrivance for sheathing them, so that they rest like a sword in its scabbard. This is a fold of mucous membrane, the *vagina dentis*, which envelopes the tooth like a hood, enwrapping its base, and slipping down over its length, partly as a consequence of its elastic texture, partly on account of its connections. Erection of the fang causes the sheath to slip off, like the finger of a glove, and gather in folds around the base of the tooth. This arrangement can be readily examined without dissection.

“The poisonous fluid is secreted in a gland which lies against the side of the skull, below and behind the eye, of a flattened oval shape, obtuse behind, tapering in front to a duct that runs to the base of the tooth. Without going into the minute anatomy of the gland, it may be described as a sac, or reservoir, in the walls of which the numerous secretory follicles are imbedded; it is invested with two layers of dense, white, fibrous tissue, the outer of which gives off three strong ligaments that hold it in place. In a large snake, the entire gland may be nearly an inch long and one-fourth as wide, weighing, empty, 10 or 12 grains, and having a capacity of 10 or 15 drops of fluid. There is no special reservoir for the venom, other than the central cavity of the gland. A certain dilatation of one portion of the duct, formerly supposed to be such store-house, is due to thickening of its walls, without corresponding increase of capacity, resulting from muscular fibres which serve as a sphincter to compress the canal and prevent wasteful flow of the contents. There is further provision to this same end. When the tooth is folded back, the duct attached to its root is submitted to

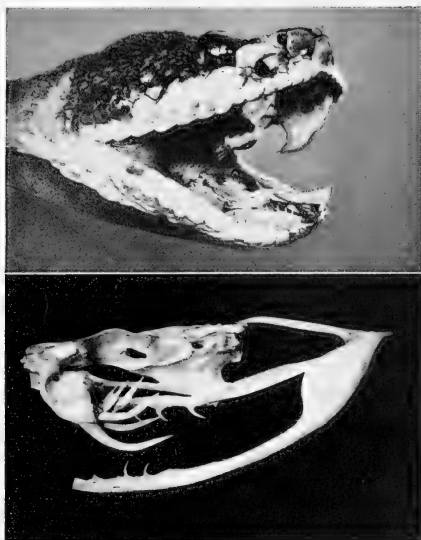


FIG. 1. *Crotalus oreganus*, Pacific Rattlesnake
Los Gatos, Santa Clara County, California—Head showing fangs; left tang in sheath

FIG. 2. *Crotalus lucasensis*, San Lucan Diamond Rattlesnake
Skull. San Jose del Cabo, Lower California, Mexico

FIG. 3. *Crotalus lucasensis*, San Lucan Diamond Rattlesnake
Head from side, life size. San Jose del Cabo, Lower California, Mexico—Alcoholic specimen

some strain, which pushes it against a shoulder of the maxillary bone, and tends to shut off the communication.

“The injection of the venom, though to all appearance instantaneous, is a complicated process of several rapidly consecutive steps. Forcible voluntary closure of the jaws may always be, if desired, accompanied by a gush of the venom, owing to the arrangement of the muscles which effect such movement of the under jaw. These are the *temporals*, one of the three of which is situated in such relation to the poison-sac that its swelling in contraction presses upon the receptacle and squeezes out the fluid. The force of ejection is seen when the serpent, striking wildly, misses its aim; under such circumstances, the stream has been seen to spurt five or six feet. A blow given in anger is always accompanied by the spurt of venom, even when the fang fails to engage from whatever cause. But since this result does not follow upon mere closure of the mouth, it is probable that the two posterior temporals ordinarily effect this end, the more powerful action of the anterior temporal (the one which presses upon the poison-sac) being reserved for its special purpose. There is one very curious piece of mechanism to be noted here. Since the serpent always snaps its jaws together in delivering a blow, the points of the erected fangs would penetrate the under jaw itself in case they failed to engage with the object aimed at, were there no contrivance for preventing such disaster to the snake. But there is a certain movement among the loose bones of the skull, perhaps not well made out, the result of which is to spread the points of the fangs apart in closure of the mouth, so that they clear the sides of the under jaw, instead of impinging upon it.

“The complicated mechanism of the act of striking may be thus described:—The snake prepares for action by throwing itself into a number of superimposed coils, upon the mass of which the neck and a few inches more lie loosely curved,

the head elevated, the tail projecting and rapidly vibrating. At the approach of the intended victim, the serpent, by sudden contraction of the muscles upon the convexity of the curves, straightens out the anterior portion of the body, and thus darts forward the head. At this instant, the jaws are widely separated, and the back of the head fixed firmly upon the neck. With the opening of the mouth, the spheno-palatines contract, and the fangs spring into position, throwing off the sheath as they leap forward. With delivery of the blow and penetration of the fangs, the lower jaw closes forcibly, the muscle that executes this movement causing simultaneously a gush of venom through the tubular tooth into the wound. There are also some secondary actions, though all occur at nearly the same instant. The mouth, fixed at the wound, drags upon it with the whole weight of the snake's body. This dragging motion is accompanied by contraction of the ectopterygoid and spheno-palatine muscles, which ordinarily fold back the tooth; but the fang being at this moment engaged in the flesh, the action of the muscles only causes it to bury itself deeper, and thus enlarge the puncture. The train of action seems to be, the reaching of the object, the blow, the penetration, the injection of the poison, and the enlargement of the wound. These actions completed, the serpent loosens its hold by opening the jaws, and disengages itself, sometimes not without difficulty, especially when the bitten part is small and the numerous small teeth have caught. The head is withdrawn, the fangs folded, the mouth closed, and the former coiled attitude of passive defense is resumed.

“While the venomous properties of these reptiles, not easily overrated, should suffice to ensure due caution in capturing or killing them, it is as well to remember that the utmost range of a rattlesnake's blow is less than its own length. They may readily be captured alive by pinning down

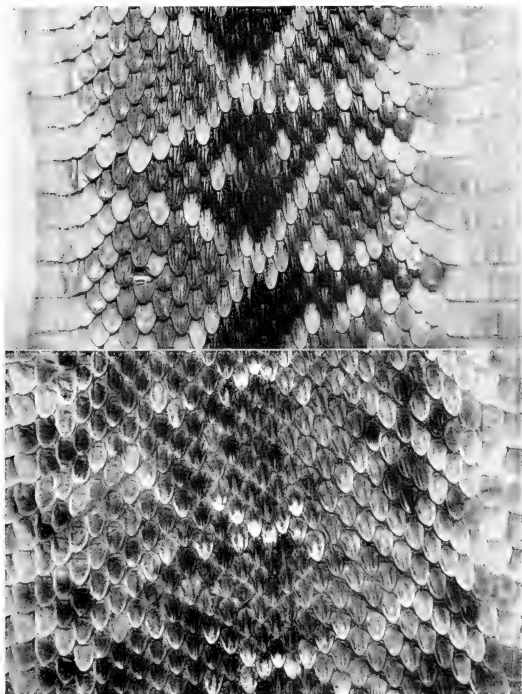


FIG. 1. *Crotalus molossus*, Black-tailed Rattlesnake
Section of skin of specimen collected at Cave Creek, Maricopa County, Arizona, April, 1910.

FIG. 2. *Crotalus exul*, Red Diamond Rattlesnake
Section of skin of specimen collected at Ensenada, Lower California, Mexico, February, 1908.

the neck with a forked stick, and may be handled with impunity, when not too large and powerful, if seized immediately behind the head. In case of a strong snake, however, the power of constriction is sufficient to paralyze the muscles of both arms, as in the case of a person we knew who had seized two of these reptiles by the back of the neck. He had to be relieved by a bystander. A method employed in the South to capture the *C. adamanteus* is perhaps worthy of mention. A silk handkerchief is fastened to the end of a pole, which is held toward the reptile, which strikes fiercely at it, the fangs and teeth become engaged in the fibre of the silk, and a dexterous movement of the stick readily pulls out the fangs, and the reptile can be approached with safety." (Coues and Yarrow).

THE NATURE AND ACTION OF VENOM

Snake venom is a yellowish or colorless fluid, clear or slightly cloudy, odorless and tasteless. It is readily soluble in water, and if exposed to the action of putrefactive bacteria loses its toxicity within a few days. Dried or preserved in alcohol or glycerine it retains its poisonous qualities indefinitely, or at least for more than 20 years. Snake venoms are complex poisons composed of a number of toxic substances of a proteid nature. The symptoms caused by the bites of different kinds of poisonous snakes vary with the nature and proportions of these toxic proteids which constitute their venoms. Thus, the bite of an elapine snake, such as our Coral Snake or its relative the cobra, is followed by but slight local changes about the part bitten, while great swelling and local discoloration from capillary haemorrhages ordinarily follow the bite of a rattlesnake. The more dangerous, systemic, effects of snake bites occur after the venom has found its way into the blood.

The severity of the symptoms which follow a snake bite vary with the nature of the poison, the amount of the poison, the size of the person or animal bitten, and the rapidity with which the poison enters the circulating blood.

The nature of the poison varies with the kind of snake. In western North America, however, Coral Snakes are small and quite rare and occur only in Sonora, Arizona and southern Utah. Practically, our only dangerous snakes are the rattlesnakes.

The amount of poison thrown into the wound depends on a number of factors. Among these are the size of the snake, its activity at the time, its condition of health and nourishment, the condition of its fangs and whether both cause wounds, the extent to which the snake has depleted its supply of venom by recent use of its poison apparatus, and the protection afforded by clothing, hair, or the resistance of the part bitten.

With any given quantity of venom thrown into the wound the relative size of the dose depends, of course, on the weight of the victim. Therefore, the danger is greatest when small children are bitten.

The rapidity with which the poison enters the circulating blood is perhaps the most important factor of all. If it so happened that the fang entered a vein and the venom was thrown directly into the blood, dangerous or fatal effects would follow almost immediately. Fortunately, this almost never occurs. Usually the venom is injected into the subcutaneous tissues, and whether its entrance into the blood is rapid or slow depends largely upon whether the bitten part is richly or poorly supplied with blood vessels. Ordinarily some minutes elapse before the onset of symptoms.

The pain and swelling which follow the bite of a rattlesnake often are very great, and later a blackish or purplish discoloration of the skin about the wound appears, as a re-

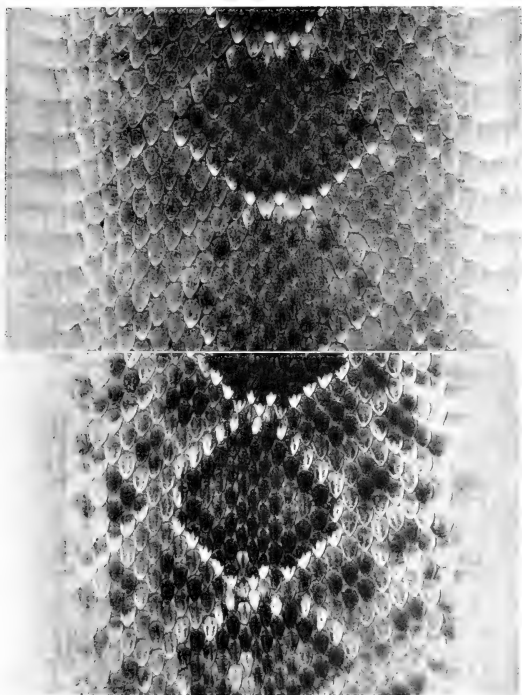


FIG. 1. *Crotalus atrox*, Desert Diamond Rattlesnake

Section of skin of specimen collected near Tucson, Pima County, Arizona, April, 1913

FIG. 2. *Crotalus lucasensis*, San Lucan Diamond Rattlesnake

Section of skin of specimen collected at San Jose del Cuto, Lower California, Mexico

sult of small haemorrhages. There may be considerable excitement and dread, and dizziness or faintness may be followed by drowsiness or torpor. The nerve centers which control arterial tension and respiration are profoundly affected. There is a great lowering of blood pressure, due to vascular dilatation, with abdominal venous congestion. Respiration and pulse usually become more rapid. Death may result from paralysis of respiration, paralysis of the heart, small haemorrhages into important parts of the brain or other organs, and probably from other changes, for these complex poisons act in many ways.

Death, however, follows rattlesnake bite in probably not more than 10 per cent of all cases, and most of these fatal cases are in children.

Where death does not supervene recovery may be quite rapid. Often there is considerable sloughing about the wound. Resistance to bacterial invasion is reduced and serious infection may follow.

There is some reason to believe that venom is removed from the blood and destroyed in the liver.

TREATMENT OF SNAKE BITE

A considerable number of chemical substances will destroy venom, but they also destroy and are destroyed by the tissues and fluids of the body, which chemically are similar to venom, and, therefore, their use is restricted to the area immediately about the bite. The ideal method of treatment would seem to be with an antitoxic serum. Such serum has been prepared and seems to have been of use in certain cases, but seldom can be available for use where needed.

From what has been said it may be seen that treatment should be directed toward four ends. These are:

1.—To prevent as much poison as possible from reaching the circulating blood. This resolves itself into:

a.—Attempts to remove venom from the bitten part by sucking or cupping.

b.—Attempts to destroy venom in the fang punctures and in the tissues about them by the injection of chemicals. This involves the use of a hypodermic syringe. The chemicals ordinarily used are one per cent solutions in water of either potassium permanganate or chromic acid.

c.—The stopping of the flow of blood into and from the bitten part by means of a tourniquet or tight bandage. This, of course, cannot be done if the bite is on the head or body. The danger of gangrene resulting from the prolonged application of the tourniquet probably has been much overestimated. Dr. William S. Halsted informs me that in his surgical service at Johns Hopkins Hospital the blood-flow in a limb has been shut off for six hours without gangrene.

2.—To permit that portion of the venom which cannot be removed from the wound, or locally destroyed, to enter the circulating blood in small amounts and at safe intervals. This must be done by loosening the tourniquet from time to time for a few seconds only, regulating the periods of flow and the intervals between them according to the severity and duration of the symptoms which follow. Unless handled in this manner the tourniquet is a source of danger, for its sudden removal would permit the blood to carry the poison into the general circulation in an overwhelming dose. I have seen a frog, into whose leg venom had been injected beyond a tourniquet, remain well for 24 hours and then die within a few minutes after the protecting band was removed.

3.—To stimulate and support the vital processes of the body as from time to time may be indicated by the symptoms.

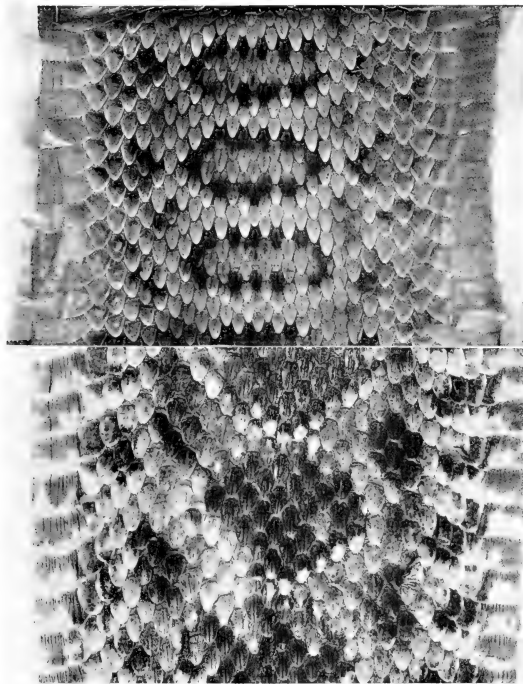


FIG. 1. *Crotalus confluentus*, Prairie Rattlesnake

Section of skin of specimen collected at Cave Creek, Maricopa County, Arizona, 1910

FIG. 2. *Crotalus oreganus*, Pacific Rattlesnake

Section of skin of specimen collected on Mount Lemmon, Santa Catalina Mountains, Pima County, Arizona, June, 1912



4.—To prevent infection of the wound. Instruments used should be sterilized as well as time and circumstances will permit, and an antiseptic dressing should be applied.

When a person has been bitten by a rattlesnake waste no time. The first few moments are precious, so keep cool and remember that about 90 people recover out of every hundred bitten.

A poisonous snake in biting usually makes two punctured wounds. Suck these hard for not more than five seconds. Then tie a handkerchief, a sock, a suspender strap, a strong piece of cloth, or a rope very loosely about the arm or leg a few inches above the bite. Put a strong stick under this bandage and twist the stick until the bandage is so tight that its pressure on the arteries stops the flow of blood completely. Paint the skin about the bite with iodine. With a small knife, dipped in an iodine solution if possible, cut open each of the punctures made by the fangs. Cut deep, lengthwise of the limb. Cup or suck the wounds thoroughly, remembering that the venom is harmless in the mouth or stomach. Now prepare the syringe and the solution of permanganate or of chromic acid, one part to 100 parts of water. Using a needle about three quarters of an inch long inject a few syringefuls of the solution under the skin and into the deeper tissues close to the wounds and for an inch or more about them. Then press your fingers hard on the parts injected, pressing toward the wounds.

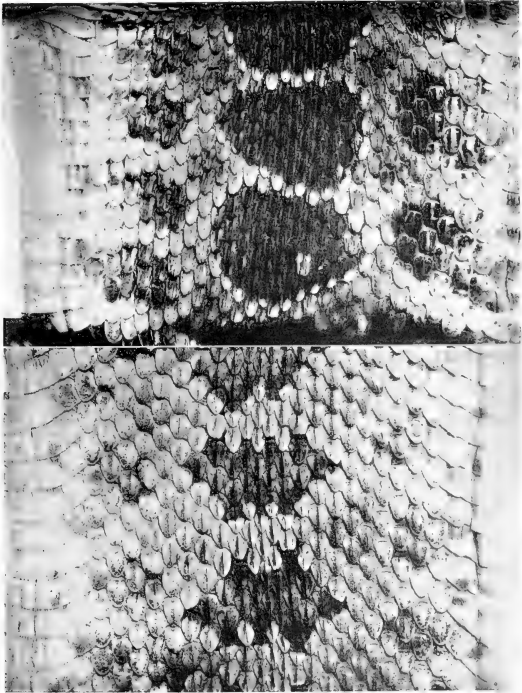
All these things should be done without any loss of time. If you have not already sent for a doctor, and are not too far from one, arrange now to secure medical aid.

The wound should be protected with an antiseptic dressing, or it may be washed with iodine or alcohol and covered with sterile gauze.

The tight bandage about the limb may cause considerable pain, but it must not be removed for several hours. It must,

however, from time to time, be loosened for a few seconds. The length of time that the bandage should remain loose, and the intervals between these periods, must be regulated by the symptoms which follow. Loosen for two or three seconds and tighten again. If no effects are apparent in 10 minutes loosen again, increasing the period to five seconds. Repeat this procedure every 10 or 15 minutes, adding two seconds each time. If shortness of breath, rapid or irregular breathing, and depression or faintness, or any other serious symptom, appear, lengthen the interval and shorten the period of bandage release.

If, in spite of all these measures, the patient develops alarming symptoms, the treatment should be similar to that for anaphylactic or surgical shock. The respiration, the circulation and the temperature must be supported and conserved. Blankets and hot water bottles should be used to keep the patient warm. Suitable stimulants may be given. A few teaspoonful doses of whiskey or brandy at intervals of one-half or one hour may not be harmful, but large doses certainly are. Strychnine and caffeine probably are the best stimulants. One-thirtieth of a grain of Strychnine sulphate or nitrate dissolved in a little boiled water may be injected under the skin with the hypodermic syringe. If time will permit the syringe should, of course, be boiled for a few (three to five) minutes before it is used, to prevent infection. This injection should not be near the part of the body bitten by the snake. This dose of strychnine may be repeated once or twice at intervals of one half hour if the symptoms seem to demand it and if there are no muscular spasms. Caffeine citrate in one grain doses may be used in the same manner, or strong black coffee may be given by mouth or rectum. Adrenalin seems sometimes to be of use as an aid in restoring vascular tone. In desperate cases the subcutaneous or intravenous administration of large quantities of physiologic



Crotalus oregonus, Pacific Rattlesnake

Sections of skin of two California specimens showing variation. Fig. 2 (lower) is Great Basin style of coloration.

salt solution may be tried. Resort may be had to artificial respiration when respiratory paralysis precedes failure of the circulation.

Genus 47. *Sistrurus*

Crotalus FLEMING, Philos. Zool., Vol. II, 1822, p. 294 (type, *C. miliaris*) (not of Linn.).

Crotalophorus GRAY, Ann. Philos., 1825, p. 205 (not of Houttuyn).

Caudisona FITZINGER, Neue Class. Rept., 1826, p. 34 (type, *C. miliarius*) (not of Laurenti).

Sistrurus GARMAN, Mem. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, p. 110 (type, *C. miliarius*).

The head is broad and low, with flattened top, and is very distinct from the neck. Its upper surface is covered with nine large plates, the internasals, prefrontals, frontal, supraoculars, and parietals. The anal plate and most of the urosteges are undivided. The tail is short and ends in a horny rattle or button. The scales are keeled.

The snakes of this genus differ from the rattlesnakes of the genus *Crotalus* in having the head covered above with large plates instead of small scales. The few species known are all of small size, and therefore, correspondingly less dangerous than the larger rattlesnakes. One kind has been found in southern Arizona.

207. *Sistrurus catenatus edwardsii* (Baird & Girard)

EDWARDS MASSASAUGA

Crotalophorus edwardsii BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. 1, Serpents, 1853, p. 15 (type locality, **Tamaulipas, Mexico**); DUMÉRIL et BIBRON, Erpétol. Génér., Vol. VII, 1854, p. 1483; BAIRD, U. S. Mex. Bound. Surv., Vol. II, Rept., 1859, p. 15, pl. V, fig. 1; BAIRD, Rep. Pac. R. R. Surv., Vol. X, Rept., 1859, pl. XXV, fig. 10; DUGÈS, La Natureza, Vol. IV, 1879, p. 27.

Crotalus edwardsii COPE, Mitch. Res., 1861, p. 125; COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 610.

- Crotalus miliaris* var. *edwardsii* JAN, Elenco Sist. degli Ofidi, 1863, p. 124.
- Crotalus miliaris* JAN, Iconogr. Génér. Ophid., 46e livr., 1874, pl. III, fig. 6.
- Caudisona edwardsii* COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 34; YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 531; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 78; CRAGIN, Trans. Kansas Acad. Sci., Vol. VII, reprint 1906, p. 118.
- Sistrurus miliaris* var. *edwardsii* GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, p. 177.
- Crotalophorus catenatus edwardsii* COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 685; COPE, Proc. Acad. Nat. Sci. Phila., 1892, p. 336.
- Sistrurus catenatus edwardsii* STEJNEGER, Report U. S. Nat. Mus. for 1893, 1895, p. 416, pl. 6; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1144, fig. 328; STEJNEGER, Proc. U. S. Nat. Mus., Vol. XXV, 1902, p. 158; DITMARS, Repti'e Book, 1907, p. 438, pl. CXXV, figs. 3, 5; ELLIS & HENDERSON, Univ. Colorado Studies, Vol. X, No. 2, 1913, p. 111; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 107; VORHIES, Univ. Ariz. Agric. Exper. Station Bull. No. 83, 1917, p. 364; TERRON, Mem. y Rev. Soc. Cient. Antonio Alzate, Vol. 39, 1921, p. 180.
- Sistrurus edwardsii*, COCKERELL, Amer. Nat., Vol. XXX, 1896, p. 326.
- Sistrurus catenatus* BOULENGER, Cat. Snakes Brit. Mus., Vol. III, 1896, p. 570 (part).
- Sistrurus catenatus consors* BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 99; BAILEY, N. Amer. Fauna, No. 25, 1905, pp. 28, 49; STRECKER, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 43.

Description.—Rather small. Head flat-topped, subelliptical in outline when seen from above. Rostral moderately large, bounded behind by internasal, anterior nasal and first labial plates. Plates on top of head are a pair of internasals, a pair of prefrontals, a frontal, supraocular of each side and a pair of parietals. Superior labials 11 or 12, separated from eye by one or two scales. Scales on body in 23 or 25 rows, strongly keeled except in about two rows on each side. Anal plate entire. Gastrosteges varying in number from 136 to 153. Urosteges in a single series of from 24 to 31.

The color above is yellowish brown, with three series

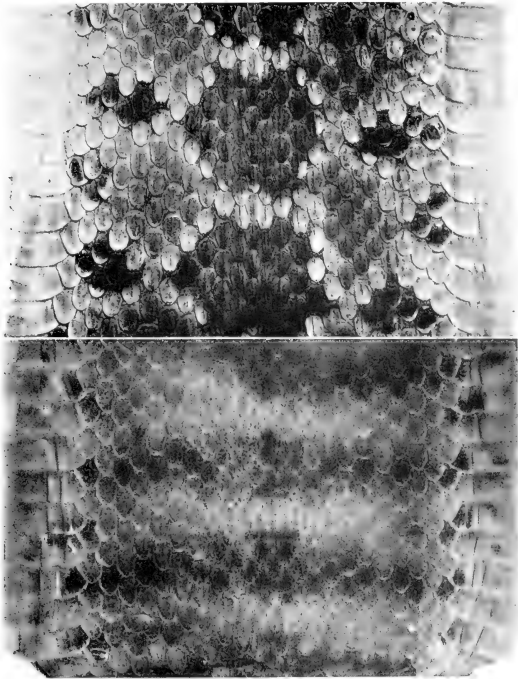


FIG. 1. *Crotalus enyo*, Lower California Rattlesnake
Section of skin of specimen collected at San Jose del Cabo, Lower California, Mexico.

FIG. 2. *Crotalus tigris*, Tiger Rattlesnake
Section of skin of specimen collected eighteen miles north of Tucson, Pima County, Arizona,
May, 1912.

of small chestnut-brown blotches along the sides and a row of large brown dorsal blotches. A pair of elongate brown blotches extend from the supraoculars back onto the neck. A narrow chestnut-brown band extends down and back from the prefrontal plate to the eye and on to the neck, and is bordered below by a narrow yellowish stripe which extends from the nostril to the angle of the mouth. The snout and upper jaw are brown, with two yellow rays diverging from the pit. The chin and lower jaw are mottled with brown and yellow. The dorsal blotches are about 34 to 45 in number between the head and the anus, and are somewhat irregular in shape. They are brown bordered with black and margined with yellow. There are about four to eight similar blotches on the tail. The lateral blotches are proportionally small, and alternate with the dorsal and the other lateral series. Those of the upper series are more or less obsolete. Those of the second series are darker and occupy scales of the second, third and fourth rows. The lowest series is confined to single scales of the first and second rows. The belly is light straw-color, irregularly dotted and sprinkled with brown.

Length to anus.....	187	248	380	412	450
Length of tail.....	28	32	53	63	70

Distribution.—Edwards Massasauga ranges from Oklahoma through western Texas to the Mexican border. Three specimens have been found in southeastern Arizona. Two of these, collected by H. W. Henshaw, have no more definite locality. The third specimen was secured, by Dr. Wilcox, on the parade ground of Fort Huachuca, Cochise County.

Genus 48. *Crotalus*

Crotalus LINNÆUS, Syst. Nat., 10 ed., 1758, Vol. 1, p. 214 (type, *horridus*).

Crotalophorus HOUTTUYN, Linn. Nat. Hist., Vol. VI, 1764, p. 290 (same type).

Caudisona LAURENTI, Syn. Rept., 1768, p. 92 (same type).

Crotalinus RAFINESQUE, Am. Month. Mag., Vol. III, 1818 (p. 446), Vol. IV, p. 41 (same type).

Uropsophus WAGLER, Syst. Amph., 1830, p. 176 (type, *triseriatus*).

Urocrotalon FITZINGER, Syst. Rept., 1843, p. 29 (type, *durissus*).

Aploaspis COPE, Proc. Acad. Nat. Sci. Phila., 1861, p. 206 (type, *lepida*).

Æchmophrys COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 609 (type, *cerastes*).

The head is broad and low, with flattened top, and is very distinct from the neck. Its upper surface is covered with scales, which are small except sometimes on the snout. The anal plate and most or all of the urosteges are undivided. The tail is short and ends in a horny rattle or button. The dorsal and most of the lateral scales are keeled.

SYNOPSIS OF SPECIES

a.—Rostral in contact with anterior nasal.

b.—Outer edge of supraocular plate normal, not raised into a horn-like process.

c.—Tail entirely black; snout between rostral and supraoculars covered with large plates.

C. molossus.—p. 911.

c².—Tail not entirely black; snout not with large plates as far back as supraoculars.

d.—Tail light with black cross-bands; light postocular line, if present, reaching row of scales next above supralabials anterior to corner of mouth.

e.—First supralabial usually not divided. General coloration grayish or brownish; markings less definite, more punctulate; dorsal blotches usually not completely surrounded by light margins.

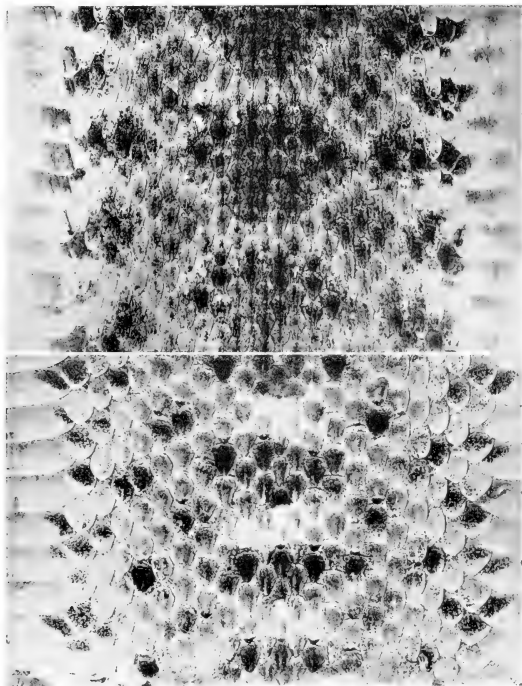


FIG. 1. *Crotalus mitchellii*, Bleached Rattlesnake
Section of skin of specimen collected at San Jose del Cabo, Lower California, Mexico.

FIG. 2. *Crotalus cerastes*, Horned Rattlesnake
Section of skin of specimen from the Mohave Desert, California.

f.—Dorsal rhombs usually not enclosing light lateral areas.

C. atrox.—p. 914.

f'.—Dorsal rhombs usually enclosing light lateral areas as pale as the ground color. Tortuga Island.

C. tortugensis.—p. 918.

e².—First supralabial usually divided transversely; general coloration reddish, pinkish or yellowish.

ff.—General coloration reddish, pinkish or yellowish; markings duller and less definite; dorsal blotches not usually completely surrounded by light margins; gastrosteges usually more numerous.

C. exsul.—p. 919.

ff².—General coloration yellowish; markings much brighter and more definite, less punctulate; dorsal blotches usually completely surrounded by light margins; gastrosteges usually fewer.

C. lucasensis.—p. 925.

d².—Tail brownish or grayish with darker brown (rarely in part blackish) cross-bands; light postocular line, if present, reaching row of scales next above supralabials at or posterior to corner of mouth, if at all.

ee.—Intervals between dorsal dark blotches less than length of blotches along midline.

fff.—Dorsal blotches large, forming a single series.

g.—Rostral not wider than high.

h.—Gastrosteges average more numerous (158 to 189); no vertical white line across middle of rostral plate nor two white lines on side of head.

i.—Light postocular line one scale wide; dark postocular band arising below anterior corner of eye.

C. confluentus.—p. 926.

i².—Light postocular line, if present, more than one scale wide; dark postocular band, if distinct, arising below middle of eye.

j.—Not from southern Lower California; lateral spots not so well defined; coloration much less ornate.

C. oreganus.—p. 930.

j².—Cape Region of Lower California; lateral spots darker brown in greater contrast; coloration more ornate.

C. enyo.—p. 945.

h².—Gastrosteges fewer (145 to 160); a vertical white line across middle of rostral, continuing onto lower jaw and expanding between two wide dark bars which extend about halfway back on the lower jaw; two white lines on side of head.

C. willardi.—p. 958.

g².—Rostral wider than high; dark markings more or less indefinite, cross-banded posteriorly.

C. tigris.—p. 947.

fff².—Dorsal blotches small, in two series.

C. pricei.—p. 963.

ee².—Intervals between dorsal dark blotches much greater than length of blotches along midline.

C. lepidus.—p. 961.

b².—Outer edge of supraocular plate, raised into a horn-like process.

C. cerastes.—p. 953.

a².—Rostral separated from anterior nasal by granular scales.

C. mitchellii.—p. 949.

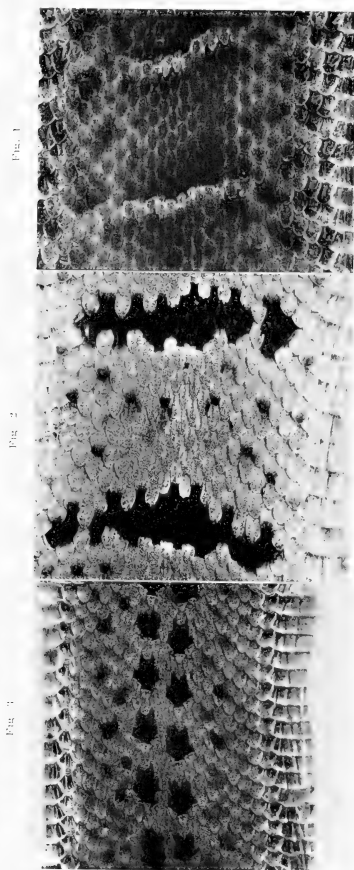


Fig. 1

Fig. 2

Fig. 3

FIG. 1. *Crotalus scottii*, Willard, Rattlesnake
Section of skin of female from the Santa Rita Mountains, Santa Cruz County, Arizona,
September, 1926

FIG. 2. *Crotalus effusus*, Blue Rattlesnake
Section of skin of specimen from Carr Canyon, Huachuca Mountains, Cochise County, Arizona,
July, 1922

FIG. 3. *Crotalus pricei*, Price, Rattlesnake
Section of skin of specimen from Rains Canyon, Huachuca Mountains, Cochise County,
Arizona, July, 1922

208. *Crotalus molossus* Baird & Girard

BLACK-TAILED RATTLESNAKE

Plates 99 and 106

- Crotalus molossus* BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. I, Serpents' 1853, p. 10 (type locality, **Fort Webster, St. Rita del Cobre, New Mexico**); DUMÉRIL et BIBRON, *Erpétol. Génér.*, Vol. VII, 1854, p. 1482; BAIRD, Rep. U. S. Mex. Bound. Surv., Vol. II, Rept., 1859, p. 14, pl. 2; COPE, Proc. Acad. Nat. Sci. Phila., 1859, p. 338; BAIRD, Rep. Pac. R. R. Surv., Vol. X, Rept., pl. XXIV, fig. 5; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 33; COPE, in YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 533; COPE, Proc. Acad. Nat. Sci. Phila., 1883, p. 12; GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, p. 113; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 12, 78; GARMAN, Bull. Essex Inst., Vol. XIX, 1888, p. 123; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 688; STEJNEGER, Report U. S. Nat. Mus. for 1893, 1895, p. 424, pl. 8; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 348; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1154, fig. 330; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 101; STEJNEGER, Proc. U. S. Nat. Mus., Vol. XXV, 1902, p. 158; BAILEY, N. Amer. Fauna, No. 25, 1905, pp. 35, 50; DIRMARS, Reptile Book, 1907, p. 440, pls. CXXIX, fig. 6, CXXX, fig. 4, CXXXIII, fig. 2; STONE, Proc. Acad. Nat. Sci. Phila., 1911, p. 232; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 426, pls. XVII, XXV, fig. 1; STRECKER, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 43; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 110; VORHIES, Univ. Ariz. Agric. Exper. Station Bull. No. 83, 1917, p. 359, pl. I, fig. 2.
- Crotalus ornatus* HALLOWELL, Proc. Acad. Nat. Sci. Phila., 1854, p. 192 (type locality, **Pecos River, between El Paso and San Antonio, Texas**); HALLOWELL, Rep. Pac. R. R. Surv., Vol. X, 1859, p. 23, pl. II; COPE, Proc. Acad. Nat. Sci. Phila., 1859, p. 338.
- Crotalus molossus* COPE, in Mitchell's Research. Venom Rattles., 1861, p. 124; COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 308; COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 605.
- Crotalus durissus* var. *molossus* GARMAN, Mem. Mus. Compr. Zool. Cambr., Vol. VIII, No. 3, 1883, p. 171.
- Crotalus terrificus* BOULENGER, Cat. Snakes Brit. Mus., Vol. III, 1896, p. 573 (part).

Description.—Size large. Head broad, flat-topped. Rostral about as broad as high, in contact with anterior nasal. Two nasals. Two preoculars. Three postoculars. Internasal and prefrontal region covered with large plates. Supraocular large but not raised into a horn-like process; separated from its fellow by from two to seven irregular scales. Fourteen to 18 superior and 15 to 20 inferior labials, first pair of latter in contact on median line in front of single pair of genials. Three to five rows of scales between supralabials and eye. Scales in 25 to 29 rows, keeled except in from two to four rows on each side. Gastrosteges varying from 180 to 194. Anal not divided. Urosteges varying from 20 to 27, a few of the first and last sometimes divided.

The ground color above is yellow, or yellowish, grayish or brownish olive, marked along the back with a series of dark chocolate or olive brown blotches. These blotches often are irregular in outline and usually contain, on each side, a few scales of the light ground color. In some specimens the blotches are separated from each other or bordered by pale yellow scales. A peculiarity of the coloration is that each individual scale usually is of a uniform tint, but occasionally scales are particolored as in most other species. Smaller blotches may or may not be present on the sides below or between the dorsal rhombs. Posteriorly the general color becomes browner and the dark markings tend to become cross-bars which may show but little contrast with the darkened ground color. The rhombs on the neck often are confluent and many form longitudinal lines. The upper surface and sides of the head are of the same light ground color as the body. The internasal, prefrontal and supraocular regions are blackish brown. A dark brown band runs back and down from the eye to the scale above the last supralabial, often becoming indefinite or obsolete posteriorly. There usually is a trace of a similar dark band running down and



Crotalus molossus, Black-tailed Rattlesnake
Collected at Tucson, Pima County, Arizona, May, 1920.

back from the pit. The lower surfaces are white or pale yellow often clouded or mottled with gray or brown on the body, especially posteriorly and laterally. The tail both above and below is black or blackish brown, sometimes unicolor, but often with some lateral paler areas indicating cross-bands.

Length to anus.....	615	796	800	896	905	1070
Length of tail to base of rattle.....	45	45	65	54	54	76

Distribution.—The area inhabited by this large species extends from Pecos and El Paso counties, Texas, west to Arizona, and south into northern Mexico.

In Arizona, this rattlesnake is quite common in the Huachuca Mountains, in Cochise County, where it has been taken in Ramsey, Miller and Carr canyons. It has been collected also at an elevation of 5,000 feet near Blue River, Greenlea County, and at an altitude of 6,000 feet in Walnut Canyon, in the Santa Rita Mountains. Specimens are at hand from Saw Mill Canyon, Santa Rita Mountains, Pima County; trail between Gardner Canyon and Greaterville, Pima County; Tucson, Pima County; vicinity Pete Mountain, Santa Rita Range, Santa Cruz County; Fort Buchanan, Santa Cruz County; and from the canyon between Madera and Agua Caliente canyons, Santa Rita Mountains, Santa Cruz County, Arizona. The most northern record seems to be that of a specimen secured at Cave Creek, Maricopa County. Cope has recorded a specimen as taken by Dr. Mearns in the "Tucson Mountains, Yuma County," probably an error for Pima County.

Remarks.—This species is easily distinguished by its black tail and snout, and by the large plates on the anterior

part of the upper surface of the head. It is a large species and very handsomely colored.

Habits.—While this snake, like others of the genus, doubtless spends most of its life on the ground, Cope mentions one which he discovered in the act of springing through a bush. It was suspended over a branch, and was heavy in its movements, except at the moment of leaping.

209. *Crotalus atrox* Baird & Girard

DESERT DIAMOND RATTLESNAKE

Plates 100, 107, and 108

- Crotalus atrox* BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. 1, Serpents, 1853, pp. 5, 156 (type locality, **Indianola, Texas**); DUMÉRIEUX et BIBRON, *Erpétologie Générale*, Vol. VII, Pt. 2, 1854, p. 1482; HALLOWELL, *Proc. Acad. Nat. Sci. Phila.*, 1856, p. 307; BAIRD, *U. S. Mex. Bound. Surv.*, Vol. II, 1859, p. 14, pl. I; BAIRD, *Rep. Pac. R. R. Surv.*, Vol. X, 1859, p. 39, pl. XXIV, fig. 3; COPE, *Proc. Acad. Nat. Sci. Phila.*, 1859, p. 337; COOPER, *Proc. Cal. Acad. Sci.*, Vol. IV, 1870, p. 66; COPE, in YARROW, *Surv. W. 100th Merid.*, Vol. V, 1875, p. 534; STEJNEGER, *Report U. S. Nat. Mus. for 1893*, 1895, p. 436, pl. 11; VAN DENBURGH, *Proc. Cal. Acad. Sci.*, Ser. 2, Vol. VI, 1896, p. 348; STEJNEGER, *Proc. U. S. Nat. Mus.*, Vol. XXV, 1902, p. 158; BAILEY, *N. Amer. Fauna*, No. 35, 1905, p. 49; DITMARS, *The World Today*, Oct. 1896, p. 1049; DITMARS, *Reptile Book*, 1907, p. 452, pls. CXXIX, fig. 2, CXXX, fig. 1, CXXXII; RUTHVEN, *Bull. Amer. Mus. Nat. Hist.*, Vol. XXIII, 1907, p. 591; STRECKER, *Proc. Biol. Soc. Washington*, Vol. XXI, 1908, p. 78; ELLIS & HENDERSON, *Univ. Colorado Studies*, Vol. X, No. 2, 1913, p. 108; VAN DENBURGH & SLEVIN, *Proc. Cal. Acad. Sci.*, Ser. 4, Vol. 3, 1913, p. 426; STRECKER, *Baylor Bulletin*, Vol. XVIII, No. 4, 1915, p. 44; GRINNELL & CAMP, *Univ. Cal. Publ. Zool.*, Vol. 17, No. 10, 1917, p. 196; VORHIES, *Univ. Ariz. Agric. Exper. Station Bull.* No. 83, 1917, p. 359; STEJNEGER & BARBOUR, *Check List N. Amer. Amph. Rept.*, 1917, p. 108; COWLES, *Journ. Entomol. & Zool.*, Pomona College, Vol. XII, No. 3, 1920, p. 66.
- Crotalus adamanteus atrox* JAN, *Rev. Mag. Zool.*, 1859, p. 153; JAN, *Elenco Sist. degli Ofidi*, 1863, p. 123; COPE, *Bull. U. S. Nat. Mus.*,



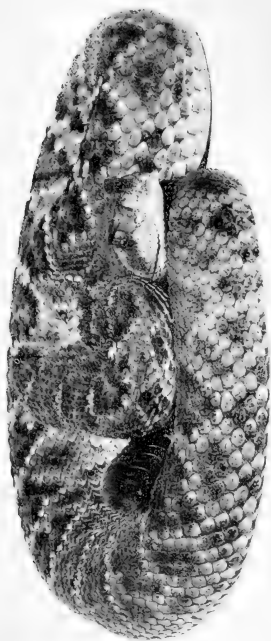
Crotalus atrox, Desert Diamond Rattlesnake
Collected near Tucson, Pima County, Arizona, August, 1912.

- NO. 1, 1875, p. 33; COPE, Bull. U. S. Nat. Mus., No. 17, 1880, p. 24; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 12, 75; GARMAN, Mem. Mus. Compr. Zool. Cambr., Vol. VIII, No. 3, 1883, pp. 113, 172; COPE, Proc. Am. Philos. Soc., 1885, p. 287; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 90; COPE, Proc. U. S. Nat. Mus., Vol. XI, 1888, p. 398; COPE, Proc. U. S. Nat. Mus., Vol. XII, 1889, p. 147; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 690; COPE, Proc. Acad. Nat. Sci. Phila., 1892, p. 366; COPE, Amer. Naturalist, Vol. XXX, 1896, p. 1013; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1164, fig. 334 (part); STONE & REHN, Proc. Acad. Nat. Sci. Phila., 1903, p. 33.
- Caudisona atrox* COPE, in Mitchell's Research. Venom Rattlesn., 1861, p. 121; COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 309.
- Caudisona atrox* var. *sonoraensis* KENNICOTT, Proc. Acad. Nat. Sci. Phila., 1861, p. 206 (type locality, **Sonora and vicinity**); COPE, Proc. Acad. Nat. Sci. Phila., 1861, p. 292.
- Crotalus adamanteus* var. *sonoriensis* JAN, Elenco Sist. degli Ofidi, 1863, p. 124.
- Crotalus adamanteus* JAN, Iconogr. Génér. Ophid., 46e livr., 1874, pl. II, fig. 1.
- Crotalus scutulatus* COPE, in YARROW, Surv. W. 100th Merid., V, 1875, p. 533; BOULENGER, Cat. Snakes Brit. Mus., Vol. III, 1896, p. 575; MOCQUARD, Miss. Sci. au Mexique, Pt. III, Rept., 1909, p. 965, pl. 77, figs. 3, 3a.
- Caudisona adamantea atrox* COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 607.
- Caudisona adamantea scutulata* COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 607.
- Crotalus adamanteus scutulatus* COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 33; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 12, 76; COPE, Proc. Am. Philos. Soc., 1885, p. 287; COPE, Proc. U. S. Nat. Mus., XIV, 1892, p. 690; COPE, Report U. S. Nat. Mus., for 1898, 1900, p. 1158, fig. 332.
- Crotalus confluentus* BOULENGER, Cat. Snakes Brit. Mus., Vol. III, 1896, p. 576 (part).
- Crotalus atrox atrox* BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 103; BROWN, Proc. Acad. Nat. Sci. Phila., 1903, p. 551.
- Crotalus atrox* phase *scutulatus* DITMARS, Reptile Book, 1907, p. 454 (part), pl. CXXXIII, fig. 1.

Description.—Large. Head broad, flat-topped, varying in outline according to position of fangs. Rostral usually higher than wide, in contact with anterior nasal. Two nasals. Usually two preoculars and two to four internasals. A large scale just in front of supraocular. Supraocular large but not raised into a horn-like process; separated from its fellow by from three to six irregular rows of scales. About 13 to 17 superior and 14 to 18 inferior labials; first pair of latter usually meeting on median line in front of a single pair of genials, but rarely divided. About three to five rows of scales between supralabials and eye. Scales in 25 to 27 rows, of which one or two on each side are smooth. Gasterosteges varying from 179 to 191. Urosteges 17 to 27.

The general color is yellowish or grayish brown, with a series of large, darker brown blotches along the back. These blotches often are not well defined, usually are not completely enclosed in light borders, and show much of the punctulate or pepper-and-salt style of coloration. The sides are more or less indefinitely spotted or blotched with dark brown in the same punctulate manner, and sometimes show pinkish shades. The head is nearly unicolor above or mottled with darker. A yellowish or whitish stripe runs across the side of the face from the preocular plates to the mouth. The scales behind and above this light stripe are darker than the ground color and are set off posteriorly by a light streak which runs down and back from the corner of the eye and strikes the supralabials in front of the corner of the mouth. The tail is whitish or grayish with about four to six black cross bands or rings. The lower surfaces are yellowish white.

Length to anus.....	840	870	975	1000	1060	1280
Length of tail to base						
of rattle.....	55	65	65	83	82	102



Crotalus atrox, Desert Diamond Rattlesnake
Collected near Tucson, Pima County, Arizona, August 1912.

Remarks.—*C. atrox* is closely related to *C. tortugensis*, *C. exsul* and *C. lucasensis*. It differs from both in the more faded, pepper-and-salt style of its coloration. It may sometimes be pinkish along the lower rows of scales but seems never to develop the red coloration of *C. exsul*. In *C. exsul* the first labial usually is divided into a labial and an inferior portion. This occurs in only two of 20 specimens of *C. atrox* from Arizona. The largest specimen I have seen measured five feet four inches. It was secured at Yuma, Arizona.

Distribution.—The Desert Diamond Rattlesnake ranges from Texas west to the deserts of southern California, and south into Sonora (Camora), and probably northeastern Lower California. It has been taken on Tiburon Island.

In Arizona, it is the common rattlesnake of the lower levels, and has been collected at Fort Buchanan, Santa Cruz County; Fort Huachuca and Wilcox, Cochise County; Tucson and the Catalina Mountains, Pima County; Fort Grant, Graham County; Rice, Gila County; Cave Creek and Phoenix, Maricopa County; Vicksburg and Yuma, Yuma County; and about 15 miles south of Hackberry, Mohave County.

California records are few in number. It has been taken at Fort Yuma and Laguna Station, Imperial County, and near Coachella and Mecca, Riverside County.

I believe that this species has not yet been secured in Lower California, but it undoubtedly occurs in the northeastern part of the peninsula. Lower California records are based upon specimens of *C. lucasensis* and *C. exsul*.

Habits.—One specimen contained an adult ground squirrel.

210. *Crotalus tortugensis* Van Denburgh & Slevin
TORTUGA ISLAND DIAMOND RATTLESNAKE

Crotalus tortugensis VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 398 (type locality, **Tortuga Island, Gulf of California, Mexico**).

Description.—Large. Head broad, flat-topped, varying in outline according to position of fangs. Rostral usually higher than wide, in contact with anterior nasal. Two nasals. Usually two preoculars and two to four internasals. A large scale just in front of supraocular. Supraocular large but not raised into a horn-like process; separated from its fellow by from four to five irregular rows of scales. About 14 to 17 superior and 14 to 18 inferior labials; first pair of latter usually meeting on median line in front of a single pair of genials, but rarely divided. About three or four rows of scales between supraoculars and eye. Scales in 27 rows, of which one or two on each side are smooth. Gastrosteges varying from 180 to 190. Urosteges 16 to 25.

The general color is yellowish, brownish or pinkish, with a series of large, darker brown blotches along the back. These blotches often are not well defined, especially posteriorly, are not completely enclosed in light borders, and show much of the punctulate or pepper-and-salt style of coloration. The margins of the rhombs are much darker than the central portions which usually include on each side a group of scales as pale as the general ground color. These light areas in the rhombs may spread and be connected across the middle line. The sides are more or less indefinitely spotted or blotched with dark brown in the same punctulate manner, and sometimes show pinkish shades. The head is nearly unicolor above or mottled with darker, with a light streak across the supraocular plate. A yellowish or whitish stripe runs across the side of the face from the preocular plates to

the mouth. The scales behind and above this light stripe are darker than the ground color and are set off posteriorly by a light streak which runs down and back from the corner of the eye and strikes the supralabials in front of the corner of the mouth. The tail is whitish or grayish with about four to six black cross bands or rings. The lower surfaces are yellowish white, sometimes clouded with brown.

Length to anus.....	568	745	789	897	923	932
Length of tail to base						
of rattle.....	31	48	50	67	70	70

Distribution.—This rattlesnake probably is confined to Tortuga Island, in the Gulf of California, Mexico.

Remarks.—This species resembles *C. atrox* rather than *C. exsul* and *C. lucasensis*. The first labial rarely is divided and the coloration is of the punctulate type as in *C. atrox*. The pattern of the dorsal rhombs is quite different.

This rattlesnake was common on Tortuga Island. Eighteen were collected in two days and others were seen. Three were taken at the foot of an old osprey's nest built about the base of a great cactus. All of the snakes were extremely fat and most of them contained from two to four mice. Most of them were more or less hidden in little cups in the ground and had debris or blocks of lava over them. However, they usually rattled vigorously on one's approach, making it easy to find them.

211. *Crotalus exsul* Garman

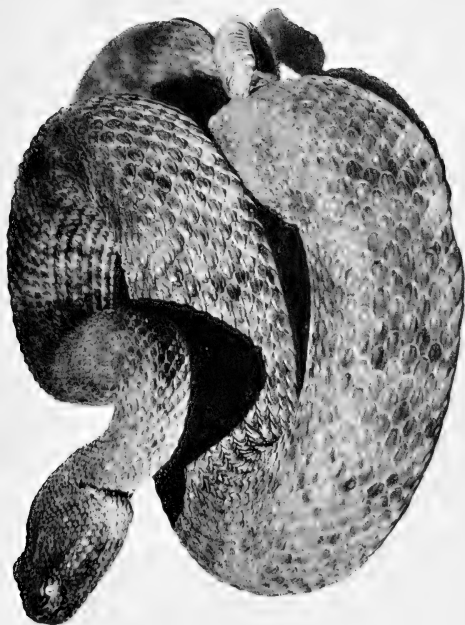
RED DIAMOND RATTLESNAKE

Plates 99 and 109

Crotalus exsul GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, pp. 114, 174 (type locality, **Cedros Island, Lower California**), VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 3, Vol. 4, No. 1, 1905, pp. 3, 24; VAN DENBURGH, Proc. Cal. Acad. Sci.,

- Ser. 2, Vol. 5, 1895, p. 157; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 133, 145; GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 196; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 109; STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 65; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 52, 71; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, p. 114.
- Crotalus adamanteus ruber* COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 690 (type locality, **unknown**).
- Crotalus atrox ruber* STEJNEGER, Report U. S. Nat. Mus. for 1893, 1895, p. 439; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 104; DITMARS, Reptile Book, 1907, p. 455, pl. CXXXII, fig. 2; RITTER, Copeia, 1921, No. 94, p. 29.
- Crotalus confluentus* BOULENGER, Cat. Snakes Brit. Mus. Vol. III, 1896, p. 576 (part); MOCQUARD, Nouv. Arch. Mus. Hist. Nat., Ser. 4, Vol. I, 1899, p. 332.
- Crotalus ruber* VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 1007; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., Vol. V, 1897, p. 226; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1167, fig. 335; MEEK, Field Columbian Mus., Zool. Ser., Vol. VII, No. 1, 1906, p. 17; ATSATT, Univ. Cal. Publ. Zool., Vol. 12, No. 3, 1913, p. 44.
- ? *Crotalus confluentus* MOCQUARD, Nouv. Arch. Mus. Hist. Nat., Paris, Ser. 4, Vol. I, 1899, p. 332.
- ? *Crotalus confluentus* var. *atrox* MOCQUARD, Miss. Sci. au Mexique, Pt. III, Rept., 1909, p. 969, pl. 77, figs. 5, 5a.
- Crotalus atrox* TOWNSEND, Bull. Amer. Mus. Nat. Hist., Vol. XXXV, 1916, p. 426.

Description.—Large. Head broad, flat-topped, varying in outline according to position of fangs, etc. Rostral usually higher than wide, in contact with anterior nasal. Two nasals. Usually two preoculars, three postoculars, and two to four internasals. A large scale just in front of supraocular. Supraocular large but not raised into a horn-like process; separated from its fellow by six or seven irregular rows of scales. About 13 to 18 superior and 14 to 19 inferior labials; first pair of latter usually divided transversely, in which case the



Crotalus eximius, Red Diamond Rattlesnake
Collected in Riverside County, California. Copyrighted by W. H. Backus, 1905.

labial portions do not meet on median line in front of the single pair of genials. About four rows of scales between supralabials and eye. Scales in 27 to 29 rows, of which one or two on each side are smooth. Gastrosteges varying from 185 to 201. Urosteges 16 to 26.

The general color is light red, reddish cinnamon, or brownish yellow, with a series of large darker blotches along the back. These blotches are sometimes very indefinite, especially toward the sides. On the middle of the back they are separated by light yellow or white. This light edging may or may not be continued onto the sides, where smaller indefinite dark blotches may often be seen. The head is unicolor above. A faint light stripe crosses the side of the face from the preocular plates to the mouth. The scales behind and above this light stripe are a little darker than the ground color, and sometimes are set off posteriorly by a light line running down and back from the posterior corner of the eye and striking the supralabials in front of the corner of the mouth. The tail is ash-color with from three to five black rings or cross-bars. The lower surfaces are yellowish, often faintly clouded with light brown.

Length to anus.....	379	881	935	960	1080	1160
Length of tail to rattle....	49	53	55	60	75	96

Distribution.—This rattlesnake was first described from a specimen of unknown origin. It has since been found in the western parts of San Diego and Riverside counties, California, and in the northern portion of Lower California, but not in the Cape Region.

In California, it has been collected in Riverside County at San Jacinto, Riverside, Reche Canyon, the San Jacinto Mountains near Cabazon, and at Dos Palms Spring, Santa Rosa Mountains, and in San Diego County at Twin Oaks,

De Luz, Dulzura, El Nido, Witch Creek, Poway, Escondido, La Jolla, and at Mountain Spring.

In northern Lower California, it is known to occur near Ensenada, San Quentin, San Tomas, Matomi, Agua Escondito, Santa Catalina, San Matias, Turtle Bay, San Salado Canyon, and in the San Matias, Cocopah and San Pedro Martir Mountains, and on Cerros Island. It has been found also on Angel de la Guardia, South San Lorenzo, San Marcos and Monserrate islands in the Gulf of California.

Habits.—This large, heavy rattlesnake is common on the coast slopes of southern California and northern Lower California. It inhabits chiefly chaparral-covered and rocky hill-slopes. It is reported as seen well up in bushes in Reche Canyon. Atsatt states that one was extremely active when found at daylight in the morning of August 23, 1908, at Dos Palms Spring. Evidently it was not chilled by the night temperature. Another very active and demonstrative rattler was seen, but it retreated into a cleft in the rocks, from which it could not be dislodged.

Regarding the length of time an individual of this subspecies may continue to rattle without apparent external stimulus, Dr. Wm. E. Ritter writes:

“The snake was some 20 or 30 feet from a trail on which I was slowly and quietly walking, and discovered itself to me by setting up a vigorous whir. As it was partly concealed by vegetation I should certainly have passed it by unnoticed but for its noise. In this instance its “warning” would surely have resulted in its death were I a sharer in the usual vengefulness against rattlesnakes. As a matter of fact I did nothing to disturb his peace of mind except to move around in various ways on my trail for the purpose of learning something about the rattle business.

“That the animal was keenly watching my every move-

ment, and was regulating his rattle to a considerable extent by what he saw, was manifest from the crescendos and diminuendos corresponding to my alternating periods of movement and perfect quiet. But there were diminutions, intensifications and momentary cessations in the rattle beyond the variations in my movements. My impression was that the tail vibration tended to be irregularly rhythmic independently of the stimulus, though my observations were not sufficiently full to establish this surmise.

"The snake was coiled when I first saw him, but the coil was not the strike coil. Nor did he change his position as long as I watched him. Even the head was moved very little, if at all. So far as I could make out, the only part of him in motion was the tip of his tail. Thinking that as good a test as I could make of my presence as a rattle enticing stimulus would be to move slowly and quietly away; this I did. At about 80 paces from the snake, the trail, curving around a steep slope, took me out of sight of his position and beyond the sound of his rattle. The sound became so faint at this point that I could not decide positively whether it actually stopped or continued but inaudibly to me. I am quite sure, however, from its evenness, that its general intensity of the whirl gradually diminished as I moved away. Nor could I tell certainly whether I was in range of his vision the whole time.

"Why I so unfortunately failed to return a little later to see what was going on, and to take other means of testing the snake's behavior, I do not now recall. Probably I imagined I had more important duties elsewhere, though now I doubt this. The entire time of the observation was something more than 20 minutes.

"At the time of rattlesnake encounter thus narrated, I was greatly interested in the different behavior of this individual from that of one of the same species I came

upon a few years before. On the earlier occasion the snake was almost in the path I was traveling, and I became aware of his presence only by seeing him where he was within easy kicking or striking distance from me. Furthermore, I had an iron bar in my hand at this time, one blow with which, had I chosen to deal it, would have finished the life of the snake. (I was wholly unarmed during my tete-a-tete with rattler No. 2). But in spite of a variety of pokings with my iron bar, I failed to elicit from this individual, rattle or any real effort to strike, or other evidence of fear or solicitude about safety. Indeed, it almost seemed as though this creature was abnormal in some way, though I saw no evidence of this beyond what has just been indicated.

"After I had spent as much time with the snake as I thought profitable I went on my way and he did the same, in seemingly normal fashion.

"Wherefore the difference in behavior of these two individual rattlesnakes? Any answer I might give to the question would be almost wholly speculative. The indubitable facts deserving special attention are these: Snake No. 1 made not the slightest effort toward self-preservation, though under the provocation of great danger. On the other hand, snake No. 2, while not in the least danger, set up a noise which, so far as the act itself was concerned, was an invitation to certain death.

"Since writing the above I have mentioned the case to my colleague, Dr. F. B. Sumner, whose work leads him a good deal over the mesas in this region. He remarks, "I can duplicate your observation several times over." Surely there is much yet to be learned about the ways of rattlesnakes!"

212. *Crotalus lucasensis* Van Denburgh

SAN LUCAN DIAMOND RATTLESNAKE

Plates 98 and 100

- Caudisona atrox sonoraensis* COPE, Proc. Acad. Nat. Sci. Phila., 1861, p. 292.
- Crotalus adamanteus atrox* COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 33 (part); YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 75 (part); COPE, Proc. U. S. Nat. Mus., Vol. XII, 1889, p. 147; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 691 (part); COPE, Report U. S. Nat. Mus., 1898 (1900), p. 1164 (part).
- Crotalus atrox* VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 156; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115; TERRON, Mem. y Rev. Soc. Cient. Antonio Alzate, Vol. 39, 1921, pp. 165, 168, 190 (part).
- ? *Crotalus confluentus* MOCQUARD, Nouv. Arch. Mus. Hist. Nat., Paris, Ser. 4, Vol. I, 1899, p. 332.
- ? *Crotalus confluentus* var. *atrox* MOCQUARD, Miss. Sci. au Mexique, Pt. III, Rept., 1909, p. 969, pl. 77, figs. 5, 5a (part).
- Crotalus lucasensis* VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. X, No. 2, 1920, p. 29, pl. 3, fig. 1 (type locality, **Agua Caliente, Cape Region of Lower California, Mexico**); VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 52, 70; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.

Description.—Large. Head broad, flat-topped, varying in outline according to position of fangs. Rostral usually higher than wide, in contact with anterior nasal. Two nasals. Usually two preoculars and two to four internasals. A large scale just in front of supraocular. Supraocular large but not raised into a horn-like process; separated from its fellow by from six to eight irregular rows of scales. About 14 to 18 superior and 15 to 19 inferior labials; first pair of latter, if not divided, meeting on median line in front of a single pair of genials. About five rows of scales between supra-labials and eye. Scales in about 27 rows, keeled except in one or two rows on each side. Gastrosteges varying from 186 to 199. Urosteges 17 to 26.

The general color is yellowish brown, or brownish yellow, with a series of large darker brown blotches along the back. These blotches are well defined, are usually enclosed in continuous light borders laterally as well as dorsally, and show little of the punctulate or pepper-and-salt style of coloration so characteristic of *C. atrox*. The sides are clouded or blotched with brown more or less indefinitely outlined with light yellow or white. The head is somewhat mottled above. A yellow or white stripe runs across the side of the face from the preocular plates to the mouth. The scales behind and above this light stripe are darker than the ground color and are set off posteriorly by a light streak which runs down and back from the corner of the eye and strikes the supralabials in front of the corner of the mouth. The tail is grayish with about four to six black cross-bands. The lower surfaces are yellowish white.

Length to anus.....	900	925	935	1062	1070
Length of tail to base of rattle....	47	53	80	78	90

Distribution.—*Crotalus lucasensis* may be restricted to the Cape Region of Lower California, where it has been taken at Cape San Lucas, La Paz, Pidulingua [Pichilinqué?] Bay, San Jose del Cabo, Sierra El Taste, and Agua Caliente.

Five rattlesnakes from San Jose Island seem to belong to this species.

213. *Crotalus confluentus* Say

PRAIRIE RATTLESNAKE

Plates 101 and 110

? *Crotalus viridis* RAFINESQUE, Am. Month. Mag., Vol. IV, 1818, p. 41.

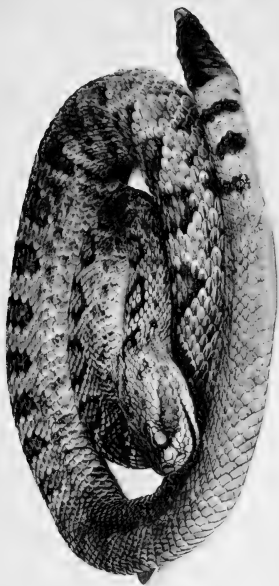
Crotalus confluentus SAY, In Long's Exped. Rocky Mts., Vol. II, 1823, p. 48 (type locality, "Valley of the Arkansa," near Bell's Springs, Colorado); BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. 1, Serpents, 1853, p. 8; BAIRD & GIRARD, in Marcy's Expl. Red River,

- 1853, p. 217, Zool. pl. I; HALLOWELL. Proc. Acad. Nat. Sci. Phila., 1856, p. 250; BAIRD, U. S. Pac. R. R. Surv., Vol. X, 1859, Rept., p. 40; BAIRD, U. S. Mex. Bound. Surv., Vol. II, 1859, Rept., p. 14; COPE, Proc. Acad. Nat. Sci. Phila., 1859 (1860), p. 337; COOPER, U. S. Pac. R. R. Surv., Vol. XII, Pt. III, 1860, p. 295, pl. XII; COOPER, Amer. Naturalist, 1869, p. 124; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 33; YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 530 (part); COUES & YARROW, Bull. Geol. Surv. Terr. (Hayden), Vol. IV, No. 1, 1878, p. 262; COPE, Amer. Naturalist, Vol. XIII, 1879, p. 435; COPE, Bull. U. S. Nat. Mus., No. 17, 1880, p. 24; CRAGIN, Trans. Kansas Acad. Sci., Vol. VII, 1881, p. 121; GARMAN, Mem. Mus. Compr. Zool., Vol. VIII, No. 3, 1883, pp. 114, 172; GARMAN, Bull. Essex Inst., Vol. XVI, No. 1, 1884, p. 34; STEJNEGER, N. Amer. Fauna, No. 5, 1891, p. 111; TAYLOR, Ann. Rep. Nebraska State Board Agric. for 1891, 1892, p. 354; HAY, Proc. U. S. Nat. Mus., Vol. XV, 1892, p. 387; COUES, Hist. Exp. Lewis & Clark, 1893, Vol. I, p. 313, Vol. II, p. 373; STEJNEGER, Report U. S. Nat. Mus. for 1893, 1895, p. 440, pl. 12; BOULENGER, Cat. Snakes Brit. Mus., Vol. III, 1896, p. 576 (part); VAN DENBURGH, Occas. Papers Cal. Acad. Sci., Vol. V, 1897, p. 218, fig.; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 104; BROWN, Proc. Acad. Nat. Sci. Phila., 1903, p. 551; BRANSON, Kansas Univ. Sci. Bull., Vol. II, No. 13, 1904, p. 426, fig. 39; BAILEY, N. Amer. Fauna, No. 25, 1905, pp. 35, 50; MOZLEY, Trans. Kansas Acad. Sci., Vol. VI, reprint, 1906, p. 35; DITMARS, Reptile Book, 1907, p. 455, pls. CXXIX, fig. 4, CXXX, fig. 3, CXXXIV, fig. 1; CARY, N. Amer. Fauna, No. 33, 1911, pp. 21, 23, 27; ELLIS & HENDERSON, Univ. Colorado Studies, Vol. X, No. 2, 1913, p. 109; STRECKER, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 44; ELLIS & HENDERSON, Univ. Colorado Bull., Vol. XV, No. 6, 1915, p. 263; VORHIES, Univ. Ariz. Agric. Exper. Station Bull. No. 83, 1917, p. 360; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 109; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 40.
- Crotalus lecontei* HALLOWELL, Proc. Acad. Nat. Sci. Phila., Vol. VI, 1852, p. 180 (type locality, **Cross Timbers**); HALLOWELL, in Sitgreaves' Exped. Zuñi and Colorado Rivers, 1854, p. 139 (part).
- Crotalus adamanteus* var. *confluentus*, JAN, Rev. et Mag. Zool., 1859, No. 12, repr. p. 28; JAN, Elenco Sist. degli Ofidi, 1863, p. 124.

- Caudisona lecontei* COPE, in Mitchell's Research. Venom. Rattlesn., 1861, p. 121; HAYDEN, Geol. Nat. Hist. Upp. Missouri, 1862, p. 177.
- Caudisona confluenta* COPE, in Mitchell's Research. Venom Rattlesn., 1861, p. 122; COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 309; COPE, Ann. Rep. U. S. Geol. Surv. Terrs., 1871 (1872), p. 476; ALLEN, Proc. Boston Soc. Nat. Hist., Vol. XVII, 1874, p. 69; COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 604.
- Crotalus durissus* WIED, Verz. Rept. Reisse Nord. Amer., 1865, p. 65, pl. VII, figs. 1-3.
- Caudisona confluenta lecontei* COPE, Proc. Acad. Nat. Sci. Phila., 1886, p. 307.
- Crotalus adamanteus atrox* YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 529.
- ? *Crotalus lucifer* YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 529.
- Crotalus confluentus confluentus* COPE, Proc. Acad. Nat. Sci. Phila., 1883, p. 11; COPE, Proc. Acad. Nat. Sci. Phila., 1892, p. 336; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 692; TAYLOR, Amer. Naturalist, Vol. XXVI, 1892, p. 752; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1170, fig. 336 (part).
- Crotalus confluentus pulverulentus* COPE, Proc. Acad. Nat. Sci. Phila., 1883, p. 11 (type locality, vicinity **Lake Valley, New Mexico**); COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 692; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1174, fig. 337.

Description.—Moderate. Head broad, flat-topped, varying in outline according to position of fangs, etc. Rostral much higher than wide, in contact with anterior nasal. Two nasals. Usually two preoculars and four internasals. A large scale just in front of supraocular and occasionally large scales on prefrontal region. Supraocular large but not raised into a horn-like process;* separated from its fellow by from three to six irregular rows of scales. Fourteen to seventeen superior and a similar number of inferior labials; first pair of latter meeting in front of single pair of genials. Two to four rows of scales between supralabials

*Garman mentions a specimen with horn-like supraocular.



Crotalus confluentus, Prairie Rattlesnake
Photographed from alcoholic specimen (No. 17531) collected at Cave Creek, Maricopa County,
Arizona, in 1910

and eye. Scales in 25 to 29 rows, keeled except in one to three rows of each side. Gastrosteges varying from 177 to 188. Urosteges 16 to 28.

The ground color is grayish or yellowish brown, marked along the back with a series of large darker brown blotches which usually become cross-bars or incomplete rings posteriorly. These blotches are paler centrally than about their edges, and vary greatly in shape and amount of separation. Smaller alternating dark blotches are usually present on the sides. Many of the scales between or around the dark dorsal blotches are light, either gray or white. These colors sometimes show between the dark lateral blotches also. Many specimens show a light transverse streak on the supraocular. A dark streak runs from the eye to the corner of the mouth, the line of its lower edge passing in front of the eye or striking it about under its anterior corner. This dark streak is bordered above by a light streak which is not wider than the width of one scale and passes above the corner of the mouth. Another narrow light streak crosses the side of the face below the dark one, and is bordered in front by dark brown on the side of the snout. The tail is provided with brown and light rings or cross-bars, a few of the former, near the tip of the tail, being sometimes blackish. The lower surfaces are dull yellow or white, sometimes clouded with brown.

“The color varies greatly, being sometimes duller, sometimes brighter, lighter or darker, depending upon age, season, condition of skin, climate, and the predominating color of surroundings.”*

Length to anus.....	595
Length of tail to rattle.....	37

Distribution.—“Broadly speaking, the Prairie Rattle-

*Stejneger, Report U. S. Nat. Mus. for 1893.

snake occupies the area bounded in the East by the ninety-sixth meridian and the Upper Missouri Valley; by the main divide of the Rocky Mountains in the West; by the thirty-third parallel in Texas and the Mexican boundary further west in the South; and by the fiftieth parallel in the north. Although the main divide of the Rocky Mountains in this northern region seems to be the limit of its extension to the west, yet in at least one place where there is no high crest to obstruct its passage across, it has been found on the western slope, viz.; at Lemhi, Idaho."* It has not been taken in Nevada, nor in any of the Pacific States. Specimens have been recorded from a number of localities in Arizona, as, Cave Creek, Maricopa County, Wilcox, Cochise County, Apache, Navajo County, Camp Grant, Graham County, and Fort Buchanan, Santa Cruz County.

Remarks.—The Arizonan specimens which I have seen are not really typical *Crotalus confluentus*. Nevertheless they seem to be more like that species than like Arizonan specimens of *C. oregonus*. It is possible that they are merely abnormal individuals of the latter species, but until more specimens have been secured it seems best to continue to regard them as *C. confluentus*.

214. *Crotalus oregonus* Holbrook

PACIFIC RATTLESNAKE

Plates 98, 101, 102, 111, and 112

Crotalus oregonus HOLBROOK, N. Amer. Herpet., Ed. 1, Vol. 4, 1840, p. 115, pl. 29 [= XXIV] (type locality, **banks of the Oregon or Columbia River**); GILL, Science, Ser. 2, Vol. 17, 1903, p. 910; GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 194; COWLES, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, 1920, p. 66; STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 65; VAN DENBURGH & SLEVIN,

*Stejneger, Report U. S. Nat. Mus. for 1893.

- Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 29, 38, 40, 53; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, p. 114.
- Crotalus oregonus* HOLBROOK, N. Amer. Herpet., Ed. 2, Vol. III, p. 21, pl. III; BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. 1, Serpents, 1853, p. 145; BAIRD, U. S. Pac. R. R. Surv., Rept., Vol. X, 1859, p. 14, pl. XXIV, fig. 6; COPE, Proc. Acad. Nat. Sci. Phila., 1859, p. 337; VAN DENBURGH, Proc. Amer. Philos. Soc., Vol. XXXVII, No. 157, 1898, p. 141; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 105; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 3, Zool., Vol. 4, No. 1, 1905, pp. 3, 16, 18; DITMARS, Reptile Book, 1907, p. 458, pls. CXXIX, fig. 3, CXXX, fig. 2, CXXXIV, fig. 2; STONE, Proc. Acad. Nat. Sci., Phila., 1911, p. 232; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, pp. 149, 151, 158; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 428; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Vol. 4, 1914, pp. 133, 138, 141; EVERMANN, Copeia, 1915, No. 14; BRYANT, Copeia, 1915, No. 23; RICHARDSON, Proc. U. S. Nat. Mus., Vol. 48, 1915, p. 433; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 5, No. 4, 1915, p. 109; DICE, Univ. Cal. Publs. Zool., Vol. 16, No. 17, 1916, pp. 307, 308; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 110; VORHIES, Univ. Ariz. Agric. Exper. Station Bull. No. 83, 1917, p. 360; BLANCHARD, Copeia, 1921, No. 90, p. 6.
- Crotalus lucifer* BAIRD & GIRARD, Proc. Acad. Nat. Sci. Phila., Vol. VI, 1852, p. 177 (type locality, **Oregon and California**); BAIRD & GIRARD, Cat. N. Amer. Rept., Pt. 1, Serpents, 1853, p. 6; GIRARD, U. S. Explor. Exped., Herpet., 1858, p. 187, pl. XV, figs. 1-6; BAIRD, U. S. Pac. R. R. Surv., Vol. X, Rept., 1859, p. 10, pl. XI; HALLOWELL, U. S. Pac. R. R. Surv., Vol. X, 1859, pl. III; COPE, Proc. Acad. Nat. Sci. Phila., 1859, p. 337; COOPER, Rep. Pacific R. R. Surv., Vol. XII, Pt. III, 1860, p. 295; LORD, Natural. Vancouver Isl., Vol. II, 1866, p. 303; YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 529; COPE, in YARROW Surv. W. 100th Merid., Vol. V, 1875, p. 533; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 33; LOCKINGTON, Amer. Naturalist, 1880, p. 295; GARMAN, Mem. Mus. Compr. Zool., Camb., Vol. VIII, No. 3, 1883, p. 114; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 12, 76; COPE, Standard Nat. Hist., Vol. III, 1885, pl. facing p. 398; TOWNSEND, Proc. U. S. Nat. Mus., Vol. X, 1887, p. 239; BEHR, Proc. Cal. Acad. Sci., Ser. 2, Vol. 1, 1888, p. 94; STEJNEGER, N. Amer. Fauna, No. 5, 1891, p. 111; STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 218; COUES,

- Hist. Exp. Lewis and Clark, Vol. III, 1893, pp. 898, 968; VAN DENBURGH, Bull. U. S. Fish Commis., 1894, p. 57; STEJNEGER, Report U. S. Nat. Mus. for 1893, 1895, p. 445, pl. 13; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. V, 1895, p. 157; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. V, 1896, p. 1007; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 216, fig.; Mc LAIN, Critical Notes, 1899, p. 13; Mc LAIN, Contributions to Neotropical Herpetology, 1899, p. 5; DITMARS, Rept. New York Zool. Soc., 9, 1907, p. 200; GRINNELL & GRINNELL, Throop Inst. Bull., No. XXXV, 1907, p. 50; GRINNELL, Univ. Cal. Publ. Zool., Vol. 5, No. 1, 1908, p. 168; ATSATT, Univ. Cal. Publ. Zool., Vol. 12, No. 3, 1913, p. 44; RUTHVEN & GAIGE, Occas. Papers Mus. Zool. Univ. Mich., No. 8, 1915, p. 33.
- Crotalus lecontei* HALLOWELL, Rep. Pac. R. R. Surv., Vol. X, 1859, p. 18.
- Caudisona lucifer* COPE in Mitchell's Resear. Venom Rattlesn., 1861, p. 121; COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 309; COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 606.
- Caudisona scutulata* KENNICOTT, Proc. Acad. Nat. Sci. Phila., 1861, p. 207 (type locality **none**); COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 309.
- Crotalus adamanteus* var. *lucifer* JAN, Elenco Sist. degli Ofidi, 1863, p. 124.
- Crotalus hallowelli* COOPER, in Cronise, Nat. Wealth California, 1868, p. 483; COOPER, Proc. Cal. Acad. Sci., Vol. IV, 1870, pp. 64, 68.
- Crotalus confluentus* YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 530 (part); YARROW & HENSHAW, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th Merid., Appendix NN, 1878, p. 210; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 77 (part); BOULENGER, Cat. Snakes Brit. Mus., Vol. III, 1896, p. 576.
- ? *Caudisona lucifer* var. *cerberus* COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 607 (type locality, **San Francisco Mts., Arizona**).
- Crotalus adamanteus atrox* STREETS, Bull. U. S. Nat. Mus., No. 7, 1877, p. 40; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, p. 75 (part).
- Crotalus oregonus* var. *lucifer* GARMAN, Mem. Mus. Compr. Zool., Camb., Vol. VIII, No. 3, 1883, p. 173.
- Crotalus confluentus lucifer* COPE, Proc. Acad. Nat. Sci. Phila., 1883, p. 11, 19, 22; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 692; COPE, Proc. Acad. Nat. Sci. Phila., 1893, p. 183; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1176, fig. 339.
- Crotalus confluentus lecontei* COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 692; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1175 fig. 338.

Crotalus helleri MEEK, Field Columbian Mus., Zool. Series, Vol. VII, No. 1, 1906, p. 17, pl. II (type locality, **San Jose, northern Lower California**).

Crotalus sp., TAYLOR, Univ. Cal. Publ. Zool., Vol. 7, No. 10, 1912, p. 355.

Description.—Moderately large. Head broad, flat-topped, varying in outline according to position of fangs, etc. Rostral much higher than wide, in contact with anterior nasal. Two nasals. Usually two (very rarely one) preoculars and four internasals. A large scale just in front of supraocular and occasionally large scales on prefrontal region. Supraocular large but not raised into a horn-like process, separated from its fellow by three to nine irregular rows of scales. Twelve to 17 (usually 14 to 16) superior and 14 to 19 (usually 15 to 17) inferior labials, first pair of latter in contact on median line in front of a single pair of genials. Two to four rows of scales between supralabials and eye. Scales in 23 to 27 rows, usually 25, keeled except in one to three rows of each side. Gastrosteges varying from 158 to 189; males having from 161 to 186 (usually 169 to 180), females from 158 to 187 (usually 175 to 182). Urosteges 14 to 27, a few sometimes divided, males with from 18 to 27 (usually 21 to 25), females with 14 to 24 (usually 16 to 20).

The ground color is brown, olive, gray, or dull yellow, marked along the back with a series of large dark brown blotches which become cross-bars or incomplete rings posteriorly. These blotches are often paler centrally than about their edges, and vary greatly in shade, shape, amount of separation, and contrast with the ground color. Their number varies from 27 to 41 on the body, and three to nine on the tail. Smaller alternating blotches are usually present on the sides. Many of the scales between or around the dark dorsal blotches are light—yellow, gray or white. These colors often show between the lateral dark blotches also.

Young specimens show a light transverse streak on the supra-ocular, usually not present in adults. A dark streak runs from the eye to the corner of the mouth, the line of its lower edge striking the eye about under the pupil, although a narrow forward continuation may be present. This dark streak is bordered above by a light streak which is wider than the width of one scale and passes above the corner of the mouth. Another light streak crosses the side of the face below the dark one and usually is bordered in front by a dark brown patch on the side of the snout. Sometimes these markings are more or less completely obscured. The tail is provided with brown and light rings, a few of the former, near the tip of the tail, being occasionally blackish. The lower surfaces are white or yellow, more or less spotted or clouded with brown.

Some specimens are nearly black, and one from Utah is pure white without any markings.

Length to anus.....	253	540	740	810	810	960
Length of tail to base of rattle	22	35	43	64	85	77

Distribution.—The Pacific or Black Rattlesnake occupies all parts of California except the Colorado and Mohave deserts. It ranges south into northern Lower California and north across Oregon and Washington to British Columbia. Farther east, it occurs in Idaho along the Snake River, and has been taken in many parts of Nevada, in Utah, and in Arizona. Throughout the northern part of this territory it is the only rattlesnake, but in the southern regions is found with other species.

In California, it ranges from sea level up at least to an altitude of 8,600 feet in the Sierra Nevada. Specimens have been taken in San Diego (De Luz, Bonsall, San Diego, 12 miles northwest from San Diego, Julian, Dulzura, Cuyamaca Mountains, Orcutt, Witch Creek, Santa Ysabel, Campo,



Crotalus oreganus, Pacific Rattlesnake
Photographed from alcoholic specimen (No. 34853) collected on Mt. Lemmon, Santa Catalina
Mountains, Pima County, Arizona, June, 1912.



Boulevard), Riverside (San Jacinto, Vallevista, San Jacinto Valley, Banning, Tahquitz Valley at 8,000 feet, San Jacinto Mountains), San Bernardino (Ontario, Santa Ana Canyon at Seven Oaks, Doble at 7,000 feet, Bluff Lake, San Bernardino Mountains, and in the Providence Mountains in the eastern part of the county), Los Angeles (Sierra Madre, Mount Wilson, San Gabriel Mountains, Claremont, Santa Catalina Island), Ventura (Mount Pinos), Santa Barbara (Santa Barbara), Kern (Fort Tejon, Santos Creek, Delano, Mohave, Tehachapi Mountains, San Emigdio Plain, Kernville, Soda Springs on the North Fork of the Kern River, Walker Pass, Bakersfield, eight miles northeast from Bakersfield, 12 miles northwest from McKittrick), Tulare (East Fork Kaweah River, Kern River, Sheep Meadows), Fresno (Fresno, Kings River Canyon, Charlotte Creek at 8,500 feet), Merced (Los Baños), Mariposa (Yosemite Valley, Merced River, Dudley), El Dorado (Strawberry), San Joaquin (seven miles southwest from Tracy), San Luis Obispo (seven miles southeast from Simmler, Indian Creek, Cuyama Valley), Monterey (Carmel Valley near Del Monte Ranch, Carmel, Jolon, Monterey), Santa Cruz (Santa Cruz, Glenwood), Santa Clara (Gilroy, Smith Creek, Mount Hamilton, Los Gatos, Black Mountain, Stanford University), San Mateo (Woodside, Sierra Morena, Corte Madera Creek, Rolph Ranch), Contra Costa (Antioch), Marin (Rock Spring, Mount Tamalpais), Yolo (Rumsey), Glen (Winslow), Lake (Lower Lake), Sonoma (Petrified Forest), Mendocino (Eden Valley Ranch, Covelo, Mount Sanhedrin), Siskiyou (Gazelle, Sugar Loaf near Sisson), Shasta (Baird), Modoc (Warner Mountains), and Lassen (Eagle Lake), counties.

Oregon records are from Douglas (Fort Umpqua), Klamath (Klamath Falls, between Olene and Spring Lake), Lake (Silver Lake and Warner Lakes), Harney (Camp

Harney, Burns, Silvies River, Diamond), and Gilliam (Lonerock, Willows), counties, and from the Blue Mountains and Columbia River.

In Washington, it has been collected at Fort Walla Walla, Walla Walla County; near Springdale, Stevens County; Grand Dalles, Klickitat County; Entiat and Chelan, Chelan County; Omak Lake, Okanogan County; Skamania County; and on Wenass River, Snake River, Pelouse River, Spokane River, Grande Ronde River, and in Yakima Valley.

In Idaho, specimens have been secured in Jerome (Blue Lakes Canyon), Twin Falls (Twin Falls), and Butte (Big Butte, and Little Lost River), counties.

In Utah, this rattlesnake has been collected in Cache, Salt Lake (Fort Douglas), Utah (Provo), Wasatch (in the Wasatch Mountains), Grand (Thompson), Millard (seven miles south from Kanosh, Deseret City), Beaver, 15 miles north from Beaver), Iron (Rush Lake, Buckhorn Hills), and Washington (Springdale), counties, and in Steptoe Valley.

In Nevada, it has been found at Mountain City and Lamoille, Elko County; Cortez Mountains, Eureka County; Virgin Valley, Pine Forest Mountains, and Quinn River Crossing, in Humboldt County; on Anaho Island in Pyramid Lake, at the Pyramid Lake Indian Agency, and the Truckee River, Washoe County; at 6,000 feet on Peavine Creek, Toiyabe Mountains, Nye County; and in Snake Valley.

In Arizona, *Crotalus oreganus* seems to be most often met in the more elevated regions, where it has been obtained at San Francisco Mountain and Oak Creek, Coconino County; Cave Creek, Maricopa County; Mount Lemmon, Catalina Mountains, Pima County; and in the White Mountains, Apache County. It is not restricted to the higher elevations,

however, for we have a specimen of the *scutulatus* type from the desert near Tucson, Pima County.

In Lower California, this species is common on Los Coronados Islands (South Island), and has been taken in the San Pedro Martir Mountains, and at San Jose in the northern part of the peninsula.

Remarks.—This rattlesnake is closely related to *C. confluentus* and *C. enyo*. It is the common rattlesnake of the far west and seems adapted to very varied conditions of soil, vegetation, climate and altitude. Its coloration is very variable, both in shade and pattern. Occasionally a few of the distal caudal cross-bars are blackish or even black. Some specimens from the desert resemble *C. atrox* in general appearance, but may be recognized by the position of the stripes on the side of the head. These specimens sometimes have large plates on the anterior part of the head. Such was the type of Kennicott's *C. scutulata*, although more recent authors usually have applied this name to specimens of *C. atrox*. It is possible that *scutulatus* should be regarded as a desert subspecies. The snakes of Utah, Nevada and eastern California may perhaps deserve similar treatment since their color pattern is usually different from that of typical *C. oreganus*. (See plate 102 in which figure 2 shows the Great Basin type of coloration).

Habits.—Dr. and Mrs. Grinnell have published the following notes on this rattlesnake, as observed by them in Los Angeles County and in the San Bernardino Mountains:

“Rattlesnakes are undoubtedly becoming more and more rare in the settled parts of the County, where formerly they were often met with. One was seen on the bluff west of San Pedro near Point Fermin, September 15, 1906; and a few have been reported the past year or two from the hills west

of Pasadena. They are, however, still common in parts of the San Gabriel mountains. There is scarcely anyone, sufficiently courageous, who neglects the opportunity to destroy a rattlesnake when the chance is afforded. So that the decrease in the numbers of this reptile may be very confidently laid to direct human influence.

"To the naturalist, rattlesnakes are very interesting members of our fauna, and their growing scarcity arouses regret within us, just as does the disappearance of the ground owl, road-runner and golden eagle. We wish people could be more sensible in regard to even the rattlesnake; and yet probably 99 out of 100 people would put us down as crazy for recommending that rattlesnakes, except in the thickly-settled valleys, or in the near vicinity of ranches where there are children, had better be left unharmed.

"The senior author in his extended field work has encountered a great many rattlesnakes but has never been bitten and has never known anyone else in his near vicinity having been bitten. The point here made is that the chances of being bitten, even when one is by occupation particularly exposed, are extremely remote. As to the venomous nature of the bite we of course cannot defend the rattler. Yet fatal cases are rare, and it would seem that where a sensible course of treatment is at once resorted to there should be little fear of serious results.

"The authors of this paper spent the summer of 1906 about the headwaters of the Santa Ana River, in the San Bernardino Mountains. In that locality rattlesnakes were remarkably common, it being not an uncommon thing to meet with three or four during a forenoon's tramp along the canyon bottom. We saw in the neighborhood of 30 individuals and noosed ten for preservation as specimens; the rest we left unharmed. Of all these none took the offensive until thoroughly aroused, as when cornered and

poked with a stick. Many of these were encountered on trails or open stretches of sand, where they had crawled in the hottest part of the day. In such locations are they usually surprised by the camper and tourist in the mountains, and often give rise to spasms of fear and palpitations of the heart on the part of the timid people, who expect the snake to coil and spring up at them as if discharged from a catapult! From this year's experience with the Pacific rattlesnake, combined with all our previous acquaintance, we present the following facts.

"A rattlesnake, as a rule, is a very timid animal; only when suddenly surprised in a broad open space, does it fail to retreat into the nearest hiding place, such as a brush patch or rock-pile. Then it coils and begins to rattle warningly. Sometimes, when logy from cold or a recent heavy meal, the snake fails to rattle; but if it hasn't energy enough to rattle neither has it energy enough to strike. The senior author has several times put his foot close by and even kicked aside rattlesnakes; in each case there was no warning rattle, and in no case did the snake strike, until perhaps subsequently stirred up on purpose. The point we wish to make here is that when in the mood to strike the snake gives notice of its proximity by rattling vehemently, as soon as it sees (or hears) a person or other large animal approaching. The great majority of rattlers at once endeavor to crawl into some place of safety, but if unable to find a retreat and especially if stoned or jabbed it coils and begins to strike, often blindly, if excessively irritated.

"Now here is where the popular idea has grotesquely exaggerated the ferocious propensities of the rattlesnake. We have heard people seriously aver that rattlers can instantly spring to a distance of many feet, accurately aiming to bite (or "sting") one. We have taken pains to closely watch particularly lively rattlers, at the same time prodding

them industriously, with the result that we have never seen one strike *more than one-third its own length*. The strike however, is almost too quick to be followed by the eye, though the recovery succeeding it is slow. At the same time the snake strikes, its mouth is opened widely and the fangs are thrust forward so that the points are directed outwards at right angles with the vertical roof of the mouth. The mouth is kept tightly closed except during a strike, only the protruding and rapidly vibrating tongue shows, so terrifying to the average person. This tongue is a very soft and delicate organ, perhaps tactile in function.

"The food of the rattlesnake consists chiefly of mammals. We found three snakes last summer by following up the excited calls of a number of birds in a rose thicket. The birds evidently had reason to fear the snakes, especially as they were of species which nest on or near the ground. We have never seen the rattlesnake climbing trees, though one individual was climbing through a brush thicket perhaps two feet above the ground proper. It is plainly of too heavy a build to be enabled to climb readily. It is hard enough work for it to squirm its way over the ground. We have never found any bird remains in rattlesnakes' stomachs.

"On Pine Flats, in the San Gabriel Mountains, a large lazy rattler was secured which showed a tremendous bulge about half-way along its body. Dissection disclosed a full-grown ground squirrel (*Citellus beecheyi fisheri*) which had been swallowed entire, as is always the case with whatever a snake eats.

"In the San Bernardino Mountains, the junior author found a small rattler in the act of swallowing an adult meadow-mouse (*Microtus*). The victim was about half-way protruding from the snake's mouth, and so tightly wedged in as to render the snake unable to get rid of its mouthful when we began to tease it and it wanted to. We



Crotalus oreganus, Pacific Rattlesnake
Collected ten miles west from Gazelle, Siskiyou County, California, May, 1913.

were able to hold the snake in our hands, with as much safety as if it had been muzzled. Snakes have a way of swallowing things much larger than their heads; their jaws are pliable, and almost stretchable! But they always swallow their prey head first. Two other rattlers examined contained each a full-grown gopher (*Thomomys*). Another had swallowed a chipmunk (*Eutamias merriami*).

"A rattlesnake collected at Bluff Lake, in the San Bernardino Mountains, July 21, 1905, measuring 42 inches in length, contained two chipmunks (*Eutamias speciosus*). These were tandemly aligned in the alimentary canal, nearer the vent than the mouth of the snake. The hindmost chipmunk was almost completely dissolved, hair and bones as well as the flesh having softened into a pasty mass, save for parts of the head, ears, and teeth. The digestive powers of snakes are truly astonishing.

"Were it not for the danger from its bite, the rattlesnake would be a desirable resident of any ranch where gophers and squirrels prove a nuisance.

"There are lots of interesting things to be learned about rattlesnakes in their native haunts, and we would urge students having the opportunity to avail themselves of it by finding out everything possible. The only danger we can conceive of, that when a rattler may be stepped upon unawares, is past as soon as you have caught sight of the reptile. You are at once on your guard. Retain your common sense. Don't go into hysterics and think you must batter the snake to death at once. For it won't run after you! Exercise reasonable caution, give your curiosity full sway, and see what you can find out. There are dozens of deaths in southern California every year, from the accidental discharge of guns. And yet no one treats a gun as he does a rattler! Let us find out more of all our native animals,

against the time when the close settlement of our land accomplishes the extinction of many of our wild things.

"A thing we cannot help mentioning here, is the popular exaggeration as to the size of snakes. We have heard thoroughly honest people tell about rattlesnakes five and six feet long and "as big around as a man's leg." In all our experience the largest measurement we have obtained from fresh specimens was 42 inches; in this instance the girth was just four inches, which is rather less than in some shorter examples we have seen. We refer here to the *Crotalus lucifer* of the Pacific Slope of Los Angeles and San Bernardino Counties. Doubtless the desert and San Diego County rattlers, which are of different species, do attain greater length. But snakes *look bigger* to most people than they really are! Then too, some people base their statements on the measurements of *skins*. Now a three foot rattler will produce a skin, when stretched and tanned, four and one-half feet long! We do not doubt that four-footers of our species do exist though we haven't found that size yet ourselves. But we want the chance to apply the yard stick to larger ones, for our own satisfaction."

"During all three summers we found rattlers actually abundant along the upper Santa Ana between Seven Oaks and Big Meadows (5,000 to 6,800 feet altitude); also in the lower Fish creek cañon (6,500 to 7,000 feet), and on the south face of Sugarloaf up to 6,800 feet. We ran across fully thirty individuals in that neighborhood in the summer of 1906. Most of these were on the cañon bottom near the willow or rose thickets, though some were along the trail that wound through the sage, in places a hundred yards or more from the stream. The line of cienagas running up the south base of Sugarloaf appeared to be a favorite resort for rattlesnakes, doubtless due to the abundance of gophers and meadow mice there.

"In all our experience the rattlers of this region proved to be mild-mannered and always inoffensive, seeking to make their escape in every instance, and only striking when worried to the last degree. Neither myself nor my companions had any "narrow escapes" from being bitten that we were aware of. Many were noosed and a dozen were preserved as specimens.

"The size of the rattlesnake of this region seems to average small, judging from reports from elsewhere in California. The following are a series of actual measurements taken by myself, length in inches from fresh (chloroformed) specimens: 19, 22, 24, 26, 27, 37, 38½, 40 and 42. The latter specimen was taken at Bluff lake, 7,500 feet altitude, July 22, 1905. A specimen taken on the upper Santa Ana July 6, 1907, and 37 inches long, was four inches in largest circumference, and weighed just one and one-fourth pounds. I saw one rattlesnake, not the largest either, with 13 rattles; all the others possessed from three to nine rattles, usually incomplete in number, that is, with the "button" and probably later acquired ones missing. In color there was considerable variation, though the majority were very dark, so black above as to show the merest traces of the lighter markings. Some also were heavily mottled on the under surface as well. The lightest specimens, with beautifully contrasted light and dark markings, were obtained at Doble (in the arid belt), though a dark one was also noted there.

"The food of the rattlesnake may be judged from the following instances. One caught on the south face of Sugarloaf July 3, 1905, contained an entire chipmunk (*Eutamias merriami*), recently swallowed head first. Another from the same locality contained similarly a full-sized gopher (*Thomomys altivallis*). A small-sized individual was found at the mouth of the South Fork, July 18, 1906, with its mouth efficiently gagged by a half-swallowed adult meadow mouse

(*Microtus californicus*). Even when handled and worried the snake was unable to extricate himself from his bulging mouthful. At Bluff lake a rattler taken July 21, 1905, contained two chipmunks (*Eutamias speciosus*) tandemly aligned in the alimentary canal, nearer the cloacal opening of the snake than the mouth. The most posteriorly located chipmunk was approaching complete dissolution, much of the hair and bones, even having disappeared. Another rattler, only 26 inches long, taken on the upper Santa Ana June 20, 1907, contained a $10\frac{3}{8}$ inch alligator lizard (*Gerrhonotus scincicauda*), extended straight out in the snake's alimentary canal. As is always the case, and of obvious necessity, the lizard had been swallowed head first."

It seems, however, that snakes do not always swallow their food head first. Dr. Barton Warren Evermann examined a *C. oregonus*, killed in Yosemite Valley, and writes: "the rattler had a fine adult Merriam Chipmunk (*Eutamias merriami*) for its breakfast. And the rattler had swallowed it tail first! The head of the chipmunk was towards the snake's head, and its legs, tail and fur all lay back toward the snake's tail, smooth and in perfect order. This surprised us very much. We could hardly see how the chipmunk could go down tail first without turning the tail, or some of the legs, or the fur, the other way. We could scarcely believe our own eyes; some of the party were even disposed to grant there had been an error in observation. But as all members of the party (there were six or seven of them) were agreed as to the fact, it is evident that this chipmunk had been swallowed tail first.

"A few days later Dr. J. Grinnell sent me a photograph taken August 1, 1914, by Mr. Edward R. Warren, of Colorado Springs, which showed a gopher snake in the act of swallowing a chipmunk tail first only the head of the chipmunk remained exposed."

A specimen (C. A. S. No. 13586) from South Coronado Island had eaten a lizard, *Plestiodon skiltonianus*.

215. *Crotalus enyo* Cope
LOWER CALIFORNIA RATTLESNAKE
Plate 103

Caudisona enyo COPE, Proc. Acad. Nat. Sci. Phila., 1861, p. 293 (type locality, **Cape St. Lucas, Lower California**); COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 309.

Crotalus enyo COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 33; COPE in YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 534; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 12, 74; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 90; BELDING, West American Scientist, Vol. III, No. 24, 1887, p. 98; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 693; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 157; MC LAIN, Contributions to Neotropical Herpetology, 1899, p. 5; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1189, fig. 343; MOCQUARD, Miss. Sci. au Mexique, Pt. III, Rept., 1909, p. 967, pl. 77, figs. 4, 4a; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 109; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 53, 71; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115; TERRON, Mem. y Rev. Soc. Cient. Antonio Alzate, Vol. 39, 1921, p. 164.

Crotalus oregonus var. *enyo* GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, p. 174; GARMAN, Bull. Essex Inst., Vol. XVI, No. 1, 1884, p. 35.

Crotalus tigris BOULENGER, Cat. Snakes Brit. Mus., Vol. III, 1896, p. 580 (part); MOCQUARD, Nouv. Arch. Mus. Hist. Nat., Paris, Ser. 4, Vol. I, 1899, p. 333; TERRON, Mem. y Rev. Soc. Cient. Antonio Alzate, Vol. 39, 1921, p. 188.

Description.—Size moderate. Head broad, flattened. Rostral as high as, or higher than, wide, in contact with anterior nasal. Two nasals. Two preoculars. Three postoculars. A large scale just in front of supraocular. Supraocular large but not raised into a horn-like process; separated from its fellow by from three to five irregular rows of scales. Thirteen to 15 superior and 13 to 15 inferior labials, first pair of latter in contact on median line

in front of the single pair of genials. Three or four rows of scales between supralabials and eye. Scales in 25 to 27 rows, keeled except in two or three rows on each side. Gastrosteges varying from 160 to 170. Anal not divided. Urosteges varying from 18 to 26, the first and a few of the posterior sometimes divided.

The ground color is gray or light brown, marked along the back with a series of large dark brown blotches which tend to become cross-bands posteriorly. These blotches are paler centrally and are edged with black or very dark brown. Opposite these dorsal blotches are one or more series of smaller black or very dark brown lateral spots on scales from the first to fifth rows. Alternating with the dorsal blotches there may be a series of paler brown, more or less indefinite, blotches on scales of the fifth to eighth rows, and a series of smaller blackish spots on the first, second and third rows. The dorsal rhombs may be outlined with scales lighter than the ground color. The coloring of the head, as of the body, is similar to that of *C. oreganus*, but brighter. There is a light transverse streak on the supraocular in adults as well as young. The posterior part of the upper surface of the head usually shows an irregular pair of dark brown longitudinal streaks. A dark brown streak runs from the eye to and behind the corner of the mouth, the line of its lower edge striking the eye about under the pupil. This brown streak is bordered above a very narrow light streak, less than one scale wide, which passes above the corner of the mouth and forms the lower limit of the light temporal stripe. The tail is gray or brown with brown or dark gray rings or cross-bars, often more or less obscured. The lower surfaces are yellowish white, sometimes more or less clouded with brown.

Length to anus.....	252	578	608	658	720	725
Length of tail to base of rattle	20	40	65	45	45	75

Distribution.—*Crotalus enyo* is known only from the southern part of the peninsula of Lower California. It was originally described from a specimen collected by John Xantus at Cape San Lucas. Since then, it has been found at La Paz, San José del Cabo, San Bartolo, Miraflores, Santa Anita, San Antonio, San Pedro, Todos Santos, and in the Sierra Laguna, all in the Cape Region. Mocquard has recorded specimens from Mulege.

Habits.—Mocquard states that small mammals are eaten by this rattlesnake.

216. *Crotalus tigris* Kennicott

TIGER RATTLESNAKE

Plates 103 and 113

Crotalus tigris KENNICOTT, Rep. U. S. Mex. Bound. Surv., Vol. II, Rept., 1859, p. 14, pl. IV, (type locality, **Sierra Verde and Pozo Verde, Deserts of Gila and Colorado**); BAIRD, Rep. Pac. R. R. Surv., Vol. X, 1859, Rept., p. 16, pl. XXX, fig. 1; COPE, Proc. Acad. Nat. Sci. Phila., 1859, p. 338; COOPER, in Cronise, Nat. Wealth California, 1868, p. 483; COOPER, Proc. Cal. Acad. Sci., Vol. IV, 1870, p. 66; COPE, Surv. W. 100th Merid., Vol. V, 1875, p. 534; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, pp. 33, 90; GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, pp. 117, 175; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 12, 74; GARMAN, Bull. Essex Inst., Vol. XVI, 1884, p. 35; YARROW, in Buck's Ref. Handb. Med. Sci., Vol. VI, 1888, p. 166; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 693; STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 214; MERRIAM, N. Amer. Fauna, No. 7, 1893, p. 215; BOULENGER, Cat. Snakes Brit. Mus., Vol. III, 1896, p. 580 (part); VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 220; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1181, fig. 341; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 107; MEEK, Field Columbian Mus., Zool. Ser., Vol. VII, No. 1, 1906, p. 16; DITMARS, Reptile Book, 1907, p. 459; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 427, pls. XIX, XXVI, fig. 1; GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 197; STEJNEGER & BARBOUR, Check List N. Amer. Amph.

Rept., 1917, p. 110; VORHIES, Univ. Ariz. Agric. Exper. Station Bull. No. 83, p. 360; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 29.

Caudisona tigris COPE, in Mitchell's Res. Venom Rattlesn., 1861, p. 122; COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 309; COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 608.

Description.—Of moderate size. Head rather small, flat-topped varying in outline according to position of fangs, etc. Rostral wider than high, in contact with anterior nasal. Two nasals. Usually two preoculars and four internasals. Supraocular large but not raised into a horn-like process; separated from its fellow by five to seven irregular rows of scales. About 14 to 16 superior and 13 to 16 inferior labials; first pair of latter meeting in front of single pair of genials. Three rows of scales between labials and eye. Scales in 21 to 25 rows, dorsals strongly keeled. Gastrosteges varying at least from 165 to 183. Urosteges 18 to 26.

The ground color is yellowish ash, varying from whitish to tawny, marked along the back with a series of rather small and indistinct brown blotches which become cross-bars or stripes posteriorly, and number about 31 to 37 on the body and three to six on the tail. These blotches are paler centrally than about their edges, and sometimes are nearly obsolete. Smaller alternating blotches are present on the sides. The head markings are rather indistinct, especially the postocular stripe, which is often lost in the dense sprinkling of minute black dots covering the sides of the head. The lower surfaces are yellow or white, sometimes faintly clouded with brown.

Length to anus.....	515	582	625	688	708	750
Length of tail to rattle.....	35	43	46	48	56	58

Distribution.—The Tiger Rattlesnake “was formerly



Crotalus tigris, Tiger Rattlesnake
Collected eighteen miles north from Tucson, Pima County, Arizona, May, 1912.
Photographed from alcoholic specimen (C. A. S. No. 2427 D).

only known from a few localities in southern Arizona near the Mexican boundary, until in 1891 the Death Valley exploration under Dr. Merriam extended its range very materially into the desert mountains of southern California and Nevada south of the thirty-seventh parallel, from Owen's Valley to the great bend of the Colorado." The vertical range is at least 2,000 to 8,000 feet above sea-level. Some of the localities at which this snake has been taken are: Rocky Creek, Independence Creek, Lone Pine, Owens Valley, Coso Valley, Argus Range, Panamint Mountains, Slate Range, Wild Rose Springs, Beveridge Canyon in the Inyo Mountains, all in Inyo County; Round Valley in Mono County; and 20 miles above Picacho, Colorado River, Imperial County; California; Vegas Valley, Vegas Wash, Indian Spring Valley, and Grapevine Mountains, Nevada; and Catalina Mountains, Pima County; Fort Buchanan, Santa Cruz County; Sierra del Poso Verde, and the Coyote Mountains 40 miles southwest from Tucson, Arizona.

Habits.—This snake seems to be of partially nocturnal habits. It feeds upon small mammals, such as kangaroo rats and pocket mice. It probably mates in April. It inhabits rocky situations as well as sandy places. In the latter it has the habit of worming out shallow depressions in which it reposes flush with the surface and is difficult to see, especially since its coloring is such as to blend with its surroundings.

217. *Crotalus mitchellii* Cope

BLEACHED RATTLESNAKE

Plates 104, 114, and 115

Caudisona Mitchellii COPE, Proc. Acad. Nat. Sci. Phila., 1861, p. 293
(type locality, Cape St. Lucas, Lower California, Mexico);
COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 10.

- Caudisona pyrrha* COPE, Proc. Acad. Nat. Sci. Phila., 1866, pp. 308, 310 (type locality, **Canyon Prieto near Fort Whipple, Arizona**); COPE, Surv. W. 100th Merid., Vol. V, 1875, p. 535; COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 608.
- Crotalus mitchellii* COPE, in Yarrow, Surv. W. 100th Merid., Vol. V, 1875, p. 535; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 33; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 73, 189; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 90; BELDING, West Amer. Scientist, Vol. III, No. 24, p. 98; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 694; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 4, 1894, p. 450; STEJNEGER, Report U. S. Nat. Mus. for 1893, 1895, p. 454; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 159; BOULENGER, Cat. Snakes Brit. Mus., Vol. III, 1896, p. 580; Mc LAIN, Critical Notes, 1899, p. 13; MOCQUARD, Nouv. Arch. Mus. Hist. Nat., Paris, Ser. 4, Vol. I, 1899, p. 331; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1193, figs. 345, 346; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 108; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 3, Vol. 4, No. 1, 1905, pp. 3, 26; MEEK, Field Columbian Mus., Zool. Ser., Vol. VII, No. 1, 1906, p. 18; DITMARS, Reptile Book, 1907, p. 463; GRINNELL & GRINNELL, Throop Inst. Bull., No. XXXV, 1907, p. 59; GRINNELL, Univ. Cal. Publ. Zool., Vol. 5, No. 1, 1908, p. 170; MOCQUARD, Miss. Sci. au Mexique, Pt. III, Rept., 1909, p. 970, pl. 77, figs. 6, 6a; VAN DENBURGH Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1912, p. 152; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 429, pl. XXVI, fig. 2; ATSATT, Univ. Cal. Publ. Zool., Vol. 12, No. 3, 1913, p. 44; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 4, 1914, pp. 133, 145, 147; CAMP, Univ. Cal. Publ. Zool., Vol. 12, No. 17, 1916, p. 533; GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 197; VORHIES, Univ. Ariz. Agric. Exper. Station Bull. No. 83, 1917, p. 359; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 110; COWLES, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, 1920, p. 66; STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 65; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 53, 72; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 115, 159.
- Crotalus pyrrhus* COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 33; COPE, in Yarrow, Surv. W. 100th Merid., Vol. V, 1875, p. 535, pl. XXII; STREETS, Bull. U. S. Nat. Mus., No. 7, 1877, p. 39; YARROW & HENSHAW, Ann. Rep. Chief of Engineers for 1878, Surv. W. 100th



Crotalus mitche/llii, Bleached Rattlesnake
Collected at Bontevard, near Campo, San Diego County, California, June, 1915.

Merid., Appendix NN, 1878, p. 210; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 12, 73; TOWNSEND, Proc. U. S. Nat. Mus., Vol. XIII, 1890, p. 144; STEJNEGER, West Amer. Scientist, Vol. VII, 1891, p. 165; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 694.

Crotalus confluentus var. *pyrrhus* GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, p. 173.

Crotalus oregonus var. *mitchelli* GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII, No. 3, 1883, p. 173; GARMAN, Bull. Essex Inst., Vol. XVI, No. 1, 1884, p. 35.

Crotalus Mitchellii pyrrhus STEJNEGER, Report U. S. Nat. Mus. for 1893, 1895, p. 456.

Description.—Moderately large. Head rather small, with flattened top, varying in outline according to position of fangs, etc. Rostral either higher than wide or wider than high, separated from anterior nasal by one to two rows of granular scales. Usually two nasals, and two preoculars. Postoculars usually three, sometimes four. Supraocular large, somewhat projecting laterally, separated from its fellow by from four to eight scales. Thirteen to 18 superior and 14 to 18 inferior labials, first pair of latter meeting in front of a single pair of genials. Three to five rows of scales between supralabials and eye. Scales in 23 to 27 rows, keeled except sometimes in one or two rows of each side. Gastrosteges varying from 158 to 198. Urosteges 16 to 27, a few of the posterior sometimes divided.

The general color is white, gray, yellow, vinaceous-cinnamon, or salmon-red, minutely dotted with black or brown, and with a series of about 32 to 37 indefinite brown, black, or red blotches along the back anterior to tail. These dots and dorsal blotches, as well as smaller blotches which sometimes are present on the top of the head and on the sides, may be so faint as to cause the animal to be called the White Rattlesnake, or so dark as to produce a blackish effect; the blotches, however, never have definite outlines, appearing

only as darker portions of the general 'pepper and salt' style of coloration. A dark band sometimes runs down and back from the eye. The tail is gray, with four to six black cross-bars. The lower surfaces are white or yellow, usually more or less clouded with brown.

Length to anus.....	710	770	810	840	870	930
Length of tail to rattle.....	62	74	72	60	71	90

Remarks.—This rattlesnake seems to be most nearly related to *C. tigris*. It may usually be distinguished from that species by its black bands on the tail as well as by the granules between the rostral and anterior nasal plates.

Distribution.—This rattlesnake has been found in the Mohave and Colorado deserts of southeastern California, and in central Arizona, and ranges the whole length of the peninsula of Lower California.

In Arizona, it has been found in the Tinajas Altas Range, about fifty miles southeast from Yuma, and on the Colorado River 20 miles above Picacho, Yuma County; on the Mohave Desert and at the foot of the Needles, Colorado River, Mohave County; at Cave Creek, Maricopa County, and near Fort Whipple, Yavapai County.

In California, it has been collected in Los Angeles (Fairmont), San Bernardino (Cushenbury Spring, Forest Home, San Bernardino Mountains, one mile east from Oro Grande, Victorville, Horn Mine, Turtle Mountains, 14 miles northeast from Blythe Junction), Riverside (Asbestos Spring, Santa Rosa Mountains, San Jacinto Mountains five miles southwest from Banning), San Diego (Mountain Springs, Campo, Boulevard, and Coyote Valley 25 miles east from Oak Grove) counties.

Lower California records are Cape San Lucas, La Paz, Sierra El Taste, Miraflores, Sierra San Lazaro, Las Huavi-



Crotalus mitchellii, Bleached Rattlesnake
Collected at Boulevard, near Campo, San Diego County, California, June, 1915.

tas, Agua Caliente, in the Cape Region; San Evaristo, Santa Rosalia, Mulege, San Ignacio, Parral, and San Matias farther north, and on Santa Margarita, Angel de la Guardia, San Jose, Espiritu Santo, and Ceralbo islands.

Habits.—This seems to be distinctively a desert species. Like other rattlesnakes, it is viviparous. A specimen taken at San Jose del Cabo, in September, contained three young about 260 *mm* in length. Mocquard records the statement that this species lives upon lizards. Camp mentions one which contained a nocturnal canyon mouse (*Peromyscus crinitus stephensi*).

218. *Crotalus cerastes* Hallowell

HORNED RATTLESNAKE

Plates 104 and 116

Crotalus cerastes HALLOWELL, Proc. Acad. Nat. Sci. Phila., 1854, p. 95 (type locality, **Borders of the Mohave River and in the desert of the Mohave**); HALLOWELL, Rep. Pac. R. R. Surv., Vol. X, 1859, p. 17, pl. IV, fig. 1; KENNICOTT, in Baird, U. S. Mex. Bound. Surv., Vol. II, 1859, p. 14, pl. III; BAIRD, Rep. Pac. R. R. Surv., Vol. X, 1859, p. 16, pl. 35, fig. 4; COPE, Proc. Acad. Nat. Sci. Phila., 1859, p. 337; JAN, Elenco Sist. degli Ofidi, 1863, p. 124; COOPER, Proc. Cal. Acad. Sci., Vol. IV, 1870, p. 67; JAN, Iconogr. Génér. Ophid., 46e livr., 1874, pl. III, fig. 5; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 33; COPE, in Yarrow, Surv. W. 100th Merid., Vol. V, 1875, p. 534; YARROW, Bull. U. S. Nat. Mus., No. 24, 1875, pp. 12, 73; GARMAN, Mem. Mus. Compr. Zool., Cambr., Vol. VIII; No. 3, 1883, pp. 116, 175; YARROW, Buck's Ref. Handb. Med. Sci., Vol. VI, 1888, p. 166; GARMAN, Bull. Essex Inst., Vol. XVI, No. 1, 1884, p. 35; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 694; STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 216; MERRIAM, N. Amer. Fauna, No. 7, 1893, p. 217; STEJNEGER, Report U. S. Nat. Mus. for 1893, 1895, p. 450, pl. 15; BOULENGER, Cat. Snakes Brit. Mus., Vol. III, 1896, p. 583; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 222; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1196, fig. 347; BROWN, Proc. Acad. Nat. Sci. Phila., 1901,

p. 107; MEEK, Field Columbian Mus., Zool. Ser., Vol. VII, No. 1, 1906, p. 18; DITMARS, Reptile Book, 1907, p. 460, pl. CXXXV; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 429, pls. XXII, XXVIII, fig. 1; ELLIS & HENDERSON, Univ. Colorado Studies, Vol. X, No. 2, 1913, p. 108; ATSATT, Univ. Cal. Publ. Zool., Vol. 12, No. 3, 1913, p. 44; CAMP, Univ. Cal. Publ. Zool., Vol. 12, No. 17, 1916, p. 534; GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, p. 198; STEJNEGER & BARBOUR Check List N. Amer. Amph. Rept., 1917, p. 108; VORHIES, Univ. Ariz. Agric. Exper. Station Bull. No. 83, 1917, p. 360, pl. I, fig. 1; STEPHENS, Copeia, 1918, No. 54, p. 35; COWLES, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, 1920, p. 66; STEPHENS, Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 65; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, pp. 29, 53; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 126.

Caudisona cerastes COPE, in Mitchell's Research. Venom Rattlesn., 1861, p. 124; COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 309; COPE, Proc. Acad. Nat. Sci. Phila., 1867, p. 85.

Æchmophrys cerastes COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 609.

Description.—Small. Head rather narrow, flat-topped, varying in outline according to position of fangs, etc. Rostral as broad as, or broader than, high, in contact with anterior nasal. Anterior and posterior nasals usually united, at least above nostril. Usually two preoculars and two internasals. Supraocular very large, raised into a horn-like process, separated from its fellow by from four to six irregular rows of scales. Eleven to 14 superior and 12 to 14 inferior labials, first pair of latter in contact on median line in front of single pair of genials. Two or three rows of scales between supralabials and eye. Scales in 19 to 25 (usually 21 or 23) rows; feebly keeled except in one to three lower rows on sides, where smooth; those near middle of back with central tubercular swellings. Gastrosteges varying from 134 to 150. Urosteges 15 to 25, a few sometimes divided.

The general color above is gray, often with a yellowish



Crotalus cerastes, Horned Rattlesnake
Young individual collected near Yuma, Yuma County, Arizona, September, 1912



or vinaceous tinge, with a series of rather small and indefinite blotches of grayish or yellowish brown. There usually are from 31 to 33 of these blotches between the head and anus, and from three to nine on the tail. Smaller blotches or spots usually are present on the sides and on the tips of the gastrosteges. The supraocular shows an indistinct transverse streak. A brown streak runs from the eye to the corner of the mouth. The tail is ash-color with half rings of brown, which are much darker near its tip than anteriorly. The lower surfaces are yellowish white, sometimes faintly clouded with brown or gray.

Length to anus.....	404	415	428	440	450	592
Length of tail to rattle....	30	38	42	42	31	38

Distribution.—The Sidewinder occupies the lower levels of the Colorado and Mohave Deserts in California, where the Tiger Rattler occurs in the mountainous districts, and ranges thence across Arizona and southern Nevada to “south-western Utah.”

It is known to occur in southern Nevada in Pahrump, Vegas and Indian Spring Valleys, at Sarcobatus Flat, in the Amargosa Desert, and in the valleys of the Virgin and Lower Muddy, and in Cottonwood Canyon.

In Arizona, it has been found at Yuma and Chrystoval, Yuma County; Salado Valley near Tempe, Maricopa County; Fort Buchanan, Santa Cruz County; and at Vulture.

It is said to be common in northeastern Lower California, where it is confined to the lower gulf strip, and has been secured at San Felipe.

In California, it has been taken at Chalput, Mono County; Keeler and Lone Pine in Owen’s Valley, Borax Flat, Panamint Valley, Mesquite Valley, Ballarat, Echo Canyon in the Funeral Mountains, Furnace Creek Ranch and Bennett Wells in Death Valley, Inyo County; Barstow, Daggett,

three miles south from Lovic, Oro Grande, and Needles, San Bernardino County; Indio, Torres, Mecca, and Blythe Junction, Riverside County; and on Echo Island in the Salton Sea, at New River near the Salton Sea, Holtville, Coyote Wells, Laguna Station, and Pilot Knob, Imperial County, and in La Puerta Valley, San Diego County.

Habits.—In certain parts of its range, as in the Colorado and Mohave deserts, this species is very numerous, but owing to its coloring and habits individuals seldom are seen. The name "side-winder" is derived from its peculiar mode of progression: "when disturbed it moves away sideways, keeping its broadside toward the observer instead of proceeding in the usual serpentine manner. * * * One was shot containing a kangaroo rat (*Dipodomys*) and two pocket mice (*Perognathus*). * * * During the latter part of April and the early part of May these rattlesnakes were often found in pairs and were doubtless mating. At such times they remained out in plain sight over night instead of retreating to holes or shelter under desert brush, and on two occasions they were found by us on cold mornings so early that they were too chilled to move until considerably disturbed."*

Heller is quoted by Meek as stating that it is strictly nocturnal. I have found it to be not entirely inactive in the daytime. Two were found coiled in the mouths of rodent holes in clumps of cactus where they were lying in the sun. One was found crawling under a bush, and one hidden under a tin can. One was found out on the desert at night, and it is probable that most rattlesnakes are most active at that time. Camp states that both at Needles and near Blythe Junction individuals were traced by the characteristic tracks in the sand. Each was found closely coiled in a symmetrical pad and partly buried flush with the surface in the hot sand

*Merriam, *N. Amer. Fauna* No. 7, 1893, p. 217.

right out in the noonday sunshine of mid-summer. In neither case were the snakes easily seen, as they were of the exact color of their sandy surroundings. Both, though alert allowed themselves to be noosed without moving away or doing more than rattle feebly.

Specimens which I have seen had eaten lizards, *Uta stansburiana*, *Cnemidophorus tigris* and *Phrynosoma platyrhinos*. The *Phrynosoma* had been only partially swallowed; and its horns had penetrated and protruded from the ventral surface of the snake's neck.

Regarding the mode of progression of this species Mr. Cowles notes: "These snakes seem to be almost entirely restricted to the sandy areas of the desert, rarely wandering from them, and then only for a short distance, its mode of locomotion admirably fits it for the type of country which it inhabits. The ordinary snake finds difficulty in rapid motion over the loose and shifting sand, since part of the tractive power comes from a bracing of each loop of the body against that part of the ground which is posterior to the loop, and through the movement of the central portion of the body against the surface of the ground. It can readily be seen that a shifting and loose surface would seriously hinder the progress of the ordinary snake. The "Side-winder," *Crotalus cerastes*, instead of progressing as do ordinary snakes, longitudinally, progresses laterally, leaving separate tracks, each paralleling the other, and angling in the direction in which the snake is moving. Each track is approximately the length of the snake making it, and is wavy, that is a series of "S" shaped loops. The tracks give no sign of any part of the body moving from one mark to the other, which gives the impression that the snake jumps the three to six inch interval between the tracks. Such is not the case, however. When the snake is moving, the body is kept partially looped and the advance seems to be through the advancing of the head

and tail, while the rest of the body is rested on the intervening loop, supporting the rest of the body, the weight then seems to be shifted to the head and tail and the rest of the body advanced, the whole progression being a series of graceful continuous movements. This *seems* to be the mode of progression."

Mr. Slevin found a pair mating under a bush on the desert west of Barstow, San Bernardino County, California, at about five o'clock in the afternoon, during the last week of April, 1913.

219. *Crotalus willardi* Meek

WILLARD'S RATTLESNAKE

Plates 105 and 117

Crotalus willardi, MEEK, Field Columb. Mus., Zool. Ser., Vol. 7, No. 1, 1906, p. 18, pl. III (type locality, **Tombstone, Arizona**); MOCQUARD, Miss. Sci. au Mexique, Pt. III, Rept., 1909, p. 972; HARTMAN, Proc. U. S. Nat. Mus., Vol. 39, 1911, p. 569, fig. 1-4; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 394; STEJNEGER & BARBOUR, Check List. N. Amer. Amph. Rept., 1917, p. 111; SWARTH, Copeia, 1921, No. 100, p. 83 (type locality stated to be **Hamburg, Ramsey Canyon, Huachuca, Mts., Arizona**).

Description.—Moderately large. Head long, with flattened top and rather narrow, elevated snout. Rostral higher than wide, in contact with anterior nasal. Two nasals. Upper preocular large, not divided vertically. Internasals rather small, as long as wide, turned up anteriorly into the prominent canthus rostralis. Supraocular large but not raised into a horn-like process; separated from its fellow by about seven to nine irregular rows of scales. Supralabials 13 to 15, separated from eye by about two rows of scales. Infralabials 13 to 15, first pair in contact on median line in front of a single pair of genials. Scales on body in 25 or

27 rows, all keeled except the first two or three rows. Gastrosteges varying in number from 145 to 160. Anal not divided. Urosteges 21 to 28, a few of the anterior and posterior sometimes divided.

The coloration of the original specimen was described by Dr. Meek as follows:

Color light olive brown, more or less irregularly blotched with white; dorsal region crossed by 19 lighter bands, each one scale length in width and narrowly margined with black; dorsal transverse bars about nine scale lengths apart; no transverse bands on tail; ventral surface much speckled and mottled with black, becoming darker posteriorly; small black dots on sides, these most numerous near ventral region; supraocular light ash color; a large ashy blotch on occiput more or less reticulated posteriorly with darker; snout and region between supraoculars olive brown; a distinct white line one scale wide from upper edge of prenasal above pit to upper edge of seventh supralabial, passing obliquely downward to tenth supralabial and backward covering the last four supralabials; a white line on lower half of first five supralabials, passing downward and backward on lower jaw to white on throat; the space between these bands brown; rostral with white median line.

The second known specimen, as described by Mr. Hartman, was in "general color chocolate, dorsally marked with short cross-bars of dark shading into a black line posteriorly or anteriorly, these bars sometimes occurring in pairs and then separated by one or two scales' width of ground color; tail with three distinct brown half rings on anterior part, remainder uniform brown dorsally; brown spots covering parts or all of from one to four scales laterally; whole body more or less speckled with black or brown; lateral scales covered with fine specks; ventrals of anterior portion almost white, posteriorly becoming slightly speckled with dark, the

specks farther back becoming so numerous as to merge into spots or blotches until the posterior half of the ventral surface is almost entirely dark brown; a white median line on rostral continuing onto lower jaw and expanding between two wide dark bars, which extend about halfway back on the jaw; a light line bordering the second, third, fourth, and fifth labials continuing onto the lower jaw; a light band extending obliquely from the nasals, under the eye to the last four labials, covering them almost completely; below this, running across the pit, a dark band spreading out onto five or six lower labials; a prominent dark postocular band, about three scales wide, not bordered by white above."

In life, the general color above is yellowish cinnamon with grayish white or very pale cinnamon dorsal cross-bars which probably represent interspaces between obsolete rhombs. Each light bar is partially edged with black and deep cinnamon. On the sides are rather small dark cinnamon or chestnut spots, the most evident ones being at the lateral extremities of the light dorsal bars and on the first and second and third and fourth rows of scales, making, where well developed, three lateral series of alternating spots. The proximal portion of the tail above is colored like the body, but the distal portion is bluish ash-gray, marked with red at the bases of the scales, the lower row of caudal scales and the urosteges are red, edged with pure white. The light stripes on the head are pure white, the dark streaks, deep cinnamon. The temporal regions are tinged with olive. The lower surfaces are marbled with cinnamon, black and white. Many of the scales on the body have one or more minute black dots.

Length to anus.....	196	220	380	444	445
Length of tail.....	20	18	35	51	37

Distribution.—This rattlesnake has been found only in



Crotalus willardi, Willard's Rattlesnake
Collected in Ramsey Canyon, Huachuca Mountains, Cochise County, Arizona, June, 1926.

southeastern Arizona, where specimens have been recorded as collected at Tombstone, Cochise County, and in "the region of the Santa Rita Mountain." Willard has stated that the original specimen came not from Tombstone but from near Hamburg, Ramsey Canyon, Huachuca Mountains, Cochise County. Mr. Slevin found it at Hamburg in Ramsey Canyon, Huachuca Mountains, Cochise County, and on the trail from the head of Temporal Gulch to Old Baldy, Santa Rita Mountains, Santa Cruz County.

Habits.—A specimen from the Santa Rita Mountains (C. A. S. No. 48041) contained an adult mouse. This snake was found in a pile of loose rock by the side of the trail.

220. *Crotalus lepidus* (Kennicott)

GREEN RATTLESNAKE

Plates 105 and 118

- Caudisona lepida* KENNICOTT, Proc. Acad. Nat. Sci. Phila., 1861, p. 206 (type locality, **Presidio and Eagle Pass, Texas**); COPE, in MITCHELL, Res. Venom Rattlesnake, 1861, p. 124.
- Aploaspis lepida* COPE, Proc. Acad. Nat. Sci. Phila., 1866, p. 310; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 33; COPE, Surv. W. 100th Merid., Vol. V, 1875, p. 535; YARROW, Bull. U. S. Nat. Mus., No. 24, 1883, pp. 12, 189.
- Crotalus lepidus* COPE, Proc. Acad. Nat. Sci. Phila., 1883, p. 13; GARMAN, Mem. Mus. Compr. Zool. Cambr., Vol. VIII, No. 3, 1883, pp. 117, 175; COPE, Proc. U. S. Nat. Mus., Vol. XIV, 1892, p. 692; STEJNEGER, Report U. S. Nat. Mus. for 1893, 1895, p. 452, pl. 16; BOULENGER, Cat. Snakes Brit. Mus., Vol. III, 1896, p. 582; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 348; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1191; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 107; STEJNEGER, Proc. U. S. Nat. Mus., Vol. XXV, 1902, p. 158; BAILEY, N. Amer. Fauna, No. 25, 1905, pp. 35, 51; DITMARS, Reptile Book, 1907, p. 461, pls. CXXXIX, fig. 7, CXXX, fig. 9, CXXXIV, fig. 1; MOCQUARD, Miss. Sci. au Mex., Pt. III, Rept., 1909, p. 962, pl. 76, figs. 5, 5a-b; STONE, Proc. Acad. Nat. Sci. Phila., 1911, p. 232; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 430, pls.

XXIII, XXVIII, fig. 2; STRECKER, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 45; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 109; VORHIES, Univ. Ariz. Agric. Exper. Station Bull. No. 83, 1917, p. 359.

Description.—Size small. Head broad, flat-topped, with rather narrow snout. Rostral about as high as wide, in contact with anterior nasal. Two nasals, sometimes united. Two preoculars. Two or three postoculars. A large scale just in front of supraocular. Supraocular large, but not raised into a horn-like process; separated from its fellow by about three to five irregular rows of scales. Eleven to 14 superior and 10 to 12 inferior labials, first pair of latter in contact on median line in front of single pair of genials. One to three rows of scales between supralabials and eye. Scales in 21 to 23 rows, keeled except in two or three rows on each side. Gastrosteges varying from 153 to 169. Anal not divided. Urosteges varying from 18 to 31.

The color above is a greenish or bluish or ashy gray with about 17 to 19 dark brown or black blotches or cross-bands between the head and anus. These dark markings are separated along the middorsal line by intervals from two to five times their own length along that line. They may extend laterally to the gastrosteges, or may be divided laterally into spots. Their outlines usually are irregular or serrate. The scales at their margins are often spotted with very dark brown or black, and similar spots are scattered sparsely through the gray intervals. The scales of the first two or three lateral rows may be tinted with salmon pink or orange. The head is of the gray ground color, minutely dotted with blackish brown, but without definite dark markings. The lower surfaces are yellowish white, more or less clouded with brown or gray. The tail is gray proximally, orange or salmon distally both above and below, crossed by from two to four brown bars or rings.



Crotalus lepidus, Blue Rattlesnake
Collected in Carr Cañon, Huachuca Mountains, Cochise County, Arizona, June, 1899

The color in life is bluish gray, more or less tinted with hair-brown laterally, crossed by dark hair-brown bands. The tail is salmon with lighter cinnamon-brown cross bars. The gastrosteges and many of the scales of the first to fourth rows are bright salmon pink. The tip of the tail is salmon.

Length to anus.....	460	470	495	498	547
Length of tail to rattle.....	34	40	45	48	46

Distribution.—The range of this little rattlesnake extends from Texas west across New Mexico to southeastern Arizona, and south into Mexico. In Arizona, it has been found in the Huachuca Mountains in Cochise County (at Fort Huachuca and Carr and Ramsey canyons), at Cochise Stronghold in the Dragoon Mountains, and at Onion Creek, near Paradise, in the Chiricahua Mountains.

Habits.—Mr. Slevin found one crawling up a granite boulder on a hillside. Dr. Skinner and Mr. Slevin found them on the talus slides where they could often be heard rattling underneath stones that had been disturbed. They invariably attempted to escape when approached.

221. *Crotalus pricei* Van Denburgh

PRICE'S RATTLESNAKE

Plates 105 and 119

Crotalus pricei VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 856 (type locality, **Huachuca Mountains, Arizona**); VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2; Vol. 6, 1896, p. 349, pl. L; COPE, Report U. S. Nat. Mus. for 1898, 1900, p. 1184; BROWN, Proc. Acad. Nat. Sci. Phila., 1901, p. 108; STEJNEGER, Proc. U. S. Nat. Mus., Vol. XXV, 1902, p. 158; DITMARS, Reptile Book, 1907, p. 462, pls. CXXIX, fig. 8, CXXX, fig. 6, CXXXIV, fig. 2; STONE, Proc. Acad. Nat. Sci. Phila., 1911, p. 232; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 430, pls. XXIV, XXVIII, fig. 3; STEJNEGER & BARBOUR, Check List N.

Amer. Amph. Rept., 1917, p. 110; VORHIES, Univ. Ariz. Agric. Exper. Station Bull. No. 83, 1917, p. 359.

Crotalus willardi VORHIES, Univ. Ariz. Agric. Exper. Station Bull., No. 83, 1917, p. 361.

Description.—Size small. Head subtriangular, with flattened top. Rostral nearly as broad as high, in contact with anterior nasal plate. Two nasals. Two preoculars. Usually one loreal, sometimes two. Internasals proportionally rather large. A large scale just in front of supraocular. Supraocular large but not raised into a horn-like process, separated from its fellow by from one to three scales. Superior labials nine to 11, separated from eye by one row of scales. Inferior labials nine to 11, first pair in contact on median line. Scales in 21 or 23 rows, keeled except in parts of the first and second rows. Gastrosteges varying from 151 to 162. Anal entire. Urosteges 19 to 27, the first and from two to nine posterior usually divided. Rattle very slender and delicate.

The general ground color is olive gray so thickly covered with minute brown dots as to give a decidedly brownish hue. A narrow dark brown band of uniform width runs back and down from the eye, just touching the upper angles of the eighth and ninth labials without involving them. The scales below this band are vinaceous cream. There are two small seal brown spots on the occiput. The genials and gulars are yellow, tinged with vinaceous laterally. The rest of the head is unicolor. Along each side of the back is a series of from 54 to 60 small brown blotches. Anteriorly these have a tendency to alternate, but posteriorly they unite with one another to form cross-bars. There are seven similar brown bars on the tail. The dorsal blotches are seal brown, palest centrally, and are edged with very pale brown or white. They are about one and one-half scales long, and from two to three rows of scales wide. They are separated



Crotalus pricei, Price's Rattlesnake
Collected in Ramsey Canyon, Huachuca Mountains, Cochise County, Arizona, July, 1920.

from the other blotches on the same side of the back by about one and one-half scales, and from those of the opposite side by the width of one scale. There are two or three rows of smaller alternating brown spots on the sides. The gastrosteges, except anteriorly, are dark slate. The edges of the gastrosteges and of the scales of the first row are whitish. The tip of the tail is bright salmon or flesh-color.

Length to anus.....	309	319	395	406	445	460	480
Length of tail to base of rattle.....	32	29	38	41	30	40	43

Distribution.—This beautiful little rattlesnake is known only from southeastern Arizona. It has been taken in the Huachuca Mountains, in Cochise County, and at an altitude of 7,500 feet, on a ridge near Old Baldy, Madera Canyon, Santa Rita Mountains, Santa Cruz County. Another was taken near the summit of Old Baldy. It is said that this species occurs also in the Catalina Mountains. In the Chiricahua Mountains it has been collected on Onion Creek near Paradise, Cochise County. The National Museum has it from the Apache Forest, and from 6,100 feet altitude on Ash Creek, Mount Graham.

Order II. TESTUDINATA

This order includes all of the turtles. These belong to a number of families, only four of which occur within our geographical limits. Two of these families include the sea turtles, so that our land and fresh water turtles all belong to two families, the *Kinosternidæ* and the *Testudinidæ*. The latter includes most of our species of turtles. These are very few in number. Indeed, throughout most of the area under consideration only one kind of turtle (*Clemmys marmorata*) has been found.

SYNOPSIS OF FAMILIES

- a.—Limbs with well developed feet.
- b.—Pectoral plates not in contact with the marginals; plastron with two hinged, movable portions, which may be closed against the carapace.
Kinosternidæ.—p. 966.
- b.—Pectoral plates in contact with the marginals; plastron not hinged, except in Terrapene.
Testudinidæ.—p. 972.
- a².—Limbs modified into long, flat flippers (sea turtles).
- bb.—Carapace and plastron covered with numerous large horny plates; no strong longitudinal keels on costal region.
Cheloniidæ.—p. 993.
- bb².—Carapace and plastron covered with leathery skin not divided into large plates; definite longitudinal keels or ridges on costal region.
Derموchelidæ.—p. 999.

Family 17. KINOSTERNIDÆ

This family includes a number of American turtles, of rather small size and aquatic habits. The shell is firmly ossified, and covered with large horny plates. The pectoral plates are not in contact with the marginals. The latter are 23 in number. The neck can be completely drawn into the shell. Only one genus occurs in the area under consideration.

Genus 49. Kinosternon

Kinosternon, SPILX, Testud. Brasil., 1824, p. 17, (type, *longicaudatum* = *scorpioides*).

Cinosternum, BOULENGER, Cat. Cheloniens, Brit. Mus., 1889, p. 33.

The shell is elongate, rounded, and smooth. The plastron is firmly attached to the carapace by its central portion the anterior and posterior portions are hinged and may be



Kinosternon sonoriense, Sonoran Mud Turtle
Collected near Tucson, Pima County, Arizona, July, 1912.

closed against the carapace. The plastral plates are separated from the marginals. There are two supracaudal plates. Gular single. The tail is short, with a terminal nail.

SYNOPSIS OF SPECIES

a.—Neck mottled with dark and light; shell more elongate, less rounded; barbules on neck more numerous; shell usually olive; upper border of ninth marginal nearly straight.

K. sonoriense.—p. 967.

a².—Neck less mottled, usually yellow without dark markings below; shell less elongate, more rounded; barbules on neck fewer; shell usually yellowish; upper border of ninth marginal much elevated anteriorly.

K. flavescens.—p. 970.

222. *Kinosternon sonoriense* Le Conte

SONORAN MUD TURTLE

Plates 120 and 121

Kinosternon sonoriense LE CONTE, Proc. Acad. Nat. Sci. Phila., 1854, p. 184 (type locality, **Tucson, Arizona**).

Thyrosternum sonoriense AGASSIZ, Contrib. Nat. Hist. U. S., Vol. I, 1857, p. 428, Vol. II, pl. V, figs. 8-11; BAIRD, U. S. Mex. Bound. Surv., Vol. II, 1857, Rept., p. 3.

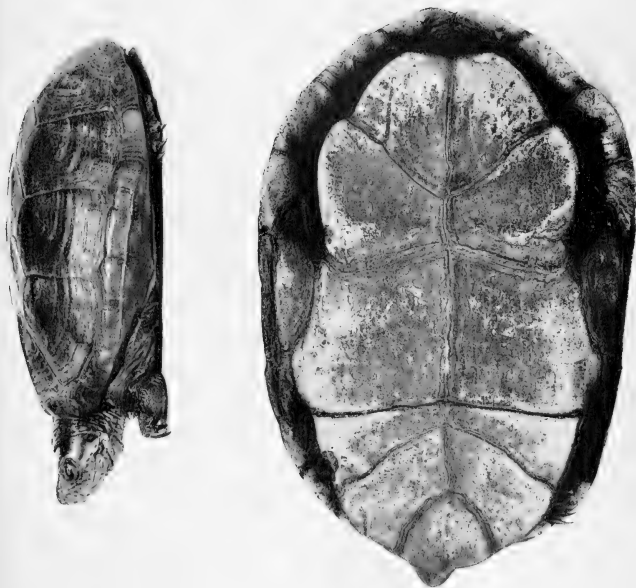
Platythyra flavescens AGASSIZ, Contributions Nat. Hist. U. S., Vol. I, 1857, p. 430 (part), Vol. II, pl. V, figs. 12-15; BAIRD, U. S. Mex. Bound. Surv., Vol. II, 1859, Rept., p. 3; COOPER, Cal. Acad. Sci., Vol. IV, 1870, p. 66.

Kinosternum henrici LE CONTE, Proc. Acad. Nat. Sci. Phila., 1857, p. 4 (type locality, **New Mexico**); COPE, Bull. U. S. Nat. Mus., No. 17, 1880, p. 13 (?).

Cinosternum henrici COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 53; YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 583, pl. XVI, figs. 1-3; COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 590; TRUE, Bull. U. S. Nat. Mus., No. 24, 1883, p. 31; BOULENGER, Cat. Chelonians Brit. Mus., 1889, p. 40; DITMARS, Reptile Book, 1907, p. 26, pl. 11, fig. 2; STRECKER, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 10 (?).

- Cinosternum sonoriense* COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 52; COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 589; TRUE, Bull. U. S. Nat. Mus., No. 24, 1883, p. 31; BOULENGER, Cat. Chelonians Brit. Mus., 1889, p. 40; SIEBENROCK, SB. Akad. Wiss. Wien, Vol. 116, 1907, p. 571; SIEBENROCK, Zool. Jahrb., Suppl. 10, Heft 3, 1909, p. 444.
- Cinosternum flavescens* COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 52 (part); TRUE, Bull. U. S. Nat. Mus., No. 24, 1883, p. 31 (part).
- Aromochelys carinatus* YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 582.
- Kinosternon sonoriense* STEJNEGER, Proc. U. S. Nat. Mus., Vol. 25, 1902, p. 149; RUTHVEN, Bull. Amer. Mus. Nat. Hist., Vol. 23, 1907, p. 594; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 396; GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 200; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 112.

Description.—Shell rather narrow, elongate, somewhat depressed, smooth. Vertebrales five, usually longer than broad. Costals four, first longest, second and third highest, last smallest. Nuchal narrow. Marginals 11 on each side, ninth with superior border not much elevated anteriorly, supracaudals not united. Plastron large, extending forward about as far as carapace, its central region covered by the abdominal plates, united to carapace by a strong bridge. Anterior and posterior portions of plastron hinged, capable of closing shell completely when head and limbs are re-drawn. Gulars partly or completely united into a single plate. Pectoral median suture shortest. Abdominal suture longest. Anal suture next longest. Axillary and inguinal plates elongate, separating abdominal from marginals. Head rather large, somewhat pointed, covered with smooth skin. Chin and throat with a few barbules. Limbs covered with smooth skin except close to toes; anterior with five, posterior with four toes, completely webbed. Tail of moderate length, ending in a horny nail or claw.



Kinosternon sonoriense, Sonoran Mud Turtle
Collected near Tucson, Pima County, Arizona, May, 1912.

Length of carapace.....	115	118	121	122	123	144
Length of plastron	105	103	106	107	109	134
Width of carapace	80	79	86	83	85	101
Width of plastron	60	61	66	62	65	79

Remarks.—What has been said under the head *K. flavescens* applies, but need not be repeated, here.

Distribution.—This turtle is common in parts of Arizona, where it seems to be generally distributed throughout the Gila River and its tributaries. It lives also in the Colorado River, but whether it ascends this river above the mouth of the Gila is not known. It is said to range across New Mexico to southwestern Texas.

In Sonora it has been taken in the San Pedro River, in the Sonoyta River three miles from Sonoyta, in Cajon Bonito Creek, in the San Bernardino River, and in Guadalupe Canyon.

In California, it has been collected on the banks of the Colorado River opposite Yuma and at Palo Verde, in Imperial County.

In Arizona, specimens have been secured at Yuma, and near Adonde, Yuma County; Phoenix and Cave Creek, Maricopa County; Fort Whipple and Fort Verde, Yavapai County; Tucson and Sabino Canyon in the Santa Catalina Mountains, Pima County; Rock Creek, Navajo County; the Chiricahua Mountains, Fairbank, six miles east from Hereford, and the Huachuca Mountains, Cochise County; Gardner Canyon in the Santa Rita Mountains, and Nogales, Santa Cruz County; and at Ash Creek, Warsaw, and Grand Central Mills.

Habits.—While this turtle is very aquatic in habits, it sometimes leaves the water to bask in the sun. It is carnivor-

ous. Captive specimens ate meat voraciously, under water. The Tucson specimens were caught with hook and line baited with meat.

223. *Kinosternon flavescens* (Agassiz)

YELLOW-NECKED MUD TURTLE

Platythya flavescens AGASSIZ, Contributions Nat. Hist. U. S., Vol. I, 1857, p. 430 (part) (type localities, Texas, Arizona), Vol. II, pl. V, figs. 12-15.

Cinosternum flavescens COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 52 (part); COUES, Surv. W. 100th Merid., Vol. V, 1875, p. 590, pl. XVII; TRUE, Bull. U. S. Nat. Mus., No. 24, 1883, p. 31 (part); BOULENGER, Cat. Chelon. Brit. Mus., 1889, p. 40; COPE, Proc. Acad. Nat. Sci. Phila., 1893, p. 386; BROWN, Proc. Acad. Nat. Sci. Phila., 1903, p. 543; SIEBENROCK, SB. Akad. Wiss. Wien, Vol. CXVI, 1907, p. 568, fig. 6; DITMARS, Reptile Book, 1907, p. 25, pl. XI; SIEBENROCK, Zool. Jahrb., Suppl. 10, Heft 3, 1909, p. 443; STRECKER, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 10.

Kinosternum flavescens COPE, Proc. Acad. Nat. Sci. Phila., 1892, p. 333.

Kinosternon flavescens STONE, Proc. Acad. Nat. Sci. Phila., 1903, p. 540; ELLIS & HENDERSON, Univ. Colorado Studies, Vol. X, No. 2, 1913, p. 114; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 111.

Description.—Shell rather narrow, elongate, somewhat depressed, smooth. Vertebrales five, usually longer than broad. Costals four, first longest, second and third highest, last smallest. Nuchal narrow. Marginals 11 on each side, ninth with superior border much elevated anteriorly, supra-caudals not united. Plastron large, extending forward about as far as carapace, its central region covered by the abdominal plates united to carapace by a strong bridge. Anterior portion of plastron hinged, capable of closing shell when head and limbs are redrawn. Gulars partly or completely united into a single plate. Pectoral median suture short. Abdominal and anal sutures longest. Axillary and inguinal plates elongate, separating abdominal from marginals. Head rather

large, somewhat pointed, covered with smooth skin. Chin and throat with a few barbules. Limbs covered with smooth skin except close to toes; anterior with five, posterior with four toes, completely webbed. Tail of moderate length, ending in a horny nail or claw.

The carapace is yellowish olive, the plastron lighter, yellowish. The horny plates are margined with dark brown, especially along their posterior edges, above. The head and neck are olive above, yellowish below, sometimes with a light yellowish streak along the side of the neck, but with little if any marbling or mottling, the chin and throat especially being usually immaculate.

Length of carapace.....	85	97	107	117	120	131
Length of plastron.....	77	82	99	99	97	105
Width of carapace.....	65	72	86	81	84	92
Width of plastron.....	55	56	67	65	69	72

Remarks.—Series of specimens of this and the preceding species show much variation in size, shape and coloration. Both species have been recorded from Arizona; indeed one of the types of *K. flavescens* was said to have come from the Gila River near Fort Yuma. Nevertheless, I incline to the opinion that it ultimately will be found that all Arizonan specimens represent one variable species or subspecies, those of Texas, another. Variation is great and identification difficult. Texan specimens (*K. flavescens*) have fewer barbules on the chin and neck, especially on the lateral fold, and the skin of the neck is less granular than in Arizona specimens (*K. sonoriense*). The shell in Texas specimens often is more rounded and smoother, with less evident dorsal ridge. The pectoral plates usually have a shorter median suture than is seen in Arizonan examples. The color of the shell in *K. flavescens*, usually is a little more yellowish and the dark margins of the plates more distinct. The neck and chin are,

on the average, much less mottled, but some specimens from Arizona show little difference in this respect. The difference in shape of the ninth marginal plate is said to be constant. I believe the two forms may be found to intergrade, and will be regarded as eastern and western subspecies. However, since this has not been clearly shown, and probably cannot be until much more material has been secured, I conform to the current usage and record two species from Arizona.

Distribution.—Dr. Stejneger informs me that, in addition to the cotype said to have been secured in the Gila River at Camp Yuma, the National Museum has specimens of *K. flavescens* collected by Dr. Mearns and Col. Carpenter at Fort Verde, and by Mr. Julius Hurter in Graham County, Arizona.

The National Museum has a specimen said to have been collected in Utah.

Family 18. TESTUDINIDÆ

This widely distributed family contains a large number of turtles distinguished from others chiefly by osteological characters. The shell is firmly ossified, and covered with large horny plates of which 11 or 12 are on the plastron. The pectoral plates are in contact with the marginals. The latter are 24 or 25 in number. The neck can be completely drawn into the shell. Five genera are represented in the area under consideration.

SYNOPSIS OF GENERA

- a.—Plastron not hinged, not closing against carapace to form a tight box.
- b.—Feet not club-shaped, webbed; two supracaudal plates; skin on top of head not divided into scales.
- c.—Suture between abdominal plates less than twice length of suture between pectorals.

d.—Inguinal plates not wedged in between abdominals and marginals; no definite longitudinal light bands on head, neck, limbs, or tail; no definite dark blotches on marginals.

Clemmys.—p. 973.

d².—Inguinal plates more or less wedged in between abdominals and marginals; definite longitudinal light bands on head, neck, limbs and tail; definite dark blotches on upper and lower surfaces of marginals.

Pseudemys.—p. 978.

c².—Suture between abdominal plates about twice length of suture between pectorals; inguinal plates wedged in between abdominals and marginals.

Chrysemys.—p. 980.

b².—Feet club-shaped, not webbed; one supracaudal plate; skin on top of head divided into scales.

Gopherus.—p. 986.

a².—Plastron hinged, closing against carapace when head and limbs are redrawn.

Terrapene.—p. 984.

Genus 50. Clemmys

Clemmys Ritgen, Nova Acta Acad. Leopold—Carol., Vol. 14, Pt. 1, 1828, p. 272 (type, *punctata*=*guttata*).

Chelopus RAFINESQUE, Atlantic Journal, 1832, p. 64.

Actinemys AGASSIZ, Contr. Nat. Hist. U. S., Vol. I, 1857, p. 444 (type *marmorata*).

The shell is broad and low. The plastron is immovably united to the carapace by a broad bridge. There is no median ridge on the alveolar surface of the upper jaw parallel to the cutting edge. The internal openings of the nostrils are between the eyes. The fingers and toes are webbed. The skin on top of the head is not divided into scales. There are two supracaudal plates. The tail is moderate or long.

224. *Clemmys marmorata* (Baird & Girard)

PACIFIC TERRAPIN

Plate 122

- Emys marmorata* BAIRD & GIRARD, Proc. Acad. Nat. Sci. Phila., 1852⁷
p. 177 (type locality, **Puget Sound**).
- Emys nigra* HALLOWELL, Proc. Acad. Nat. Sci. Phila., 1854, p. 91 (type
locality, **Posa Creek, Lower [=Southern] California**); HAL-
LOWELL, Rep. Pac. R. R. Surv., Vol. X, 1859, Pt. IV, p. 3, pl. I.
- Actinemys marmorata* AGASSIZ, Contr. Nat. Hist. U. S., Vol. I, 1857, p. 444,
Vol. II, pl. III, figs. 5-8; GIRARD, U. S. Explor. Exped., Herp.,
1858, p. 465, pl. XXXII; LORD, Naturalist Vancouver Island,
Vol. II, 1866, pp. 100, 301.
- Clemmys marmorata* STRAUCH, Mém. Acad. Sci. St. Petersbourg, Ser. 7,
Vol. 5, No. 7, 1862, p. 108; BOULENGER, Cat. Chelonians Brit.
Mus., 1889, p. 110; STRAUCH, Mém. Acad. Sci. St. Petersb., Ser.
7, Vol. 38, No. 2, 1890, p. 72; STEJNEGER, N. Amer. Fauna, No. 7,
1893, p. 162; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., Vol.
V, 1897, p. 30; Mc LAIN, Critical Notes, 1899, p. 2; MEEK, Field
Columbian Mus., Zool. Ser., Vol. VII, No. 1, 1906, p. 3; GRINNELL
& GRINNELL, Throop Inst. Bull., No. 35, 1907, p. 18; SIEBENROCK,
Zool. Jahrb., Suppl. 10, Heft 3, 1909, p. 484; HURTER, First Ann.
Rep. Laguna Marine Lab., 1912, p. 67; VAN DENBURGH, Proc. Cal.
Acad. Sci., Ser. 4, Vol. 3, 1912, p. 155; GRINNELL & CAMP, Univ.
Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 199; STEJNEGER & BAR-
BOUR, Check List N. Amer. Amph. Rept., 1917, p. 114; STEPHENS,
Trans. San Diego Soc. Nat. Hist., Vol. III, No. 4, 1921, p. 66; VAN
DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921,
p. 53.
- Clemmys Wosnessenskyi* STRAUCH, Mém. Acad. Sci. St. Petersb., Ser. 7,
Vol. V, No. 7, 1862, p. 114, pl. —, (type locality, **Sacramento
River, California**).
- Geoclemys marmorata* GRAY, Suppl. Cat. Shield Rept. Brit. Mus., 1870,
p. 27.
- Chelopus marmoratus* COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 53;
TRUE, Bull. U. S. Nat. Mus., No. 24, 1883, p. 36; TOWNSEND,
Proc. U. S. Nat. Mus., Vol. 10, 1887, p. 237; DITMARS, Reptile Book,
1907, p. 52.

Description.—Shell broad and low, broader posteriorly
than anteriorly, more nearly round in young than in adults.

Young with a median dorsal ridge not present in adults. Vertebrae five, broader than long. Costals four, first longest, second highest, last smallest. Nuchal very narrow. Marginals 12 on each side, supracaudals being distinct. Plastron large, extending forward about as far as carapace, weakly notched posteriorly, truncate anteriorly. Its gular plates smallest, triangular. Pectorals not much smaller than abdominals. Anals large, median suture between them longer than that of any other plastral plates. Bridge formed of pectoral and abdominal plates. Axillary and inguinal plates very small or absent. Head large, more or less flat-topped, covered above and laterally with smooth skin. Upper jaw not hooked, sometimes notched at symphysis. Skin of neck and gular region granular. Limbs covered with scales; anterior with five, posterior with four digits webbed to bases of long claws. Tail moderately long, tapering to tip, covered with scales in irregular whorls.

The coloration is very variable. In some specimens the carapace is olive or horn-color with few or no markings. In others a few broken and very irregular black lines are present. These lines frequently have become so numerous that, blending and crossing, they appear as the ground color, or form a very fine network through which the original ground color shows more or less indistinctly. Sometimes the carapace is almost black. The plastron is yellow, usually irregularly blotched with black or brown, or with dark lines along the posterior margins of the plates. The upper surface of the head may be unicolor or finely or coarsely reticulated with yellow and black. The chin and throat are yellow, often dotted with brown or black. The limbs and tail are yellow marked with black or brown, or brown marked with yellow. In young, the plates of the carapace show a central area of brown sometimes surrounded by a band of lighter brown or

dull yellow, and the markings on the limbs, tail, neck, and gular region form irregular longitudinal bands.

Length of carapace.....	27	45	90	120	125	164
Length of plastron.....	24	40	79	109	117	153
Width of carapace.....	27	42	71	101	100	130
Width of plastron.....	21	33	57	85	85	105
Length of tail.....	21	30	36	38	48	65

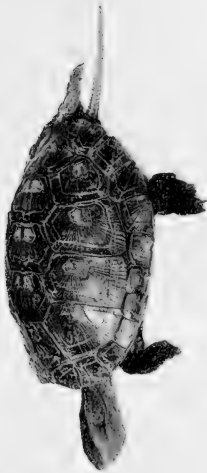
Distribution.—The Pacific Terrapin probably occurs in all the fresh waters of the Pacific Slope from Lower California to British Columbia. It has been taken at both San Diego and Puget Sound, as well as at many intermediate localities.

In California, it has been found in San Diego (San Diego), Orange (Laguna Beach), Riverside (Riverside), Los Angeles (San Gabriel, Arroyo Seco and Tujunga canyons), San Bernardino (Mohave River), Kern (Fort Tejon, Poso Creek, Buena Vista Lake, South Fork of Kern River 25 miles above Kernville), Madera (Raymond), Mariposa (at 2,800 feet six miles east from Coulterville, Dudley), San Joaquin (Stockton), Monterey (Monterey, Carmel, Castroville), San Benito (Hollister), Santa Cruz (Santa Cruz), Santa Clara (Coyote Creek, Uvas Creek, Los Gatos, Palo Alto), San Mateo (San Francisquito Creek), San Francisco, Contra Costa (Mount Diablo), Marin (San Rafael, Nicasio), Napa (Calistoga), Sonoma (Sonoma, Agua Caliente, Cloverdale), Shasta (Pit River, Baird, McCloud River), and Siskiyou (Montague, McCloud River, Lower Klamath Lake), counties.

In Oregon, it is abundant about the Klamath Lakes and in Link River at Klamath Falls, Klamath County.

In Washington, it has been reported from the Puget Sound region, Seattle, Fort Steilacoom, and Walla Walla.

Lord reports it common on Vancouver Island.



Glemmys marmorata, Pacific Terrapin
Fig. 1. Collected at Alameda, Alameda County, California, June, 1912.
Fig. 2. Collected in San Francisco, California, July, 1913.

Habits.—This is the terrapin of the San Francisco markets, and is popularly known as the Mud Turtle or Snapper. Very little is known of its habits. It is almost exclusively aquatic, preferring ponds and small lakes to running water, but is sometimes encountered in rivers or creeks and even on land while crossing from one body of water to another. It sometimes is caught with hook and line, and probably is omnivorous. A specimen which I kept alive laid three eggs in June and another in August. The eggs are elliptical, with hard, white, limy shells, and measure about 34 by 21 millimetres.

In riding along the east side of Lower Klamath Lake, June 12, 1918, a number of these turtles were caught crossing the road. They were large females and probably were looking for suitable places to lay their eggs.

Dr. and Mrs. Grinnell give the following notes on the habits of this species as observed in Los Angeles County:

“It is seldom found far from permanent streams and ponds, and as these are scarce, one does not often meet with this animal. We have seen it in July and August in the San Gabriel, Arroyo Seco and Tujunga Canyons, where individuals were startled from rocks at the margins of sluggish pools. They seek safety in the deepest places beyond reach, burying themselves in masses of water-logged leaves and brush, if such retreats are available.

“Mr. Howard Wright, a student in the Biological Department, found mud turtles to be abundant along the West Fork of the San Gabriel, the last of June, 1906. Here the turtles were found to avoid the rapid stretches in the stream, and were easiest to capture in the still, shallow pools. In July, turtle tracks could be seen in many directions over the sand, where the animals had wandered at night away from the stream. By following these tracks, one turtle was found half-buried in the warm sand about 30 feet from the stream,

and close to her an egg completely hidden in the sand. This turtle was dissected and found to contain two more eggs. The stomach was found to be filled with beetles, of a slow-moving species then common crawling among the rocks in the water. Mr. Wright states that the turtles in the pools would bite at a baited fish-hook, if the latter was left quietly alone for awhile."

Genus 51. *Pseudemys*

Pseudemys GRAY, Proc. Zool. Soc. London, 1855 (1856), p. 197 (type *concinna*).

The shell is rather narrow and moderately low. The plastron is immovably united to the carapace by a broad bridge. The alveolar surface of the jaw is rather wide with a well developed ridge parallel to the cutting edge. The fingers and toes are fully webbed, five claws on fore limb and four behind. The skin on top of the head is not divided into scales. There are two supracaudal plates. The tail is of moderate length.

225. *Pseudemys nebulosa* (Van Denburgh)

LOWER CALIFORNIA TURTLE

Pseudemys ornata TRUE, Bull. U. S. Nat. Mus., No. 24, 1883, p. 33.

Chrysemys nebulosa VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. V, 1895, p. 84, pls. IV, V, VI (type locality, **Los Dolores, Lower California, Mexico**); DITMARS, Reptile Book, 1907, p. 41.

Chrysemys scripta var. *elegans* MOCQUARD, Nouv. Arch. Mus. Paris, Ser. 4, Vol. 1, 1899, p. 300.

Chrysemys ornata nebulosa SIEBENROCK, Zool. Jahrb., Suppl. 10, Heft 3, 1909, p. 466.

Pseudemys ornata nebulosa STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 120; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, pp. 114, 115.

Pseudemys nebulosa VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 53.

Description.—Shell rather narrow, depressed but not very low, without definite dorsal keel. Vertebrales five, broader than long. Costals four, first longest, second highest, last smallest. Nuchal well developed, not very narrow. Marginals 12 on each side, supracaudals distinct. Plastron large, somewhat shorter than carapace, truncate anteriorly, weakly notched posteriorly. Gular plates smallest, triangular. Abdominals largest, with longest median suture. Axillary and inguinal plates well developed. Head moderately large, covered above and laterally with smooth skin. Upper jaw not hooked. Skin of neck granular and folded. Limbs covered with scales; anterior with five, posterior with four digits webbed to bases of long claws. Tail moderate.

The neck is clove brown with several pale longitudinal lines on each side. The highest one of these ends on the temple in a large oval spot of the same color. The lowest and largest is continued forward across the middle of the lower eyelid, giving off, at the lower edge of the inferior maxillary bone, a branch which, continuing forward, crosses to the upper jaw, runs past the anterior edge of the orbit, turns forward at a right angle, and terminates at the nostril. The five similar lines on the nape are continued forward over the top of the head, and, besides being more or less undulating, give rise to several short transverse branches. There are six longitudinal yellow rays on the forearm; one on each edge and two on each surface. Greenish yellow lines traverse the backs of the five fingers and four perfect toes. The vertebrales sometimes show black spots. All the marginals are ornamented with black ocelli. The plastron is marked with large longitudinal seal brown blotches, not at all like the double lines on this region in *C. ornata*.

Length of carapace	80
Greatest width of carapace	63

A carapace 283 mm. in length is much less distinctly marked than the type, but has a rather indistinct black-centered ocellus on each of the last pair of costal scutes. Another 273 mm. long, shows no trace of these ocelli, nor are they visible in the other alcoholic specimen, the carapace of which measures 194 mm.

Remarks.—This turtle is closely related to *Pseudemys ornata*, but a trinomial is not used here because intergradation has not been shown.

Distribution.—This turtle is known only from the southern portion of the peninsula of Lower California, where it has been collected at Los Dolores, Agua Caliente, and San Jose del Cabo. Mocquard states that it occurs also at San Ignacio, Purissima Jesus Maria, Todas Santos, and Santiago. The specimen collected by Mr. Belding, and recorded by Yarrow as taken at La Paz, was secured at San Jose del Cabo. Mr. Belding notes that this turtle was observed also at Santiago and Miraflores.

Genus 52. *Chrysemys*

Chrysemys GRAY, Cat. Tort., Croc., Amphis., Brit. Mus., 1844, p. 27 (type, *picta*).

The shell is rather narrow, low or moderately high. The plastron is immovably united to the carapace by a broad bridge. The alveolar surface of the upper jaw is rather narrow, especially in front, and the ridge parallel to the cutting edge is not well developed. The internal openings of the nostrils are between the eyes. The fingers and toes are fully webbed. The skin on top of the head is not divided into scales. There are two supracaudal plates. The tail is short or moderate.

226. *Chrysemys marginata bellii* (Gray)

WESTERN PAINTED TURTLE

- Emys Bellii* GRAY, Syn. Rept. Griffith's An. Kingd., 1831, p. 31 (type locality, **America?**); DUMÉRIE & BIBRON, Erpét. Générale, Vol. II, 1835, p. 302; GRAY, Cat. Tort. Croc. Amphis. Brit. Mus., 1844, p. 27.
- Emys Oregoniensis* HARLAN, Amer. Journ. Sci., Vol. XXXI, 1837, p. 382, pl. (type locality, **ponds near Columbia River**); HOLBROOK, N. Amer. Herp., Ed. 2, Vol. I, 1842, p. 107, pl. XVI.
- Chrysemys bellii* GRAY, Cat. Shield Rept., Vol. I, 1855, p. 33; AGASSIZ, Contr. Nat. Hist. U. S., 1857, Vol. I, p. 439, Vol. II, pl. VI, figs. 8, 9; HAY, Batrachia and Reptilia Indiana, 1892, p. 186; HURTER, Trans. Acad. Sci. St. Louis, Vol. VI, 1892, p. 186; VAN DENBURGH, Occas. Pap. Cal. Acad. Sci., Vol. V, 1897, p. 33; DITMARS, Reptile Book, 1907, p. 33, pl. XIII, fig. 1.
- Chrysemys oregonensis* HOLBROOK, N. Amer. Herpetology, Ed. 2, Vol. I, 1842, p. 107; AGASSIZ, Contr. Nat. Hist. U. S., 1857, Vol. I, p. 440, Vol. II, pl. III, figs. 1-3; BAIRD, U. S. Mex. Bound. Surv., Vol. II, 1859, Rept., p. 4; COPE, Ann. Rep. U. S. Geol. Surv. Terrs., 1871, (1872), p. 468; COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 53; YARROW, Surv. W. 100th Merid., Vol. V, 1875, p. 583.
- Chrysemys nuttallii* AGASSIZ, Contr. Nat. Hist. U. S., 1857, Vol. II, p. 642 (**new name for *C. oregonensis***).
- Clemmys oregoniensis* STRAUCH, Mém Acad. Sci. St. Petersb., Ser. 7, Vol. V, No. 7, 1862, p. 114.
- Chrysemys cinerea bellii* BOULENGER, Cat. Chelonians Brit. Mus., 1889, p. 74; SIEBENROCK, Zool. Jahrb., Suppl. 10, Heft 3, 1909, p. 461.
- Chrysemys bellii* TRUE, Bull. U. S. Nat. Mus., No. 24, 1883, p. 35; CRAGIN, Bull. Washburn Laborat., Vol. I, 1885, p. 101; HURTER, Trans. Acad. Sci. St. Louis, Vol. XX, 1911, p. 236; ELLIS & HENDERSON, Univ. Colorado Studies, Vol. X, No. 2, 1913, p. 115; ELLIS & HENDERSON, Univ. Colorado Bull., Vol. XV, No. 6, 1915, p. 263; DICE, Univ. Cal. Publs. Zool., Vol. 16, No. 17, 1916, p. 306.
- Chrysemys marginata bellii* STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 118; BLANCHARD, Copeia, 1921, No. 90, p. 6.

Description.—Shell comparatively narrow, depressed but not very low, without dorsal keel. Vertebrae five, usually longer than broad. Costals four, first longest, second high-

est, last smallest. Nuchal very narrow. Marginals 12 on each side, supracaudals being distinct. Plastron large, extending forward about as far as carapace, weakly notched posteriorly, truncate or rounded anteriorly. Gular plates smallest, triangular. Pectorals very much smaller than abdominals; latter longest, and with longest median suture. Axillary and inguinal plates well-developed, inguinal wedged in between abdominal and marginals. Head moderately large, covered above and laterally, except sometimes on temples, with smooth skin. Upper jaw not hooked, sometimes notched at symphysis. Skin of neck and gular regions granular or tubercular. Limbs covered with scales, anterior with five, posterior with four, digits webbed to bases of long claws. Tail moderately long or short.

The carapace is indefinitely marbled above with olive, yellow, and dark brown. Near the middle of each costal plate is a vertical bar of yellow, while a narrow or indistinct yellow line runs along near the anterior margin of each costal plate. In front of each of these yellow markings is a large vertical blotch of dark brown. The vertebrales show traces of yellow longitudinal lines near their lateral edges. The edge of the carapace is yellow; from it yellow bars run up on the middle of the marginal plates. Between these yellow bars are dark brown or black ocelli with indefinite yellow concentric lines. The lower surfaces of the marginals are blotched with dark brown. The plastron is yellow, often heavily blotched with dark brown. The head and limbs are grayish or brownish olive, with numerous longitudinal yellow lines. There is a large, elongate, yellow or orange blotch behind the eye.

The colors of a living specimen were as follows: Large postocular blotch, scarlet-vermillion or flame scarlet; lines on side of head greenish white; eye Paris green with black cross-bar; costal and marginal markings chrome yellow and

dark seal brown (almost black); costal bars tinged with cadmium orange.

Hurter, in his *Herpetology of Missouri* gives the following description of the coloration:

"Color above greenish olive with narrow yellowish lines following the sutures. Some of the shields are traversed by vein-like lines of the same color. Marginals above with about three transverse lines, the median of which reaches the inner margin of plate and sometimes joins a yellow band along the outer margin. Marginals beneath with a broad band traversed by yellowish stripes. Within the fields formed by these stripes are dark circular spots with a yellowish center. The connection between the plastron and marginals has three, sometimes interrupted, yellowish red stripes. The plastron is red with the central region occupied by a large blackish lyrifiform blotch, which is marbled by pale yellow and sends rays out along the sutures. Head and legs are striped with red. A yellowish stripe from below the nostril in front to the end of the jaw. Two other lines of the same color join at the nose, run to and through the orbit, and end above and below the tympanum. Three other yellowish red stripes, one starting at near the corner of the mouth, the other through the tympanum and the third on the occiput, run parallel along the neck to the body. A yellowish stripe starts at the symphysis of the lower jaw, behind which it bifurcates and with another one in the middle of that space runs back on the lower side of the neck to the body. Besides this the whole head and neck are marked with a number of very narrow yellowish parallel lines. On the front side of the fore legs are four reddish stripes, one on each side and two in the middle, which reach to the end of the fingers. Webs largely pale yellow. On the posterior side of the hind legs are two reddish yellow bands, which start from the body, running nearly parallel and converging at the tail,

from where they run out in a single stripe on the lower end of the tail to its tip. On each side of the upper side of the tail are also two of these stripes, which join and run out to the end of this member."

Length of carapace.....	160	250
Length of plastron.....	150	232
Width of carapace.....	116	175
Width of plastron.....		139
Length of tail.....		32

Distribution.—Boulenger records specimens of this turtle as having been collected in British Columbia and Walla Walla, "British Columbia" [=Washington?]. Harlan's "*Emys Oregoniensis*" was secured in ponds near the Columbia River. This turtle has twice been found in the San Francisco markets. In each instance the market-men told me that the turtle had been sent in with fish from San Joaquin River near Stockton, California, but, when questioned, could not state positively that the lot had not come from Oregon, Washington, or elsewhere. Yarrow (1875) records this turtle as taken in Rock Creek Canyon, south of Camp Apache, Arizona.

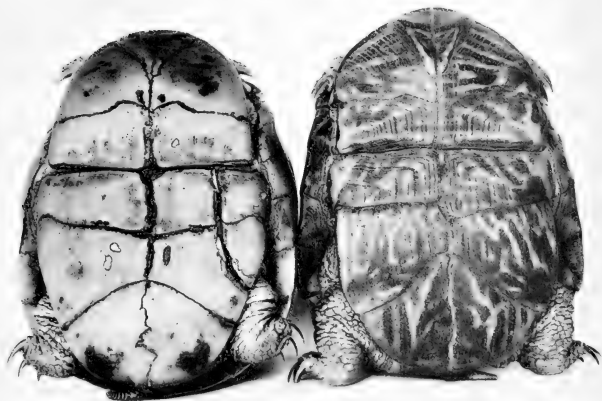
Dr. Blanchard recently collected three of these turtles in Sheep Creek, at Springdale, Stevens County, Washington, and Dice has recorded it from Walla Walla or Columbia counties.

Genus 53. *Terrapene*

Terrapene MERREM, Tent. Syst. Amphib., 1820, p. 27 (type, *clausa*=*carolina*).

Cistudo FLEMING, Philos. Zool., 1882, p. 270.

The shell is high, very convex, and rounded in lateral outline. The plastron is large, rounded both before and behind, is divided by a hinge between the pectoral and abdom-



Terrapene ornata, Ornate Box Turtle
Collected near Fairbank, Cochise County, Arizona, August, 1912.

inal plates, and is loosely united to the carapace in such a way that its two portions may be made to completely close the shell. The fingers and toes are little if at all webbed.

Several species are known, of which one occurs in eastern Arizona.

227. *Terepene ornata* (Agassiz)

ORNATE BOX TORTOISE

Plates 123 and 124

Cistudo ornata AGASSIZ, Contrib. Nat. Hist. U. S., Vol. I, 1857, p. 445 (type locality, **The Upper Missouri and Iowa**); COPE, Bull. U. S. Nat. Mus., No. 1, 1875, p. 53; TRUE, Bull. U. S. Nat. Mus., No. 24, 1883, p. 37; CRAGIN, Bull. Washburn Laborat., Vol. I, 1885, p. 100; BOULENGER, Cat. Chel. Brit. Mus., 1889, p. 118; H. GARMAN, Bull. Illinois State Lab. Nat. Hist., Vol. III, 1892, p. 220; GARMAN, Bull. Essex Inst., Vol. XXIV, 1892, p. 98; HAY, Batrachians and Reptiles Indiana, 1893, p. 187; COPE, Proc. Acad. Nat. Sci. Phila., 1893, p. 386; HURTER, Trans. Acad. Sci. St. Louis, Vol. VI, 1893, p. 261; BOULENGER, Ann. Mag. Nat. Hist., Ser. 6, Vol. XV, 1895, p. 331; COCKERELL, Amer. Nat., Vol. XXX, 1896, p. 326; DITMARS, Reptile Book, 1907, p. 58, pl. XXI, fig.

Terrapene ornata BAUR, Science, N. S., Vol. 17, 1891, p. 191; BAUR, Amer. Naturalist, Vol. XXVII, 1893, p. 678; CRAGIN, Colorado College Studies, Vol. V, 1894, p. 37; TAYLOR, Proc. U. S. Nat. Mus., Vol. 17, 1894, p. 581, fig. 7; VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 6, 1896, p. 338; BRIMLEY, Journ. E. Mitchell Soc., Vol. XX, 1904, p. 7; RUTHVEN, Bull. Amer. Mus. Nat. Hist., Vol. 23, 1907, p. 595; STRECKER, Proc. Biol. Soc. Washington, Vol. XXI, 1908, p. 79; SIEBENROCK, Zool. Jahrb., Suppl. 10, Heft 3, 1909, p. 493; HURTER, Trans. Acad. Sci. St. Louis, Vol. XX, 1911, p. 248; ELLIS & HENDERSON, Univ. Colorado Studies, Vol. X, No. 2, 1913, p. 117; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 396; STRECKER, Baylor Bulletin, Vol. XVIII, No. 4, 1915, p. 13; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 116.

Description.—Carapace high, convex, somewhat flattened above, rounded in lateral outline, but broader behind than in front. Vertebrae five, costals four, second largest.

Marginals twelve on each side and a small nuchal. Plastron large, rounded, completely closing the shell, hinged between pectorals and abdominals; anal, femoral and humeral plates largest; gulars smallest. Axillary and inguinal plates absent. Head rather large, covered above with smooth skin. Limbs well developed, anterior with five, posterior with four, clawed digits which are little if at all webbed. Tail rather short and slender.

The general color and markings are quite variable. The carapace usually is brown, olive, or yellowish, marked with yellow rays which radiate from the center of growth of each plate. In some specimens these light rays are few or obsolete. The plastron is similarly marked. The head, neck and limbs are brown or olive with yellowish or orange markings.

Length of carapace.....	121	128	129	129	129	134
Length of plastron.....	126	127	132	132	130	135
Width of carapace.....	105	106	103	102	111	111
Width of plastron.....	78	83	84	88	85	86

Distribution.—This turtle ranges from Indiana, Illinois and the Mississippi Valley west to the Rocky Mountains and southern Arizona.

In Arizona it has been collected near Fort Lowell and La Osa, Pima County, and Fairbank, and Ramsey Cányon, Huachuca Mountains, Cochise County. The National Museum has it from the Graham Mountains at 4,600 feet.

Genus 54. Gopherus

Gopherus RAFINESQUE, Atlantic Journal, Vol. 1, No. 2, 1832, p. 64 (type, *polyphemus*).

Xerobates AGASSIZ, Contr. Nat. Hist. U. S., Vol. 1, 1857, p. 446 (types, *polyphemus* and *berlandieri*).

The shell is very broad and high. The plastron is im-



Terrapene ornata, Ornate Box Tortoise
Collected near Fairbank, Cochise County, Arizona, August, 1912.

movably united to the carapace by a broad bridge. There is a ridge along the middle of the alveolar surface of each side of the upper jaw parallel to the cutting edge, except in front where there is a longitudinal ridge at the symphysis. The internal openings of the nostrils are between the eyes. The limbs are club-shaped, the fore limbs flattened, without webs. The skin on top of the head is divided into scales. There is but one supracaudal plate.

Of the three known species one occurs within our limits. The genus is but doubtfully distinct from *Testudo*.

228. *Gopherus agassizii* (Cooper)

DESERT TORTOISE

Plates 125, 126, and 127

Xerobates agassizii COOPER, Proc. Cal. Acad. Sci., Vol. 2, 1863, p. 120 (type locality, **Mountains of California near Fort Mojave**); COOPER, Proc. Cal. Acad. Sci., Vol. IV, 1870, p. 67; TRUE, Proc. U. S. Nat. Mus., Vol. 4, 1881, p. 437; TRUE, Bull. U. S. Nat. Mus., No. 24, 1883, p. 38.

Testudo agassizii BOULENGER, Cat. Chelonians Brit. Mus., 1889, p. 156; DITMARS, Reptile Book, 1907, p. 69, pl. XXIV; SIEBENROCK, Zool. Jahrb., Suppl. 10, Heft 3, 1909, p. 517; CAMP, Univ. Cal. Publ. Zool., Vol. 12, No. 17, 1916, p. 512; GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10, 1917, p. 199; COWLES, Journ. Entomol. & Zool., Pomona College, Vol. XII, No. 3, 1920, p. 64; TERRON, Mem. y Rev. Soc. Cient. Antonio Alzate, Vol. 39, 1921, p. 165.

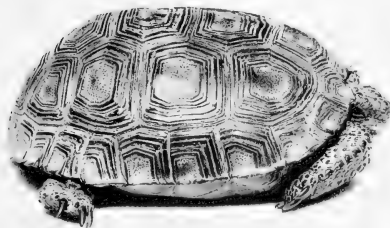
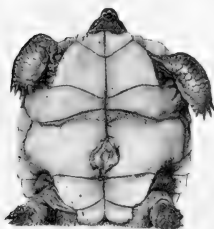
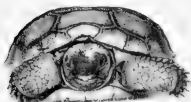
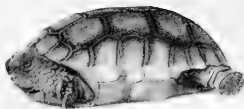
Gopherus agassizii STEJNEGER, N. Amer. Fauna, No. 7, 1893, p. 161; VAN DENBURGH, Occas. Papers Cal. Acad. Sci., V, 1897, p. 35; Mc LAIN, Critical Notes, 1899, p. 2; MEEK, Field Columbian Mus., Zool. Series, Vol. 7, No. 1, p. 3; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. 3, 1913, p. 397; STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 121; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. III, Vol. XI, 1921, p. 29.

Description.—Shell broad and deep, often flattened above, its margin serrate all around, except in worn speci-

mens, and usually more or less rolled upward over limbs. Growth-center of each plate smooth, but usually surrounded by beautifully ribbed shell. Vertebrales five, last largest and widest. Costals four, first longest, second and third about equally high, last smallest. Nuchal not much narrower than long. Marginals eleven and a half on each side, last pair being united to form a single supracaudal plate. Plastron large, extending forward beyond the carapace, notched posteriorly and sometimes anteriorly. Gular plates smallest, sometimes united, covering a narrow process of the plastron, which may be level or curved upward. Pectorals very much smaller than abdominals, with shortest median suture, except sometimes that of anals. Abdominals largest, with longest median suture. Humerals larger than femorals. Anals little longer than gulars. Axillary and inguinal plates well developed, latter varying from two to six, not extensively wedged in between abdominals and marginals. Head rather elongate, not very wide, covered above with flat scales larger anteriorly than posteriorly. Upper jaw not hooked, margins nearly straight, irregularly but finely serrate. Skin of neck with flattened granules. Anterior limbs large, heavy, much expanded laterally, covered in front and externally with large, hard, smooth scales, and provided with five stout claws. Posterior limbs not compressed, covered around the edge of the circular sole with large scales, and provided with four stout claws. Tail very short, slender distally.

The carapace is brown or horn-color, usually relieved, especially near the centers of the plates, with yellow. The head and limbs are brown. The plastron is yellow, shaded with brown along the edges of its plates.

Length of carapace.....	215	260	285	310
Length of plastron.....	210	265	285	300
Width of carapace.....	160	212	230	240
Width of plastron.....	148	184	210	209



Gopherus agassizii, Desert Tortoise

Figs 1, 2 & 3. Young collected near Mecca, Riverside County, California, May, 1912

Fig 4. Collected near Tucson, Pima County, Arizona, June, 1912

Distribution.—The Desert Tortoise was first described from the mountains of California near Fort Mojave. Its range is restricted to the desert areas of southeastern California, southern Nevada, and Arizona.

In California, it has been found in Kern (one-half mile east of Mohave), Los Angeles (three miles south of Palmdale), San Bernardino (Salado Valley, Leach Point Valley, between Daggett and Pilot Knob, Crater Summit, Victorville, Needles, Kramer, Barstow, Ludlow), Riverside (Cottonwood Mountains), and Imperial (Fort Yuma), counties.

Nevada records are Pahrump Valley and the Bend of the Colorado River.

We have received one of these tortoises from Utah, where it was taken on the mesas south of the Shivwits Indian Reservation, about 14 miles west of Saint George, Washington County.

In Arizona, it has been secured near Yuma and Ehrenburg, Yuma County; Phoenix, Maricopa County; near Tucson, and in the Santa Catalina Mountains, in Pima County; and near Fort Grant, Graham County.

It has been taken on Tiburon Island, and at San Pedro Bay, Sonora.

Habits.—Almost nothing is known of the habits of this turtle if we except the following note by Mr. E. T. Cox:*

“This fellow is found on the basaltic mountains in the most arid parts of this dry country. He is a vegetarian, feeding, as I am told, on cacti. His flesh is highly esteemed as food by the Indians and Mexicans. You will perceive that his mandibles are notched or toothed. His legs are covered with bony scales, and his front toe nails are made long and strong for digging amongst the rocks, while the hind feet are round like an elephant’s.

*Cox, *Am. Nat.*, XV, 1881, p. 1003.

"When molested he draws in his head and closes the aperture with his legs by bringing the knees together in front of the head; the hind legs are also drawn in until the posterior spaces are closed by the feet, and in this way all vulnerable points are protected by impenetrable armor. In preparing the specimen, I found on each side, between the flesh and carapax, a large membranous sack filled with clear water; I judged that about a pint ran out, though the animal had been some days in captivity and without water before coming into my possession. Here then is the secret of his living in such a dry region; he carries his supply of water in two tanks. the thirsty traveler, falling in with one of these tortoises and aware of this fact, need have no fear of dying for immediate want of water."

Meek gives the following note by Heller regarding six specimens secured north of Daggett, in the Calico mining district. "They had apparently just emerged from their winter hibernation, some being taken within a few feet of their burrows. The burrows were usually made in light, gravelly soil, in which they were sunk obliquely to a depth of about two feet. In this locality (2,500 to 3,500 feet altitude) they were found on a peculiar slate-colored soil in the lower part of the tree yucca zone. Soon after a shower they are said to be usually common, but during the hottest months, when most of the vegetation is dormant, they retreat to their burrows and hibernate."

Mr. Camp who observed this tortoise near Goffs, 30 miles west of Needles, writes: "About a mile north of Goffs station a number of desert tortoise burrows were found, some of which were occupied. The holes were dug slantingly into the rather firmly packed sand and gravel, usually at a grade of about 45 degrees. Often the places chosen were under creosote bushes and in the banks of small dry washes. The tunnels were from two to eight feet long, with a slight



Gopherus agassizii, Desert Tortoise
Collected near Tucson, Pima County, Arizona, May, 1912.

widening at the bottom. They varied in diameter with the size of the tortoise that inhabited them, being in every case about the shape of a longitudinal, vertical section of the animal's shell. Sometimes the tortoise could be seen lying at the inner end of its burrow. In the deeper holes a stick thrust in would reveal the presence of the creature which, lying partly outstretched, would draw up its feet and head when it felt the touch; and this diminution of respiratory space beneath the shell would be accompanied by a noisy expiration like the rapid blowing of a bellows. When seized by the back of the carapace to be drawn out the tortoises would sometimes stick fast in the holes, hooking their crooked front legs into the sand. One deep burrow, otherwise empty, contained the broken halves of two white, hard-shelled eggs which appeared to have been spherical and about an inch in diameter. No brush or food of any kind was found in any of the dens. Late in the afternoon of a hot July day a large tortoise was surprised in the act of coming out of its burrow. When it saw me it turned immediately and ambled back to safety.

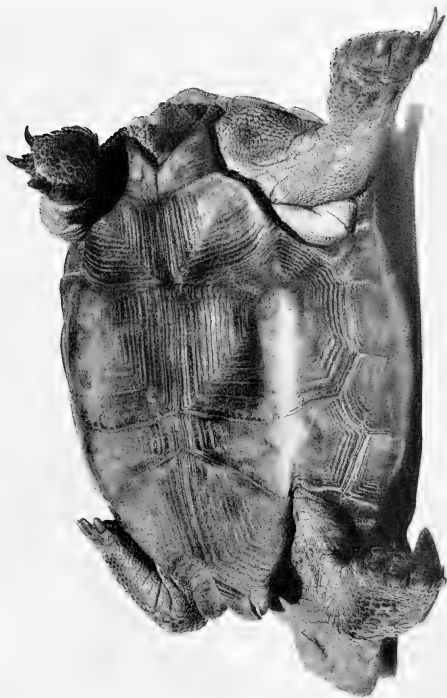
"Desert tortoises are said to come out in great numbers after thunder-showers. But this is by no means the only time of their activity, for they appear to wander abroad at all seasons, frequenting rocky and uneven as well as level ground. One meets with them plodding steadily across-country, occasionally stretching their short necks down over the pointed extremities of the plastron and testing the ground with the sensitive tip of the snout or stepping aside to crop some small annual plant growing in the shade of a boulder. Their usual gait does not carry them along at a rate of more than four or five miles a day (20 feet a minute by test), and they live at such great distances from water that in places it would seem impracticable for them to get a drink from one year's end to another. Sometimes when roughly handled a

tortoise will void the contents of its cloaca and bladder. The feces are black and about the size of those of the fox.

"The author kept a number of desert tortoises at his home for a time in an enclosure out-of-doors. The captive tortoises paced their pens and frequently attempted to dig out under the fence. They were not able to burrow into hard ground, but in a gravel bank they would scrape away alternately with the fore limbs and when the hole became deep enough would turn around and push the dirt out with their shoulders. They grazed contentedly upon the lawn or in patches of green weeds, and also ate lettuce or cabbage leaves thrown to them. They were never active unless warm and seldom so even then, coming out in bright sunshine to lie outstretched or seeking the warmth of a stove or radiator in a room. They were handled a great deal and were never known to open their mouths to bite. They soon became used to human surroundings and would pursue their accustomed activities with people about. Some of their habits are worthy of notice.

"When one tortoise meets another in the course of its journeying each, whatever the sex, nods its head rapidly up and down as if in salutation, and sometimes noses are touched before passing along. If two males happen to meet, a fight is likely to ensue. After the preliminary nodding the tortoises separate a little distance and then rush toward one another with the heads drawn part way into the shell. The combatants meet head on and the curved horns projecting from the anterior end of the plastron are butted rather violently against the adversary, but do him no damage except sometimes to turn him upon his back; he may then struggle for some time with one fore leg vibrating vigorously in the air and the other pawing for a foothold in the ground before he can right himself.

"The males court their mates by biting them gently



Gopherus agassizii, Desert Tortoise.
Collected near Tucson, Pima County, Arizona, May, 1912

around the edges of the shell. During copulation the male stamps his hind feet and utters a mechanical grunt with the head hooked over the end of the plastron and the mouth half open.

“Stephens (1914, p. 135) writes that teeth marks are sometimes seen on shells of living tortoises and believes that the shells “generally prove too hard for the coyotes.” The younger tortoises are soft-shelled and delicate. They probably fall prey in numbers to raptorial mammals and birds. The old ones are a favorite delicacy among the Indian and Mexican section-hands who live with their families along the railroad lines. Some tortoises kept as curiosities at Needles on a grass plot in front of the Santa Fe hotel are thought to have been gradually depleted by the inroads of the Indians, many of whom lounge about the place.”

Family 19. CHELONIIDÆ

This family is composed of all the marine turtles except the so-called leather-back turtles. They are turtles with paddle-shaped limbs, bony carapaces covered with horny plates, and head and limbs covered with scales. They inhabit the tropical and semitropical oceans. There are no authentic records of any of these turtles having been taken on the western coast of the United States, but they occur about the shores of southern Lower California. Individuals are said to reach a length of seven feet and a weight of eight or nine hundred pounds. The three kinds are known as green turtles, loggerhead turtles, and hawk-billed or tortoise-shell turtles. The first is the soup turtles of commerce. The last furnishes the tortoise “shell” of which combs and similar articles are made. The loggerheads are the most pelagic, and ordinarily are not used as food, or otherwise. All of the species resort to sandy shores to lay their eggs in holes which they dig a short distance above tide line. The

eggs are spherical and very numerous, are inclosed in leathery shells, and when deposited in the pits are covered with sand and left by the turtle.

Our knowledge of sea turtles is still too limited to justify any very definite conclusions as to the number of species, or even very emphatic statements as to the difference or identity of Atlantic and Pacific Ocean specimens. Still it seems best to regard those from the Pacific as distinct species.

SYNOPSIS OF GENERA

a.—Carapace covered with thicker, horny, imbricate shields; pectorals and abdominals usually keeled; two pairs of prefrontal shields; costals four.

Eretmochelys.—p. 994.

a².—Carapace covered with thin, juxtaposed, shields; pectorals and abdominals usually smooth.

b.—Vertebral plates five; costals four; one pair of prefrontal shields.

Chelonia.—p. 996.

b².—Vertebral plates usually more than five or costals more than four; two pairs of prefrontal shields.

Caretta.—p. 998.

Genus 55. *Eretmochelys*

Eretmochelys FITZINGER, Syst. Rept., 1843, p. 30 (type, *imbricata*).
Onychochelys GRAY, Proc. Zool. Soc. Lond., 1873, p. 397, (type, *O. kraussi*).

Shell covered with thick, imbricate, horny plates, the tortoise shell of commerce. Two pairs of prefrontal plates. Limbs large, paddle-shaped, with two claws. The vertebral and costal plates are keeled in young, and the plastral plates in adults also. The marginals project making the edge of the carapace serrate. The beak is hooked like that of a hawk.

These turtles are found in the tropical seas. The specific differences among them are as yet but little known.

229. *Eretmochelys squamosa* (Girard)

PACIFIC TORTOISE-SHELL TURTLE

Caretta squamosa GIRARD, U. S. Explor. Exped., Herpetol., 1858, p. 442, pl. 30, figs. 1-7 (type locality, **Sulu Seas and Indian Ocean**).

Caretta imbricata VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. 5, 1895, p. 83.

Eretmochelys squamata TOWNSEND, Bull. Amer. Mus. Nat. Hist., Vol. XXXV, 1916, p. 445.

Eretmochelys squamosa STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 122; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 53; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, p. 114.

Description.—Forelimbs long, paddle-shaped, with two claws. Head covered above with large plates of which four occupy the prefrontal region; frontal rather small; interparietal largest. Snout in profile curving up and back from the point of the beak which is the most anterior part of head. Horny plates of shell thick, and imbricate; vertebrals five, costals four, marginals 12 on each side and a nuchal. A series of plates between marginals and large plastral plates.

The general color is yellowish or brownish. The horny plates of the shell are beautifully mottled and clouded with yellow and brown. The plastron is light yellow.

The usual length of carapace is one and one-half or two feet, but in very large specimens may be nearly three feet.

Distribution.—So far as I can learn the Pacific Tortoise-shell or Hawksbill Turtle has been taken, within the limits of the present work, only near San Jose del Cabo. Its range doubtless extends considerably to the north of Cabo San Lucas both in the Gulf of California and along the west side of the peninsula of Lower California.

Remarks.—It is said that an average Hawksbill Turtle will weigh about 20 or 30 pounds. Large specimens yield as much as eight or ten pounds of shell.

Habits.—This is a marine species which resorts to sandy beaches to lay its eggs in pits which it digs. The eggs are more or less spherical and are inclosed in leathery shells. Its food is said to consist of fish, mollusks and crustaceans.

Genus 56. *Chelonia*

Chelonia LATREILLE, Hist. Nat. Rept., Vol. 1, 1802, p. 22 (type, *mydas*).

The shell is covered with thin horny plates which are not imbricate. There is but one pair of prefrontal plates. There is little or no keeling of the vertebral, costal or plastral plates. The vertebrals are five and the costals four in number.

The so-called green or soup turtles live in nearly all tropical and semitropical seas. Little is known regarding specific variation. Atlantic and Pacific Ocean species usually are considered to be distinct.

230. *Chelonia agassizii* Bocourt

PACIFIC GREEN TURTLE

Chelonia agassizii BOCOVRT, Ann. Sci. Nat., Ser. 5, Zool., Vol. 10, Pts.

1-3, 1868, p. 122 (type locality, **Pacific Coast of Guatemala**);

DUMÉRIL & BOCOVRT, Miss. Sci. au Mex., Reptiles, 1e livr., 1870,

p. 26, pl. VI; COPE, Bull. U. S. Nat. Mus., No. 32, 1887, p. 24;

VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. V, 1895, p. 83;

STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917,

p. 122; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4,

Vol. XI, 1921, p. 53; NELSON, Mem. Nat. Acad. Sci., Vol. XVI,

1921, p. 114.

Chelonia virgata TRUE, Bull. U. S. Nat. Mus., No. 24, 1883, p. 28; TOWN-

SEND, Bull. Amer. Mus. Nat. Hist., Vol. XXXV, 1916, p. 445.

Chelonia japonica STEPHENS, Trans. San Diego Nat. Hist., Vol. III,

No. 4, 1921, p. 65.

Description.—Forelimbs long, paddle-shaped, with one well developed claw. Head covered above with large plates of which one pair occupy the prefrontal region; frontal rather small; interparietal largest. Snout in profile often extending anterior to edge of beak. Horny plates of shell thin, not imbricate; vertebrals five, costals four, marginals 12 on each side and a nuchal. A series of plates between marginals and large plastral plates.

The carapace is olive or brownish, often clouded or mottled with yellow. The plastron is yellow.

The usual length of carapace is between two and three feet.

Distribution.—This turtle is abundant in the tropical waters of the Pacific Ocean. It breeds in considerable numbers on Socorro Island and has been recorded from both coasts of Lower California, at San Bartolome Bay, Magdalena Bay, Willard Bay, the mouth of the Colorado River, and Tiburon Island. It may perhaps occasionally occur off the coast of southern California, but I know of no definite records. Stephens says one was caught at National City and that this turtle has been seen in San Diego Bay and Mission Bay, San Diego County.

Remarks.—Large specimens may weigh five or six hundred pounds, but the average is much smaller. Of all the sea turtles this is the only one much used for food. It may often be seen in our markets, and is known as the Green or Soup Turtle. They are reported to haul out on the beaches at San Bartolome Bay for egg laying in April and May.

Habits.—Like the other marine species this turtle deposits its eggs in pits on sandy shores. The female goes ashore at night and crawls over the sand to a point above

high water level. Here she digs a hole with her fins. In this hole, from one to two feet deep, she lays from one to two hundred eggs. She then scrapes the sand back over the eggs and levels and smooths the surface. The eggs are nearly spherical and are enclosed in leathery shells. The young enter the water as soon as hatched. The food of this turtle consists mostly of marine plants.

Genus 57. *Caretta*

Caretta RAFINESQUE, Specchio Sci. (Palmero), Vol. 2, No. 9, 1814, p. 66 (type, *nasuta*=*caretta*).

The shell is covered with thin horny plates which are not imbricate. There are two pairs of prefrontal plates. The head is very large. There usually are more than four costals and often more than five vertebrales.

231. *Caretta olivacea* (Eschscholtz) PACIFIC LOGGERHEAD TURTLE

Chelonia olivacea ESCHSCHOLTZ, Zool. Atlas, Pt. 1, 1829, p. 2, pl. 3 (type locality, **Manila Bay, P. I.**).

Lepidochelys olivacea VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 2, Vol. V, 1896, p. 1008.

Caretta olivacea STEJNEGER & BARBOUR, Check List N. Amer. Amph. Rept., 1917, p. 123; VAN DENBURGH & SLEVIN, Proc. Cal. Acad. Sci., Ser. 4, Vol. XI, 1921, p. 53; NELSON, Mem. Nat. Acad. Sci., Vol. XVI, 1921, p. 114.

Description.—Forelimbs long, paddle-shaped, usually with two claws. Head covered above with large plates of which two pairs occupy the prefrontal region; frontal rather small; interparietal largest. Horny plates of shell thin, little if at all imbricate; costals usually more than four and vertebrales often more than five. A series of plates between marginals and large plastral plates. Young specimens have the costals and vertebrales more or less strongly keeled.

The carapace is brownish or blackish above. The plastron is yellowish.

The usual length of carapace is between two and three feet, but specimens a foot longer sometimes are taken.

Distribution.—The tropical and subtropical waters of the Pacific Ocean are included in the range of this Loggerhead Turtle. One very young individual was collected near San Jose del Cabo, Lower California. An adult was captured at sea at latitude 22 degrees between Cerros* and San Benedicto islands. The species has not been recorded from California but may perhaps occasionally visit our coast.

Remarks.—Large specimens may weigh nearly 500 pounds. Usually their weight is much less. This turtle often is met far from land. It is not used as food.

Habits.—Loggerhead Turtles more often are met in mid-ocean than either the Green or the Shell turtles. Like these species they resort to sandy beaches to lay their eggs in pits which they dig. They seem to be chiefly carnivorous, eating crabs, molluscs, and fish.

Family 20. DERMOCHELIDÆ

This family contains only the marine turtles of the genus Dermochelys, variously known as the Leather-backed Turtle, Trunk Turtle, Luth, Lyre Turtle, Harp Turtle, or Leathery Turtle. The Atlantic and Pacific Ocean turtles now are regarded as specifically distinct, but are as yet little known. These turtles reach a size greater than that of any other existing turtle. The shell is without horny shields. The vertebrae and ribs are not fused with the carapace.

Genus 58. *Dermochelys*

Dermochelys BLAINVILLE, Bull. Soc. Philom. Paris, 1816, p. 111 (119),
(type, *coriacea*).

Sphargis MERREM, Syst. Amphib., 1820, p. 19 (type, *coriacea*).

The carapace has seven and the plastron five longitudinal keels. The body is covered with thick, smooth leathery skin. The upper jaw is deeply notched anteriorly. The limbs are paddle-shaped, without claws; the anterior limbs are very long.

232. *Dermochelys schlegelii* (Garman)

PACIFIC LEATHER-BACK TURTLE

Plate 128

Sphargis coriacea var. *schlegelii* GARMAN, Bull. U. S. Nat. Mus., No. 25,
1884, p. 303 (type locality, **Tropical Pacific and Indian Ocean**).

Dermatochelys BELDING, West. Amer. Scientist, Vol. III, No. 24, 1887,
p. 99.

Dermochelys VAN DENBURGH, Proc. Cal. Acad. Sci., Ser. 3, Zool., Vol. 4,
No. 3, 1905, p. 51, pls. IX, X.

Dermochelys schlegelii STEJNEGER, Bull. U. S. Nat. Mus., No. 58, 1907,
p. 485; GRINNELL & CAMP, Univ. Cal. Publ. Zool., Vol. 17, No. 10,
1917, p. 198; STEJNEGER & BARBOUR, Check List N. Amer. Amph.
Rept., 1917, p. 124; STEPHENS, Trans. San Diego Soc. Nat. Hist.,
Vol. III, No. 4, 1921, p. 65; NELSON, Mem. Nat. Acad. Sci., Vol.
XVI, 1921, p. 114.

Description.—Body and limbs covered with leathery skin without horny plates. Anterior limbs very long, without claws. Head very large, not retractile. Carapace with seven and plastron with five longitudinal ridges or keels.

The color is bluish black more or less spotted or marbled with white.

Specimens are said to attain a length of nine feet, but six to seven feet is a more usual size.

Distribution.—The tropical and subtropical waters of the Pacific and Indian oceans. One specimen was seen at Guaymas, on the Gulf of California. One was captured near Los Coronados Islands, one was secured off Point Loma, San Diego County, two near Santa Barbara, and one near Pigeon Point, San Mateo County, California. The species thus occurs occasionally off our coast.

Remarks.—Large specimens may weigh over 1500 pounds. Mr. Belding stated that the one which he saw at Guaymas, Mexico, weighed 1,102 pounds. Its flesh, perhaps without reason, is not considered good for food.

In January, 1905, a Leather-backed Turtle was caught near Santa Barbara. Upon its arrival in San Francisco this turtle proved to be a female measuring six feet and seven inches from the tip of its snout to the end of its tail. Its weight was given on the bill of lading as 800 pounds, but this may have been estimated rather than actually determined. It was secured by Mr. G. W. Gourley and Albert F. Stafford, about January 2, in 25 fathoms of water in the open sea about two miles south of Santa Barbara. (Plate 128).

Mr. Gourley has given me the following glowing account of its capture :

“SANTA BARBARA, CAL.,

“Jan. 17, 1905.

“*Dear Sir:*—Your note of 13th inst. received
In regard to the details of the capture I will say that the turtle was first seen swimming on the surface about two miles off shore and to the southwestward of the Santa Barbara whistling buoy. I went after it (accompanied by a boy) in an 18 foot sailboat. I had a gaff with a hook on the end of it and bent about 200 feet of rope onto the handle. I

had also prepared a number of other ropes with nooses on them to be ready for quick work.

"On approaching the turtle it did not hear the wash of the boat until we were within about 25 feet of it, when it made a rush to windward and started to dive, but the momentum of the boat when I luffed into the wind carried her right along side of him and I dropped the tiller and got forward with the gaff-hook and swung over the side in the weather rigging and got the hook fast in the leathery part of his neck. He immediately sounded and run out the full length of the line—about 200 feet—and towed the boat about half a mile further out to sea. He then came to the surface and we overhanded the line and pulled up close to him again. When he caught sight of the boat he turned and came toward us and threw one of his flippers over the gunwale of the boat, nearly capsizing her. I climbed up on the upper side and shoved him off with an oar. He grabbed the end of the oar and bit the end of it off like a piece of cheese. His movements in the water were very swift; using his fore flipper he could turn almost instantly from one side to the other and his head would project about 18 inches from the body. I succeeded in throwing a noose over his head and later by attracting his attention in the opposite direction got ropes around both flippers—finally having five lines on him—and started to tow him toward the shore. He repeatedly slipped the ropes off from his neck and flippers—several times getting almost entirely free. We were from 11:30 A. M. till nearly 4 P. M. in finally landing him. When about half way to shore he suddenly turned and made a break out to sea, towing the boat stern first with all sail drawing full for several hundred yards with little effort. He emitted at intervals a noise resembling the grunt of a wild boar. There were (when we first tackled him) about a dozen ramoras attached to different parts of the body.



Dermochelys ablegensis, Pacific Leather-back Turtle
Collected near Santa Barbara, California, January, 1906

Most of them stayed with him all through the struggle and only deserted him when I hoisted him to the deck of the dock. I captured two of them and kept them in a bucket for several days. One was about ten inches long. The turtle lived for four days after taking out of the water—being very lively when first landed and gradually subsiding. I don't think this species ever come out of the water on their own responsibility.

“So far as I can learn there has been but one other of this kind ever taken on this coast. It was less than half the size of this and was entangled in a fisherman's net and was wounded in capturing, so that it died soon after. The meat was sold to the hotels here and was very fine eating.

“Respectfully,

“G. W. Gourley.”

Inquiry regarding the second specimen referred to in Mr. Gourley's letter finally resulted, through the kindness of Dr. Frank M. Anderson, in my securing from Mr. E. B. Hoyt of San Luis Obispo, a photograph of this turtle, taken soon after its death. Mr. Hoyt tells me that this photograph was taken by himself at Santa Barbara in July or August, 1901. It shows the animal covering more than half the length of the floor of a dray on which it was lying.

Regarding the one caught near Los Coronados Islands, the “San Francisco Chronicle” stated:

“It was found tangled in the kelp, and it required the assistance of nine men to get it on to the deck of the launch. It lived only three days after it was brought to land, deep-sea species being unable to live long out of water. In length it was seven feet eight inches and nine feet across the fore flippers from tip to tip. It weighed 1575 pounds.”

This is the most pelagic of turtles. It is perfectly adapted to marine life and resorts to land only to deposit eggs. Its motions are remarkably quick and its strength enormous. Little is known regarding its food, but it probably is purely carnivorous.

Banded Burrowing Snake.....	869	Bipedidæ.....	49, 597
Banded Gecko.....	58, 60	<i>Bipes biporus</i>	598
Band-tailed Earless Lizard.....	177	<i>biporus</i> (<i>Bipes</i>).....	598
barbouri (Coluber).....	41, 659, 681	<i>biporus</i> (<i>Euchirotes</i>).....	35, 597
bartolomas (Cnemidophorus).....	34, 492, 523, 526, 549	<i>biscutata</i> (<i>Eutania</i>).....	834
<i>Bascanion</i>	658	(<i>Thamnophis</i>).....	834
<i>anthonyi</i>	673	<i>biscutatus</i> (<i>Thamnophis</i>).....	23, 24, 25, 38, 789, 790, 817, 823, 833, 834, 837
<i>aurigulum</i>	683	biseriatus (<i>Sceloporus</i>).....	21, 24, 26, 28, 34, 111, 112, 219, 265, 289, 297, 298, 301, 304, 306, 308, 317
<i>constrictor vetustum</i>	660	Black Footless Lizard.....	467
<i>flagellum</i>	666	Black Spiny-tailed Iguana.....	64
<i>frenatum</i>	533	Black Rattlesnake.....	934
<i>laterale</i>	678	Black-tailed Rattlesnake.....	911
<i>aurigulum</i>	683	Black-throated Whiptail Lizard.....	529
<i>fuliginosum</i>	666	Blainville's Horned Toad.....	388
<i>piceum</i>	666	<i>blainvillei</i> (<i>Phrynosoma</i>).....	388, 393, 394, 395
<i>semilineatum</i>	675	blainvillii (<i>Phrynosoma</i>).....	21, 34, 365, 367, 388, 389, 391, 395, 396, 397, 403
<i>taniatum</i>	685	Bleached Rattlesnake.....	949
<i>taniatus</i>	685	Blue-tailed Lizard.....	581
<i>vetustus</i>	660	Boa, California.....	631, 634
<i>Bascanium aurigulum</i>	683	Pacific.....	644
<i>constrictor</i>	661	San Lucan.....	636
<i>flaviventris</i>	660	<i>bocourti</i> (<i>Sceloporus</i>).....	298, 305
<i>vetustum</i>	660	Boidæ.....	50, 623, 630
<i>flagelliforme piceum</i>	665	<i>Bothrodytes</i>	783
<i>testaceum</i>	665	<i>bottæ</i> (<i>Charina</i>).....	22, 24, 25, 27, 38, 638, 639, 642, 643
<i>flagellum</i>	666	<i>bottæ</i> (<i>Pseudoeryx</i>).....	639
<i>frenatum</i>	665	(<i>Tortrix</i>).....	638
<i>flaviventris</i>	660	Boyle's Milk Snake.....	751, 752, 754
<i>laterale</i>	665	boyllii (<i>Lampropeltis</i>).....	23, 27, 28, 30, 35, 38, 741, 752, 753, 757, 758, 759, 761, 762, 763, 765, 766
<i>laterale</i>	665, 678	<i>boyllii</i> (<i>Coronella</i>).....	752
<i>piceum</i>	665, 668	(<i>Lampropeltis</i>).....	760
<i>taniatum</i>	685	(<i>Ophibolus</i>).....	752, 757, 760
<i>laterale</i>	675, 678, 685	<i>Brachydactylus</i>	57
<i>taniatum</i>	685	<i>brachyops</i> (<i>Charina</i>).....	639
<i>testaceum</i>	665	<i>brevipes</i> (<i>Eumeces</i>).....	580
<i>Batrachosoma</i>	364	<i>brevirostre</i> (<i>Phrynosoma</i>).....	378
<i>coronatum</i>	388	<i>browni</i> (<i>Lytorhynchus</i>).....	693
becki (<i>Sceloporus</i>).....	21, 37, 264, 318, 321	<i>browni</i> (<i>Phyllorhynchus</i>).....	30, 693
beldingi (Cnemidophorus).....	560, 563	Brown's Leaf-nosed Snake.....	693
(<i>Verticaria</i>).....	22, 34, 38, 558, 559, 560	Brown-spotted Garter-Snake.....	855
Belding's Mole Lizard.....	597	<i>brunnea</i> (<i>Eutania</i>).....	824, 828
Orange-throat.....	560	<i>bufonium</i> (<i>Phrynosoma</i>).....	409, 411
Scaly Lizard.....	338	burnettii (<i>Gerrhonotus</i>).....	440, 445
bellii (Chrysemys).....	24, 25, 31, 981	Burnett's Alligator Lizard.....	440
Bellii (<i>Emys</i>).....	981	<i>cærulea</i> (<i>Verticaria</i>).....	41, 553, 568, 572, 573
bellona (<i>Pituophis</i>).....	725	<i>Calamaria tenuis</i>	771
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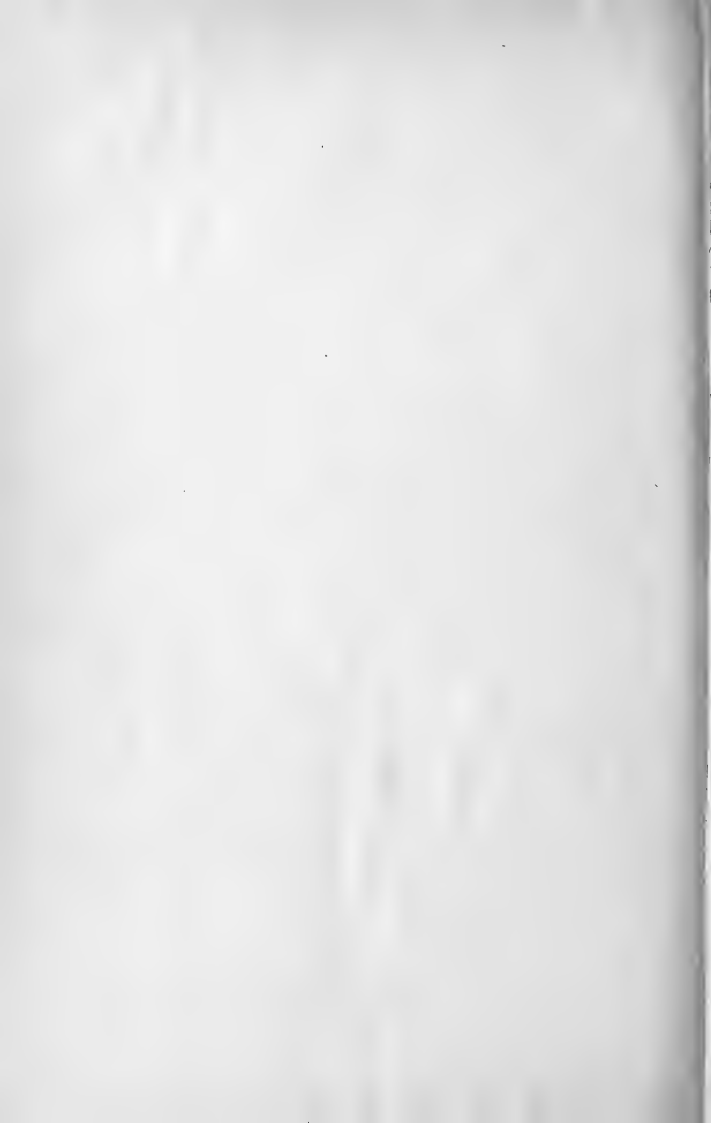
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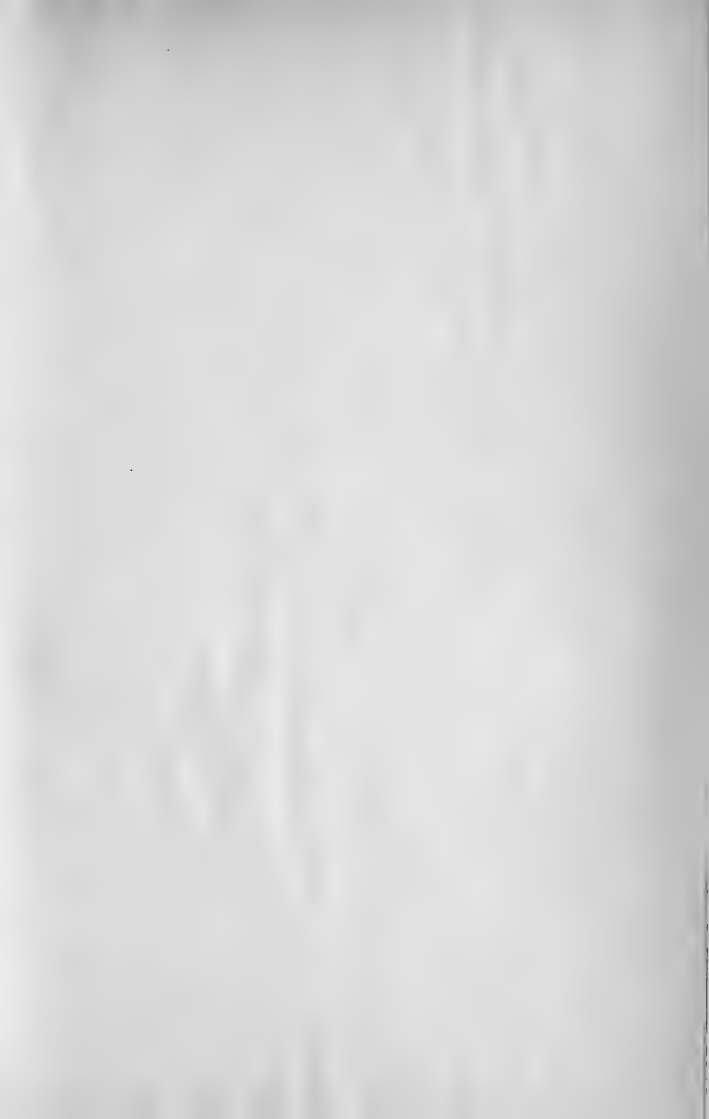
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Uta ornata symmetrica
- Page 40. Read
49. *Cnemidophorus catalinensis*
50. *Cnemidophorus bacatus*
- Page 53, line 28. Read
Esccondido, Santa Rosalia, Agua Verde Bay, farther north
- Page 63, line 27. Read
bb².—Head with spines or horns posteriorly.
- Page 64, line 24. Read
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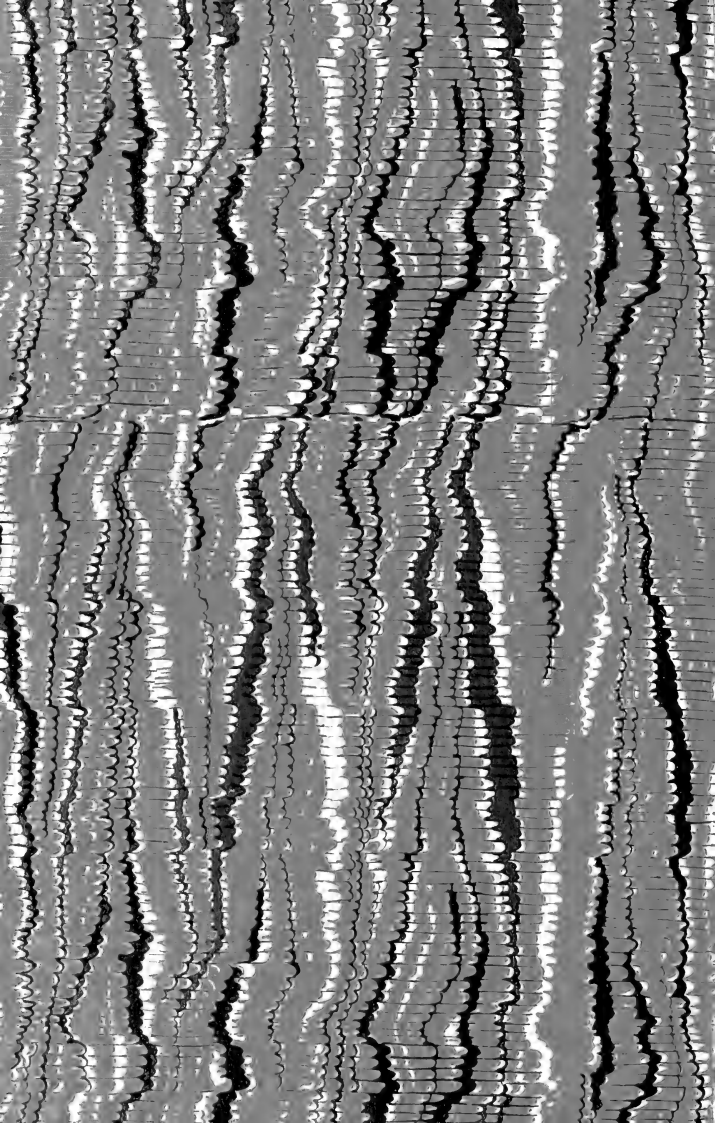
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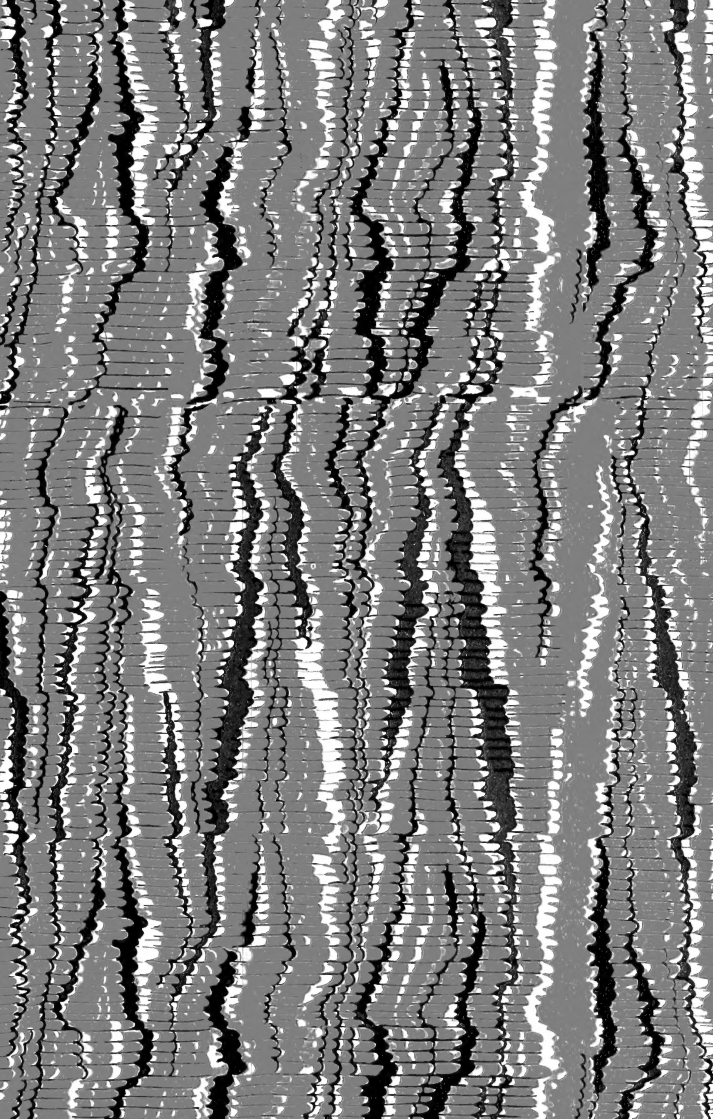
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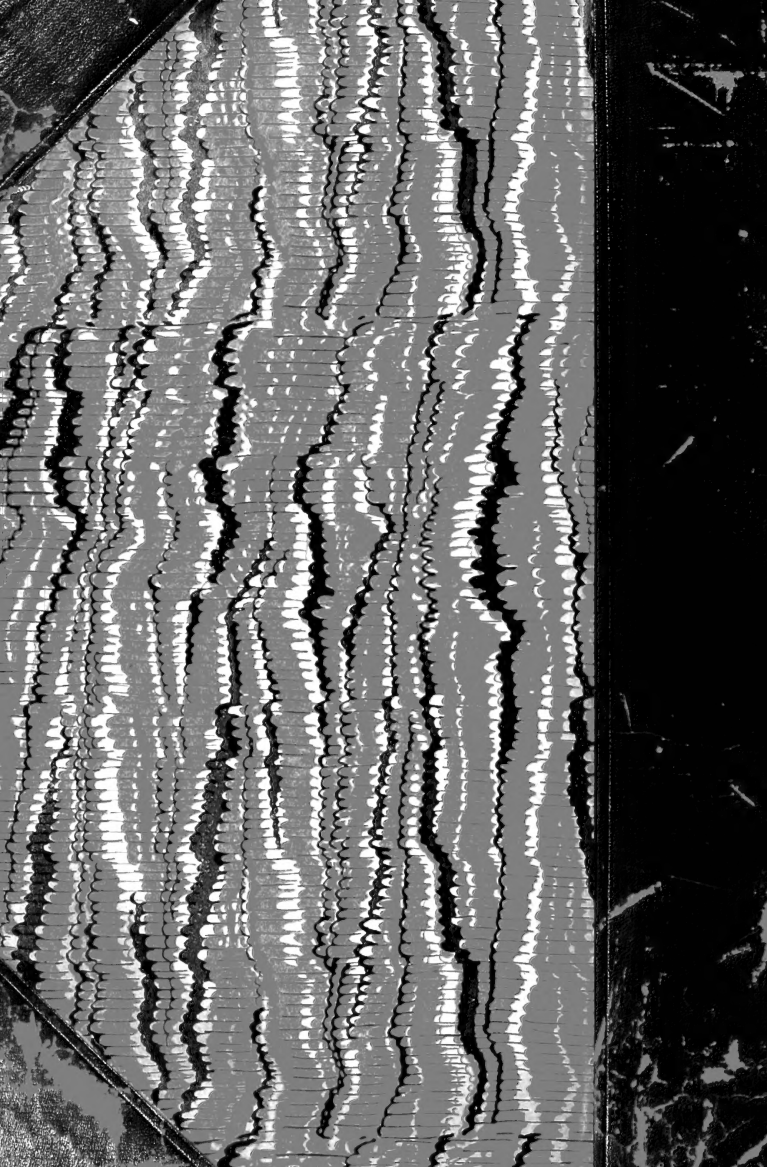
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