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# A CRITICAL REVIEW OF THE CHARACTERS AND VARIATIONS OF THE SNAKES OF NORTH AMERICA.

BY

E. D. COPE.

In the following paper the attempt is made to define with precision the species of North American snakes, together with their variations. This may be done more satisfactorily than hitherto, since the material which has accumulated in our museums is now considerable. In making this investigation I have had the advantage of a full study of the specimens in the U. S. National Museum,\* as well as those in other collections.

So soon as sufficient material becomes available, the zoologist can make that kind of research into the permanency and variability of the characters of species which characterizes the exact stage of the science. It is on such study that all useful conclusions as to the origin of species depends. It is not the orderly relation of species and genera to each other that demonstrates the truth of the hypothesis of the derivation of species, but the knowledge of their variations. Moreover, the beginning of all investigation into the causes of those variations is the knowledge of the direction which they take, whether they are promiscuous or whether they bear some definite relation to each other or to the environment.

This being the object of this paper, I have not entered into any discussion of systematic problems.

## I.—CATODONTA.

### GLAUCONIA Gray.

Catalogue Lizards Brit. Mus., 1845, p. 139. *Stenostoma* Wagl., Nat. Syst. Amphib., 1830, nec Latreillei, 1810 (Coleoptera). *Leptotyphlops* Stejneger, Proc. U. S. Nat. Mus., 1891, 501 (after Fitzinger, *nomen nudum*).

Head slightly depressed and continuous with the body. Snout blunt and rounded, overlapping considerably the lower jaw. A large rostral plate. One nasal. A pair of frontonasals. One ocular shield, which extends to the labial border. A pair of superciliaries, parietals and

\*I wish to express here the obligation under which I have been placed by the officers of that institution, Profs. S. P. Langley and G. B. Goode.

postparietals, all scale like. Medial row of scales extending over the head to the rostral. Nostrils lateral, oblong, situated between the nasal and fronto-nasal. Eyes covered by continuous epidermis.

This genus is found throughout tropical Africa and America, and it embraces a considerable number of species in all the faunal regions of the latter. These are of subterranean habits, which are little known. Some of them are said to inhabit ants' nests. One species is known from India.

***Glauconia dulcis* Bd., Gird.**

*Rena dulcis* Bd. & Girard, Catal. Serp. N. A., 1853, p. 142. *Stenostoma dulce* Peters Monatsber., Berlin Akad., Wis., 1857, p. 402; Cope, Proc. Academy Phila., 1861, p. 305; Jan. Icon., Gen. Oph. I, vol. 2, Fig. 5. *Stenostoma rubellum* Garman, Memoirs Mus. Comp. Zoology, Cambridge, VIII, 1883, p. 130; teste Stejneger.

This species ranges from central Texas to the Red River on the east to New Mexico, inclusive, on the west, and southward along the Rio Grande in Texas as far as San Antonio.

**RENA Baird, Girard.**

Cat. Rep. N. A., Pt. I, Serpents, 1853, p. 142; Cope, Proc. Amer. Philo. Soc., 1886, p. 481. *Catodon* Dnm. & Bibron, Er. Gen., VI, p. 318, 1844, not of Artedi. *Siagonodon* Peters, Gesselsch. Naturforsch. Freunde, Berlin, 1881, p. 71.

Similar to *Stenostoma*, but the superciliary scales are absent.

***Rena humilis* Bd., Gird.**

Cat. Rep. N. Am., I, Serpents, p. 143. *Stenostoma humile* Cope, Proc. Acad. Phila., 1861, p. 305; Check List, Batr. & Rep. N. A., 1875, p. 44.

Lower California, southern California, and southern Arizona.

## II.—ASINEA.

### BOIDÆ.

The only genus of Boidæ which is known to enter the boundaries of the Nearctic Realm is *Lichanura*. It is possible that the *Boa imperator* has been seen in the valley of the Lower Rio Grande, but of this positive evidence is as yet wanting. This species, the *Epicrates angulifer* of Cuba, and the *Ungualia pardalis* of Jamaica are occasionally introduced into the country in bunches of bananas. The serpent winds itself tightly around the stem, and is concealed from view until the fruit is being removed. Unless of large size, these snakes are harmless.

**LICHANURA Cope.**

Proc. Acad. Phila., 1861, p. 304; Bull. U. S. Nat. Mus., 32, 1887, p. 50.

General form abbreviated and stout; tail short, slightly prehensile, obtuse at the extremity. Head slightly distinct; eye small, pupil vertical. Nostril between two plates, the anterior in contact with that of the opposite side upon the median line. Frontonasal suture extensive,

Posterior to these, the upper surface of the head is covered with smooth scales. Labial plates without pits. Scales smooth, broad, poreless. Spurs conspicuous. Gastrosteges narrow.

In this genus the tail is less prehensile than in *Boa*, but is more so than in *Eryx* and *Charina*. It also differs externally from the latter genus (with which Garman at one time proposed to unite it) in the absence of the frontal plate and the parietals adjacent to it. An important osteological difference is the presence of the coronoid bone, which is wanting in *Charina*.

The species of this genus are variable in their details both as to squamation and coloration. I distinguish three species. Dr. Stejneger has named another, which he subsequently withdrew. In his latest study of this genus this author distinguishes the species as follows:

A. Eye large; its diameter more than one-third distance from anterior canthus to tip of muzzle; gastrosteges about 218.

Whitish with three blackish brown longitudinal bands in strong contrast. *L. trivirgata*

AA. Eye smaller; its diameter one-third or less the distance from anterior canthus to tip of muzzle; gastrosteges 224 to 241.

Color brownish or bluish above, with or without longitudinal bands, which when present contrast but little with the ground color; true loreals 3; scale rows 39-43; rostral not prominent.....*L. roseofusca*

Color as in *L. roseofusca*; true loreals 2; scale rows 35; rostral prominent. *L. orcuttii*

#### *Lichanura trivirgata* Cope.

Proc. Acad. Phila. 1861, p. 304; Bocourt, Miss. Sci. de Mexique, p. 573; Stejneger, Proc. U. S. Nat. Mus., 1889, p. 98; 1891, 514; *Charina trivirgata* Garman, Mem. Mus. Compar. Zool. Cambr., VIII, 1883, 136.

The coloration of this handsome *Boa* is altogether unique in the family. It calls to mind the *Salvadora* of the same region. It inhabits the southern part of Lower California, where Messrs. Xantus and Belding have obtained it for the Smithsonian Institution. They found it in swamps among the mountains.

No. 12602: 40, 14: 215 + 1 + 44: 582, 96 mm.

#### *Lichanura roseofusca* Cope.

Proc. Acad. Phila., 1868, p. 2; Stejneger, Proc. U. S. Nat. Museum, 1891, p. 514; *Lichanura myriolepis* Cope, Proc. Acad. Phila., 1868, p. 2; Stejneger, Proc. U. S. Nat. Mus., 1889, p. 96; *Lichanura simplex* Stej., l. c., pp. 95, 96.

A variety of this species is represented by a specimen (No. 14129) from San Diego, Cal. The color above as far as the fifth row of scales on each side is a brownish lead color; below this line and on the lower surfaces light lead color with dark lead-colored borders to some of the scales, and a wide lead-colored basal band of the gastrosteges and urosteges. There are three longitudinal rusty brown bands on the dorsal region, which are indistinctly defined, and of irregular width. No. 14129: 42, 14; 229, 49; 788, 115.

It was on a specimen of this variety from the same locality that I proposed the species *Lichanura myriolepis*. It has forty-three rows of scales. Another specimen from San Diego is described by Dr.

Stejneger as a distinct species under the name of *L. simplex*. It has forty rows of scales, and there are no longitudinal stripes above, the general color above being brownish drab, below whitish; gastrosteges 23, urosteges 39. Eye encircled by 7-8 scales. These forms graduate into the *L. trivirgata*, both in color and in number of scale rows. The number of gastrosteges is larger, but I suspect that this character is not constant.

*Lichanura orcuttii* Stejneger.

Proc. U. S. Nat. Museum, 1889, p. 96; 1891, p. 514.

San Diego, California.

## CHARINIDÆ.

### CHARINA Gray.

Gray, Cat. Snakes in the Brit. Mus., 1849, p. 84; Cope, Bull. U. S. Nat. Mus. 32, 1887, p. 51; *Wenona* Bd. and Gird., Cat. Serp. N. Amer., 1853, p. 139; Bocourt, Miss. Sci. Mexique, 1882, p. 511. *Pseuderyx* Jan, Archiv. f. Naturgesch. 1862, v. 1, p. 242; *Elencos Sistem*, 1863, 19.

Nostril between postnasal and prenasal, the latter confluent with the internasal. Two pairs of prefrontals, a frontal, and rudimentary parietals. Pupil vertical. Scales of body smooth. Tail short, obtuse, not prehensile, and spurs exerted.

Prenasal separated from internasal; postnasal joining preocular; prefrontal entering orbit; one superciliary; superior labials 8-9.....*C. brachyops*.  
Postnasal plate separated from preocular; prefrontal not entering orbit; more than one superciliary; prenasal fused with internasal; superior labials 9-11...*C. bottæ*

### *Charina brachyops* Cope.

Proc. U. S. Nat. Mus., 1888, p. 88, Pl. xxxvi, Fig. 2; Stejneger, *loc. cit.*, 1890, 179.

Point Reyes, California.

### *Charina bottæ* Blv.

Gray, Cat. Snakes in Brit. Mus., 1849, p. 113; Cope, Check List Batr. Rep. N. Am., 1875, 43; *Tortrix bottæ* Blainville, Nouv. Ann. Mus. Hist. Nat., Paris, III, 1834, p. 57; *Pseuderyx bottæ* Jan, l. c., Fig. 1; *Wenona plumbea et isabella* Bd. and Gird., Cat. Serp. N. Am., 1853, pp. 139-40; Jan, Icon. Gen. Oph., 1, 3, ii, Fig. 2; Bocourt Miss. Sci. Mex., 1882, p. 512, pl. xxx, Fig. 7.

The extraordinary variability of this species in the squamation of the head may be exhibited in the following table:

#### I. Internasals confluent with prefrontals.

Loreal present; eye resting on labials; No. 4496, No. 9563.

#### II. Internasals distinct.

##### A. Rostral separating internasals on the middle line.

Loreal present; eye on labials on one side; separated by scales on the other; No. 4497.

##### AA. Rostral not separating internasals.

##### B. Eye resting on labials.

Loreal present; Nos. 4497, 11691, 11789, 12581.

No loreals; No. 7299.

- BB. Eye resting on labials on one side, and not on the other.  
Loreal present, No. 4494.
- BBB. Eye separated from labials on both sides.  
Loreals, one on one side, two on the other, 8922.  
Loreals, one on each side, 9255.  
Loreals, none, 4492.

None of the North American specimens have the internasals separated on the middle line by a scale, as is stated to be the case in the type of *C. bottæ* by Bocourt. Several have the prefrontals separated by scales, however, so that the character of the type specimen is probably only an individual variation. There is no reason to suppose that the Upper California species differs from that of Lower California. I give the following notes which I took from De Blainville's type in the Museum of the Jardin des Plantes in 1864, by permission of Prof. Auguste Duméril: "The tail enters the total length  $9\frac{1}{2}$  times. Frontal much wider than long, postnasal and loreal longer than wide. One preocular. Ten superior labials; second and third touching loreal; fourth, fifth, and sixth entering orbit. Forty-three rows of scales, size graduating smaller from first to third. A reddish tint in the pale brown of the belly; above slaty brown." The specimen agreed in size and character with the one described by De Blainville, and I am therefore at a loss to understand the accounts given by Jan and Bocourt. The former says\* there are but thirty-nine rows of scales on the body, and the latter says, perhaps by a typographical error, 29. Bocourt also says that at the period of his writing, 1882 (Mission Sci. de Mexique, 512), the specimen was no longer in good condition. It was in good condition at the time of my examination in 1864.

The *Wenona isabella* does not appear to me to differ specifically from the other forms. Its head plates display a peculiarity which is also seen in a specimen from California. (See table above).

This species ranges throughout the entire Pacific district, as well as the Lower Californian. The most eastern point from which the Smithsonian Institution has procured specimens is the John Day River, Oregon. It has been also obtained in the Great Basin, on the Humboldt River, Nevada.

## COLUBRIDÆ.

### CHILOMENISCUS Cope.

Proc. Acad. Phila., 1860, p. 339. Bull. U. S. Nat. Mus. No. 32, 1887, p. 53. *Bergenia* Steindachner, Voyage of the Novara, v, 1876, p. 92.

Form stout, body cylindrical, the head not distinct. Muzzle rounded, very prominent, and much depressed. Rostral plate large, with an extensive superior surface and presenting an obtuse angle between the prefrontals; the inferior surface greater than the superior, owing to the backward position of the mandible. Head shields broad, normal, except

\* Archiv. f. Naturgeschichte, 1862, I, p. 242.

internasals  
in the confluence of the prefrontals with the nasals. Loreal none. One pre-, two post oculars. Scales smooth. Tail short, the urosteges and anal plate divided. Teeth equal or the posterior a little stouter. Palatine and pterygoid teeth present.

This truly calamarian genus is analogous to *Stenorhina* in the union of the nasal and prefrontal shields; and perhaps the form of the muzzle and inferior position of the mouth indicates affinity to *Chionactis*.

There are three species, which differ as follows:

I.—Rostral plate very prominent.

Postnasal reaching preocular; numerous black cross-bands which reach the gastrosteges ..... *C. ephippicus*.

Postnasal not reaching preocular; light, with punctæ or cross-bands... *C. stramineus*.

II.—Rostral plate less prominent.

Postnasal reaching preocular; reddish brown above, dirty yellow below; larger. *C. mexicanus*.\*

*Chilomeniscus ephippicus* Cope.

Proc. Acad. Phila., 1875, p. 85. Cope, Check List, N. Am. Batr. Rept., 1875, p. 35; Cones U. S. G. G. Surv. W. 100th Mer. v, p. 625. Pl. XVIII, Fig. 3. *Carpophis cincta* Garman, Mem. Mus. Comp. Zool. Cambr., VIII, 1883, p. 166.

Nevada, Arizona.

*Chilomeniscus stramineus* Cope.

Proc. Phila. Acad., 1860, p. 339. Check List N. Am. Batr. Reptilia, 1875, p. 35.

Scales in thirteen rows, all wide and obtuse, four rows on each side, wider than long. Rostral plate extensively recurved on the superior surface of the muzzle, its posterior border presenting an obtuse angle. Internasals and prefrontal median suture short; frontal wide, but not as wide as long, angulate in front, more strongly angulate behind. Each parietal but little if any longer than the frontal. Prefrontal in considerable contact with second superior labial. Seven superior labials all longer than high except the first. Temporals 1 – 1, both deeper than long. Eyes and superciliary plates very small. Tail short and conical.

There are three color varieties of this species as follows:

Body annulate, with complete black rings..... *C. s. cinctus*.

Body with black cross-bands, which reach the first and second rows of scales. *C. s. fasciatus*.

Scales with a median brown dot within the apex; no bands. .... *C. s. stramineus*.

*Chilomeniscus stramineus cinctus* Cope.

*Chilomeniscus cinctus* Cope, Proc. Acad. Phila., 1861, p. 303; Check List N. Amer. Batr. Reptilia, 1875, p. 35. *Carpophis cinctus* Garman, Mus. Comp. Zool. Cambr., VIII, 1883, p. 166.

Sonora.

\* *Bergia mexicana* Steindachner Voyage of the Novara, 1876, p. 92, fig. (no number).

*Chilomeniscus stramineus fasciatus* Cope.

*Chilomeniscus cinctus* Cope, Yarrow Check List N. A. Batr. and Reptilia, 1883, p. 86.

There are no differences between this subspecies and the typical *C. s. stramineus* to be detected in the squamation, but the coloration differs to an extraordinary degree, resembling that of the *C. ephippicus*. Two specimens are in the National Museum collection: one of these has twenty-four and the other twenty-six black cross-bands on a white ground. Of these four in one and five in the other are on the tail. They are two scales long and eleven and two half scales in width; the spaces between them are two and a half scales long. There is a black patch on the head from the middle of the frontal to the posterior border of the occipital shields. No dark color on any of the under surfaces. No punctæ on the scales. No. 12,630; 13, 7: 108+1+26: 235, 33 mm.

*Chilomeniscus stramineus fasciatus* Cope.

Catalogue No.	No. of specimen.	Locality.	When collected.	From whom received.	Nature of specimen.
12,630	2	La Paz, Cal.	Feb. —, 1882.	L. Belding.	Alcoholic.

*Chilomeniscus stramineus stramineus* Cope.

*Chilomeniscus stramineus* Cope, Proc. Acad. Phila., 1860, p. 339. *Carphophis stramineus* Garman, Mem. Mus. Comp. Zool. Cambr., VIII, 1883, 166.  
Lower California.

**STILOSOMA** Brown.

Proc. Phila. Acad. Nat. Sci., 1890, p. 199.

Body slender, cylindrical, and rigid; tail short; head rounded on frontal outline, not distinct from body. Rostral prominent, but not recurved; no internasals, anteorbitals, or loreals. One nasal. Prefrontals and parietals in contact with labials. Scales smooth. No scale pits. Anal entire. Teeth smooth.

This genus belongs to the type of *Rhabdosoma* D. and B. and *Carphophiops*, approaching nearest to *Geophidium* Pet. in the absence of internasal plates. It exhibits, however, a greater reduction than in that genus in the absence of loreal and preocular plates. Only one species is known.

*Stilosoma extenuatum* Brown

Proc. Phila. Acad. Nat. Sci., 1890, p. 199.

This curious species has the coloration of the type of *Hypsiglena* or *Sibon*. It is of great rarity, the type specimen found near Jacksonville, Fla., being the only one known. Its habits are probably subterranean.

**CARPHOPHIOPS** Gervais.

Dict. Hist. Nat. Univers. par D'Orbigny III, p. 191, 1843; Cope, Proc. Acad. Phila., 1860, p. 78; *Celuta* Bd. and Gird. Cat. Serp. N. A., 1853, p. 129. *Carphophis* Duméril Prodrome Class. Rep. Ophid., 1853, 43-46; Erp. Gen., VII, 1854, p. 131; Günther, Cat. Col. Snakes, Brit. Mus., 1858, p. 17.

Head depressed, continuous with the body. Cephalic plates normal, sometimes no distinct internasal plate. One nasal, nostril in the middle. No anteorbital; loreal entering orbit. Scales smooth, pitless. Postabdominal scutella bifid. Subcaudals divided.

This genus is the North American representative of the Neotropical *Rhabdosoma* and *Elapoidis*, the typical forest-burrowers. The species are generally found under and in rotten logs, and under the bark, where they readily make their way, forcing their sharp muzzle into narrow places with much muscular strength.

*Carphophiops* has exactly the plate and scale formula of *Abastor*.

The two species of the genus differ as follows:

Temporal scales 1-2; light color of belly not extending to third row of scales.	
	<i>C. amœnus.</i>
Temporal scales 1-1; light color of belly extending to third row of scales; back darker .....	<i>C. vermis.</i>

***Carphophiops amœnus* Say.**

Cope, Proc. Acad. Phila., 1860, p. 78; *Coluber amœnus* Say, Journ. Acad. Phila., IV, 1825, 237; Storer, Rep. Mass., 1839, 226; *Calamaria amœna* Schlegel Essay Phys. Serp., 1837, 31; Pl. I, Figs. 19, 20. *Brachyorrhos amœnus* Holbrook N. Amer. Herpetol., III, 1842, 115, Pl. XXVII. *Celuta amœna* Bd. and Gird. Cat., 1853, p. 129. *Carphophis amœna*. Dum. Bibl. Erp. Gen., VII, 1854, p. 132; Günther, Cat. Col. Snakes Brit. Mus., 1858, p. 17; Jan Icon. Gen. Oph. I, 12, II, Fig. 4; *Celuta helenæ* Kennicott, Proc. Acad. Phila., 1859, p. 100.

In nearly half the specimens the internasal scuta are wanting. This condition was supposed by Kennicott to indicate a distinct species (*C. helenæ* Kenn.) and by some others, a distinct genus. There is, however, no other character by which to separate it from the *C. amœnus*, and the character itself is not constant. Thus in jar No. 8840 from Union County, Tenn., one specimen has both internasals, a second has but one, and a third is without any. In jar No. 12046 from Mount Carmel, Ill., nearly all the specimens lack the internasals, but one of them has the plate on one side.

Some other variations occur. Thus in a specimen from Jackson, N. C., (No. 1921), the anterior angle of the frontal plate is produced forwards to the internasals completely separating the prefrontals. In No. 10721 from Washington, D. C., there is but one, a large scute, in the second row of temporals, and two rows of scales are of the color of the abdomen, which contrasts strongly with that of the dorsal regions. The specimen is quite intermediate between this species and the *C. vermis*. In some specimens the superciliary is larger than the postocular; in others the reverse is the case. 1925: 13.5: 127+1+32: 260, 46<sup>mm</sup>.

*Carphophiops vermis* Kenn.

Cope, Check List Batr. Rept. N. Amer., 1875, p. 34. *Celuta vermis* Kennicott, Proc. Acad. Phila., 1859, p. 99.

The distribution of this species is in the southwestern part of the eastern region.

**TANTILLA** Bd. Gird.

Cat. Serp. N. A., 1853, p. 131; Cope, Journ. Acad. Phila., 1875, p. 143; Bull. U. S. Nat. Mus., 32, p. 52, 1887; *Homalocranium* Dum. Prodrome Class Rept. Ophid., 1853, p. 94; Günther, Cat. Col. Snakes B. M. 1858, p. 18.

Head depressed, continuous with the body. Cephalic plates normal. Internasals and prefrontals two each. Posterior maxillary tooth grooved. Two nasals, nostrils in the anterior plate. No loreal. Anterior orbital one; posterior one or two. Eyes below the medium size. Body subcylindrical; tail short. Scales smooth. Postabdominal scutella bifid. Subcaudals all divided.

This genus is distributed throughout the Neotropical Realm excepting the West Indian Region, Trinidad excepted. Its species are especially abundant in the Central American district. Three species are found in the Nearctic Realm. They differ as follows:

## I. Superior labials six; orbitals 1-1

Muzzle produced; preorbital not in contact with superciliary nor nasal; three longitudinal bands..... *T. calamarina*, Cope.

Muzzle less produced; preorbital in contact with superciliary and nasal; temporal one; three bands..... *T. bimaculata*, Cope.

Temporals two; no bands..... *T. gracilis*, Bd. and Gird.

## II. Superior labials seven; orbitals 1-1.

Coloration uniform..... *T. planiceps*, Blainv.

## III. Superior labials seven; two postorbitals.

A. Postnasals in contact with preocular, or nearly so.

B. Posterior labials elevated, separated from parietals by one temporal.

From slender; a yellow black bordered collar near parietal plates; below red.

*T. miniata*, Cope.\*

BB. Posterior labials elevated, bounded above by two temporals (longitudinally).

Urostege 68; head black with yellow collar; body brown with three yellow stripes..... *T. taniata*, Boc.

Urostege 55-63; labials higher; first inferior labials separated; black everywhere, with yellow collar..... *T. moesta*, Gthr.

Urostege 37; black above, with yellow collar; yellowish below.

*T. schistosa*, Boc.

Frontal narrower; posterior labials higher, body light, dark banded.

*T. melanocephala*, Linn.

Frontal wider; posterior labials lower; body uniform red.... *T. rubra*, Cope.

BB. Posterior labials lower, bounded above by two temporals (longitudinally).

C. Inferior labials of first pair in contact on the middle line.

Postnasal very small; collar far behind head; body banded; urostege 51.

*T. armillata*, Cope.

Postnasal large; collar crossing parietal scute; body unicolor; below whitish; urostege 35..... *T. coronata*, Bd. and Gird.

\**Homalocranium deppiei*, Boc. Miss. Sci. Mex., 1883, p. 584, pl. xxxvi, f. 11.

## CC. Inferior labials separated by symphyseal.

Urosteges 67; postnasal large, bounded below by first labial; a yellow collar.  
*T. reticulata* Cope.

Urosteges 57; postnasal chiefly bounded by second labial; head black, no collar.....*T. nigriceps*, Kenn.

Urosteges 39; first labial rising to nostril; head and body uniform.

*T. canula*, Cope.

Urosteges 25; nasals not interrupted by first upper labial; head dark with a pale occipital spot.....*T. vermiformis*, Hallow.

## AA. Postnasals separated from preocular by a wide space.

Urosteges 57; unicolor, pale; top of head and collar black.

*T. pallida*, Cope.

Urosteges 66; last upper labial larger than sixth; body above with black and white half-rings.....*T. semicincta*, D. and B.

***Tantilla gracilis* Bd. and Gird.**

Cat. Serp. N. Amer., 1853, 132; Cope Check List, 1875, p. 35; *Homalocranium gracile* Bocourt Mission Scient., Mexique 1883, p. 579, Pl. xxxvi, Fig. 5; Jan, Icon. Gen. Ofid. i, 15 ii, Fig. 1. *Tantilla hallowellii* Cope, Proc. Acad. Phila. 1860, p. 77.

The postnasal and preocular plates are sometimes separated in this species. On such a specimen the *T. hallowellii* was proposed.

Western Texas.

***Tantilla planiceps* Blainv.**

Cope, Jour. Acad. Phila., 1875, p. 143; *Coluber planiceps* Blainville, Amer. Mus. Hist. Nat., Paris, iii, 1834, p. 62, Pl. xxvii, Figs. 3, 3a, 3b; *Homalocranium planiceps* Dum., Bibr. Erp. Gen. vii, 1834, p. 857; Bocourt Miss. Sci. Mex., 1883, p. 581, Pl. xxxvi, Fig. 7; Jan, Icon. Gen. Ofid. i, 15 ii, Fig. 2.

Lower California.

***Tantilla nigriceps* Kennicott.**

Proc. Acad. Phila., 1860, p. 3:8; Cope Check List Batr. Rept. N. Amer., 1875, p. 35; *Scot'cophis fumiceps* Cope, Proc. Acad. Phila., 1860, p. 371; *Homalocranium praeoculum* Boc. Miss. Sci. Mex. Rept., 1883, p. 582, Pl. xxxvi, Fig. 8 (abnormally with two preocular plates).

In a specimen of this species from southwestern Texas there is but one postocular on one side.

Texas generally, except the east.

***Tantilla coronata* Bd. and Gird.**

Cat. Serp. N. Amer., 1853, p. 131; Cope, Jour. Phil. Acad., 1875, p. 144; *Homalocranium coronatum* Bocourt Mission Sci. Mexique Reptiles, 1883, p. 589, Pl. xxxvii, Fig. 5; *Homalocranium wagnerii* Jan, Icon. Gen. Ofid. i, 14 ii, Fig. 3.

Gulf States to Florida inclusive.

In its distribution this species extends much farther east than any of its North American congeners. It is yet rare in museums. A specimen is in my collection from Volusia, Lake George, Florida.

**VIRGINIA** Bd. and Gird.

Cat. Serp. N. Amer., 1853, p. 127; Cope, Bull. U. S. Nat. Mus., 32, 1887, p. 53.

Head distinct from the body. Cephalic plates normal. Two nasals; posterior one not invaded by the nostril. Prefrontals and loreal entering into the orbit, and suppressing the anteorbitals. Superciliaries well developed. Genieal scuta, 2 pairs. Pupil circular. Scales smooth. Postabdominal scutellum bifid. Subcaudal scuta all divided.

The distinction of the head from the neck and the relatively narrow frontal plate in this genus suggest affinities to the *Coronellinae*. The lateral head scuta are like those of *Rhabdosoma* and its immediate allies.

But two species are known:

Scales wider, in 15 rows .....	<i>V. valeriae</i> .
Scales narrow, in 17 rows .....	<i>V. elegans</i>

The species occur in both the eastern and Austroriparian districts; the *V. elegans* in the western part of the latter only.

**Virginia valeriae** Bd. and Gird.

Cat. Serp. N. Amer., 1853, p. 127; Cope, Check List Batr. Rept. N. Amer., 1875, p. 35; Jan, Icon. Gen. Oph. I, 12 ii; Fig. 5; *Carphophis harperi* Dum., Bibr. Erp. Gen., 1854, VII, p. 135.

Not yet found north of the Carolinian division of the eastern district.

**Virginia elegans** Kenn.

Proc. Acad. Phila., 1859, p. 99; Cope, Check List Batr. Rept. N. Amer., 1875, p. 35; Jan, Icon. Gen. Oph. I, 12 ii; Fig. 6.

The specimens show considerable variation in the number of the postocular scuta. Thus in two specimens from Fort Towson, Arkansas, (2055), there are 3 on each side; in 12023, from Mount Carmel, Illinois, there are 2 on each side; and in 13632, from Helotes, Texas, the 2 are fused into a large one on each side.

The difference between this species and the *V. valeriae* are restricted to the form and number of the scales. Beyond these I have not been able to detect any.

**CONTIA** Bd. and Gird.

Cat. Serp. N. Amer., 1853, p. 110; Cope, Proc. Acad. Phila., 1860, p. 251; Bull. U. S. Nat. Mus., 1887, p. 53; *Sonora* Bd. and Gird., Cat. Serp. N. Amer., 1853, p. 117; *Eirenis* Jan, Elenco Sist. d. Ofidi, 1863, p. 48.

Dentition complete, and the teeth of maxillary bone of equal length. The scales are smooth and without pits, and the anal plate is divided. The head shields are normal; the nasal, usually entire in the genus, is sometimes divided by a suture from the nostril to the labial border. Two pairs of genieals; a loreal; rostral obtuse. The head is little distinct from the body, and the pupil is round.

This genus is widely distributed over the warmer temperate regions of the Northern Hemisphere. Several species are described by Jan from Syria. The division of the nasal plate is never complete, although it is present below the nostril sometimes. I suspect that the *Sonora* of Baird and Girard is established on a species of this genus. They state that the nasal plates are distinct, but on examination of the typical specimen I find that this is not the case. The rostral plate is not more prominent than in the *C. episcopa*, and the division of the superciliary plate is probably abnormal.

The three North American species differ as follows :

Scales in 17 series; superior labials 8; body compressed behind; black above.

*C. pygæa*

Scales in 15 series; superior labials 7; body not compressed; rostral rather prominent; light, with or without black cross-bars ..... *C. episcopa*

Scales in 15 rows; superior labials 7; body not compressed; rostral not prominent; back brown, with pale borders; sides, lead colored; below cross-banded. *C. mitis*

The *C. pygæa* is Floridian; the *C. episcopa* from Texas and the Sonoran region, and the *C. mitis* is from California.

#### *Contia pygæa* Cope.

Proc. Acad. Phila., 1871, p. 222.

The belly is salmon red in life. Florida.

#### *Contia episcopa* Kennicott.

Cope, Check List N. Amer. Batr. Rept., 1875, p. 36; Bull. U. S. Nat. Mus. No. 20, 1880, p. 21. *Lamprosoma episcopum* Kenn., U. S. Mex. Bound. Surv., II, 1889, p. 22, Pl. VIII, Fig. 2. *Homalosoma episcopum* Jan, Icon. Gen. Ophid., I, 13, iv, Fig. 2.

Scales in fifteen rows, all smooth; superior labials, seven; the orbit bounded by the third and more largely by the fourth; loreal small, quadrangular, longer than high; oculars, 1-2; anterior short, covered above by superciliary; postoculars resting on fourth labial; fifth and sixth labials equal, as high as long; parietals large, long; frontal longer than wide; prefrontals transverse. Internasals partly separated by rostral, which is not very prominent. Inferior labials six, first pair meeting, fourth largest. Postgenaeals extremely short. Temporals little larger than body-scales, 1-2. Muzzle obtuse; head scarcely distinct; eye small. Gastrosteges 163; anal 1-1; urosteges varying in Texan specimens from 35 to 45.

There are three well-marked color varieties, which pass into each other. They are as follows :

Ground color ashen to rosy, with the scales broadly tipped with brown. A few only of the median rows of dorsal scales may be red, and the top of the head may or may not be brown. .... *C. e. episcopa*.

Ground color light yellow, tinged with brown above; three median dorsal rows orange. Top of head, from anterior border of frontal to near end of occipitals, black. A transverse black spot commencing on the fourth scale behind the occipitals, two scales long, and including the fourth row of scales from the gastrosteges on each side. .... *C. e. torquata*.

Back traversed by from nineteen to twenty-one black cross-bands of three and a half scales in length; there are six on the tail. Belly uniform..... *C. e. isozona*.

These subspecies pass into each other by distinct gradations, although the intermediate forms are less abundant than the types.

This is a characteristic species of western Texas. It is common west of Fort Worth to Fort Concho and about Helotes in the South. It exhibits a great range of color-variation, and, since it is evident that the *C. isozona* must be reckoned as one of its varieties, its range extends to Utah and Arizona.

***Contia episcopa episcopa* Kenn.**

Cope, Bull. U. S. Nat. Mus. No. 20, 1880, p. 21; Cope, Bull. U. S. Nat. Mus., No. 20, 1880, p. 21. *Lamprosoma episcopum* Kennicott, U. S. Mex. Bound. Surv., II, Reptiles, 1859, p. 22; Pl. VIII, Fig 2. *Homalosoma episcopum* Jan, Icon. Gen. Ophid., I, 13, iv, Fig. 2.

Texas.

***Contia episcopa torquata* Cope.**

Bull. U. S. Nat. Mus., No. 17, 1880, p. 21.

Northern Texas.

***Contia episcopa isozona* Cope.**

Bull. U. S. Nat. Mus., No. 20, 1880, p. 21. *Contia isozona* Cope., Proc. Acad. Phila., 1866, p. 304. Rept. U. S. G. G. Surv. W. of 100th Mer., v. p. 537, Pl. XVIII, Figs. 1-1a.

There are four specimens of this form in the collection; in two of them the ground color is ashy, in two red.

I suspect that the *Sonora semiannulata* of Baird and Girard was established on an abnormal specimen of this subspecies. That specimen is remarkable in having the superciliary plate divided symmetrically on each side by a suture, which cuts off a plate whose apex reaches the parietal and which Baird and Girard term a third postocular. The muzzle was somewhat wrinkled, so as to produce folds of the integument; this led to the mistaken belief that the nasal is divided. Omitting these two characters, there remains only a slightly more protuberant rostral plate, which is not more in my opinion than an individual peculiarity. The coloration is identical with that of the *C. e. isozona*. More specimens will be necessary to settle the question definitely. Should the identification here suggested prove necessary, the name of the species will stand as *Contia semiannulata*, with the subspecies *episcopa*, *torquata*, and *semiannulata*.

***Contia mitis* Bd. and Gird.**

Cat. Serp. N. Amer., 1853, p. 100; Check List Batra. Rept. N. Amer., 1875, p. 36. *Homalosoma mite*, Jan. Icon. Gen. Oph. I, 13, iv, Fig. 1.

California.

***LODIA* Bd. and Gird.**

Bd. and Gird., Cat. Serp. N. Amer., 1853, p. 116.

Head distinct from the body. Two frontal plates, a small anterior one being situated between the post-frontals immediately in advance of the

frontal proper. One nasal. Loral entering into the orbit; above it one anteorbital. Superciliaries well developed. Genieals, one pair. Pupil circular. Scales smooth. Postabdominal scutella bifid. Subcaudals all in pairs.

*Lodia tenuis* Bd. and Gird.

Cat. Rept. N. Amer. Serpents, p. 116, 1853; Cope, Check List N. Amer., Batr. Rept., p. 36, 1875.

This species so much resembles the *Contia mitis* as to lead to the suspicion that its generic peculiarities are abnormalities of the head scuta. The relations of the loreal plate are, however, symmetrical, and the frontal plate is wider than in the *C. mitis*. The coloration is identical in alcohol. The head is relatively shorter. To this fact are to be ascribed its tegumental peculiarities. It is in any case a type of recent origin.

Puget Sound, Oregon.

### CEMOPHORA Cope.

Proc. Acad. Phila., 1860, p. 244; Bull. U. S. Nat. Mus., 32, 1887, p. 50; Jan, Elenco Sist. d. Ofidi, 1863, p. 45.

Head small, continuous with the body. Rostral plate large, prominent, subtriangular. One pair of prefrontal plates, and one of internasals. One nasal; nostril in the middle. One loral. Pre and post orbitals present. Superciliaries, eyes, and mouth small. Teeth longer posteriorly. Scales smooth. Postabdominal scutum entire; subcaudals bifid.

But one species of this genus is known. Its general characters are as follows:

Scales in nineteen rows; superior labials six, the eye over the third; tail about one-eighth of total length; red, crossed by pairs of black rings separated by a yellow one, which is divided by a black spot on the side..... *C. coccinea*.

### *Cemophora coccinea* Blumenbach.

Cope, Proc. Acad. Phila., 1860, p. 244.

*Coluber coccineus* Blumenbach, in Liell. and Voigts Magazine, v, 1788, Pl. v; Gmelin,

Syst. Nat., Ed. XIII, I, iii, 1788, 1777; Harlan, Jour. Acad. Phila., v, 1827, p. 356.

*Heterodon coccineus* Schleg. Ess. Physion. Serp., 1837, 102, Pl. iii, Figs. 15, 16.

*Rhinostoma coccinea* Holbrook, N. Amer., Herpet., iii, 1842, 125; Bd. and Gird., Cat., 1853, 118.

*Simotes coccineus* Dum. Bibr., Erp. Gen. VII, 1854; Günther, Cat. Colubr. Snakes, Brit. Mus., 1858.

*Cemophora copei* Jan, Archiv. p. la Zoolog. Modena, II, 1863, p. 21.

The *Cemophora coccinea* is a species of the Austroriparian region, but it has not been found in the Texan district, nor does it ascend the Mississippi River as far as the region extends. It is especially abundant in Florida. The specimen from Tennessee described by Jan under the name *C. copei* presents the abnormality of the loreal reaching the orbit below the preocular.

**GYALOPHIUM** Cope.

Proc. Acad. Phila., 1860, 243; Bull. U. S. Nat. Mus., 1887, 32, p. 52.

Form stout, tail short. Head slightly distinct, large, depressed. Rostral plate acute, its anterior border elevated, its upper surface concave. It is produced backwards, separating the internasals and prefrontals. Internasals present; prefrontals, one pair. Nasal confounded with the first labial, a groove from the nostril to the suture of the second labial. No loreal, its place supplied by the prefrontal. One preocular. Postgenitals rudimental. Scales smooth; anal and subcaudal scutella divided. Teeth small, of equal lengths. Pupil round.

This genus introduces us to a type which is especially Mexican and which includes the genera *Ficimia* Gray, *Ogmilus* Cope, and *Conopsis* Günther. *Sympholis* Cope is probably also allied, as well as perhaps *Geagras* Cope. They all have protuberant rostral shields, which are in the first three genera named more or less recurved. Besides the *G. canum* there is but one species of *Gyalopium*, the *G. publium* Cope,\* which has been found in Yucatan.

Rostral plate reaching frontal; seventeen rows of scales; seven labials; quadrate brown dorsal spots; larger ..... *G. publium*.

Rostral not reaching frontal; seventeen rows of scales; seven superior labials; transverse brown bands; smaller ..... *G. canum*.

**Gyalopium canum** Cope.

Proc. Acad. Phila., 1860, p. 241. Coates, U. S. G. G. Expl. Surv. W. 100th Mer., V, p. 624, Pl. xviii, f. 2, 2a; Cope, Check List N. Amer. Batr. Rept., 1875, p. 36. *Ficimia cana* Garman, Mem. Mus. Comp. Zool., Cambr., VIII, 1883 p. 161.

Arizona.

**ABASTOR** Gray.

Cat. Snakes Brit. Mus., 1849, p. 78; Bd. and Gird., Cat. Serp. N. Amer. 1853, p. 125; Cope, Bull. U. S. Nat. Mus. 32, 1887, p. 53.

Head subconical, continuous with the body. Cephalic plates normal. One nasal, grooved beneath the nostril. No anteorbitals. One loreal, together with the prefrontals, constituting the orbit anteriorly. Teeth equal. Pupil circular. Scales smooth. Last abdominal scutellum bifid. Subcaudals all bifid.

This genus is represented by a single species, which inhabits the southern part of the Neartic region. It is thus characterized:

Scales in nineteen rows; superior labials seven; tail one-seventh of total length, or shorter. Bluish black, with three red stripes above; below flesh-colored, with a series of bluish-black spots on each side ..... *A. erythrogrammus*.

**Abastor erythrogrammus** Daudin.

Gray, Cat. Snakes Brit. Mus., 1849, 78; Bd. and Gird., Cat. Snakes N. Amer., 1852, 125; Cope Check List Batr. Rept. N. Amer., 1875, 35.

*Coluber erythrogrammus*, Daud., Hist. Rept., VII, 1799, 93, Tab. 83, Fig. 2 Holbr., N. Amer. Herp., 1st ed., I, 1836, 115, Pl. xxii.

\* Proceeds. Acad. Phila., 1866, p. 126. *Ficimia ornata* Bocourt, Mission Scientif. de Mexique, p. 571, Pl. xxv, Fig. 10.

*Helicops erythrogammus* Wagl., Nat. Syst. Amph., 1830, 170; Holbr., N. Amer. Herp., 2d ed., III, 1842, 107, Pl. xxv.

*Homalopsis erythrogrammus* Boie, Isis, 1827, 551; *Calopisma erythrogrammum* Dum. and Bibr., Erp. Gen., VIII, 854; Jan, Icon. Gen. Ofid., II, 29, IV, Fig. 2.

*Hydrops erythrogrammus* Garman, Mem. Mus. Comp. Zool. Cambr., VIII, 1843, p. 144.

Austroriparian region, eastern part, including Florida.

#### **FARANCIA** Gray.

Cat. Snakes Brit. Mus., 1848, p. 74; Bd. and Gird., Cat. Serp. N. Amer., 1853, p. 123; Cope, Bull. U. S. Nat. Mus. 32, 1887, p. 52.

Head slightly distinct from the body. Internasal plate single. One nasal grooved beneath the nostril. No preorbital; prefrontal and loreal constituting the anterior portion of the orbit. Postorbitals present. Scales smooth. Postabdominal scutella bifid. Subcaudals in pairs.

This genus is known from the Louisianian district of the Austroriparian region. It does not occur in the Texan district and is rare in the Floridan. It is represented by only one species, which is defined as follows:

Dorsal scales in nineteen rows; superior labials seven; two postoculars; tail from one-fifth to one-seventh total length. Bluish black, with subquadrate red spots on the sides; belly red, with bluish-black spots..... *F. abacura*.

#### **Farancia abacura** Holbrook.

Bd. and Gird., Cat. N. Amer. Snakes 1853, p. 123; Cope Check List Batr. Rept. N. Amer. 1875, 35.

*Colubur abacurus* Holbr., N. Amer. Herp. I, 1836, 119, Pl. xxiii.

*Homalopsis Reinwardtii* Schl., Ess. Phys. Serp. Part. descrip., 1837, 357.

*Hydrops Reinwardtii* Gray, Zool. Misc. 1842, 67.

*Hydrops abacurus* Dum. & Bibr., Erp. Gen. Tab. 65.

*Helicops abacurus* Holbr., N. Amer. Herp. 2d ed. III, 1842, III, Pl. xxvi.

*Farancia Drummondi* Gray, Zool. Misc. 1842, 68.

*Farancia fasciata* Gray, Cat. of Snakes, Brit. Mus. 1849, 74.

*Calopisma abacurum* Dum. Bibr., Erp. Gen. VII, 1854.

*Hydrops abacurus* Garman, Mem. Mus. Comp. Zool. Cambr. VIII 1843, p. 144.

*Calopisma Reinwardtii* Jan, Icon. Gen. Ofid. II, 29 VI, figs. 1, 2.

Dr. R. W. Shufeldt found this species abundant near New Orleans. He says that it is generally present in swampy ground, or on the shores of water, coiled beneath logs and other objects. It is of a gentle disposition, and grows to a considerable size, one specimen sent by him to the National Museum measuring nearly 6 feet in length. The species ranges north to southern Indiana.

Louisianan district of Austroriparian Region.

#### **CHIONACTIS** Cope.

Proc. Acad. Phila. 1861, p. 303; Check List N. Amer. Batr. Rept. 1875, p. 35; Bull. U. S. Nat. Mus., 1887, p. 53. *Lamprosoma* Hallowell, Proc. Acad. Phila. 1856, p. 310; Report Surv. U. S. Pac. R. R. x 1859, Williamson's Rept., p. 15; (preoccupied).

Teeth of equal length, posterior ones not channeled; head depressed, eyes small; a prominent rostral, two internasals and two prefrontals; one anterior ocular; a loreal. Anal plate and subcaudal scuta divided; scales smooth.

I have referred this genus to the Calamarinae, where it has some affinity to *Contia* and to *Conopsis*. It is a transitional form. Two species are known which differ as follows:

Yellow with black cross bands, or annuli.....*C. occipitalis*.  
Brown with darker narrow longitudinal stripes.....*C. diasii*.

The *C. diasii*\* Cope has been found in the state of Puebla, Mexico; the *C. occipitalis* is so far only known from the deserts of the lower Colorado River, Arizona.

#### *Chionactis occipitalis* Hallow.

Cope, Proc. Acad. Phila. 1866; p. 310; Check List Batr. Rept. N. Am. 1875, 35.  
*Rhinostoma occipitale* Hallowell Proc. Acad. Phila. 1854, 95; *Lamprosoma occipitale*  
Hallow, l. c. 1856, 310; Baird U. S. Mex. Bound. Survey, 1859, 21, Pl. xxi, fig. 1.

A variety of this species was described by Kennicott under the name of *C. o. annulatus* (*op. cit.*) based on two specimens from the Colorado Desert. They only differ from the type in the continuance of the black cross bands across the abdomen, forming complete rings. No. 2105; 15, 7: 172, 43: 350, 64 mm.

The light color of the specimens of this species in alcohol is yellow in life, with some pink intermixed, forming a handsome combination of colors.

#### **RHINOCHILUS** Bd. and Gird.

Cat. Rept. N. Amer. Serpents, p. 120; Cope, Check List N. Amer. Batr. Rept., 1875, p. 36; Proc. Amer. Phila. Soc., 1886, 487; Bulletin U. S. Nat. Mus., 1887, p. 52.

Head separated from the body by a moderately contracted neck. Rostral plate produced, but not recurved above. Internasal and prefrontal plates. Two nasals; nostrils between. On loreal. One anterior orbital. Scales smooth. Postabdominal scutella entire. Subcaudal scutella all undivided.

Two species of this genus are known, as follows:

Scales in twenty-three rows; labials eight; tail one-tenth total length. A dorsal series of numerous square black spots separated by red spaces, sides black-varied; belly white ..... *R. lecontei*  
Scales in seventeen rows; labials eight; tail one-eighth total length; a few broad and long cross bands on body above, extending to the borders of the belly.

*R. antonii*.†

\* Proc. U. S. Nat. Mus. 1886, p. 188. *Toluca lineata* Kenn. hinc *Conopsis lineatus* Bo-court Mission Sci. de Mexique Reptiles, p. 565, Pl. xxv, fig. 4; not *Toluca lineata* Kenn.

† Dugés, Proc. Amer. Philos. Soc., 1886, p. 290; from Mazatlan, Mexico.

*Rhinochilus lecontei* Bd. and Gird.

Cat. N. Amer. Serp., 1853, 120 : Baird U. S. Mex. Bound. Surv., II, Rept., p. 21, Pl. xx ; Cope, Check List Batr. Rept. N. Amer., 1875, 36, Jan. Icon. Gen. Ofid. III, 48 iii, Fig. 1.

This species displays remarkable variations in coloration. In No. 5168 the large blotches are perfectly distinct, and their lateral interspaces have but faint traces of markings. In 2020, 2023, 2030, 2031, 11743, and 11784, all of small size, and some fully grown, there is a vertical black spot between the dorsal blotches on each side. In 8376, 4471, and 4472 the entire space on the sides between the dorsal blotches is marked with a black spot on the center of each scale. Nos. 8021 and 8022 are more like the first noted variety, but carry the peculiarity further. The dorsal blotches are perfectly distinct from each other, and are truncate, and not narrowed at their inferior border. Very few of the scales have light centers, and there are no intermediate lateral spots. Belly spots sparse. In No. 8022 a wide longitudinal median black band forms with the occipital spot an anchor-shaped figure. This variety is approached nearly by the second and only other species of the genus, the *R. antonii* Dugés, which has the black cross bands fewer in number and wider. It is from Mazatlan. Individuals also differ in the relative size of the loreal plate and number of cross bars. In one from the Canadian River there are thirty-seven rings, in one from the Llano Estacado, twenty-six. In another from the same locality the abdomen is black tessellated ; in all others, white.

The range of the *Rhinochilus lecontei* is throughout the Sonoran district. The most eastern and northern locality known for it is Garden City, in southwest Kansas where Prof. Cragin, of Topeka, obtained a specimen. It presents the anomaly of having the loreal plate to enter the orbit below the preocular.

*Osceola* Bd. and Gird.

Cat. Rept. N. Amer. Pl. I, Serpents, 1853, p. 133.

Head distinct from the body. Cephalic plates normal. Prefrontals extending to the upper labials, and suppressing the loreal. Two nasals, with nostril between. One anterior orbital. Mental scutella two pairs. Body slender, subcylindrical. Scales smooth. Postabdominal scutellum entire. Subcaudals bifid.

*Osceola elapsoidea* Holbrook.

Bd. and Gird., Cat. Serpt N. Amer., 1853, p. 133 ; Cope, Check List, 1875 ; p. 36, *Calamaria elapsoidea* Holbrook, N. Amer. Herpet., 1842, III, 119, Pl. 28. *Ophibolus doliiatus* var. *elapsoideus* Garman, Mem. Mus. Comp., Zool. Cambr., VIII, 1843, p. 155.

In two specimens of the eight which have come under my observation, the loreal plate is present (Nos. 9689 and 11988). In No. 5560 there are two temporal scuta on one side, instead of the normal number, one. The Floridan district.

## OPHIBOLUS Bd. and Gird.

Cat. Rept. N. Amer. Pt. 1, Serpents, 1853, p. 82. Cope, Check List North American Batr. Reptilia, 36, 1875; Proc. Amer. Philos. Soc., 1886, 487; Bull. U. S. Nat. Mus. 1887, p. 78. *Lampropeltis* Fitzinger *nomen nudum*, Systema Reptilium, 1843, p. 25; Cope, Proc. Acad. Phila., 1860, p. 254. *Sphenophis* Fitz., *loc. cit. nomen nudum*. *Bellophis* Sockington, Proc. California Acad. Sci., 1877, p. 52.

Posterior maxillary teeth larger and stronger than the anterior. Head but little distinct. Cephalic scuta normal. Rostral plate not modified; loreal present; one preocular. Scales smooth, with two apical pits. Anal scutum entire; subcaudal scuta in two rows. Pupil round.

This genus represents in North America the *Cororella* of the Old World, but is abundantly distinct in its entire anal scutum and its double scale pits. Its six species form a very homogeneous group, and although they present abundant differences to the eye, critical examination shows that their characters are by no means easy to determine. Some of them (*O. doliatus* and *O. getulus*) offer a degree of variation within themselves which is not equaled by any other North American species, with the exception of the *Eutania sirtalis*. They afford excellent lessons in the evolution of specific types.

The characters of the species are as follows:

## I. Temporal scuta 2 (1) 2 (3) 3.

Scales in twenty-one rows; large brown or red dorsal spots or saddles broadly black bordered, forming pairs of black cross bands above..... *O. doliatus*.

## II. Temporal scuta 2 - 3 - 4.

$\alpha$  Scales in 21 - 3 rows.

Eight superior labials; numerous brown dorsal saddle spots closed at the sides, *O. multistratus*.

Seven superior labials; smaller, head wide, distinct, body slender; numerous black rings more or less split with red..... *O. pyrrhomelas*.

Seven labials; large, robust, head little distinct; black with or without white transverse or longitudinal bands..... *O. getulus*.

Seven labials; robust, head not distinct; light brown, with small transverse, reddish dorsal spots faintly dark bordered..... *O. rhombomaculatus*.

$\alpha\alpha$  Scales in twenty-five rows.

Seven labials; robust; light brown with a median dorsal, and two lateral rows of darker brown spots faintly dark bordered..... *O. calligaster*.

The distribution of these species is as follows: The *O. doliatus* covers North America east of the Rocky Mountains and south of latitude 50°, and south to Panama. The *O. getulus* has nearly the same eastern range, not reaching so far north by 10°, and covers the Sonoran and Pacific regions besides, but is scarcely found in continental Mexico. The *O. pyrrhomelas* inhabits the Sonoran and southern part of the Pacific regions. The *O. rhombomaculatus* occupies the middle regions east of the Appalachian Mountains, and the *O. calligaster* the corresponding region west of those mountains, and extends west as far as the Pecos River of Texas.

*Ophibolus doliatus* Linn.

Bd. and Gird., Cat. Serp. N. Amer., 1853, p. 89; Cope, Check List Batr. Rept. N. Amer., 1875, pp. 4 and 36; Proc. U. S. Nat. Mus., 1888, p. 381.  
*Coluber doliatus* Linn., Syst. Nat., i, 1766, 379; Gmel. Linn. Syst. Nat. Ed., XIII, i, iii, 1788, 1096; Harlan, Journ. Ac. Nat. Sci. Phila., v, 1827, 362.  
*Coronella doliata* Holbrook, N. Amer. Herp., III, 1842, p. 105, Pl. 24; Dum. and Bibr., Erpet. Gen., VII, p. 621; Günther, Cat. Colubr. Snakes Brit. Mus., 1858, p. 41.  
*Coronella coccinea* Schlegel, Essai s. le. Phys. Serp., i, 1837, p. 130; II, p. 57.

Scales in twenty-one rows, rather wide. Tail rather short, entering total length six and two-thirds times. Head rather flat, little distinct. Loreal small, longer than high; one preocular, two postoculars. Temporals 2-2 (rarely 1-2). Frontal rather wide, narrowing the superciliaries in front. Parietals rather wide, the length a little less than that of frontal and prefrontals combined. Seven superior labials all higher than long, except the first, the third and fourth bounding the orbit. Genaeals, the anterior about twice the size of the posterior. Size medium to small.

The ground color of the superior surfaces varies from ashen to bright yellow, but it only appears as transverse spaces between the broad reddish brown to crimson spots or saddles which cross the back. The extent to which these spots preserve their outlines or surround the body like rings, indicate the characters of various subspecies. The coloration of the head varies from red or black, abruptly cut off posteriorly, to banded with two chevrons, a brown within a yellow one, with a yellow cross band on the nose.

The variations of this species are remarkable, and form the subject of some remarks which I have made on former occasions.\*

## I. No yellow band posteriorly from orbit (a yellow half collar).

α Dorsal spots or saddles (red) open at the side, their adjacent borders forming pairs of black rings.

Interspaces between red saddles, open below; scales not black-tipped; front more or less black; first black ring on nape only. . . . . *O. d. coccineus*.

Interspaces between red saddles closed by black spot below; scales black tipped; front black; first black ring complete. . . . . *O. d. polyzonus*.

Interspaces not closed; rings including first complete on belly; first yellow band crossing occipital plates; front black; scales not black tipped. *O. d. conjunctus*

## α α. Dorsal saddle spots closed at the sides

β. Saddles closed by a single black tract on the middle of the belly; no spots between saddles.

Dorsal spots undivided medially; front black; first black ring complete; . . . . . *O. d. annulatus*.

Dorsal spots divided longitudinally by a median black connection; front black. . . . . *O. d. gentilis*.

## β β. Inferior borders of saddles separate and not confluent with each other below.

Saddles completed on gastrosteges; no alternating spots; no black collar; . . . . . *O. d. parallelus*.

Saddles completed on gastrosteges; spots opposite intervals forming a single series on the middle line of the belly . . . . . *O. d. sypsilus*.

Saddles completed above the gastrosteges; alternating spots which do not meet on the middle line of the belly . . . . . *O. d. doliatus*.

\* Bull. U. S. Nat. Mus., i, 1875, p. 4; Proc. U. S. Nat. Mus., 1888, p. 381.

II. A yellow band from orbit bounded below by a black or brown one. (Saddle spots closed laterally above gastrosteges; superciliary light spots or bands).

A half collar nearly or quite touching occipital plates, no bands; alternate spots largely on gastrosteges ..... *O. d. collaris*.

Neck with longitudinal bands; alternate spots largely on gastrosteges. *O. d. clericus*.

Neck with bands; alternate spots entirely on scales. .... *O. d. triangulus*.

The *O. d. polyzona* Cope (*Coronella formosa* Schl.) and *O. d. conjuncta* Jan. (*O. d. occipitalis* Cope) are exclusively Mexican and Central American.

***Ophibolus doliatus coccineus* Schleg.**

Cope, Check List N. Amer. Batr. Rept., 1875, p. 36; Proc. U. S. Nat. Mus., 1888, p. 382.

*Coronella coccinea* Schlegel, Ess. Phys. Serp., II, 1837, p. 67, Pl. 2, Fig. 11.

*Lampropeltis coccineus* Cope, Proc. Acad. Phila., 1860, p.

*Ophibolus doliatus* Bd. and Gird., Cat. N. Amer. Serp., 1853, p. 89.

*Coronella doliata* var. *gentilis* Bocourt, Mis. Sci. Mex. 1886, p. 610, Pl. xxxix, Fig. 5.

The Austroriparian region.

***Ophibolus doliatus annulatus* Kenn.**

Cope, Check List, Batr. Rept. N. Amer., 1875, p. 36; Proc. U. S. Nat. Mus., 1888, p. 382.

*Lampropeltis annulata* Kennicott, Proc. Acad. Phila., 1860, p. 329.

S. W. Texas and Nuevo Leon, Mexico.

***Ophibolus doliatus gentilis* Bd. and Gird.**

Cope, Check List Batr. Rept. N. Amer., 1875, p. 36; Proc. U. S. Nat. Mus., 1888, p. 383.

*Ophibolus gentilis* Bd. and Gird., Cat. Serp. N. Amer., 1853, p. 90; Marcy's Report Expl.

Red River, 1853, p. 229, Pl. VIII.

Arkansas.

***Ophibolus doliatus parallelus* Cope.**

Proc. U. S. Nat. Mus. 1888, p. 385. *Coronella coccinea* Jan, Icon Gen. Ofid., I, 17, I, Fig. 1.

Floridan district.

***Ophibolus doliatus sypsilus* Cope.**

Proc. U. S. Nat. Mus., 1888, p. 384. *Coronella doliata* var. *gentilis*, Jan, Icon. Gen. Ofid., I, 17, I, Fig. 2.

The Austroriparian region.

***Ophibolus doliatus doliatus* Linn.**

Cope Batr. Rept. N. Am. Check List, 1875, p. 37; Proc. U. S. Nat. Mus. 1888, p. 383.

*Coluber doliatus* Linn., loc. sup. cit.; Harlan, *Coronella doliata* Holbrook, loc. sup. cit.; Dum. Bibr. Erp. Gen., loc. sup. cit.; Günther, loc. sup. cit.

Austroriparian region and Carolinian district.

***Ophibolus doliatus collaris* Cope.**

Proc. U. S. Nat. Mus., 1888, p. 383.

*Coronella doliata* Jan, Icon. Gen. Ofidi., I, livr. 14, Pl. IV, Fig. A. *Coronella doliata typica* L. Bocourt Miss. Sci. Mex. 1886, Pl. xxxix, Fig. 2. *Coronella eximia* Jan, loc. cit., I, 17, I, Fig. 3.

The Carolinian district.

**Ophibolus doliatus clericus** Bd. and Gird.

*Ophibolus clericus* Bd. and Gird., Cat. Rept. N. Amer. Serpents, p. 88. Cope, Proc. U. S. Nat. Mus., 1888, p. 383.

Carolinian district, Louisianian district.

**Ophibolus doliatus triangulus** Boie.

Cope, Check List N. Am. Batr., Rept., 1875, p. 37; Proc. U. S. Nat. Mus., 1888, p. 383.

*Coluber triangulum* Boie, Isis von Oken. 1827, p. 537.

*Ablates triangulum* Dum. and Bibr., Erp. Gen., VII, 1854, p. 315; Hallowell, Proc. Acad. Phila., 1856, p. 245.

*Lampropeltis triangua* Cope, Proc. Phila. Acad., 1860, p. 256.

*Pseudoeclaps* Y Berthold, Abh. k. Gess. Wiss., Göttingen, I, 1843, p. 67, Pl. 1, Figs. 11-12.

*Coluber eximius* Dekay, N. York Fauna, Rept. 1842, p. 38; Harlan, Journ. Acad. Nat. Sci. Phila., 1827 p. 360; Holbrook, N. Am. Herp., III, 1842, Pl. 15; Günther, Catal.

Colubr. Snakes Brit. Mus., 1858, p. 91.

*Ophibolus eximius* Bd. and Gird., Cat., 1853, p. 87.

**Ophibolus rhombomaculatus** Holbr.

Bd. and Gird., Cat. Serp. N. Amer., 1853, p. 86; Cope Check List Batr. Rept. N. Amer., 1875, p. 37.

*Coronella rhombomaculata* Holbr., N. Amer. Herp., III, 1842, p. 103, Pl. xxiii.

*Lampropeltis rhombomaculata* Cope, Proc. Acad. Phila., 1860, p. 255 *Ophibolus triangulus* var. *rhombomaculatus* Garman, Mem. Mus. Comp. Zool. Cambr., VIII, 1883, p. 156.

Carolinian district east of Allegheny Mountains.

**Ophibolus calligaster** Say.

Cope, Check List N. Amer. Batr. Rept., 1875, p. 37.

*Coluber calligaster* Say, Harlan Med. and Phys. Researches, 1835, p. 122.

*Alabes triangulum* var. *calligaster* Hallow., Proc. Acad., Phila., 1856, p. 244.

*Lampropeltis calligaster* Cope, Proc. Phila. Acad., 1860, p. 255.

*Ophibolus evansii* Kennicott, Proc. Phila. Acad., 1859 p. 99.

*Ophibolus triangulus* var. *calligaster* Garman, Mem. Mus. Comp. Zool. Cambr., VIII, 1883, p. 155.

Illinois and Kansas to Texas.

**Ophibolus pyrrhomelas** Cope.

*Ophibolus pyremelanus* Cope, Proc. Acad. Phila., 1866, p. 305; Check List Batr. Rept. N. Amer., 1875, p. 37 (*pyrrhomelas*), Rept. U. S. G. Surv., W. of 100th Mer., v, 1875, p. 537, Pl. XIX.

*Bellophis zonatus* Sockington, Proc. Cal. Acad. Sci., 1877, p. 52.

*Ophibolus getulus* var. *pyrrhomelas* Garman Mem. Mus. Comp. Zool. Cambr., VIII, 1883, p. 157.

*Coronella multifasciata* Bocourt, Miss. Sci. Mex., 1886, p. 616; Pl. XL, fig. 2.

This species occupies a position between the *Ophibolus doliatus*, and the *Ophibolus getulus boylii*. It is in fact an *Ophibolus getulus boylii* of slender form and reduced size, in which the black spaces between the white rings are more or less split by red. This division, when complete, gives the snake the appearance of the *Ophibolus doliatus conjunctus*, and to a somewhat less degree of the *O. d. coccineus*. Such are specimens 8174, 4292, and 10200. Where the black is complete just at the middle

line of the back, we have a form like *O. d. genitilis*, as No. 8435. In 7845, 11753, and 13571 the red only appears on the anterior part of the body, and divides completely only a limited number of black rings behind the head. These approach nearest the *O. g. boylii*. The species further varies in the extent to which the black of the front covers the muzzle. The latter is white to the posterior part of the prefrontal scuta in 7845, 8174, and 10200; it is speckled at the end and on the sides in 8435 and 4292, and it is totally black in 11753 and 13571. The yellow half-collar crosses the posterior parts of the parietal plates in this species, advancing further forwards than in any of the subspecies of *Ophibolus doliatus* excepting the *O. d. conjunctus*.

The increased number of scales on the body and on the temporal region indicate that the affinities of this species are stronger with the *O. g. boylii* than with the *O. doliatus*. It inhabits a hotter and a drier region than the *O. boylii*, and as the conditions of the country are of later geologic origin than are those of California, the habitat of the *O. boylii*, we may conclude that it is a descendant of the latter. It appears in the southern part of California. It illustrates how, under a semitropical sun, a brilliant color makes its appearance little by little, and probably in a way totally different from that in which it appeared in the case of the *O. doliatus* (see that species).

#### *Ophibolus multistratus* Kenn. .

Cope, Check List Batr. Rept. N. Amer., 1875, p. 37.

*Lampropeltis multistrata* Kennicott, Proc. Acad. Phila., 1860, p. 328; *Ophibolus triangulus* var. *multistratus* Garman Mem. Mus. Comp. Zool. Cambr., VIII, 1883, p. 155.

Central region from latitude 40° to Mexican Plateau.

#### *Ophibolus getulus* Linn.

Bd. and Gird., Cat. Serp. N. Amer., 1853, p. 85; Cope, Check List Batr. Rept. N. Amer., 1875, p. 37.

*Coluber getulus* Linn. Syst. Nat. I, 1766, p. 362; Gmel. Linn. Syst. Nat. XIII, III, 1788, p. 1106; Harlan, Journ. Acad. Phila., v, 1827, 358; Peale contr. Maclur. Lyc., I, 1829, Pl. v., Günther, Cat. Colubr. Snakes Brit. Mus., 1858, p. 249.

*Pseudoeclaps getulus* Fitz., New Class, Rept., 1826, p. 56.

*Herpetodryas getulus* Schleg., Ess. S. l. Phys. Serp., II, 1837, p. 198.

*Coronella getula* Holbr., N. Amer. Herp., III, 1842, p. 95, Pl. 21; Dunn. and Bibr. Erp. Gen. VII, 617.

*Lampropeltis getula* Cope, Proc. Acad. Phila., 1860, p. 255.

Head little distinct, conical, not depressed, the muzzle slightly compressed and the rostral plate projecting beyond the lower jaw. Rostral plate moderately recurved on the superior face of the muzzle. Frontal rather wide, produced posteriorly. Loreal small; oculars 1-2. The eye not large, resting on the third and fourth superior labials. Temporal scales, 2-3-4. Superior labials seven, higher than long, except the first, sixth, and seventh. Inferior labials ten, fifth longest, post-geneials shorter than pre-geneials. Scales in from twenty-one to twenty-five rows, rather short, the sizes graduating insensibly. Tail short.

Ground color black, marked above and below with yellow or white spots and bands, the latter generally transverse, rarely longitudinal. Labial plates light-colored, with dark borders. Top of head black, with larger or smaller white or yellow spots.

This species ranges the entire nearctic realm as far north as about latitude 41°. It is not found in the neotropical realm, unless the Lower Californian district be embraced in it.

The variability of this species is in some respects considerable, while in others it is quite constant. A number of distinct species have been proposed on its forms, most of which I felt compelled to reduce to this one as subspecies at the time of writing my check list in 1875. Further reduction is made now. The number of rows of scales is not constant. In the subspecies *O. g. getulus*, they may be twenty-one or twenty-three; and in the *O. g. boylii* they may number twenty-three or twenty-five. The characters based on color indicate natural geographical subspecies, but the transitions from one to the other are not lacking. The subspecies are defined as follows:

1. Scales in 21 (3) rows.

Scales with yellow centers, sometimes collected into cross bands on the back; head yellow spotted above ..... *O. g. sayi*.

Narrow white dorsal cross bands bifurcating on the flanks to embrace alternating black areas; head, white spotted above ..... *O. g. getulus*.

Uniform black above; below, with white spots; head spots few ..... *O. g. niger*.

2. Scales in 23 (5) rows.

Scales of the sides with yellow or white centers; median dorsal region black, with cross-bands of scales with yellow centers; top of head, except muzzle, black ..... *O. g. splendidus*.

Black, with complete white annuli, which are wider on the sides than on the back; top of head black; of muzzle, white ..... *O. g. boylii*.

Black, with more or less numerous longitudinal stripes above and on the sides, parts of annuli present or absent; top of head, black; top of muzzle, white ..... *O. g. californica*.

The geographical distribution of these subspecies is well defined. Thus the *O. g. sayi* belongs to the Austroriparian region west of the Allegheny Mountains, and of the central region north to latitude 42°. The *O. g. getulus* occupies the Austroriparian and Eastern regions north to about latitude 42°. The *O. g. splendidus* is the type of the Sonoran district, and the *O. g. boylii* of the Pacific. The *O. g. californica* probably comes from the Lower Californian, but our specimens come from the southern part of the Pacific region.

This is the largest species of the genus, and is beautiful in all its forms. It is thoroughly harmless to mankind, and can be handled to any extent without showing fear or anger.

*Ophibolus getulus sayi* Holbrook.

Cope, Check List Batr. Rept. N. Amer., 1875, p. 37.

*Coronella sayi* Holbr., N. Amer. Herpet., III, 1842, p. 99, Pl. xxii; Dum. Bibr. Erp.

Gen. VII, 1854, p. 619; Günther, Cat. Colubr. Snakes Brit. Mus., 1858, p. 41.

*Coluber sayi* Dekay, N. Y. Fauna Rept., 1843, p. 41.

*Ophibolus sayi* Bd. and Gird., Cat. Serp. N. Amer., 1853, p. 84.

*Lampropeltis sayi* Cope, Proc. Phila. Acad., 1860, p. 254.

*Herpetodyas getulus* Schleg., Essai Phys. Serp., II, 1837, p. 198.

*Coronella getulus sayi* Jan, Icon., Gen. Ofid., I, 14 v, Fig. 2.

**Austroriparian region.**

***Ophibolus getulus getulus* Linn.**

Cope, Check List Batr. Rept. N. Amer., 1875 p. 37.

*Coluber getulus* Linn., loc. sup. cit.; Harlan, loc. sup. cit.; Peale, loc. sup. cit.; Günther, loc. sup. cit.

*Pseudolaps getulus* Fitz., loc. sup. cit.

*Coronella getula* Holbrook, loc. sup. cit.; Dunn. Bibr. Erpet. Gen., loc. sup. cit.; Jan. Icon. Gen., Ophid., I 14, v, Fig. 1.

*Anguis annulatus* Catesby, Nat. Hist. Carolina, II, 1743, p. 52, Pl. iii.

*Lampropeltis getula* Cope, loc. sup. cit.

In his pamphlet on the serpents of New York (Albany 1854) Prof. Baird remarks that this species is maritime in its northern distribution, being rarely found in the Northern States, excepting near the coast. It is occasionally seen in Long Island (New York), according to Dekay, and more frequently in eastern New Jersey. It is not cited by J. A. Allen in his catalogue of the reptiles and batrachians found in the vicinity of Springfield, Massachusetts (Proc. Boston Soc. Nat. Hist., XII, 1863, Dec.), nor is it included in the list of species found in the State which is included in the paper. In its western distribution it is not known from west of the Mississippi.

This form is said to be an enemy and a devourer of other snakes, especially of the venomous *Crotalidæ*. I have not personally met with a case of it. It is entirely inoffensive to man, making no hostile demonstrations. My daughter, when a girl of six or eight years, had several individuals as pets. They drank milk readily from a cup which she held in her hand.

***Ophibolus getulus niger* Yarrow.**

Proc. U. S. Nat. Mus., 1882, p. 438.

**Southern Indiana.**

***Ophibolus getulus splendidus* Bd. and Gird.**

Cat. Serp. N. Amer., 1853, p. 83; Cope, Check List Batr. Rept. N. Amer., 1875, p. 37; Baird, U. S. Mex. Bound. Survey, II, 1859, 20, Pl. xiv, Jan. Icon. Gen. Ophid., I, 12 vi, Fig. 1; *Lampropeltis splendida* Cope, Proc. Phila. Acad., 1860, 255.

**Boundary region of United States and Mexico.**

***Ophibolus getulus boylii* Bd. and Gird.**

Cope, Check List Batr. Rept. N. Amer., 1875, p. 37.

*Ophibolus boylii* Bd. and Gird., Cat. Serp. N. Amer., 1853, p. 82; *Coronella balteata* Hallowell, U. S. Pacific R. R. Rept., x. Williamson's Rept., p. 14, Pl. v; Proc. Acad. Phila., 1853, p. 236.

*Lampropeltis boylii* Cope, Proc. Acad. Phila., 1860, p. 255.

*Coronella getulus*, var. *pseudogetus* Jan, Icon. Gen. Ofid. I, Livr., 12 Pl., vi, Fig. 2.

*Ophibolus getulus californiæ* De Bl.

*Ophibolus californiæ* Cope, Check List Batr. Rept. N. Amer., 1875, p. 37.

*Coluber (Ophis) californiæ* De Blainville, Arch. Mus. d'Hist. Nat., Paris, III, 1834, p. 60, Pl. xxvii, Figs. 1, 1a, 1b; Bd. and Gird., Cat. Serp. N. Amer., 1853, p. 153.

*Coronella californiæ* Dum. and Bibr., Erp. Gen., VII, 1854, p. 623.

*Ophibolus getulus eisenii* Yarrow, Proc. U. S. Nat. Mus., 1882, p. 439.

*Coronella getulus californica*, Jan. Icon. Gen. Ofid., I, Livr., 14 Pl., v., Fig. 3.

## Southern California and Lower California.

**DIADOPHIS** Bd. and Gird.

Cat. Rept. N. Amer., Pt. I, Serpents, 1853, p. 112; Cope, Bull. U. S. Nat. Mus. 32, 1887, pp. 54-89.

Head normal, distinct from body. Teeth of maxillary bone subequal, and in an uninterrupted series. Palatine teeth present. Cephalic plates normal; rostral normal, two nasals, one loreal. Scales smooth, unifossate. Anal plate and subcaudal scuta divided.

Diadophis is allied to *Dromicus*, but in that genus the last superior maxillary tooth is longer, and follows a toothless space, and the scales are pitless. *Rhadinæa* agrees with *Diadophis* in dentition, but has no scale pits, as in *Dromicus*. Both of these genera are Neotropical in distribution. The species of *Diadophis* are North American in distribution, except one from the Bahama Islands. It is, however, not unlikely that other species will be referred to this genus when the characters of their scale pits shall be known.

The North American species of *Diadophis* are difficult to define, owing to their variability. If exceptions to definitions were to be chiefly considered all might be regarded as one species. They are easily seen to be of common origin at no very remote period. The number of labial scuta is variable in all of the forms; the number of rows of scales is much less so. The width of the yellow neck collar is very variable; in the *D. regalis* it may be present or absent. The distribution of the spots on the belly, whether regular or irregular, coincides with other characters quite closely, but the absence of the median series from the form with 3 rows is of no significance. The light or dark color of the dorsal region characterizes geographical varieties of each of the three North American species. The species are characterized as follows:

## I. Tail long; urosteges 119; temporals 1-2.

Scales in seventeen rows; superior labials, eight; light reddish brown above, white below; unspotted ..... *D. rubeascens*.

## II. Tail short; urosteges not more than 60; temporals 1-1; generally a collar.

Scales in seventeen rows; superior labials, seven; labials, throat, and belly irregularly spotted ..... *D. regalis*.

Scales in fifteen rows; superior labials, seven; labials, throat, and belly irregularly spotted ..... *D. amabilis*.

Scales in fifteen rows; superior labials, eight; labials, throat, and belly unspotted, or the belly with a median series of spots ..... *D. punctatus*.

The *Diadophis rubescens* Cope\* inhabits the Bahaman Island of New Providence. The *D. punctatus* is restricted to the eastern region of Nearctica; the *D. amabilis* belongs to the Central, the Pacific, and the Sonoran, while the *D. regalis* is Sonoran, extending its range as far south in Mexico as the Tierra Templada of Vera Cruz.

*Diadophis regalis* Bd. and Gird.

Cat. Serp. N. Amer., 1853, p. 115; U. S. and Mex. Bound. Surv., II, 1859, p. 22, Pl. XIX, Fig. 2; Cope, Check List, 1875, p. 38.

Body above, uniform greenish ash to blackish brown; beneath, light yellow, scattered all over with small black spots. Dorsal scales in seventeen rows. Superior labials, seven; temporals, 1-1-1; oculars, 2-2.

Head proportionately short and broad behind; head flattened above; snout rounded. Eyes very small. Frontal plate subpentagonal, tapering posteriorly. Superciliaries narrower anteriorly. Body long and subcylindrical. Scales proportionally large and elongated, in seventeen rows; those of the outer row conspicuously broader. The upper and lower jaws and inferior surface of head spotted with black, on a light ground. The black spots of the inferior surface extend considerably beyond the anus.

Two distinct color forms are represented in this species, as follows:

Upper surfaces, bluish ashen; color of abdomen extending on first row of scales;  
..... *D. r. regalis*.  
Upper surfaces to gastrosteges brownish black; ..... *D. r. arnyi*

Of fourteen specimens of the *Diadophis regalis* examined, all have seven superior labials but two, which have eight.

*Diadophis regalis regalis* Bd. and Gird.

Loc. cit. Copel. c. *Diadophis punctatus regalis* Cope, Bull. U. S. Nat. Mus. 32, 1887, p. 80.  
Sonoran region.

*Diadophis regalis arnyi* Kennicott.

*Diadophis arnyi* Kennicott, Proc. Acad. Phila., 1859, p. 99; Cope, Check List, 1875, p. 38; *Diadophis punctatus arnyi* Cope, Bull. U. S. Nat. Mus. 32, 1887, p. 80; Jan, Icon. Gen. Ofid., I, 15, VI, Fig. 5.

Central region; Mexican plateau to Guanajuato and Zacualtipan, Vera Cruz.

*Diadophis amabilis* Bd. and Gird.

Cat. Serp. N. Amer., 1853, p. 113; *D. docilis* Bd. and Gird., l. c. 114; *D. pulchellus* Bd. and Gird., l. c. p. 115; *D. punctatus* var. *stictogenys* Cope, Proc. Acad. Phila., 1860, p. 250; *D. texensis* Kennicott, l. c., 1860, p. 328.

Body above, bluish slate color to deep blackish brown; beneath, yellowish white with crowded small black spots. Occipital ring narrow. Dorsal scales in fifteen rows; labial plates, seven above; oculars, 2-2; temporals, 2-2-2.

\* Proc. Amer. Philos. Soc., 1855, p. 403.

Head, body, and tail slender; head flattened above; body subcylindrical; tail subconical and tapering into a point. Frontal plate subpentagonal, less tapering posteriorly than in *D. punctatus*, and subacute. Occipitals narrow and elongated. Prefrontals as in *D. punctatus*. Superciliaries narrower and nearly of the same width throughout their length. Upper labials seven, sixth largest. Lower labials eight, fifth largest. Scales rather short, subelliptical, considerably larger on the sides than on the back, especially the outer row. Numerous small spots are scattered all over the lower part of the body, from the head to near the end of the tail. The upper surface and sides of head are blackish brown. The ground color of the abdomen is orange in life.

This species exhibits the same range of color variation as in *D. regalis*, with some exceptions. Thus there is a light-bluish form and a blackish form, the former western, and latter more eastern. I have seen no specimen without a nuchal collar. The specimens are always smaller and more slender than the fully grown *D. regalis arnyi*. These forms are distinguished as follows:

Color above bluish, below orange, the latter color covering two rows of scales.

*D. a. pulchellus*.

Color above bluish to the gastrosteges..... *D. a. docilis*.

Color above blackish brown to the gastrosteges; labials brown; ventral spots irregular..... *D. a. amabilis*.

Color above blackish to gastrosteges; labials yellow; ventral spots in three series.

*D. a. stictogenys*.

The *D. a. pulchellus* and *D. a. amabilis* are Californian; the *D. a. docilis* is known from Texas and Sonora; while the *D. a. stictogenys* ranges from Texas to Louisiana and Georgia.

#### *Diadophis amabilis pulchellus* Bd. and Gird.

*Diadophis puchellus* Bd. and Gird., Cat. Serp. N. Amer., 1853, p. 115.

*Diadophis punctatus pulchellus* Cope, Proc. Acad. Phila., 1883, p. 27; Jan, Icon. Gen. Ofid., 1, 15, vi, Fig. 3.

Oregon and California.

#### *Diadophis amabilis docilis* Bd. and Gird.

*Diadophis docilis* Bd. and Gird., Cat. Serp. N. Amer., 1853, p. 114.

*Diadophis texensis* Kennicott, Proc. Acad. Phila., 1860, p. 328; *Diadophis punctatus docilis*, Jan, Icon. Gen. Ofid., 1, 15, vi, Fig. 2.

Texas and Sonora.

#### *Diadophis amabilis amabilis* Bd. and Gird.

*Diadophis amabilis* Bd. and Gird. Cat. 1853, p. 113; *Diadophis punctatus amabilis*, Jan, Icon. Gen., Ofid., 1, 15, vi., Fig. 4.

Southern California.

#### *Diadophis amabilis stictogenys* Cope.

*Diadophis punctatus* var. *stictogenys* Cope, Proc. Acad. Phila., 1860, p. 250. *D. punctatus stictogenys* Cope, Check List, 1875, p. 37.

Louisiana to Georgia.

*Diadophis punctatus* Linn.

Bd. and Gird., Cat. 1853, p. 112, No. 1. Cope, Check List Batr. and Rept., 1875, p. 37.  
*Coluber punctatus* Linné, Systema naturæ, t. i, p. 376; Latreille, Hist. nat. des rept., t. iv, part 2, p. 136; Gmelin, Lin. Syst. Nat., t. i, part 3, p. 1089; Daudin, Hist. nat. des rept., t. vii, p. 178, Lacép., ii, p. 287; Bonnat. Ophiol., p. 10; Merr. Tent., p. 136; Harlan, Journ. Acad. Nat. Sci. Phila., 1827, p. 354; and Med. Phys. Res., 1835, p. 117; Storer, Reports, 1839 p. 225; Holbr., N. Amer. Herpet., 1842, iii, t. 18.  
*Natrix punctatus* Merrem, Tentamen, p. 136, spec. 193.  
*Homalosoma punctatum* Wagler, Syst. der Amph., 1830, p. 191.  
*Spilotes punctatus* Swainson, Cycloped. Rept., 1839, p. 364.  
*Calamaria punctata* Schlegel, Ers., 1837, t. i, p. 132; t. ii, p. 39.  
*Ablabes punctatus* Duméril et Bibron, Erp. Gen., 1854, t. vii, part i, p. 310; Günther, Cat. Col. Snakes Brit. Mus., 1858, p. 28.  
*Coluber torquatus* Shaw, Gen. Zoöl., 1803, t. iii, p. 553.  
*Diadophis dysopes* Cope, Proc. Acad. Phila., 1860, 251.

Eastern and Austroriparian regions except Texan District.

**HYP SIGLENA** Cope.

Proc. Acad. Phila., 1860, June, p. 240; Bull. U. S. Nat. Museum 32, 1887, p. 54;  
*Pseudodipsas* Peters, Monatsber. Preuss. Akad. Wiss., 1860, p. 52 (October). *Comastes*, Jan. Elenco Sistematico Ophidi, 1863, p. 102.

Dentition diacranterian; *i. e.*, a long, smooth, posterior maxillary tooth, separated from the anterior by an edentulous space. Pupil elliptic, erect; head distinct, broad posteriorly; body cylindrical. Cephalic shields normal. Two nasals, nostril between; one loreal; two pre- and two postoculars. Scales smooth. Gastrosteges not angulated. Anal and subcaudal scutella divided. Tail not elongate.

This genus includes four species of Central America, Mexico, and parts of the United States adjacent to the latter. They are of small size and resemble considerably the more robust species of Sibon. Their vertical pupil indicates that they are of nocturnal habit.

But one species enters the limits of the United States.

*Hypsiglena ochrorhyncha* Cope.

Proc. Acad. Phila., 1860, p. 246; *Hypsiglena chlorophæa* Cope, loc. cit. *Comastes quincunciatus*, Jan, Icon. Gen. Ofid., ii, 381, Fig. 1.

Sonoran, and Lower Californian regions; Chihuahua.

**PHYLLORHYNCHUS** Stejneger.

Proc. U. S. Nat. Mus., 1891, p. 151.

Head slightly distinct, short; tail short; palatine teeth present; dentition diacranterian; rostral plate greatly enlarged, with free lateral borders and produced backwards so as to separate the supranasals entirely; anal undivided; no scale-pits; pupil vertical; two nasals; loreal present; supralabials not in contact with orbit; one pair of genials only.

This genus is a curious example of those snakes in which the rostral shows a most extraordinary development. In the present instance this shield resembles a thick leaf loosely attached to the front of the snout.

and turned over on top of the muzzle. Two species are known, both from the Sonoran region. They differ as follows:

Scales keeled on posterior two-thirds of body; tail one-eighth of total length; about fifteen dorsal and no lateral spots..... *P. brownii*  
 Scales all smooth; tail shorter, about one-twelfth the length; about thirty dorsal spots and one or two rows of lateral spots..... *P. decurtatus*

***Phyllorhynchus brownii* Stejneger.**

Proc. U. S. Nat. Mus., 1890, p. 152.

One specimen from Tucson, Ariz.

***Phyllorhynchus decurtatus* Cope.**

Stejneger, Proc. U. S. Nat. Mus., 1890, p. 154.

*Phimothya decurtata* Cope, Proc. Phila. Acad., 1863, p. 310; *Id.*, Bull. U. S. Nat. Mus., No. 1, pp. 38, 92 (1875); Yarrow, Bull. U. S. Nat. Mus., No. 24, pp. 15, 99 (1885). *Salvadora decurtata* Garman, N. Amer. Serp., pp. 39, 145 (1883); *Id.*, Bull. Essex Inst., xvi, p. —; List N. Amer. Rept. Batr., p. 25 (1884); Cope, Bull. U. S. Nat. Mus., No. 32, p. 72 (1887); Bocourt, Miss. Scientif. Mex. Rep., 11 livr., p. 663 (1888).

Lower California.

**DROMICUS Bibron.**

Histoire de l' Isle de Cuba par de la Sagra, 1843, p. 225; Duméril et Bibron Erp. Gen., vii, 1857, p. 646; Cope, Proc. Acad. Phila., 1862, p. 76.

Posterior maxillary tooth longer than the others and separated from them by a space; palatine teeth present. Cephalic plates normal; two nasals and a loreal. Rostral not produced. Scales smooth, without fossæ. Preanal plate divided. Tail elongate. Pupil round.

This genus embraces a dozen species of medium and small size, from the West India Islands, with one species from the southeastern United States. Several species from Mexico are provisionally referred to this genus. The large West Indian species, with double-scale fossæ, formerly referred to *Dromicus*, are Colubrinæ related to *Drymobius*, and form the genus *Alsophis* Cope.

The North American species, *D. flavilatus* Cope, is one of the smaller forms of the genus.

Scales in seventeen rows; superior labials seven; tail entering the length  $3\frac{1}{2}$  times. Yellowish brown, first two rows of scales yellow-edged; below, and labials white; a brown band from nostril to last labial ..... *D. flavilatus*.

***Dromicus flavilatus* Cope.**

Proc. Acad. Phila., 1871, p. 222; Check List N. Amer. Batr. Rept., 1875, p. 38; Proc. Amer. Philos. Soc., 1878, p. 64; Proc. U. S. Nat. Mus., 1888, p. 386.

From the coast of North Carolina to Florida, inclusive.

**SALVADORA Bd. and Gird.**

Cat. Serp. N. Amer., 1853, p. 104; Cope, Bull. U. S. Nat. Mus., 32, 1887, pp. 57, 72. *Phimothya* Cope, Proc. Acad. Phila., 1860, 566; Check List, Batr. Rept. N. Amer., 1875, p. 38.

Form elongate, head distinct from body. Cephalic plate normal, except rostral shield, which is expanded laterally with more or less free

margins, and is recurved on the summit of the muzzle. Two nasals. Pre-ocular divided. Scales smooth, bifossate. Anal and subcaudal scutella divided. Teeth larger posteriorly. Pupil round.

This genus is more like the *Lytorhynchus* of Peters, of Africa and the adjacent parts of Asia, and like it, it inhabits, as to its typical form, the *S. grahamiæ*, dry and rocky regions. It has the same peculiar expanded rostral plate as the genus *Phyllorhynchus* Stejn., and displays a similar tendency to division of the lateral head shields. Three species of *Salvadora* are known, all of which are found within the political limits of Mexico, and one of them (*S. grahamiæ*) occurs also in the Sonoran region within the United States.

I proposed (*loc. cit.*) to change the name of this genus, because it had been previously given by Linnæus to a genus of plants. As it is not now regarded as necessary to maintain uniform difference between plant and animal generic names, I have recurred to the name of Baird and Girard.

The species differ as follows :

- I. Tail one-fourth of total length or shorter ; superior labial plates eight.

Rostral plate wider, more free laterally ; temporal scales 2, 3, 4 ; bluish or yellowish, with a brown stripe on each side of a yellowish dorsal stripe.

*S. grahamiæ.*

Rostral plate narrower, less free laterally ; temporal scales 2, 2, 3 ; olivaceous, with two brown stripes on each side of a narrow light brown dorsal stripe.

*S. bairdii.\**

- II. Tail one-third length ; superior labial plates nine.

Rostral plate narrower, less free at the sides ; temporal scales 2-2-2. Yellowish, with two brown bands on each side of a dorsal stripe, anteriorly broken up into parallel narrow lines and crossed by brown cross bars near the head.

*S. mexicana.†*

All of the species have seventeen longitudinal rows of scales.

#### *Salvadora grahamiæ* Bd. and Gird.

Cat. Serp. N. Amer., 1853, p. 104 ; Baird, U. S. Mex. Bound. Survey, II, 1859, Reptilia, p. 21, Pl. v, Fig. 2 ; Cope, Bull. U. S. Nat. Mus. 32, 1887, p. 72 ; Jan, Icon. Gen. Ofidi. Livr. I, Pl. III, Fig. 2.

*Phimothyræ grahamiæ* Cope, Proc. Acad. Phila., 1860, p. 304 ; Check List Batr. Rept. N. Amer., 1875, p. 38.

Considerable variations are presented by this species. Thus in two specimens (4673 and 4470) a narrow brown band extends along the fourth row of scales, in addition to the usual one on each side of the median line. In 4470 and 2082 the superior is partially broken into spots. In No. 9001 the bands are obsolete, being represented by black-

\* *Salvadora bairdii* Jan, Iconografia degli Ofidi Tab. III, p. 52. Specimens in U. S. Nat. Mus. from Orizaba Vera Cruz, West Tehuantepec and Chihuahua ; Sumichrast, and Potts ; and in Mus. Acad. Phila. from Jalapa, Vera Cruz, Mr. Pease.

† *Salvadora mexicana* D. & B., Cope, Bull. U. S. Nat. Mus., 32, p. 72, 1887 ; *Zamenis mexicanus* D. & B., Erp. Gen., VII, 1854, p. 695 ; *Lytorhynchus mexicanus* Cope, Proc. Amer. Philos. Soc., 1869, p. 266 ; *Coluber mexicanus* Garman, Mem. Mus. Comp. Zool. Cambr., VIII, 1883, 148. The last maxillary tooth is separated a little from the others hence diacranterian.

ish shades at the bases of the scales. Several specimens (2082, 9101, 5347, 12638) have a small loreal below the usual one. In three (2082, 4470, 9101) a second inferior ocular is formed from the summit of the fourth superior labial plate, so that the fifth only enters the orbit. On a specimen of this kind was proposed, the *Phimothyrax hexalepis*, which has also wider brown dorsal stripes than any other individual.

The *S. bairdii* resembles this species considerably, but has the rostral plate much narrower, and with more closely appressed edges, quite as in the *S. mexicana*. One or more of the temporal scales of the inferior row is larger than in the *S. grahamiae*. The colors are darker. The *S. mexicana* is a larger species than either of the others, and its general appearance is a mixture of the *Bascanium tæniatum* and the *B. flagelliforme*. The head is longer and flatter than the other species, and the temporal scales are in four vertical rows, the upper row larger.

The *Salvadora grahamiae* ranges from Guaymas, Sonora (Cragin); Batopilas, Chihuahua (Wilkinson); and Cape St. Lucas (Xantus) on the south, to Cottonwood Cañon, Utah, on the north. The locality given on the authority of Yarrow, "Ogden, Utah," requires confirmation, as this is much further north than it is to be looked for.

#### LIOPELTIS Cope.

Proc. Acad. Phila., 1860, p. 559; Bull. U. S. Nat. Mus. 32, 1887, p. 56.

*Chlorosoma* Bd. and Gird. (Wagler), Cat. Serp. N. Amer., 1853, p. 108; not of Wagler.

*Cyclophis* Günther, Reptiles Brit. India, 1864, p. 227,

Head distinct, scuta normal. Rostral plate not modified; one nasal. Teeth equal. Anal and caudal scuta divided. Scales smooth, unifossate (in *L. vernalis*).

This genus includes colubriiform species with a single nasal plate perforated by the nostril, with divided anal plate, and with smooth scales. They are of small and medium size, and are frequently of green color. The headquarters of the genus is in eastern Asia and India, no species existing in Europe or Africa, and but one in North America. Typical Asiatic species are the *L. tricolor* Schleg., *L. calamaria* Günth., and *L. major* Günth.

In North America the genus ranges the entire realm excepting the Pacific and Sonoran regions.

But one species is known in our fauna.

Scales fifteen rows; superior labials seven; postoculars two; temporals 1-2; green above; labials and below pale yellowish green; rather small. .... *L. vernalis*.

#### *Liopeltis vernalis* DeKay.

Proc. Phila. Acad., 1860, p. 560; Jan, Icon. Gen. Otid., II, 3 IV, Fig. 3.

*Coluber vernalis* MSS. Harlan, Journ. Acad. Phila., v, 1827, 361; Med. Phys. Res., 1835, p. 142; Storer, Rept. Mass., 1839, 224; Holbrook, N. Amer. Herpetology, III, 1842, 79, Pl. xvii; DeKay, New York Fauna Rept., 1842, 49, Pl. xi, Fig. 22; Thompson, Hist. Vermont, 1842, 117; *Chlorosoma vernalis* Bd. and Gird., Cat. 1853, p. 108; *Herpetodryas vernalis* Hallow., Proc. Acad. Phila., 1856, p. 243; *Cyclophis vernalis* Günther, Cat. Coluber Snakes Brit. Mus., 1858, p. 119; Cope, Check List Batr. N. Amer., 1875, p. 38.

**CYCLOPHIS** Günther.

**Cat.** Colubrine Snakes Brit. Mus., 1858, p. 119; Cope, Bull. U. S. Nat. Mus. 32, 1887, p. 56; *Opheodrys* Fitzinger, Systema Reptilium 1843, p. 26, *nomen nudum*; Cope, Proc. Acad. Phila., 1860, 560, *Philophyllophis* Garman, Memoirs Museum Comp. Zoölogy, Cambridge, 1883, p. 146.

Head distinct, scuta normal. One nasal plate, one preocular. Teeth equal, smooth. Anal and caudal scuta divided. Scales keeled, bifossate (*C. æstivus*).

This genus is found in temperate North America only. In the nearctic realm its range is mainly the Austroriparian region; but it has been taken in the southern part of the central region, and it ranges also the Carolinian district of the eastern region. But one species is known, which is characterized as follows:

Scales in seventeen rows; superior labials seven; temporals 1-2; tail two and one-half times in total length. Green above; labials and below light yellow.

*C. æstivus*.

**Cyclophis æstivus** Linn.

Günther, Cat. Coluber Snakes Brit. Mus., 1858, xi; Cope, Check List N. Amer. Batr. Rept., 1875, p. 38.

*Coluber æstivus* Linn., Syst. Nat. i, 1766, p. 387; Gmelin, Syst. Nat., ed. xiii, i, iii, 1788, p. 1114; Harlan, Jour. Acad. Phila., v, 1827.

*Leptophis æstivus* Bell, Zool. Journ., ii, 1825, 329; Holbrook, N. Amer. Herpetol., iii, 1842, p. 17, Pl. iii; Bd. and Gird., Cat. 1853, p. 106.

*Herpetodryas æstivus* Dum. and Biör. Erp. Gen., vii, p. 209, 1854.

*Opheodrys æstivus* Fitz., Cope, Proc. Acad. Phila., 1860, p. 560; *Cyclophis (Phyllophilopis) æstivus* Garman, Mem. Mus. Comp. Zool. Cambr., viii, 1883, p. 146.

*Anguis viridis* Catesby, Nat. Hist. Carolina, ii, 1743, p. 57, Pl. vii.

Austroriparian and part of Eastern region.

**BASCANIUM** Bd. and Gird.

Cat. Rept. N. Amer., Pl. i, Serpents, 1853, p. 93; Cope, Check List Batr. Rept. N. Amer., 1875, p. 40; Bull. U. S. Nat. Mus. 32, 1887, p. 56; *Coryphodon* Duméril and Bignon, Erpet. Gen., vii, 1854, p. 181; not of Owen, 1846; *Masticophis* Bd. and Gird. Cat. l.c., 1853, p. 98. *Coluber* Duméril Prodrôme, 1852; Garman, 1863.

Head distinct; cephalic plates normal. Teeth increasing gradually in size posteriorly; not grooved. Scales smooth, in an odd number of series, with two apical fossæ. Subcaudal scutella in two series; anal plate divided. Two preoculars; loreal present; two nasal plates. Form elongate.

The species of this genus are elongate in form, and active in movement, so that the popular names of "whip snake" and "racer" are appropriate. Although at home on the ground they climb bushes and low trees, though they rarely ascend to any great height. They are skillful in capturing young birds, as well as small mammals and reptiles. They are distributed over all North America south of the Boreal region, and are represented, like most of our other genera of snakes, by a greater multiplicity of form in the southwestern section of the continent. One species inhabits Mexico exclusively.

The young individuals of this genus frequently differ in coloration from the adults, and the species may be arranged in two series according to the coloration of the young, as follows:

(1) Young transversely spotted or banded. *B. constrictor*; *B. flagelliforme*.

(2) Young longitudinally striped. *B. semilineatum*; *B. laterale*; *B. schottii*; *B. taniatum*.

Of the second series all retain the striped coloration to maturity, excepting the *B. semilineatum*, where a trace only remains on the anterior part of the body. The general characters of the species are as follows:

- I. Scales in seventeen rows; superior labials seven. (Frontal plate nearly as wide as superciliaries posteriorly; muzzle rather produced; colors not in stripes.)  
Two labials bounding orbit below; form robust; colors generally uniform; always so on lips and throat..... *B. constrictor*.  
One labial bounding orbit below; form more slender; more or less spotted on the lips and throat..... *B. mentovarium*.
- II. Scales in nineteen rows; superior labials eight. (Frontal plate one-half as wide as superciliary behind; muzzle narrowed, produced.)  
Slender; above, black; below, yellow..... *B. piceum*.
- III. Scales in seventeen rows; superior labials eight. (Frontal plate one-half width of superciliaries posteriorly; form slender.)  
Muzzle narrowed, more or less decurved; without, or with dark shades or spots anteriorly; young cross-spotted..... *B. flagelliforme*.  
Muzzle narrowed; pale with a lateral brown stripe anteriorly: no temporal spot; young striped..... *B. semilineatum*.  
Muzzle flattened, wider; a continued yellow stripe on third and fourth rows of scales only; dorsal scales brown; a yellow temporal spot; belly yellow.  
*B. laterale*.
- IV. Scales in fifteen rows; superior labials eight. (Form slender; color in stripes.)  
Muzzle elongate, narrow; frontal plate more than half as wide as superciliaries posteriorly; two lateral yellow stripes on a dark ventral and dorsal ground; dorsal scales yellow-edged; no temporal spot..... *B. schottii*.  
Muzzle elongate, flattened; frontal half as wide as superciliary behind; reddish brown above and below, with two yellow stripes as in *B. schottii*, that on the third and fourth rows black-edged and split by a black line; colors above alternately transversely darker and paler..... *B. ornatum*.  
Muzzle depressed, short; frontal plate half as wide as superciliaries posteriorly; brown above to fourth row of scales; below and sides, yellow; latter with four or five lines on middles of rows of scales..... *B. taniatum*.

Some of the species above admitted are nearly allied, and young specimens are sometimes not readily referred to their proper places. In the first place, although the eyes of young vertebrata are relatively larger than those of the adult, yet the superciliary plates in this genus encroach more on the frontal in mature than in young specimens, so that in the former the frontal plate is more narrowed posteriorly than in the latter. The color characters of young individuals of the *B. laterale* and *B. taniatum* are sometimes not fully developed, so that their reference is difficult. In all of the species the head plates are pale-bordered in the young, and this character may or may not continue to maturity in the *B. taniatum*. The *B. constrictor* and *B. flagelliforme* are cross-barred

and spotted in youth, but this character disappears except on the anterior dorsal region of the latter species, where it is frequently retained.

The species are distributed as follows :

Regions—Eastern, *B. constrictor* ; Austroriparian, *B. constrictor*, *B. flagelliforme* ; Central, *B. constrictor*, *B. tæniatum* ; Pacific, *B. constrictor*, *B. flagelliforme*, *B. tæniatum*, *B. laterale* ; Sonoran, *B. flagelliforme*, *B. semilineatum*, *B. piceum*, *B. schottii*, *B. laterale*, *B. ornatum*, *B. tæniatum* ; Mexican, *B. mentovarium*.

The number of rows of scales is very constant. Apparent exceptions are referred to under the head of *B. laterale*. The number of labial scuta is very constant except in the Californian representatives of the *B. constrictor*. The small inferior preocular plate is very constant in *B. constrictor*, its only absence being noticed in a very few specimens of the Californian form of *B. constrictor*. The temporal scales are always normally 2-2-2, and rarely vary from it.

The anterior and posterior parts of the body are frequently differently colored in this genus. This is especially the case with the *B. flagelliforme*, *B. semilineatum*, and *B. ornatum*, where the posterior region is paler than the interior and lacking in the pattern. In the *B. constrictor* the transition from the black to the green variety is first seen in fading out of the black on the tail and posterior part of the body.

As regards the striped forms, we have evidence how the young differ from the adult in the *B. semilineatum* and the *B. tæniatum*. In these the tendency to form distinct wider bands is stronger than in the adult, where they are subdivided and more or less obliterated. Thus the young of both these forms resemble more the *B. laterale* than do the adults. We may then regard the *B. laterale* as representing a primitive form for this series. The primitive form for *B. flagelliforme* and *B. constrictor* was probably a cross-banded form, but no such species is known. In this respect the last named species resemble those of the genus *Drymobius*, where the young are cross-banded or spotted. Some *Drymobii* are known where the adults are cross-spotted.

The remains of a *B. constrictor* were found by Mr. C. M. Wheatley in the bone cave at Port Kennedy, Pennsylvania, which furnished so many species of extinct mammalia.

#### *B. constrictor* Linn.

Bd. and Gird., Cat. Serp. N. Amer., 1853, p. 93; Cope, Check List Batr. Rept. N. Amer., 1875, p. 40.

*Coluber constrictor* Linn., Syst. Nat., I, 1766, p. 385; Gmelin, Linn. Syst. Nat., XII, I, iii, 1788, p. 1109; Harlan, Journ. Acad. Phila., v, 1827, p. 348; Schleg. Ess. Phys. Serp., 1837, p. 133, Pl. v, Figs. 3-4; Storer Report Rept. Mass., 1839, p. 225. Holbrook, N. Amer. Herp., III, 1842, p. 55, Pl. XI; Thompson, Hist. Vermont, 1842, p. 117; Dugay, New York Fauna, Rept. 1842, p. 35, Pl. x, Fig. 20; Garman, Memoirs Mus. Comp. Zool., Cambridge, VIII, 1883, p. 147.

*Hicrophis constrictor* Bonap., Fauna Italica, II, 1841, nomen nudum.

- Coryphodon constrictor* Dum. and Bibr., *Erp. Gen.*, vii, 1854, p. 183; Günther, *Cat. Col. Snakes Brit. Mus.*, 1858, p. 108; Jan. *Icon. Gen. Ofid.*, ii, 22, iii, Fig. 2; iv, Fig. 2; iii, 48, iii, Fig. 17.
- Coluber flaviventris* Say, in Long's *Exped. Rocky Mts.*, ii, 1823, p. 185.
- Coryphodon constrictor* var. *flaviventris* Jan. *Icon. Gen. Ofid.*, ii, 22, iii, Fig. 1; iii, 48 vi, Fig. 2.
- Bascanium fremontii* Bd. and Gird., *Cat. Serp. N. Amer.*, 1853, p. 95.
- Bascanium foxii* Bd. and Gird., l. c. 96.
- Bascanium vetustus* Bd. and Gird., l. c. 97; Girard, *U. S. Expl. Exped.*, 1858, p. 127, Pl. vii, Figs. 12-19; Cooper, *Pac. R. R. Report*, xii, Pl. ii, 1860, p. 301.
- Bascanium constrictor* var. *vetustum* Cope, *Check List Batr. Rept. N. Amer.*, 1875, p. 40; Yarrow, *U. S. G. Surv. W. of 100th Mer.*, v, 1875, p. 241.
- Coryphodon constrictor* var. *vetustus* Jan, *Icon. Gen. Ofid.*, ii, 22, iv, Fig. 1.
- Bascanium anthicum* Cope, *Proc. Acad. Phila.*, 1862, p. 338.

Transitions between the eastern black and the western green forms of this species are frequently met with in the region connecting the two habitats. Thus, in Michigan the species is generally of a bluish green or greenish blue tint above, and is known as the "blue racer." Similar specimens are in the National Museum from New Orleans. On the yellow-bellied form of the plains, Say proposed his *Coluber flaviventris*, which was regarded as a distinct species by Hallowell and by Baird and Girard. I, however, do not find it to be more than a geographical color race. The same color characterizes specimens from the Pacific district, which are also inferior in size to Eastern individuals, and frequently have the head a little shorter. In spite of this fact they incline to develop an additional labial plate, the number being occasionally in this region eight on one or both sides. Thus, of eleven black Eastern specimens only two have 8 superior labials on both sides. Of twenty-two yellow-bellied specimens, three have the labials, 7 on one side and 8 on the other, and nine have 8 on both sides. Of the twelve specimens thus exceptional, seven are from the Pacific region and five from the Great Basin of Nevada and Utah, of the central region. This is the *Bascanium vetustum* of Baird and Girard. In the type specimens the sixth labial reaches the lower postocular; but this is exceptional and rarely occurs in California or other individuals.

A remarkable color variety of this species was described by me under the name of *Bascanium anthicum*. In this form the general color is as in the dark bluish tinted variety, but numerous scales on all parts of the body are a bright yellow. The yellow scales are rarely regularly arranged, but sometimes show a tendency to a distribution in chevron-shaped cross-bands. A specimen of this kind was sent me by my friend, Prof. Pendleton King, as from near Baton Rouge, Louisiana. The typical specimen, which is in the National Museum, is of uncertain locality, but was alleged to have been brought from Siam, most probably erroneously.

A black *Bascanium* was described by Baird and Girard as having been brought from California, under the name of *B. fremontii*. The specimen is a typical *B. constrictor*, and was taken probably to the eastern region. The *B. foxii* Baird and Girard is the same.

The length and diameter of the tail vary considerably, some being quite slender and others quite robust. Of the slender-tailed forms, two (8298 and 4488) are males. The sex of the others is unknown, but I suspect the specimens with thick tails to be females. The lengths are as follows: *I. B. c. constrictor*:  $3\frac{1}{2}$  in total length, No. 8298;  $3\frac{3}{8}$ , 4447;  $3\frac{3}{8}$ , 11440;  $3\frac{1}{4}$ , 1764, 4448;  $4\frac{3}{8}$ , 7194, 1788, 4444;  $4\frac{3}{8}$ , 10650. *B. c. flaviventrie*:  $3\frac{2}{5}$ , 10717;  $3\frac{3}{8}$ , 12588;  $3\frac{1}{5}$ , 4418;  $3\frac{3}{7}$ , 2132; 4, 1741;  $4\frac{1}{10}$ , 7812;  $4\frac{1}{2}$ , 7812b;  $4\frac{2}{5}$ , 12581.

*Bascanium piceum* Cope.

*Bascanium flagelliforme piceum* Cope, in Yarrow's Rept. U. S. G. G. Surv. W. of 100th Mer., 1875, v., p. 617 (name only); Check List N. Amer. Batr. Rept., 1875, p. 40.

Form elongate, tail  $3\frac{3}{8}$  times in the total length. Head elongate, muzzle narrowed forwards, moderately protuberant, not flattened, slightly decurved. Rostral plate slightly recurved above; internasals longer than wide. Frontal half as wide as superciliaries behind. Parietals openly truncate emarginate at posterior margin. Loreal large, larger than high. Temporals 2-2-2. Superior labials 8, fourth and fifth bounding orbit, sixth subtriangular, seventh and eighth larger and nearly equal, and longer than high. Inferior labials 10, fifth longest; postgenaeals not longer than pregenaeals. Scales in nineteen longitudinal rows, moderately narrowed.

Gastrosteges, 195; anal, 1; urosteges, 108. Total length, 1,263 millimeters; the tail, 355 millimeters; end of muzzle to rictus oris, 34 millimeters.

Color above, to and including the extremities of the gastrosteges, black. Inferior surfaces, light yellow; the anterior fifth of the length with brownish blotches, which are posteriorly few and distant, but become larger and more approximated, until the anterior thirty to forty gastrosteges are brown or anteriorly black, like the superior surfaces. Labial plates with some pale shades in their middles. Preocular with a light middle; postoculars black. Top of head a little paler than back.

This form might be regarded as a melanistic *B. flagelliforme* but for the increased number of scale rows and longer tail. The fact that the inferior surface does not generally take part in the darkened color indicates a normal color type.

*Bascanium piceum* Cope.

Catalogue No.	No. of specimen.	Locality.	From whom received.	Character.
7891	1	Camp Grant, Arizona .....	Dr. E. Palmer.	Alcoholic.

*Bascanium flagelliforme* Catesby.

*Bascanium flagelliforme flagelliforme* Cope, Check List Batr. Rept. N. Amer., 1875, p. 40.

*Anguis flagelliformis* Catesb., Nat. Hist. Coral, II, 1743, p. 54, Pl. LIV.

*Coluber flagellum* Shaw, Gen. Zoöl., III, 1802, p. 475.

*Coluber flagelliformis* Holbr., N. Amer. Herpet., I, 1836, p. 107, Pl. XIX; Garman, Mem.

Mus. Comp. Zoöl. Cambr., VIII, 1883, p. 147.

- Psammophis flagelliformis* Holbrook, N. Amer. Herpt., 2d ed. III, 1842, p. 11, Pl. 2.  
*Masticophis flagelliformis* Bd. and Gird., Cat. Serp. N. Amer., 1853, p. 98; Jan. Icon. Gen. Ofid., II, 20, VI, Fig. 1.  
*Herpetodryas flagelliformis* Dum. and Bibr. Erp. Gen. VII, 1854, p. 210; Günther, Cat. Col. Snakes Brit. Mus., 1858, p. 118.  
*Coluber testaceus* Say, Long's Exped. Rocky Mts., 1823, p. 48; Holbr. N. Amer. Herpet., III, 1842, p. 63; Harlan, Journ., Acad. Phila., V, 1827, p. 348.  
*Masticophis testaceus* Bd. and Gird., Baird, U. S. Mex. Bound. Surv., II, Pt. II, Reptiles, p. 20, Pl. XVI.  
*Bascanium flagelliforme testaceum* Cope, Check List N. Amer., Batr. Rept., 1875, p. 40.  
*Masticophis flagelliformis* var. *testaceus* Jan, Icon. Gen. Ofid. II, 20, VI, Fig. 2.  
*Herpetodryas psammophis* Schleg. Ess. Physion. Serpens., II, 1837, p. 195.  
*Psammophis flavigularis* Hallow., Proc. Acad. Phila., 1852, p. 178.  
*Masticophis flavigularis* Bd. and Gird., Cat. Serp. N. Amer., 1853, p. 99.  
*Herpetodryas flavigularis* Günther, Cat. Col. Snakes Brit. Mus., 1858, p. 118; Hallow., Rept. U. S. Pac. R. R. Surv., X, 1859, Williamson's Rept. p. 12.

The color varieties of this species are as follows: In half-grown eastern specimens the head is light brown, with darker cross shades on the head and nape. In adult eastern specimens the head and from one-fourth to two-thirds the length of the body are deep brown. In Texas adult specimens the anterior regions are sometimes of a strong brown color, but generally they are pale, the top of the head only being of a light brown. In adults from the Sonoran and Pacific regions the posterior part of the head and several wide cross bands on the nape are of a dark brown or even of a blackish color. In specimens from Arizona these are followed by pink cross bands, which appear only on the anterior fourth or fifth of the body. In Californian specimens in the National Museum these pink cross bands indistinctly appear. In specimens from La Paz, at the southern extremity of Lower California, the entire body is a citron yellow, with some black appearing between the scales when the skin is stretched. The head and nape are spotted as in the Californian individuals. In young specimens from Georgia and Florida, as well as from the West, the chin, throat, and anterior part of the belly for a short distance are spotted by ill-defined spots of light brown. These are represented by cloudy shades, or are entirely lost in the prevailing brown color in eastern adult specimens. In Texas specimens they disappear entirely in some large adults. In Sonoran and Californian specimens they continue permanently, the spots forming a row on each side of the inferior and superior labials, and the speckled brown of the temporal region is divided by a pale line extending from the eye posteriorly.

This species ranges from South Carolina into Mexico on the plateau, and southward on the western slope. Thus I have recorded it from Chihuahua, Guanajuato, and Guadalupe.

***Bascanium semilineatum* Cope.**

This is a remarkable form, as it occupies a position between several of the species. Thus it has the scale formula and shape of head of *B. flagelliforme*, the head coloring of *B. schottii*, and part of the color-

tion between those of *B. tæniatum* and *B. laterale* and part like that of *B. flagelliforme*. Its characters ally it most nearly to the last named, but its appearance is quite distinct.

The scales are in seventeen rows, and there are eight superior labials. The posterior part of the frontal is only half as wide as the superciliary plate at the same point. The temporal scales are 2-2-2. The fourth and fifth labials bound the orbit below. The loreal is longer than high. The postgenials are a little larger than the pregenials. The muzzle is not decurved, and is moderately protuberant viewed in profile; from above it is elongate wedge-shaped. The tail is long, entering the total length in the specimen before me (No. 1981) three and one-seventh times.

The general color is a light-brownish clay-color (in spirits), the free border of each scale with an elongate whitish spot on each side. The color becomes darker anteriorly, so as to be on the anterior fourth of the length a plumbeous green with the top of the head light brown. There are no markings on the superior surface of this region, but the sides are striped, the stripes disappearing on the second fourth of the length of the body. These stripes are bounded by a brown line on the middle of each scale of the second and third rows. Between these the color is like that of the back, while the adjacent halves of the third and fourth rows are light yellow. A fainter brown line runs along the middle of the first row. Belly and throat immaculate light yellow, except a few punctæ along the ends of the first dozen gastrosteges. Middles of nasal, loreal, preocular, and postocular plates, yellow. Superior labials yellow, with a blackish superior border extending from the rostral plate back. Temporal region, like the top of the head, immaculate. A few black specks on the genial margins of the inferior labials.

Gastrosteges 201; anal 1; urosteges 134+. Total length (No. 1981) 1185 millimeters; of tail (extremity wanting) 375 millimeters.

A young specimen (No. 8434) is interesting as showing the constancy of the color characters as compared with those of corresponding age of the *B. tæniatum*, and with the adult *B. schottii* and *B. laterale*. In the first place the stripes are much more distinct in this specimen than in the adults, as is the case also with the *B. tæniatum*. Moreover, they extend farther along the length of the body, being traceable on the middle third, though they are wanting posterior to it. The stripes are: a yellow one on adjacent parts of the third and fourth rows, bounded below by a brown one on the adjacent parts of the second and third rows. A yellow stripe succeeds on the adjacent parts of the first and second rows, while another and paler brown stripe runs on the adjacent parts of the first row and the extremities of the gastrosteges. This pattern, it will be observed, is quite different from that which obtains in any of the other striped species, as the *B. tæniatum*, *ornatum*, *schottii*, or *laterale*. The head is entirely uniform greenish slate-color above and on the temples. The superior labials are yellow, the posterior bounded

above by a black line from the orbit to the neck. The muzzle of this specimen is broken off.

This species presents the interesting peculiarity of resembling another species (*B. flagelliforme*) much more in the adult than in the young stage. The young of the two species refer them to different sections of the genus, while the adults are distinguishable only on careful examination.

*Bascanium semilineatum* Cope.

Catalogue No.	No. of specimens.	Locality.	Whence obtained.	Character.
1981	3	Colorado River, Arizona.....	A. Schott.....	Alcoholic.
8434	1	Camp Grant, Ariz.....	— Butter.....	Do.

*Bascanium laterale* Hallow.

*Bascanium taniatum laterale* Cope, Check List Batr. Rept. N. Amer., 1875, p. 40; *Leptophis lateralis* Hallowell, Proc. Acad. Phila., 1853, p. 237; U. S. Pac. R. R. Report, x, 1859; Williamson's Report, p. 13, Pl. iv, Fig. 3.

This handsome species has two strongly marked subspecies, which may prove to be deserving of the rank of two species. The decision of this question must depend on future material.

The range is southern California and Arizona to the extremity of Lower California.

The subspecies are as follows:

Lateral stripe continuous to origin of tail; throat and upper and lower labials spotted; posterior upper labials less elongate..... *B. l. laterale*.  
 Lateral stripe broken up on anterior fourth of length, after which a trace only remains; labial plates and throat unspotted; posterior lateral plates more elongate. *B. l. aurigulum*.

*Bascanium laterale laterale* Hallow.

*Leptophis lateralis* Hallowell, l. c. *Bascanium taniatum laterale* Cope, l. c.

The seventeen rows of scales, together with the coloration, distinguish this form from the *B. schottii* and the *B. taniatum*. Young specimens of the latter, however, resemble it closely, since the spaces between the dark lines of the first, second, and third rows are apt to be solidly dark-colored at that age. They may be distinguished, apart from the smaller number (15) of scale rows, by the different distribution of the lateral stripes. In *B. l. laterale* the yellow stripe extends to the fifth row of scales, and the inferior band only reaches to the middle of the first row, not attaining the gastrosteges. In *B. schottii* the superior lateral stripe is as in *B. l. laterale*, but the belly is dark, and there is a yellow stripe on the adjacent edges of the gastrosteges and first row of scales. The head is unicolor, and not spotted as in the *B. l. laterale*. The yellow temporal spot of both forms of the *B. laterale* is to be noted as always absent from the allied species. The *B. semilineatum* agrees with the *B. laterale* in the possession of seventeen rows of scales, and the young is more fully striped than the adult. It may be distin-

guished at all ages by the arrangement of the lateral stripes and the uniform coloration of the head. The yellow stripe is, like that of the *B. laterale*, on the third and fourth rows only, but the dark band below it only occupies the adjacent parts of the second and third rows, instead of extending to the gastrosteges. There is a yellow band on the adjacent parts of the first and second rows, which is absent in the *B. laterale*, and there is a dark stripe on the adjacent parts of the first row and the gastrosteges, where the inferior yellow stripe is present in the *B. schottii*. The belly is light, and not dark, as in the last-mentioned species.

Southern California and Arizona.

*Bascanium laterale aurigulum* Cope.

*Bascanium aurigulum* Cope, Check List Batr. and Rept. N. Amer., 1875, p. 40. *Drymobius aurigulus* Cope, Proc. Acad. Phila., 1861, p. 301.

Lower California.

*Bascanium schottii* Bd. and Gird.

*Masticophis schottii* Bd. and Gird., Cat. Rept. N. Amer., Pt. I, Serpents, 1853, p. 160; Baird, U. S. Mex. Bound. Surv., II, Reptiles, 1859, p. 20, Pl. XVIII.

Several specimens of this species confirm the constancy of its characters.

Rio Grande Valley.

*Bascanium ornatum* Bd. and Gird.

*Masticophis ornatus* Bd. and Gird., Cat. Serpt. N. Amer., 1853, pp. 102, 159. *Bascanium tæniatum ornatum* Bd. and Gird., Cope, Check List Batr. Rept. N. Amer., 1875, p. 40.

Western Texas.

Although this species has the scale formula and some resemblance in coloration to the *B. tæniatum*, I can not now refer it to that species. The head is elongate with narrow protuberant muzzle, more like the *B. flagelliforme* and *B. laterale*. The *B. ornatum* displays the unusual peculiarity of a striped species with a tendency to become annulate.

*Bascanium tæniatum* Hallow.

Cope, Check List N. Amer. Batr., Rept., 1875, p. 40; *Leptophis tæniata* Hollowell, Proc. Acad. Phila., VI, 1852, p. 181.

*Masticophis tæniatus* Bd. and Gird., Cat. Serpt. N. Amer., 1853, p. 103; Jan. Icon. Gen. Opid., II, 22, v, Fig. 1.

Sonoran region to Salt Lake; Pacific region to northern California.

A young specimen (3123) has the tendency to a yellow stripe on the third, fourth, and fifth rows of scales above referred to, well marked. The head shields above have narrow pale margins. The frontal plate is not so narrow posteriorly as in the adult from the same and other localities. Still younger individuals (Nos. 1982 and 11423) have the

lateral yellow stripe more distinct by the suffusion of the third, second, and half the first rows with brown, thus producing an appearance much like that of the *B. laterale*. But only the third and fourth rows bear the yellow stripe, and the brown band covers the ends of the gastrosteges in that species. It was this resemblance that induced me to combine the two species, with the remark (Proc. Acad. Phila., 1866, p. 305) "The young of the form *lateralis*, the adult, the *tæniatus*."

The measurements of the tail in nine specimens are as follows :

Three and one-seventh times in total length, Nos. 8432 and 4384;  $3\frac{1}{2}$ , 9520, 8120, and 11422;  $3\frac{1}{2}$ , 13618 and 1979;  $3\frac{1}{2}$ , 8122;  $3\frac{1}{2}$ , 1983.

#### COLUBER Linn.

Systema Naturæ, ed. XII, 1766, p. 377, pt. ; Oppel, 1811, pt. Boie, Isis von Oken; 1827, p. 209; Günther ex Linn., Cat. Snakes Brit. Mus., 1858, p. 87; Cope, Check List N. Amer. Batr. Rept., 1875, p. 39; Proc. U. S. Nat. Mus., 1888, p. 390. *Calopeltis* Bonap., Mem. Real. Acad. Torino (2), II, 431, 1840. *Scotophis* Bd. and Gird., Cat. N. Amer. Rept., Serpents, 1853, p. 73. *Natrix* Cope ex Laurenti, Proc. Acad. Phila., 1862, p. 338; Cat. Batr. Rept. Centr. Amer., Mex., 1887, pp. 56-71.

Colubrid snakes, with equal teeth, subcylindric body, and two rows of caudal scutella. The pupil round; the rostral and nine superior cephalic shields normal; two nasal and one preocular plate. Two pairs of geneials; scales of the body with two apical pits, keeled or rarely smooth. Preanal shield divided.

This genus embraces a number of species of the northern temperate regions of the world. Six species belong to Eurasia and ten to North America. Three others extend to within the tropics of Mexico and Central America.

The North American species are of inoffensive habits, but are destructive to birds and small mammals. Some of them reach considerable dimensions, but they are exceeded in this respect by some of the species of the allied genus *Spilotes*. The *C. guttatus* and *C. rosaceus* are of brilliant colors.

The North American species are closely allied, and form gradations of characters which must be carefully estimated in order to learn the definitions. It is not difficult to distinguish the *C. vulpinus*, *C. guttatus*, and *C. emoryi*, but the group of which the *C. spiloides* is the type is more difficult to unravel. It embraces that species, *C. confinis*, *C. quadrivittatus*, *C. obsoletus*, and *C. latus*. All the North American species (except, possibly, *C. confinis*, of which but one specimen is known) have twenty-seven rows of scales, some species (*C. vulpinus*) varying to twenty-five, and others (*C. emoryi*) varying to twenty-nine. The most important characters are the number of rows of scales which are keeled, and the length of the tail, as indicated by the number of urosteges. The coloration has a typical value, but displays many transitions, especially in the *spiloides* group.

I present a synopsis of the principal characters in the following table. Three neotropical species are included in it :

Three neotropical species are included in it:

- I. One plate in the first row of temporals.  
Scales twenty-five rows, eleven keeled; caudal scutella? Head not banded; dorsal spots; belly partly spotted ..... *C. confinis*.
- II. Two plates in the first row of temporals.
  - a. Parietal plate shorter than muzzle, measured from front of frontal plate.  
About nine rows of keeled scales; caudal scutella not over sixty-eight; head not banded; above with rounded black spots; belly tessellated with black ..... *C. vulpinus*.
  - aa. Parietal plate longer than or equal muzzle.
  - β. Eight superior labials.  
Scales smooth; scutella?; head not banded; belly not spotted; above with wide red spots which are crossed by four longitudinal bands ..... *C. rosaceus*.  
Five rows of scales weakly keeled; scutella not exceeding seventy-one; above with angular red spots; head banded; belly tessellated ..... *C. guttatus*.  
About thirteen rows of keeled scales; scutella not exceeding 102; above with four longitudinal bands, the medium pair often connected by spots; head not banded; belly obscurely clouded ..... *C. quadrivittatus*.  
Keeled rows seven to eleven; scutella not over ninety-six; above with brown, spots, angular anteriorly, and elongate spots on sides; head not banded in adult; belly clouded ..... *C. spiloides*.  
Keeled rows seventeen; scutella not above ninety-two; above black or brown, without or with darker spots; head not banded; belly very darkly colored.. *C. obsoletus*.
  - ββ. Nine superior labials.  
Five rows of scales keeled; scutella ninety-nine; postgenials transversely divided; above with narrow transverse spots, below clouded; prefrontal and postorbital head-bands ..... *C. bairdii*.
- III. Three plates in first row of temporals.  
Keeled rows fifteen; scutella seventy-seven; dorsal spots twenty-nine, longer; parietal and prefrontal head-bands obscure; no postocular band; belly colored ..... *C. letus*.  
Scales smooth; scutella seventy-eight; dorsal spots shorter, 33-45; headbands, with postocular distinct; belly tessellated ..... *C. emoryi*.  
Scales 27-29 rows; nine superior labials; dorsal and lateral spots large and close together, not becoming obsolete; head red above, with light postocular band, and spot on nape ..... *C. flavirufus*.  
Scales in 31-33 rows; eight upper labials; dorsal and lateral spots smaller and separated; three bands behind frontal region, all markings disappearing at maturity ..... *C. mutabilis*.†
- IV. Four plates in first row of temporals.  
Scales in thirty-five rows; two or three loreals; eight upper labials; dorsal and lateral spots smaller, separated; three longitudinal bands from frontal region ..... *C. triaspis*.‡

As regards the characters above enumerated, I will remark, that in a single specimen of the *C. spiloides* there is a rudimental third temporal in the first row on each side, one of which is intercalated between the two postoculars. In some specimens of *C. guttatus* there are no keels

\* COLUBER FLAVIRUFUS Cope, Proc. Acad. Phila. 1866, p. 319; Mexico.

† COLUBER MUTABILIS Cope, Proc. Amer. Philos. Soc. 1834, p. 175; Mexico and Guatemala.

‡ COLUBER TRIASPIS Cope, Proc. Acad. Phila., 1866, p. 128; Belize.

on any of the dorsal series of scales; and in one of *C. emoryi* a few dorsal rows have faint traces of keels. In a specimen of the *C. obsoletus* (No. 5503) there are but sixty urosteges, the smallest number known in any other individual being seventy-four. This is abnormal. The young of the *C. quadrivittatus* are strongly spotted, and closely resemble the *C. spiloides*, as is also the case with the young of the *C. guttatus*. In the young of *C. emoryi*, there are seldom more than two scuta in the first row of temporals, the division into three being accomplished at a later stage of growth. The general result of these facts is that the *C. spiloides* is the primitive type from which the other species have been derived, some by one modification, some by another.

Günther retained the Linnæan name *Coluber* for this genus, as he was compelled to do in view of the use of it by his predecessors, Boie and Fleming.

*Coluber confinis* Bd. and Gird.

*Scotophis confinis* Bd. and Gird., Cat. Serpt. N. Amer., 1853, p. 76.

Mississippi.

*Coluber vulpinus* Bd. and Gird.

Cope, Check List Batr. Rept. N. Amer., 1875, p. 39.

*Scotophis vulpinus* Bd. and Gird. Cat. Serpt. N. Amer., 1853, p. 75.

*Elaphis rubriceps* Dum. Bibr. Erp. Gen. VII, 1854, p. 270.

Upper Mississippi River and Great Lakes to western New York.

*Coluber guttatus* Linn.

Syst. Nat. I, 1766, p. 385; Gmel., Linn., Syst. Nat., Ed. XIII, iii, 1788, 1110; Daubenton, Quart. Serp., p. 602; Lacep., Quadr. Ovip. Serp. II, p. 329; Bonnaterre, Ophiol., p. 19; Harlan, Journ. Acad. Phila., v, 1827, 363; Schleg., Essai. Phys. Serp. 1837, p. 168; Holbrook, N. Amer. Herp. II, 1832, p. 109, Pl. xxiv, and 2d Ed. III, 1842, p. 65, Pl. xiv; Günther, Cat. Col. Snakes, Brit. Mus., 1858, p. 89; Cope, Check List Batr. Rept. N. Amer., 1875, p. 39; Merrem, Tentamen, 1820.

*Scotophis guttatus* Bd. and Gird., Cat. Serpt., 1853, p. 78.

*Elaphis guttatus* Dum. Bibr., Erp. Gen. VII, 1854, p. 273; Garman Mem. Mus. Comp. Zool. Cambr., VIII, 1883, p. 152; Jan, Ican. Gen. Ofid. II, 21, vi, Fig. 1.

*Coluber compressus* Merrem, Beitr., II, Pl. 11.

*Coluber carolinianus* Shaw, Zool., III, p. 460, Pl. 119.

*Coluber maculatus* Latreille, Rept. IV, p. 73; Merrem, Tent.; Harlan, Journ. Acad. Phila., 1827, 360.

*Coluber pantherinus* Merr., Tent.

*Coluber floridanus* Harlan, Jour. Acad. Phila., 1827, 360.

Two plates in the first row of temporals; parietal plate longer than muzzle measured from front of frontal plate. Scales in twenty-seven or nine rows, only five rows of scales keeled, and these weakly. Eight superior labials, fourth and fifth entering orbit. Orbitals 1-2. Tail short, the scutella not exceeding seventy-one in number; gastrosteges 215-35.

Light reddish brown, with angular bright brick-red spots above. Head with brick-red bands, arranged en chevron, the angle anterior, with blackish borders. Below, white tessellated with black.

This handsome species is represented by two well-marked subspecies, which differ as follows :

Scales in twenty-seven rows; head bands present; dorsal spots narrow, extending over ten to fifteen rows, and with one or two rows of lateral spots on each side..... *C. g. guttatus*.

Scales in twenty-nine rows; head bands, excepting the postocular, wanting or rudimentary; dorsal spots wider, covering nineteen to twenty-one rows of scales; no lateral spots..... *C. g. sellatus*.

This species ranges the Austroriparian region east of the Mississippi River and the Carolinian district of the Eastern, not, however, entering New Jersey. The subspecies *C. g. sellatus* is restricted to Florida. It is one of our most brilliantly colored species, and is of inoffensive manners. It is altogether terrestrial in its habits.

#### *Coluber guttatus guttatus* Linn.

Loc. cit. Harl., Schleg., Holbr., Günth., Cope., l. c.

*Scotophis guttatus* Bd. and Gird., l. c.

*Elaphis guttatus* Dum. Bibr., l. c.

*Coluber compressus* Merrem., l. c.

*Coluber carolinianus* Shaw, l. c.

*Coluber maculatus* Latr. Merr. Harlan, l. c.

*Coluber pantherinus* Merr., l. c.

*Coluber floridanus* Harlan, l. c.

Virginia to Florida and Mississippi, inclusive.

#### *Coluber guttatus sellatus* Cope.

Proc. U. S. Nat. Mus., 1888, p. 387.

Florida.

#### *Coluber rosaceus* Cope.

Proc. U. S. Nat. Mus., 1888, p. 388, Pl. xxxvi, Fig. 3.

Florida (Key West).

#### *Coluber quadrivittatus* Holbr.

N. Amer. Herp., III, 1842, p. 89, Pl. xx; Günther, Cat. Coluber Snakes Brit. Mus., 1858, p. 88; Cope, Check List Batr. Rept. N. Amer., 1875, p. 39.

*Scotophis quadrivittatus* Bd. and Gird., Cat. Serpt. N. Amer., 1853, p. 80.

*Elaphis quadrivittatus* Dum. Bibr., Erp. Gen., VII, 1854, p. 265; Garman, Mem. Mus. Comp. Zool. Cambr., VIII, 1883, p. 153.

North Carolina to Florida, inclusive.

An instructive series of the young of this species was sent to the National Museum by William Wittfield, from Georgiana, Brevard County, Fla. They number nineteen specimens, and show how a longitudinally banded snake is developed from a spotted one. The specimens may be divided into three lots; the first including Nos. 13650, 13652, 13668, 13669, 13678, 13689, 13696, and 13706. These are the

smaller specimens, the smallest measuring 325 millimeters, and the largest 380 millimeters. The dorsal region is marked with brown spots on a light ground, and there is a series of smaller spots alternating with them on each side, with a trace of a second series of spots alternating with the last, on the ends of the gastrosteges. The dorsal spots have concave anterior and posterior borders, so that the angles of one spot approximate those of the adjacent ones. There are forty-two spots between the nape and vent. The angles of the nuchal spot are produced so as to form short bands, the anterior reaching to near the parietal scuta. There is a narrow brown postocular band, and a narrow one across the front on the posterior part of the prefrontal plates. The lateral spots of the body are elongate in front, the first forming a longitudinal line on the side of the neck. The gastrosteges are spotted at the ends, and the middle portions are clouded in some of the specimens.

In this stage these specimens are closely similar to the *C. spiloides*, except that the spots in the latter species are less numerous, ranging from thirty to thirty-five on the body. They can not be distinguished by the increased number of keeled rows of scales, as the keels are less evident in the young than in the adult.

The second set of specimens measured from 460 to 580 millimeters, and embraces Nos. 13646, 13657, 13681, 13703. Here the lateral angles of the dorsal spots are connected by a faint longitudinal stripe, thus forming the superior pair of stripes of the adult; and the lateral spots show a trace of a similar connection on the anterior part of the body. The marks on the head are present as in the smaller specimens, or they are broken into spots, or are nearly absent. The clouded marks of the belly are present or absent.

The third set varies from 580 to 620, and includes Nos. 13656, 13670, 13686, 13691. Here the lateral stripe is fairly distinct, and the head and belly are immaculate. Traces of the dorsal and lateral spots may be distinctly seen.

Associated with these specimens from the same locality is a young *C. guttatus* of 550 millimeters length. It displays all the characters of the adult, and does not vary in the direction of the *C. spiloides*, as do the young of the present species.

#### *Coluber spiloides* Dum. Bibr.

Erp. Général VII, 1854, p. 269; Günth., Cat. Colubr. Snakes, Brit. Mus., 1858, 901.

*Coluber obsoletus confinis* Cope, Check List Batr. Rept. N. Amer., 1875, p. 39.

*Coluber obsoletus spiloides* Cope, Proc. U. S. Nat. Mus., 1888, p. 387.

Austroriparian region and Texas.

#### *Coluber obsoletus* Say.

In Long's Expedition Rocky Mts., I, 1823, p. 140; Harlan, Journ. Acad. Phila., v, 1827, p. 347; Cope, Check List Batr. Rept. N. Amer., 1875, p. 39.

*Scotophis obsoletus* Kennicott, Proc. Acad. Phila., 1860, p. 330.

*Elaphis obsoletus* Garman, Mem. Mus. Comp. Zool. Camb., VIII, 1883, p. 151.

*Coluber allegheniensis* Holbrook, N. Amer. Herp., i, 1836, 111, Pl. xx; *ibid.*, 2d ed., iii, 1842, p. 85, Pl. xix.

*Scotophis allegheniensis* Bd. and Gird., Cat. Serpt. N. Amer., 1853, p. 73.

*Elaphis allegheniensis* Allen, Proc. Bost. Soc. Nat. Hist., xii, 1868, p. 181; Jan. Icon. Gen. Ofid., ii, 24 ii.

*Elaphis holbrookii* Dum. Bibr., Erp. Gen., vii, 1854, p. 272.

*Scotophis lindheimerii* Bd. and Gird., Cat. Serpt. 1853, p. 74.

Two plates in the first row of temporals; eight superior labial plates. Parietal plate longer than or equal to length of muzzle from front of frontal plate. Scales generally in twenty-seven rows, sometimes rows keeled; tail long, scutella not exceeding 92; gastrosteges from about 230 to 245.

Black or brown above with or without darker subquadrate spots; head not banded; belly very darkly clouded.

This somewhat variable species is represented by two subspecific forms, one of which shows affinity to the *C. quadrivittatus*. They differ as follows;

Spots when visible on the very dark ground, distinct; a row of obscure spots on each side of them ..... *C. o. obsoletus*

Ground light brown above, marked by square dark brown spots, which are connected at the angles, forming a longitudinal stripe; no lateral spots, but a broad dark stripe four to six scales wide ..... *C. o. lemniscatus*

This species ranges throughout the entire Austroriparian region from the Rio Grande; and the eastern, excepting only the Hudsonian district. The form *C. o. lemniscatus* is restricted to the Gulf States, but the *C. o. obsoletus* extends as far north as Mount Tom, Massachusetts, on the Connecticut River, according to J. A. Allen. Dr. Holbrook records it from the highlands of the Hudson River, New York. Prof. Verrill does not enumerate it among the species taken near Norway, Maine.

This species is not rare in the Middle States. It is, like other members of the genus, of very inoffensive habits, and is useful in reducing the number of the small mammalia. It is much less active than the *Bascanium constrictor*, which it resembles in nothing but color. It is known as the Mountain Blacksnake, or Pilot Snake.

#### *Coluber obsoletus obsoletus* Say.

Cope, Check List Batr. Rept. N. Amer., 1875, p. 39.

*Coluber obsoletus* Say, Harlan, Cope, l. c., *Scotophis obsoletus* Kenn. *Coluber allegheniensis* Holbrook, l. c. *Scotophis allegheniensis* Bd. and Gird., l. c. *Elaphis allegheniensis* Allen, l. c.

*Elaphis holbrookii* Dum. Bibr., l. c.

*Scotophis lindheimerii* Bd. and Gird., l. c.

Eastern region exclusive of the Hudsonian district; Austroriparian region exclusive of Floridan district.

#### *Coluber obsoletus lemniscatus* Cope.

Proc. U. S. Nat. Mus., 1888, p. 386.

Georgia, Alabama.

**Coluber lætus** Bd. and Gird.

*Scotophis lætus* Bd. and Gird., Cat. Serpt. N. Amer., 1853, p. 77.

Fort Smith, Arkansas (one specimen).

**Coluber emoryi** Bd. and Gird.

Cope, Check List N. Amer. Rept. Batr., 1875, p. 39.

*Scotophis emoryi* Bd. and Gird., Cat. Serpt. N. Amer., 1853, p. 157; Report U. S. Mex.

Bound. Surv., II, 1859, Pl. ii, p. 19, Pl. xii.

*Scotophis calligaster* Kenn., Proc. Acad. Phila., 1859, p. 99.

*Coluber rhinomegas* Cope, Proc. Acad. Phila., 1860, p. 255.

This is a southwestern species of the eastern region, not having been yet found east of the Mississippi River nor north of Kansas. Its range extends at least as far south on the Mexican Plateau as the city of Chihuahua, where it has been found abundantly by Edward Wilkinson.

**Coluber bairdii** Yarrow.

*Coluber bairdii* Yarrow, Bull. U. S. Nat. Mus., No. 17, 1880, p. 41.

Fort Davis, northwestern Texas (one specimen).

**SPILOTES** Wagler.

Naturl. Syst. d. Amphibien, 1830, p. 179; Duméril et Bibron, Erp. Gen., VII, 1854, p. 248;

Günther, Cat. Coluber. Snakes Brit. Mus., 1858, p. 96; Cope, Bull. U. S. Nat. Mus., 32, 1887, p. 56. *Georgia* Bd. and Gird., Cat. Serpt. N. Amer., 1853, p. 92.

*Compsosoma* Dum. et Bibr., Erpet. Gen., VII, 1854, p. 290.

Teeth of equal lengths. Head plates normal; two nasals, one loreal and one preocular. Scales bifossate. Anal plate entire; subcaudal scuta divided. Pupil round.

This genus embraces the largest ground snakes of the Neotropical realm, together with a number of species of smaller size of the Paletropical. It differs from *Coluber* in its entire anal plate, resembling in this respect *Pityophis*, *Epiglottophis*, and *Rhinechis*. It approaches the last named most nearly in characters, but the rostral shield has not the production anteriorly and posteriorly seen in that genus.

The Asiatic species have a compressed form of the body which is not seen in the American forms. Some of the latter have a roof-shaped body with subtriangular section (*S. pacilostomus*), while in others (*S. corais*) the body is subcylindric. The scales assume a slightly transverse direction in some of the American species. But one species is found in the United States, and this is a Neotropical species which ranges from Brazil through Mexico and the Gulf States to the Atlantic coast.

**Spilotes corais** Cuv.

Dum. et Bibron, Erp. Gen., VII, 1854, p. 223; Günther, Cat. Brit. Mus., 1858, p. 98; Cope, Bull. U. S. Nat. Mus., 32, 1887, p. 72; Jan, Icon. Gen. Ofid., III, 48; IV, Fig. 6; V, Fig. 1.

*Coluber corais* Cuvier, Mus. Paris; Schlegel, Ess. S. la. Phys. Serpens, 1842, I, p. 145, and II, p. 139, Pl. V, Figs. 9, 10.

Head moderately distinct, oval. Body elongate, subcylindric; tail one-sixth to nearly one-eighth the total length. Rostral plate moderately prominent, broader than high, visible from above, but not dividing the internasals. Internasals much smaller than prefrontals. Frontal as broad as long; superciliaries posteriorly wider than frontal. Parietals large, longer than wide. Postnasal higher than prenasal; loreal rather small, longer than high. Oculars 1-2, the anterior widely separated above from frontal. Temporals 2-2, all long and narrow, those of the second row coinciding in anteroposterior extent with the last superior labial. Superior labials eight, the fourth and fifth bounding the orbit; the sixth triangular, the apex not reaching the postocular. Seventh higher, but not longer than the eighth. Inferior labials eight, fifth largest. Geniials short, anterior pair the longer.

Scales smooth, rather wide, in seventeen rows.

Color varying from light brown to black, the tints when not uniform covering large parts of the body.

Size large, reaching a length of eight feet, with robust proportions.

There are three color varieties of this species which pass into each other, but which have especial geographic ranges. They are as follows:

Color light brown, with a black oblique stripe on each side of the neck... *S. c. corais*.

Color like *S. c. corais* anteriorly, but more or less of the posterior part of the body with tail, black..... *S. c. melanurus*.

Color black, the anterior gastrosteges with dark red bases, and the superior labials generally with dark red borders..... *S. c. couperii*.

The *S. c. corais* inhabits South America; the *S. c. melanurus* Central America and Mexico, and the *S. c. couperii* the Gulf States of North America.

#### *Spilotes corais couperii* Holbrook.

*Coluber couperii* Holbrook, N. Amer. Herpetol., III, 1842, p. 75; Pl. xvi.

*Georgia couperii* Bd. and Gird., Cat. N. Amer. Serpt., 1853, p. 92.

*Spilotes couperii* Cope, Proc. Acad. Phila., 1860, p. 564; Check List Batr. Rept. N. Amer., 1875, 33; Garman, Mem. Mus. Comp. Zool. Cambr., VIII, 1883, p. 149.

*Georgia obsoleta* Bd. and Gird., Cat. Serpt. N. Amer., 1853, 158 (not *Coluber obsoletus* Say).

*Spilotes erebennus* Cope, Proc. Acad. Phila., 1860, p. 564; Check List l. c., p. 39.

Some of the specimens from the coast region of Georgia have only seven superior labials, while others have the usual number, eight. I do not find it to be a constant character, and so can not separate the *Coluber couperii* of Holbrook from his *C. obsoletus* ("Say," *S. erebennus* Cope). The half-grown specimen from eastern Georgia in the National collection is brown.

#### RHINECHIS Michaelles.

In Wagler Icones et Descript. Amphib. 1833 Pl. 25. Bonaparte, Fauna Italica 1838 Pl. 70; Duméril et Bibron, Erp. Generale, 1854, VII, p. 227; Cope, Bull. U. S. Nat. Mus., 1887, No. 32, p. 56.

Arizona Kennicott, U. S. and Mex. Bound. Surv.; II, 1859, Reptiles, p. 18.

Head moderately distinct, muzzle depressed, projecting. Tail rather short. Teeth equal. Cephalic plates normal; the rostral recurved and

deeply separating the elongate internasals. Pupil round. Scales smooth, bifossate. Anal and subcaudal scuta, entire.

The production and recurvature of the rostral plate and entire anal plate distinguish this genus from *Coluber*, which it resembles. It was at one time thought to be allied to *Pityophis* in view of the presence of the two characters in question, but the absence of the epiglottis and undivided prefrontals show that it is distinct. There are several minor characters, not generic, which show that its affinities are not with the species of *Pityophis*. Such are the peculiar form of the inferior labial, prenasal, and loreal plates, and the very fine bristle-like spicules of the hemipenis, in the American species at least.

Two species are known which differ as follows:

Scales in from twenty-seven to thirty-one rows; internasal plates decurved in front; loreal elongate; temporals, 2-4; inferior labials 13-14, the anterior narrow, seventh largest. Tail less than one-sixth the length. Brownish gray with numerous transverse brown dorsal spots, with alternating lateral spots.....*R. elegans*.

#### *Rhinechis elegans* Kenn.

Cope, Proc. Amer. Philos. Soc., 1885, p. 234; *Arizona elegans* Kennicott, U. S. Mex-Bound. Surv., II, 1859, Reptiles, p. 18; *Pityophis elegans* Cope, Check List Batr. Rept. N. Amer., 1875, p. 39.

This species is subject to some variations. Thus in No. 4266 there is a small inferior preocular. In No. 14176 there are only twenty-seven rows of scales, and there is a row of three temporals between the usual 2-4 scaled rows.

This species is restricted in its range to the Sonoran region. The most southern locality yet known is near the city of Chihuahua. The most northern is north of the Cimarron River, probably in New Mexico.

M. Bocourt objects to my placing this species in the genus *Rhinechis*, as he says that the *R. scalaris* has the anal plate divided. It is true that Duméril and Bibron state that this is the case, but on examining four specimens from the Bonaparte Collection in the Museum of the Philadelphia Academy of Natural Sciences I find that the anal plate is entire.

#### *PITYOPHIS* Holbrook.

North American Herpetology IV, 1842, p. 7, Bd. and Gird., Cat. Rept. N. Amer., Pt. I Serpents, 1853, p. 64; Duméril, Prodrome des Erp. Gen., VII, 1854, p. 252; Günther Cat. Snakes, Brit. Mus., 1858; p. 85. Cope, Bull. U. S. Nat. Mus., No. 32, 1887, p. 56; *Churchillia* Bd. and Gird., Reptiles in Stansbury's Expl. Gt. Salt Lake, 1882, p. 350.

Teeth of equal lengths. A vertical laminiform epiglottis. Cephalic scuta normal except that each prefrontal is longitudinally divided into two, producing four prefrontals. Rostral plate more or less prominent, and its superior angle produced backwards. Scales more or less keeled, and with double apical pits. Anal scutum entire; subcaudals in two series. Pupil round,

The question as to the number of species included in this genus is a difficult one to decide. The *P. melanoleucus* may be always distinguished by color characters from the forms found west of the Mississippi River. From some of these it also differs in the shape of the head and muzzle, but the most eastern of the western forms, *P. sayi sayi*, resembles it in these respects. The Lower Californian form may be distinguished from the *P. melanoleucus* by color characters, and by the shape of the head and muzzle, but between it and the *P. sayi* of the western Mississippi region there is a complete transition in most of the characters. The California form resembles that of Lower California in form, but differs in color, while the Arizona form is in every respect intermediate between the Pacific form (*P. catenifer*), and the *P. sayi* of the plains. These forms are tolerably constant and can be generally recognized. The form of the rostral plate is the most characteristic peculiarity, but, from the nature of the case, transitions occur. Under the circumstances I have adopted four species, of which the *P. sayi* has two subspecies, one of which, *P. s. bellona* is intermediate between its typical form and the *P. catenifer*; the latter differing, however, in the greater smoothness of the scales.

**Scales with stronger keels beginning on the fourth row; head short, elevated, rostral plate compressed, and narrowed above; no head stripes; dorsal spots few, 27-33 on body** ..... *P. melanoleucus*.

**Scales first keeled on the sixth row; rostral plate narrowed above; head stripes present; spots numerous, 40-65 on body**..... *P. sayi*.

**Scales weakly keeled, first on tenth row; rostral little prominent, not narrowed above; head flat; head stripes present; spots numerous, 36-79 on body**..... *P. catenifer*.

**Scales weakly keeled, beginning on tenth row; rostral plate not narrowed, and little prominent; head flat; spots few, 40-44 on body, anteriorly red; no head stripes**..... *P. vertebrales*.

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at maturity. The increase in the number of spots is accomplished by the division of those on the posterior part of the body.

The number of the labial plates is apt to be unequal on the opposite sides. Thus in seventy-two specimens examined, fifteen have nine labials on one side and eight on the other. The *P. catenifer* displays the greatest irregularity in this respect, six out of sixteen specimens having labials 8-9.

***Pityophis melanoleucus* Daudin.**

Holbrook, N. Amer. Herpetology IV, 1842, p. 7, Pl. 1; Bd. and Gird., N. Amer. Serpt., 1853, p. 65; Dum. et Bibron, Erp. Gen. VII, p. 233, 1854; Günther, Cat. Col. Serp. Brit. Mus., 1858; p. 86; Cope, Check List N. Amer. Batr. Rept. Bull. U. S. Nat. Mus. 1, 1875, p. 39.

*Coluber melanoleucus* Daudin, Hist. Rept., VI, 1803, p. 409 (from Bartram); Harlan, Jour. Acad. Phila., 1827, p. 359.

Specimens from Florida have the dark colors rusty or rufus instead of deep brown or black, and the outlines of the spots are not so well defined.

This species ranges from New Jersey to Florida, preferring the sandy pine woods of the coastal plain. It is the largest snake of this region. It is of a very harmless disposition, and may be handled with impunity.

***Pityophis sayi* Schlegel.**

Bd. and Gird., Cat. Rept. N. Amer., Pt. I, Serpents, 1853, p. 151; Cope, Check List Bat. Rept. N. Amer., 1875, p. 39; *Coluber sayi* Schlegel, Ess. S. l. Physionomie des Serpents, 1837, p. 157, partim.

Head with the rostral plate more or less prominent forward and produced and narrowed upwards and posteriorly. Superior labial plates 8-8 to 9-9. Scales in from twenty-seven to thirty-three rows, keeled, except six rows on each side. Dorsal spots more numerous than in *P. melanoleucus* varying from fifty to sixty-five on the body, sometimes as few as forty. Two to three rows of spots on each side. Generally no subcaudal stripe. Head with three bands; one extending between the orbits, one from the orbit directly downwards to the labial border, and one from the orbit to the angle of the mouth. Temporal scales small, generally 3-3 to 4-4; rarely 2-2.

This species occupies the entire interior of the United States and the Mexican plateau to the valley of Mexico. Eastward it crosses the Mississippi River into the prairie country of Illinois. It is represented by two forms, which only differ in the form of the rostral plate. One of these (*P. s. bellona*) inhabits Arizona and New Mexico only, and is intermediate in character between the typical *P. s. sayi*, and the *P. catenifer*. These forms differ as follows:

Rostral plate compressed and produced upwards and backwards; often traces of a black subcaudal stripe.....	<i>P. s. sayi</i> .
Rostral plate less compressed, and less narrowed above; no traces of the black subcaudal stripe .....	<i>P. s. bellona</i>

*Pityophis sayi sayi* Schl.

Cope, Check List N. Amer. Batr. Rept. N. Amer., 1875, p. 39.

*Pityophis sayi* Bd. and Gird., Cat. N. Amer. Rept., Pt. I, Serpents, 1853, p. 151; *Coluber sayi* Schlegel, Ess. s. l. Physionomie des Serpents, 1837, p. 157; *Pityophis maclellanii* Bd. and Gird., Cat. 1853, p. 68; *Pityophis mexicanus* Dum. Bibr., Erp. Gen., VII, p. 236; 1854, Jan, Icon. Jan. Ofid., II, 22 ii, Fig. 1.

This subspecies ranges from western Canada to the central region of North America and Mexico to the valley of Mexico, inclusive. It is the common species of Texas, and even occurs in Sonora. It is a curious fact that this form has both the extreme northern and southern ranges, while the Arizonian form is so restricted.

*Pityophis sayi bellona* Bd. and Gird.

Cope, Check List N. Amer. Batr. Rept., 1875, p. 39. *Pityophis bellona* Bd. and Gird., Cat. Rept. N. Amer., Pl. I, Serp., 1853, p. 66; *Churchillia bellona* Bd. and Gird., Reptiles of Stansbury's Report Expl. Great Salt Lake, 1852, p. 350; *Pityophis melanoleucus*, Jan, Icon. Gen. Ofid., II, 22 i, Fig. 2.

Of sixteen specimens examined, twelve have 8-8 superior labials, two have 8-9; and two have 9-9. Four have twenty-nine rows of scales, nine have thirty-one and two have thirty-three. Six have between forty and fifty dorsal spots on the body; eight have between fifty and sixty; and two have sixty to sixty-three. About two-thirds have the centers of the dorsal spots paler than the borders, and the remainder have the spots black throughout. The only constant character of this subspecies as compared with *P. s. sayi* is the form of the rostral plate, but No. 8401 is intermediate between the two in this respect. Some specimens from Oregon are intermediate between it and *P. catenifer*.

The geographical range of this subspecies is the Great Basin from Oregon south to the basin of the Colorado, and Arizona.

The typical specimen of the *Churchillia bellona* Bd. and Gird. can not now be found. It is, however, from the valley of the Rio Grande, which is principally occupied by the *P. sayi sayi*. The second specimen enumerated in Baird and Girard's catalogue under the *P. bellona* is from western Texas, between San Antonio and El Paso, and hence from the same region as the type. This belongs to the *P. sayi sayi*, as determined by the examination of the specimen in the U. S. National Museum. However, Baird's figure of the head of the *P. bellona* in the Vol. x of the Report of the U. S. Surveys for the Pac. R. R., Pl. XXIX, Fig. 46, represents this subspecies.

*Pityophis catenifer* Blainv.

Bd. and Gird., Cat. Rept. N. Amer., Pt. I, Serpents, 1853, p. 69; Günther, Cat. Colubr, Snakes Brit. Mus., 1858; p. 87; Cope, Check List N. Amer. Batr. Rept., 1875, p. 39; *Coluber catenifer* Blainville, Nouv. Ann. Mus. Hist. Nat. Paris, IV, 1835, Pl. xxvi, Figs. 2, 2a, 2b; *Pityophis annectens* Bd. and Gird., Cat. Serp., 1853, p. 72, *Pityophis wilkesii* Bd. and Gird., Cat. Serpt. N. Amer., 1853, p. 71; *Pityophis heermanni* Hallowell, Proc. Acad. Phila., 1853, p. 236; *Pityophis vertebralis* Hallowell, U. S. Pac. R. R. Surv. Rept., x, 1859; Williamson's Report, p. 17.

Of seventeen specimens examined, seven have the superior labials 8-9; eight have 8-8; and two have 9-9. Four have twenty-nine rows of scales; ten have thirty-one rows; one has thirty-three; and one has thirty-five (No. 2243). The number of spots on the body is very variable. One has thirty-six dorsal spots (No. 1546); one has forty-six (No. 1532); seven have between fifty and sixty; four have between sixty and seventy; and four have over seventy, the highest being seventy-nine (No. 1816). The specimen (No. 5741) on which the *P. wilkesii* Bd. and Gird., was founded is abnormal in the nondivision of the prefrontal scuta; the only example I have observed in the genus.

The range of this species is coterminous with the Pacific region, extending from San Diego on the south to Puget's Sound on the north. It is found in the Mohave Desert, and at Pymont, Nevada (8139). Northward it extends to eastern Oregon and to Walla Walla, Washington.

***Pityophis vertebralis* Blv.**

Dumeril et Bibron, Erp. Gen., VII, 1854, p. 238; Cope, Check List Batr. Rept. N. Amer., 1875, p. 39; Bull. U. S. Nat. Mus., 32, 1887, p. 72.

*Coluber vertebralis* De Blv., Nouv. Ann. Mus. Nat. Hist., Paris, III, 1834, p. 61, Pl. xxvii, Figs. 2, 2a, 2b; Bd. and Gird., Cat. Serpt. N. Amer., 1853, p. 152.

*Pityophis hematois* Cope, Proc. Acad. Phila., 1860, p. 342.

*Pityophis melanoleucus* var. *vertebralis* Blv., Jan, Icon. Gen. Ofid., II, 22, i, fig. 3.

Peninsula of lower California.

**HETERODON Beauvais.**

In Latreille's Hist. Nat. des Reptiles, IV, 1799, p. 32.

Dumeril et Bibron, Erpetologie Generale, VII, 1854, p. 766; Bd. and Gird., Cat. Serpt. N. Amer. 1853, p. 51; Günther, Cat. Colubr. Serpt. Brit. Mus., 1858, p. 82; Cope, Bull. U. S. Nat. Mus., 32, 1887, p. 54.

Dentition diacranterian. Caudal scutella divided; anal plate double. Rostral plate recurved, with transverse upturned edge and flat antero-inferior face. The nine cephalic plates, a loreal, two nasals and ocular plates, present. Scales keeled. Form robust. Pupil round.

The few species of this genus which are known agree also in having a series of scales separating the eye from the superior labial plates, and in having an azygos plate behind the rostral. The posterosuperior aspect of the rostral plate has a keel on the middle line, and there are from three to five, generally four, scales in the first temporal row. The tail is short. The anterior ribs are capable of extension so as to flatten that part of the body, as is done by the cobras of the genus *Naja*, but the expansion is not so wide, and it has greater longitudinal extent. The postgenic plates are reduced to a very small size, and are separated from each other by small scales.

The species of this genus ranges throughout North America excepting the Pacific region. They do not extend far into the Sonoran, and are absent from the Lower Californian and the Mexican regions. They have no representatives in equatorial America or the West Indies, but a

genus *Lystrophis* Cope\* is found in subtropical and temperate South America, which only differs from *Heterodon* in possessing smooth scales. A genus occurs in Madagascar which agrees with *Lystrophis*, but differs in having an entire anal shield (*Lioheterodon* Dum. Bibr.).

The species of *Heterodon* have some peculiar habits which indicate greater intelligence than most other snakes possess. They throw themselves into remarkable contortions when alarmed, and expand their anterior ribs, inflate their lung, and open the mouth widely. They do not attempt to bite from the ground, but the long posterior maxillary tooth may be used with considerable effect if the snake is carelessly handled. The trowel-shaped rostral plate enables them to excavate sand with ease, and in such soil they are usually most abundant.

- I. No accessory scales about the azygos plate.  
Scales in twenty-five rows; rostral plate less developed; larger... *H. platyrhinus*.
- II. Accessory scales about the asygos scute.  
Scales in twenty-five rows; stouter, smaller; an inferior nasal plate; one row of lateral spots; belly white in adults ..... *H. simus*.  
Scales in twenty-three rows; smaller, more slender; no inferior nasal scute; two rows of lateral spots; belly more or less black..... *H. nasicus*.

The *H. platyrhinus* ranges throughout the Eastern and Austroriparian regions, and the *H. simus* inhabits the Austroriparian only. The *H. nasicus* is divided into two subspecies, one of which extends over the Central and the other over the Sonorian regions.

#### *Heterodon platyrhinus* Latreille.

Reptiles, IV, 1800, p. 32, Figs. 1, 2, 3; Holbrook, N. Amer. Herp., II, 1828, p. 97, Pl. XXI; second ed., IV, 1842, p. 67, Pl. XVII; Dum. Bibr. Erp. Gen., VII, 1854, p. 766; Bd. and Gird., Catal. Serp. N. Amer., 1853, p. 51; Cope, Check List Batr. Rept. N. Amer., 1875, p. 43; Jan, Icon. Gen. Ofid., III, 48 iii Fig. 2.

*Coluber heterodon* Daudin, Hist. Nat. Rept., VII, 1799, p. 153, Pl. 6<sup>1</sup>, Fig 28; Say, Am., Journ. Sci. Arts, I, 1818, p. 261; Harlan, Journ. Acad. Phila., 1827, p. 357.

*Coluber cacodemon* Shaw, Gen. Zool., III, 1802, p. 377, Pl. 102.

*Scytale niger* Daudin, Hist. Nat. Rept., V, 1803, p. 342; Harlan, Journ. Acad. Phila., 1827, V, p. 367.

*Pelias niger* Merrem, Tentamen, 1820, p. 149.

*Heterodon niger* Troost, Am. Lyc. Nat. Hist. N. York, III, p. 186; Holbrook, N. Amer. Herp., IV, 1842, p. 60, Pl. XVI; Bd. and Gird., Cat. Serp. N. Amer., 1853, p. 55; Dum. et Bibr., Erp. Gen., VII, p. 769.

*Heterodon cognatus* Bd. and Gird., Cat. Serpt. N. Amer., 1853, p. 54.

*Heterodon atmodus* Bd. and Gird., l. c., p. 57.

Eastern region excepting Hudsonian district; Austroriparian region.

#### *Heterodon simus* Linn.

Holbrook, N. Amer. Herp., IV, 1842, p. 57, Pl. XV; Bd. and Gird., Cat. Serpt. N. Amer., 1853, p. 59.

*Heterodon simus simus* Cope, Check List N. Amer. Batr. Rept., 1875, p. 43.

\* Bull. U. S. Nat. Mus., No. 32, 1887, p. 54.

*Coluber simus* Linn., Syst. Nat. Ed., XIII, 1766, p. 216; Gmel. Linn. Syst. Nat. Ed., XIII III, 1788, p. 1086.

*Heterodon platyrhinus* Schleg., Ess. Phys. Serp., 1837, p. 97, Pl. III, Figs. 20, 22; Dumet Bibr., Erp. Gen., VII, 1854, p. 768-772.

**Austroriparian region.**

***Heterodon nasicus* Bd. and Gird.**

Cat. Rept. N. Amer., Pl. I, Serpents, 1853, p. 61; *Heterodon simus nasicus* Cope, Check List Batr. Rept. N. Amer., 1875, p. 43.

Frontal and parietal scuta usually wider than long, the parietals often shorter than the frontal. Head short; rostral plate very large and strongly recurved. No inferior nasal plate cut off from the postnasal. Two or more loreals. Superior labials eight, all much higher than long. First row of temporals generally four. From three to twenty-four accessory scales beside and behind the azygos plate. Scales in twenty-three rows, all keeled except the first three on each side. Proportions of body more slender than in *H. simus*.

Color light yellowish gray above, with a median dorsal series of rather closely placed brown spots, and with two alternating series of brown spots on each side. Three brown, short, longitudinal nuchal brown bands, and a brown band from each eye posteriorly. Belly either entirely black or tessellated with black and white.

This is the western representative of the *H. simus*, to which it is nearly allied. It can be always distinguished, however, especially in its typical subspecies, by the characters given. A single specimen out of the many in the U. S. National Museum (No. 4961), from Texas, displays an inferior nasal plate.

Two forms of the *H. nasicus* inhabit different regions and may be regarded as subspecies.

Scales accessory to azygos plate, two or three; loreal small or wanting; belly black and white spotted.....*H. n. kennerlyi*.

Scales accessory to azygos plate from eight to twenty-four; loreals generally two; belly nearly entirely black.....*H. n. nasicus*.

In the *H. n. kennerlyi* in three out of six specimens the parietal scuta are shorter than the frontal. In sixteen of the *H. n. nasicus*, ten specimens have the parietals shorter than the frontal. In the small number of accessory scales the *H. n. kennerlyi* approaches the *H. simus* more nearly does the *H. n. nasicus*. The same affinity is indicated by the smaller amount of black on the belly. It represents the genus in the Sonoran region, while the *H. n. nasicus* occupies the central.

***Heterodon nasicus kennerlyi* Kennicott.**

*Heterodon kennerlyi* Kennicott, Proc. Acad. Phila. 1860, p. 336. *Heterodon simus kennerlyi* Coles & Yarrow, Herp. Dak. & Mont., Bull. U. S. Geol. Surv. Terrs., 1878, IV, p. 271; Jan, Icon. Gen. Ofid., Livr. 10, Pl. V, Fig. 2.

Western Texas and Southern Arizona.

**Heterodon nasicus nasicus** Bd. and Gird.

*Heterodon nasicus* Bd. and Gird., Cat., Pt. I, Serpents, 1853, p. 61.

*Heterodon simus nasicus* Cope, Check List Batr. Rept. N. Amer., 1875, p. 43.

Jan, Icon. Gen. Ofid., Livr 10, Pl. v, Fig. 1.

Central and Sonoran regions.

**EUTÆNIA** Bd. and Gird.

Cat. Serp. N. Amer., 1853, p. 24; Cope, Proc. Amer. Philos. Soc., 1886, p. 475.

*Thamnophis* Fitz. Syst. Rept., 1843, p. 26 (*nomen nudum*).

*Prymniodon* Cope, Proc. Acad. Phila., 1860, p. 558.

The genus *Eutænia* presents especial attractions to the student who desires an illustration of the phenomena of variation and constancy in the physical characters of animals. In few genera do we find so well illustrated the persistence of specific characters exhibited side by side with variations of the same. We have here, therefore, examples of the appearance or disappearance as the case may be, of characters, in connection with or without apparent connection with, the environment.

This genus was established by Baird and Girard in the Catalogue of Serpents of North America, published in 1853, on species which had been previously referred to the genus *Natrix* (*Tropidonotus*). To the three species previously known, these authors added four, and nine names were proposed for what are in my estimation either subspecies or individuals of the seven species actually distinguished; in the year 1860 Kennicott added five species; at various dates between 1860 and 1885 the present writer added nine species and referred to the genus a species long previously described by Wiegmann; in 1890 Brown added a species; and a species is described for the first time in the present review. The total number of species is then twenty-four.

The characters of the genus are as follows:

Subfamily *Natricinæ*. Cephalic plates normal; two nasals, one loreal. plate Eyer resting on superior labials. Scales keeled, without pits. Anal plate entire; subcaudals divided.

The maxillary teeth are rather abruptly longer at the posterior extremity of the maxillary bone than elsewhere, as in the genus *Natrix*, with two exceptions. These are the species *E. multimaculata* Cope and *E. melanogaster* Wiegman. I have on this account distinguished these species as constituting another genus which I called *Atomarchus*, the character distinguishing it from *Eutænia* being the equality in length of the maxillary teeth. As the excess in length of the posterior teeth is small in some of the species of the latter, I have not for the present retained this genus, although it may be found to be advisable to do so hereafter. The two species mentioned are more aquatic in their habits than the *Eutæniæ* proper.

*Eutæniæ* are the most abundant snakes in North America and Mexico. Where all other species are absent, either through hostility of the climate or of enemies, individuals of this genus remain. This persist-

ence may be ascribed to several causes. One of these is their great fecundity. Prof. Baird mentions a specimen of *E. sirtalis* which produced eighty young at a birth. Another cause is their readiness to seek concealment in water, so that they most readily escape observation.

Several of the species are pugnacious in their disposition. Such is the case with the two which have the widest distribution and greatest abundance of individuals, the *E. sirtalis* L. and *E. elegans* Bd. and Gird. Their bite, it is needless to remark, is perfectly harmless. Some of the species possess great elegance of form, as those of the *E. saurita* group. Others have much brilliancy of color, as the metallic green of some forms of the *E. proxima* and *E. sackenii*, and the red and black of the *E. sirtalis concinna*.

The species differ as follows:

I. Second and usually the first row of scales keeled; lateral stripe on third and fourth rows. Orbit bounded below by two or more labials.

1. Temporal scales 1-2.

\* Tail equal or exceeding one-third total length; first row of scales much longer than deep, strongly keeled; scales in 19 rows.

Superior labials eight, longer than high; very slender; color metallic olive.

*E. sackenii*.

Superior labials seven, longer than high; very slender; color brown.

*E. saurita*.

\*\* Tail less than a third and more than a fourth the total length; superior labials eight.

Head flat; superior labials longer than high; scales in nineteen rows; inferior row keeled, longer than deep..... *E. proxima*.

Head elevated, superior labials higher than long; scales in 21 rows, those of inferior row as deep as long..... *E. megalops*.

\*\*\* Tail more than one-fourth, and not less than one-fifth the total length; scales in 21 rows, the inferior row as deep as long, and weakly or not keeled.

Superior labials seven; tail less than four and five tenth times in total length..... *E. radix*.

Superior labials eight; tail more than four and five tenth times in total length.

*E. macrostemma*.

2. Temporal scales 1-1.

Tail between one-fifth and one-fourth the total length; superior labials seven; head little distinct; yellow black bordered lateral stripe on second, third, and fourth rows of scales..... *E. butleri*.

Tail between one-fourth and one-third the total length; superior labials eight; head quite distinct; lateral line faint, on third and fourth rows.

*E. rutiloris*.

II. Second row of scales keeled; the first keeled or smooth. Orbit above two labials. Lateral stripe, when present, on second and third rows of scales.

1. Temporal scales, 1-2.

\* Scales in twenty-one (3) rows; superior labials, eight.

Two preoculars; superior temporals small; first row of scales keeled; black, stripes indistinct; head short, frontal wide..... *E. biscutata*.

One preocular; superior temporals small; head short, frontal wider, not touching preocular, posterior labials higher than long; tail three and one-third to four and two-third times in length..... *E. elegans*.

One preocular; a large superior temporal bounding occipital; frontal narrow, touching preoculars; head long, labials all longer than high; tail three and one-fourth in length..... *E. angustirostris*.

## II—Continued.

## 1. Temporal scales, 1-2—Continued.

\* \* Scales in seventeen rows; superior labials eight.

Frontal narrow; head very distinct; no dorsal stripe nor lateral spots except anteriorly. .... *E. chrysocephala*.

\* \* \* Scales in nineteen rows; superior labials eight.

Form slender; head very distinct; eye large, frontal plate narrow; belly, dorsal and indistinct white lateral stripe; sides black spotted; a large nuchal black spot ..... *E. cyrtopsis*.Form robust, head distinct, frontal plate wide; large black nuchal spots; labials and belly uniform yellow; dorsal and lateral stripes very distinct, separated by uniform brown ..... *E. aurata*.Form robust, head little distinct; frontal wide; lateral stripe indistinct, a yellow dorsal stripe; no nuchal spots ..... *E. infernalis*.Form stout, head little distinct, eye moderate; labials dark bordered; stripes wanting; one row of large reddish brown bordered dorsal spots; small. .... *E. phenax*.

Labials dark bordered; no stripes; six rows of small black spots.

*E. sumichrasti*.

\* \* \* \* Scales in nineteen (17) rows; superior labials seven.

a Two preoculars (sometimes united).

Head scarcely distinct; two or three rows of spots on each side.

*E. leptocephala*.

aa One preocular.

Head scarcely distinct; postgenials short; stripes indistinct, connected by a single series of brown crossbars on each side. .... *E. scalaris*.Head little distinct; form slender; stripes very distinct; yellow, separated by black or brown; the scales with yellow keels; lateral band black bordered below ..... *E. pulchrilatus*.Form stout, head distinct; postgenials larger than pregenials; two rows of spots on each side, sometimes connected longitudinally above or below; stripes pale. .... *E. sirtalis*.

## 2. Temporal scales 3-2.

\* Scales in twenty-one rows; superior labials eight.

Frontal wide, reaching preoculars; second row of scales as wide as first; stripes distinct; separated by two rows of spots; a broad black band below lateral stripe; labials brown bordered ..... *E. nigrilatus*.

## III. Second row of scales keeled; orbit bounded below by a single labial.

\* Scales in twenty-one rows; superior labials eight.

## 1. Temporals 1-3.

Oculars 3-3; labials longer than high; loreal longer than high; muzzle narrow; seven rows of spots; no stripes ..... *E. multimaculata*.

## IV. Second row of scales smooth, like the first; others with keels. Orbit bounded by two superior labials.

\* Scales in twenty-one rows; superior labials eight.

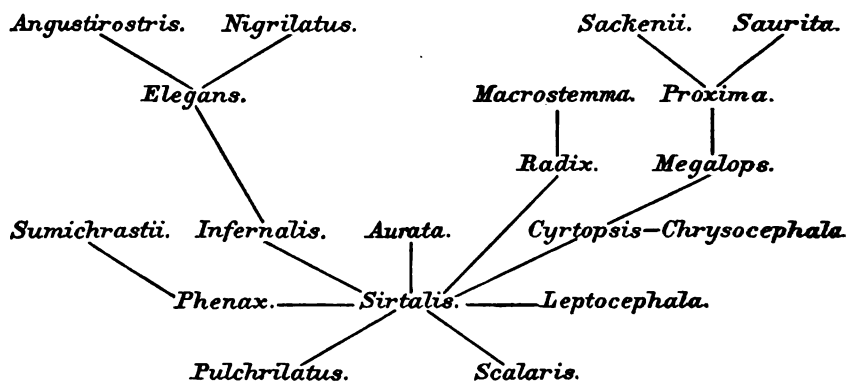
Two preoculars; temporals 1-4; superior labials larger than high; rostral plate transverse and cap-shaped. Light brown with small rufous spots anteriorly ..... *E. rufopunctata*.

\* \* Scales in nineteen rows; superior labials eight.

## 1. Temporals 1-2.

Oculars 2-3; loreal longer than high; head little distinct; dusky, stripes wanting or indistinct. .... *E. melanogaster*.

The affinities of most of these species may be expressed in the following diagram:



The *E. sirtalis* presents the greatest number of points of contact with other species. It also inhabits the region of geologically the greatest age, or that region which has been a dry land area for the longest time. Although large portions of the West of North America were elevated at the close of the cretaceous period, and probably before the genus *Eutænia* was in existence, the ancestors of *Eutænia* may be safely believed to have inhabited the area which was land prior to the cretaceous, so that the descent of *Eutænia* was rendered possible in the Eastern rather than in the Western half of the continent. It is thus rendered probable that *Eutænia sirtalis* is nearly the ancestral form. This is also confirmed by the fact that it is a spotted species; since the unicolor species, as *E. saurita* have spotted young.

The geographical distribution of these species may be tabulated as follows, by regions:

Eastern (3).	Austroriparian (4).	Central (3).	Pacific (5).	Sonoran (6).	Mexican (11).*
<i>E. saurita.</i> <i>E. butleri.</i>	<i>E. saurita.</i> <i>E. sackenii.</i> <i>E. proxima.</i>	<i>E. radix.</i>		<i>E. megalops.</i>	<i>E. proxima.</i>
		<i>E. elegans.</i>	<i>E. elegans.</i> <i>E. biscutata.</i>	<i>E. cyrtopsis.</i>	<i>E. rutiloria.</i> <i>E. macrostoma.</i>
			<i>E. infernalis.</i>	<i>E. aurata.</i>	<i>E. angustirostris.</i> <i>E. cyrtopsis.</i> <i>E. chrysocephala.</i>
<i>E. sirtalis.</i>	<i>E. sirtalis.</i>	<i>E. sirtalis.</i>	<i>E. sirtalis.</i>		<i>E. phenax.</i> <i>E. sumichrastii.</i>
			<i>E. leptocephala.</i>	<i>E. nigrilatus.</i> <i>E. rufopunctata.</i> <i>E. multimaculata.</i>	<i>E. scalaria.</i> <i>E. pulchrilatus.</i>
					<i>E. melanogaster.</i>

\* Probably not a homogeneous district.

The above table gives but a very general view of the distribution of the species, since some of them are restricted to districts of the regions only, while a few species are known from so few examples that their range is unknown. Of the latter class are *E. butlerii*, *E. rutiloris*, *E. angustirostris*, and *E. nigrilatus*. The *E. sackenii* is restricted to Florida, and the *E. radix* to that part of the central region that lies east of the Rocky Mountains, entering the eastern region. The widely distributed species, as *E. sirtalis* and *E. elegans*, are represented in special districts by peculiar subspecies, which look very different from each other. The *E. proxima* has a range which does not coincide with any zoölogical district, inhabiting eastern Mexico, Texas, and the Mississippi Valley.

The following review is preparatory to the complete monograph included in my Reptilia of North America, which it is expected will form one of the bulletins of the U. S. National Museum. The material on which this is based is mostly contained in that Museum, and I have had access to it through the permission of Secretaries Baird and Langley.

The study of the several hundred specimens of species of this genus which are contained in the National Museum and my private collection shows that in most of the species the number of rows of scales and the number of the labial plates are quite constant. In only one species, the *E. leptocephala*, is the number of scale rows varied by the presence or absence of a single row on each side, and in none is the number of labial plates frequently variable. The position of the lateral stripe is, as stated by Baird and Girard, very constant. The relative length of the tail is constant within certain limits and in certain species. In some of the species it varies a good deal. The coloration varies within limits in each species, and often characterizes subspecies with considerable precision, transitional forms in some such cases being rare, and in others more frequent. The species of the Pacific coast present the greatest difficulties to the systematist. Here the eastern *E. sirtalis* comes into contact with the western *E. elegans*, and some intermediate forms occur. The *E. sirtalis parietalis* resembles very much the *E. elegans ordinoides*, and the *E. sirtalis sirtalis* resembles a good deal the *E. elegans lineolata*. The *E. infernalis* intervenes between the two. The *E. leptocephala* appears quite distinct from the southernmost coast forms, but it has melanistic phases which resemble a good deal melanistic forms of the *E. sirtalis*; e. g., *E. s. trilineata* and *E. s. pickeringii* of the northwest coast region of Washington.

The colors of the young afford some clue to the order of probable appearance of color marks in the adults. As already remarked by Baird and Girard, the spots are more distinct in the young than in adults, both as to isolation from each other and in distinctness of outline and color. When spots disappear and are replaced by a uniform tint, both lighter (*E. elegans vagrans*), and darker (*E. elegans lineolata* and *E.*

*sirtalis obscura*), the change first appears on the posterior part of the body. The tendency to form crossbars or spots appears first on the anterior part of the body. This is slightly developed in the *E. sirtalis semifasciata*, but extends throughout the greater part of the length in the *E. phenax*. In species in which the top of the head is pale, as *E. elegans vagrans*, it is dark or black in the young. This dark color is paled also in the *E. e. couchii*, and in the *E. e. marciana*, but leaves the posterior portion as a pair of large black nuchal spots.

In the following pages the characters of the subspecies and their range are considered.

***Eutaenia sackenii* Kennicott.**

Proc. Acad. Phila., 1859, p. 98; Cope, Proc. U. S. Nat. Mus., 1888, p. 393. *Prymnodon chalcus*, Cope, Proc. Acad. Phila., 1860, p. 558.

Florida west to Pensacola.

***Eutaenia saurita* L.**

Bd. and Gird., Cat., 1853, p. 24; *Coluber saurita* Linn. Syst. Nat. i, 1766, p. 385. *Leptophis sauritus* Holbrook, N. Amer. Herpetol., iii, 1842, p. 21. *Tropidonotus sauritus* Dumet Bibr., Erp. Gen., viii, 1854, p. 585. Schlegel Ess. s. Physion. Serp., i, p. 69; II, p. 586; Günther, Cat. Colubr., Snakes, Brit. Mus., 1858, p. 72; Jan., Icon. Gen. Ofid., ii, 26; I, fig. 1; dorsal stripe too wide.

Eastern and Austroriparian regions except Texas.

***Eutaenia proxima* Say.**

Bd. and Gird., Cat., 1853, p. 25. *Coluber proximus* Say, in Long's Exped. Rocky Mts., i, 1823, p. 187. *Eutaenia faireyi* Bd. and Gird., Cat., 1853, p. 25.

The Mississippi Valley from Indiana and Illinois; Texas and Mexico below the plateau to Tehuantepec.

The individuals found in the Mississippi Valley from New Orleans northwards are mostly of a darker color than those from other regions, the spaces between the stripes being generally black. (*E. faireyi* B. & G.) This form accompanies the typical and lighter colored one in Louisiana and eastern Texas as far west as Dallas. Many transitions between the two occur. Specimens from Vera Cruz have a metallic refulgence. A pair of specimens from Fort Stockton, Tex., have the same character, and the dorsal stripe is indistinct, having no lateral black borders. The west Texas form generally has the dorsal stripe reddish.

***Eutaenia megalops* Kennicott.**

Proc. Acad. Phila., 1860, p. 330; Cope, Proc. Amer. Philos. Soc., 1884, p. 173.

Sonoran region (southern New Mexico and Arizona and Chihuahua).

***Eutaenia radix* Bd. and Gird.**

Cat. Serp. N. Amer., Pt. i, Serpents; Cope, Check List Batr. Rept. N. Am., 1875, 1883, p. 34. *Eutaenia haydenii* Kennicott, Rept. U. S. Pac. R. R. Surv., suppl. to Vol. i (Vol. xii), 1859, p. 298.

*Eutaenia radix twiningii* Coles and Henshaw.

*Eutaenia radix melanotania* Cope, Proc. U. S. Nat. Mus., 1888, p. 400.

This is the species of the plains, and it is well distinguished from all others. It ranges from Dallas, in northern Texas, on the south, to Manitoba on the north, and from the base of the Rocky Mountains on the west to the eastern limit of the prairies in Indiana on the east. It varies in color somewhat, but not sufficiently to give ground for the adoption of subspecies. The fact that of the very many specimens which are preserved in museums, the type is the only one which has nineteen rows of scales, has given rise to the synonyms above enumerated. Southern specimens (*E. v. haydenii*) are more brightly colored and more distinctly spotted than northern ones; in fact some of the latter are nearly black; hence the name *E. v. twiningii*; but these agree with the type exactly, except in having twenty-one rows of scales. In the *E. v. melanotania* from Indiana there is an imperfect longitudinal stripe crossing the end of the gastrosteges; but it is much interrupted.

***Eutænia macrostemma* Kenn.**

Proc. Acad. Phila., 1860, p. 331. *Eutania flavilabris* Cope, Proc. Acad. Phila., 1866, p. 306; *Eutania insigniarum* Cope, Proc. Amer. Philos. Soc., 1884, p. 172.

This is the representative of the *E. radix* in Mexico, but it always differs in having eight superior labials and a shorter tail. It has three forms. In one the longitudinal stripes and spots are obscure or wanting and the size is larger. This is the *E. insigniarum* Cope. In another, all the markings are very distinct, the lighter ones being a bright yellow; the size is smaller. This is the *E. flavilabris* Cope. It comes from various parts of Mexico. The type specimen of the species is intermediate between the two in color, and the size is like that of the *E. insigniarum*. It is from the valley of Mexico. Three specimens of the form *insigniarum* were sent to the zoölogical garden at Philadelphia, which are said to have been taken near Prescott, Ariz. One of them has an additional superior labial intercalated in front of the orbit.

***Eutænia butleri* Cope.\***

Proc. U. S. Nat. Mus., 1888, p. 399.

Southeastern Indiana. One specimen known.

***Eutænia biscutata* Cope.**

Proc. Acad. Phila., 1883, p. 21.

Lake Klamath, Oregon. Two specimens known.

***Eutænia elegans* Bd. and Gird.**

Cat. Rept. N. Amer., Pt. I, Serpents, 1853, p. 34.

*Eutania raygrans* Bd. and Gird., l. c., p. 35.

*Eutania marciana* Bd. and Gird. l. c., p. 36.

*Eutania couchii* Kenn., Rept. U. S. Pac. R. R. Surv.; Williamson's Rept., x, 1857, p. 10.

*Eutania hammondii* Kenn., Proc. Acad. Phila., 1860, p. 332.

*Tropidonotus trivittatus* Hallow., Proc. Acad. Phila., 1853, p. 257.

\**Eutania rutiloris* Cope, Proc. Am. Philos. Soc., 1885, p. 388. Cozumel Id., Yucatan.

This species resembles in some of its forms the *E. sirtalis*, but it is to be always distinguished by the twenty-one rows of scales, the eight superior labials, and from most of the forms of the latter, by the absence of a series of rounded spots near the end of the gastrosteges. In its range it never enters the eastern nor austroriparian regions, excepting the latter at the extreme western part of Texas, on the Concho and Nueces rivers and their tributaries.

The labial and scale formulæ in this species are quite constant. In two specimens of the *E. e. plutonia* the labials are eight, and the scales in twenty-one rows. In two of *E. e. elegans*, the figures are the same. In two of *E. e. brunnea*, the figures are the same. In eight of the *E. e. lineolata*, the figures are the same. In four of the *E. e. couchii* the figures are the same, except in one individual, where there are but nineteen rows of scales. In twenty-two specimens of *E. e. vagrans* there are twenty-one rows of scales in all, and in five specimens there are seven superior labials on one side. In one only are there seven superior labials on both sides. In all the others there are eight labials on both sides. In twelve specimens of *E. e. marciana*, all have eight upper labials, and all but two twenty-one rows of scales. In two the scales are in nineteen rows. Thus in fifty-one specimens there are three departures from the regular scale formula; and one entire departure and five partial departures from the labial formula.

There are eight well marked color forms of this species, which mostly occupy distinct geographical regions, and are abundantly entitled to be called subspecies. It is indeed possible that some of these might be as well regarded as species, but the existence of transitions, and the lack of importance in the characters themselves, induce me to consider them as subspecies. They are, however, in the great majority of cases easily recognized. The characters of these forms are as follows:

- I. No spots; labials not dark bordered.
  - Black above and below; no lateral band; dorsal band wanting or a trace in front only.....*E. e. plutonia*.
  - Black above, light below; three distinct stripes, all black bordered...*E. e. elegans*.
  - Brown above, light below; three stripes, not distinctly bordered...*E. e. brunnea*.
- II. Spotted; labials not dark bordered; nuchal spots indistinct.
  - Stripes and spots distinct; the superior row of spots confluent into a band; the inferior separated by chestnut-red spaces; belly olivaceous...*E. e. ordinoides*.
  - Spots large anteriorly, smaller or confluent posteriorly; interspaces indicated by pale edges of the scales; bands distinct.....*E. e. lineolata*.
  - Spots small, numerous, 80-100, interspaces large, pale; bands present often indistinct; belly with dark middle.....*E. e. vagrans*.
- III. Spotted; labials dark bordered; nuchal spots more or less distinct.
  - No dorsal band, lateral band indistinct; intermediate space lead-colored with one row of spots next to the lateral band; yellow marks behind eye incomplete.....*E. e. couchii*.
  - Dorsal and lateral bands indistinct; three rows of spots on a light ground on each side; two yellow crescents extending upwards, at angle of mouth and behind eye.....*E. e. marciana*.

Of these subspecies the *E. e. plutonia* has been found rarely and at remote localities, and the *E. e. brunnea* is only known from two specimens, so that these can not be yet regarded as geographical forms. The *E. e. elegans* has been found so far, in northern and central California only. The *E. e. lineolata* is from the same region, and from Oregon and Washington as well. The *E. e. vagrans* is characteristic of the entire region between the Sierra Nevada on the west and the eastern border of the Great Plains on the east, and belongs to higher parts of the Rocky Mountain ranges as well as to the valleys between them. The *E. e. couchii* is characteristic of southern California and southern Arizona and New Mexico. The *E. e. marciana* belongs to the valley of the Rio Grande, and adjacent regions in Texas and Mexico. It is seen from the above that the *Eutænia elegans* inhabits all of the nearctic realm excepting the eastern and austroriparian regions.

As regards transitions between the subspecies, I refer to the number of spots, which have been shown by Baird and Girard to be characteristic of the *E. e. vagrans* and *E. e. marciana*. In six specimens of the former, however, I find the variation to be from eighty-four to one hundred and three. In *E. e. marciana* they number from fifty-two to fifty-eight in four specimens, but in an otherwise typical one I find seventy-three. There is, however, still an interval between the ranges of variation. This is filled by the *E. e. couchii* where the number of spots runs from seventy-four to ninety-one in five individuals. The number of spots is thus characteristic in a general way, but not sufficiently exact to define the forms as species.

I have endeavored to ascertain whether there is any constancy in the number of temporal scales. Thus in the typical form, *E. e. elegans*, there are three rows of scales bordering the posterior superior labials above, while in the *E. e. lineolata* there are as often four as three. In the *E. e. vagrans* five specimens have four rows and five have three rows. In the *E. e. hammondi* three have three rows, and one (No. 866) has four. Of ten specimens of *E. e. marciana*, seven have three, and three have four. The rows always have the formula 1-2-3-4.

#### *Eutænia elegans plutonia* Yarrow.

*Eutænia vagrans angustrostris* Yarrow in Wheeler's U. S. C. G. Surv. W. 100th Mer. V. p. 554, Pl. xx, f. 2, 29.

*Eutænia henshawi* Yarrow, Proc. U. S. Nat. Mus. 1883, p. 152.

Two specimens known; one from western Arizona, and the other from Fort Walla Walla, Wash.

#### *Eutænia elegans elegans* Bd. and Gird.

*Eutænia elegans* Bd. and Gird., Cat. 1853, p. 35; Cope, Check List Batr. Rept. N. Amer., 1875, p. 41, *Tropidonotus trivittatus* Hallowell, Proc. Phila. Acad., 1853, 237.

Four specimens only known; all from California.

**Eutænia elegans ordinoides** Bd. and Gird.

*Eutænia ordinoides* Bd. and Gird., Cat. Serpt. N. Amer., 1853, p. 33, *Tropidonotus ordinoides*, Bd. and Gird., Proc. Acad. Phila., 1852, 176. .

This form is quite different from any of those enumerated as subspecies of *E. elegans*, but it resembles considerably the *E. sirtalis parietalis*. The distribution of colors is quite the same as in that form, but the red between the lateral spots is of a chestnut color, and not crimson, as in *E. s. parietalis*. The agreement of the scale and labial formulæ with those of the *E. elegans* induces me to refer it to that species rather than to the *E. sirtalis*, although the latter exhibits occasionally in California eight upper labials.

Besides the characters mentioned, this form has a yellow dorsal stripe, which is well defined, covering one and two halves rows of scales. The lateral stripe is defined below by a brown shade, which fades into the brownish olive of the belly below. The spots of the inferior lateral row are large and are confluent above with the wide black dorso-lateral band. No nuchal spots, but the dark color of the back continues into the brown of the top of the head. Superior labials brownish olive, the posterior narrowly brown-bordered; chin and throat yellow. Gastrosteges unspotted; one hundred and fifty-six in number. Tail injured; the base with a triangular section. Length of body, 490 millimeters.

One specimen from San Francisco, California. Baird and Girard enumerate three specimens, all from California, and two of them from San Francisco.

**Eutænia elegans brunnea** Cope.

Color of the superior surface to the third row of scales (exclusive), brown; of lower surfaces, light yellow, extending to the third row of scales (inclusive). Dorsal stripe light yellow, occupying the median row of scales and the adjacent borders of the adjacent rows, but not well defined laterally, and not black bordered. It covers three full rows on the nape and only one row beyond the middle of the length, and is wanting on the tail. No traces of nuchal spots. Labials colored like the abdomen, the superior with traces of brown posterior borders. There is but a faint brown shade on the first row of scales and the ends of the gastrosteges, scarcely defining the lateral stripe below. Belly unspotted. In the type No. 10849 the head is short, wide. Temporals 1-2-3 and 1-3-3. Gastrosteges 172, anal 1, urosteges 77. Genaeals equal, short. Tail entering total length four and one-tenth times.

This is a much more robust form than the *E. e. elegans*, and brown takes the place of black in the coloration. In the indefinite dorsal stripe it resembles the *E. e. lineolata*, but it does not show the least trace of the square spots even when the epidermis is removed.

Catalogue No.	No. of specimens	Locality.	From whom received.	Nature of specimen.
10848	1	Fort Bidwell, Cal. ....	H. W. Henshaw .....	Alcoholic.
10849	1	.....do .....	.....do .....	Do.

*Eutænia elegans lineolata* Cope.

Color above brown, to the third row of scales exclusive; below light olive, unspotted. A longitudinal dorsal stripe, and a lateral stripe on the second and third rows of scales, light yellow; first row of scales light brown; integument between the stripes marked with two rows of blackish square spots, which are, however, nearly invisible when the skin is not stretched, but are indicated by short, whitish borders of the scales, which occupy their interspaces. These spots are more distinct in the young, as in other forms. The brown of the sides extends to the head without forming nuchal spots, and passes from dark to lighter brown on the frontal region, or continues, especially in younger specimens, to the end of the muzzle. Superior labials yellowish olive, the middle ones with a trace of a dark posterior border above. A pair of parietal spots; gular region light yellow. Dorsal stripe faint on tail.

Temporals 1-2-3, or in some specimens 1-2-3-4. Tail three and four-fifths times in total length. Gastrosteges 168, anal 1, urosteges 89. Total length 460<sup>mm</sup>, of tail 120<sup>mm</sup> (medium sized specimen).

This a common form of eastern California and Oregon. It extends as far south as Fresno, California (No. 12564), and east as far as Walla Walla, Washington (10911). It connects completely the subspecies *E. e. elegans* and *E. e. vagrans*, in spite of their very different appearance. A specimen (11805) from Shasta County, California, is almost as uniformly black as the former; while 10911, from Walla Walla, approaches quite near to the *E. e. vagrans* in the dark, lead-colored middle abdomen.

*Eutania elegans lineolata* Cope.

Catalogue No.	No. of specimens.	Locality.	When collected.	From whom received.	Nature of specimen.
8579	2	Lake Tahoe, Nev. ....	Sept. —, 1876	Dr. W. A. Hammond, U. S. A.	Alcoholic.
8580	1	Southern California...	1875	do	Do.
8587	1	do	Aug. —, 1875	do	Do.
9565	1	East California.....	do	do	Do.
10840	1	Fort Klamath, Oreg. ...	Aug. 29, 1878	do	Do.
10843	1	Oregon .....	Sept. —, 1878	do	Do.
10844	1	do	Sept. —, 1878	do	Do.
10845	1	Camp Warner, Oreg. ...	Aug. 10, 1878	do	Do.
10846	1	do	Aug. 10, 1878	do	Do.
10847	1	Camp Bidwell, Cal. ...	July —, 1878	do	Do.
10848	1	do	July —, 1878	do	Do.
10849	1	do	July —, 1878	do	Do.
10850	1	do	July —, 1878	do	Do.
12564	1	Fresno, Cal. ....	do	Gustav Eisen .....	Do.
10811	1	South Oregon .....	do	H. W. Henshaw .....	Do.
10911	3	Walla Walla, Wash. ...	do	Capt. C. E. Bendire, U. S. A.	Do.
11805	1	Baird, Shasta County, Cal.	do	L. Stone .....	Do.

***Eutænia elegans vagrans* Bd. and Gird.**

*Eutænia vagrans* Bd. and Gird., Cat. Serpt. N. Amer., 1853, p. 35. Yarrow, Wheeler's Rept., U. S. G. Surv., W. 100th mer. v., p. 548; Cope, Check List, N. Amer. Batr. Rept., 1875, p. 41.

The entire central region, and not elsewhere, except a few specimens from the northern part of the Pacific region; extending as far south as the mountains of New Mexico and Arizona, and Humboldt Bay, California. Very abundant.

***Eutænia elegans couchii* Kennicott.**

*Eutænia couchii* Kenn., Rept. U. S. Pac. R. R. Surv., x, Williamson's Rept., p. 10, 1857. *Eutænia hammondi* Kennicott, Proc. Acad., Phila., 1860, p. 332.

This subspecies is easily recognized, and intermediates between *E. e. vagrans* and *E. e. marciana*. An approach is made to the markings of the head seen in the latter, while it resembles the young of *E. e. vagrans* in this respect also. The same *E. couchii* was based on an exceptionally narrow nosed form from northern California (Pitt River), of which but one specimen has been found. The normal form (*E. e. hammondi*) is characteristic of southern California, ranging east to Texas.

***Eutænia elegans marciana* Bd. and Gird.**

*Eutænia marciana* Bd. and Gird., Cat. Serpt. N. Amer. 1853, p. 36. Cope, Check List N. Amer. Batr. Rept. 1875, p. 41.

This easily recognized subspecies is restricted to the valley of the Rio Grande from Colorado to its mouth. It extends eastward into Texas as far as the Concho and Nueces Rivers.\*

***Eutænia cyrtopsis* Kennicott.**

Proc. Acad. Phila., 1860, p. 333, Cope, Check List N. Amer. Batr. Rept. 1875, p. 41. *Tropidonotus collaris* Jan, Icon. Gen. d. Ophidi II, 25 v, Fig. 2 (too stout).

This species inhabits the Sonoran, Lower Californian, and Mexican regions. It is well characterized by its wide head and slender body with large eye, large nuchal spots and dorsal stripes running on only one row of scales. There are three subspecies, which differ as follows:

I. Tail about one-third the total length. No large spots below lateral stripe.

*E. c. cyrtopsis*.

II. Tail between one-fourth and one-fifth the length.

No large spots below lateral stripe.....*E. c. collaris*.

Large spots below lateral stripe alternating with lower lateral spots, and invading lateral stripe.....*E. c. ocellata*.

***Eutænia cyrtopsis cyrtopsis* Kennicott.**

*Eutænia cyrtopsis* Kenn., Proc. Acad. Phila., 1860, p. 533. Cope, Check List N. Amer. Batr. Rept. 1875, p. 41.

From Durango, Mexico.

\* *EUTÆNIA AUGUSTIROSTRIS* Kennicott. Proc. Acad. Phila., 1860, p. 332. Cope, Check List N. Am. Batr. Rept. 1875, p. 41. One specimen known; from Durango, Mexico.

*EUTÆNIA CHRYSOCEPHALA* Cope, Proc. Amer. Philos. Soc., 1884, p. 173. Orizaba, Vera Cruz, Mexico,

*Eutænia cyrtopsis collaris* Jan.

*Tropidonotus collaris* Jan, Iconographia degli Ofid. II, 25, Pl. v, Fig. 2.

Mexico generally; Lower California; Arizona (Camps Whipple and Verde); New Mexico (Lake Valley.)

*Eutænia cyrtopsis ocellata* Cope.

Bull. U. S. Nat. Mus., No. 17, p. 22, 1880.

Helotes, West Texas; several specimens.

*Eutænia infernalis* Blainville.

*Coluber infernalis* Blv., Nouv. Ann. Mus. His. Nat. Paris, III, 1834, p. 59, Pl. xxxiv A, Fig. 33a; Bd. and Gird., Cat. 1853, p. 26.

This species occupies a position intermediate between the *E. elegans* and the *E. sirtalis*, having the labial plates of the former and the scale formula of the latter. In color pattern it differs from all the subspecies of either, and as its tail is generally longer than either, it is necessary to admit it as a separate species. It is more than usually compressed at the anal region, where the scales are wide and more irregular than is observed in other species. In the form *vidua* this compression extends to the entire body. There are two well-marked subspecies as follows:

Color blackish, with traces of an inferior row of spots, and a distinct lateral stripe;  
belly yellowish olive with black center; throat and lips yellow .. *E. i. infernalis*.  
Uniform black, with yellow dorsal stripe only ..... *E. i. vidua*.

*a. Eutænia infernalis infernalis* Blv.

*Eutænia infernalis* Bd. & Gird., Cat. 1853, p. 26, Blainville, l. c.; *Coluber infernalis* Blainville, Nouv. Ann. Mus. d'Hist. Nat., III, 1834, p. 59; Pl. xxiv, 33a.

Head moderately distinct, muzzle medium. Parietal plates not shortened, narrowed posteriorly. Scales not narrow, graduating in width from the first row, which is smooth. Gastrosteges 158, anal 1, urosteges 70.

Color a blackish brown, with a median yellow stripe, which covers the middle and parts of adjacent rows to the base of the tail, where it contracts to one row and continues to the end. Belly from yellow to olivaceous, extending to the third row of scales inclusive, with or without a shade on the first row distinguishing a lateral stripe, immaculate. Scales from fourth to eighth rows inclusive, with the keels olivaceous or yellowish forming delicate longitudinal lines. Shades of the same color are so distributed on the scales as to give the appearance of indistinct spots in two rows, an appearance which is increased by a few scattered yellowish dots on the margin of some of the scales. This appearance represents actual spots in some specimens. In some of the larger specimens the appearance is lost, nothing but the few yellow specs remaining. Labial plates yellow or olive, with or without very narrow posterior black borders. Throat and chin always yellow.

In eleven specimens from Fresno, Cal., only the smaller ones have distinct indications of lateral spots. In five from near San Francisco, Cal., the spots remain distinct in the adults, as in the type of Baird and Girard.

This subspecies resembles the *Eutænia elegans lincolata*, but it has always (sixteen specimens) one row of scales less on each side; the dorsal stripe is wide and better defined, and the colors are much brighter.

*Eutænia infernalis infernalis* Bd. and Gird.

Catalogue No.	No. of specimens.	Locality.	Whence obtained.	Character.
11754	11 6	Fresno, Cal. .... San Francisco .....	G. Eisen ..... Collins Overland Telegraph Co.	Alcoholic. Do.

Besides the six specimens of this form, said to be from San Francisco, Baird and Girard enumerate two from California.

*b. Eutænia infernalis vidua* Cope.

Body moderately robust, compressed to the base of the tail; head moderately distinct; muzzle moderately elongate. Tail from  $3\frac{3}{8}$  to  $3\frac{3}{4}$  times in total length, compressed for the basal half. Scales in nineteen rows graduating in size from the first on each side, which is as deep as wide and very feebly keeled. Other scales not very elongate, feebly notched. Superior labials eight, all higher than long. Loreal not longer than high; oculars 1-3, temporals 1-2-3; one of the second row larger than the rest. Geniæ narrow, subequal. Frontal short, twice as wide as the superciliaries anteriorly. Scuta, 151-177.

Color black, without markings, excepting a yellow olivaceous throat and chin, and a yellow dorsal stripe which covers one and two half rows of scales from the parietal plates to the basal third of the tail, whence it runs on a single row to the end of the latter. Muzzle and labial plates uniform lead color; throat yellowish.

This species is so far known from the two original specimens only, which are in excellent preservation. It resembles in general characters the species of the *E. sirtalis* group, but is quite different from any of the forms which I have included in that protean species. The tail is longer, as I find out of ninety-seven specimens of the latter which I have measured; but five have the tail as short as in the specimen of *E. vidua*, with the shortest tail ( $3\frac{3}{8}$ ), and none with so long a tail as the other ( $3\frac{3}{4}$ ). The eight superior labials distinguish it from all but four specimens of the ninety-seven, and in some of them the additional labial is an intercalation. Two of these four specimens come from the same locality, viz, San Francisco. The compressed body is seen in a few specimens of the *E. sirtalis*, also from the Pacific region, but not in any other forms. In some of these the stripes disappear, but altogether, and not the lateral only, leaving a well-developed dorsal, as in the *E. e. vidua*.

The coloration is a curious parallel of the "*atrata*" form of the *E. leptocephala*, which it closely resembles. The superior labials of the latter are different in being lighter and with black borders, and the throat is whitish and the muzzle brown.

While the *E. infernalis* has these points of connection with certain extremes of variation of the *E. sirtalis*, it agrees with none of them, and may be regarded as a species until more definite points of connection are found.

*Eutania infernalis vidua* Cope.

Catalogue No.	No. of specimens.	Locality.	From whom.	Character.
970	2	San Francisco		Alcoholic.

Two specimens in the U. S. National Museum are the only ones that I have seen. Both are from San Francisco, California.\*

*Eutania aurata* Cope, sp. nov.

Form of medium robustness; head well distinguished; tail about  $4\frac{2}{3}$  times in total length. Scales in nineteen series, those of the inferior row as deep as long, smooth or feebly keeled; the transverse diameter of the scales diminishing gradually, and nowhere so small as in many other species. Superior labials eight, all deeper than long. Loreal deeper than long; oculars 1-3; temporals 1-2-3. Frontal wider than superciliaries, not reaching preocular.

Brown without spots, and with three longitudinal yellow stripes, the lateral very distinct, and running on the second and third rows of scales. Belly yellow, immaculate. Labials yellow. A pair of large black nuchal spots.

This species differs from those of the same group with short tail, in its more robust form, and in the absence of spots and presence of stripes. In its large nuchal spots it resembles the *E. cyrtopsis*, but in no other respect. Its real affinities are to the *E. infernalis*, but its appearance is very unlike this form.

Robust, head short, distinct. Anterior labials short, vertical; parietal plates rather short and wide. Scales rather wide, first row very weakly keeled. Gastrosteges 168, anal 1, urosteges 74. Total length 840<sup>mm</sup>; length of tail 185<sup>mm</sup>.

The color is a rich uniform brown above, with three longitudinal yellow stripes which are without black borders. The dorsal stripe occupies the middle and parts of two adjacent rows of scales on the anterior half of the length, and one row on the posterior half, and is continued to the end of the tail. The lateral stripe covers two entire rows

\*EUTANIA PHENAX Cope, Proc. Acad. Phila., 1863, p. 134. Vera Cruz, Mexico.

EUTANIA SUMICHRASTII Cope, Proc. Acad. Phila., 1866, p. 306; Proc. Amer. Philos. Soc., 1884, p. 175. State of Vera Cruz, Mexico. † Guatemala.

of scales except on the posterior half, where it occupies the second row only. It is bordered below by a band of a rather lighter brown than that of the space above it, on the first row of scales, and on the angles of the gastrosteges, which enter between the separate scales of the latter. Every other scale of the first row has a black speck at its upper and lower base. Belly immaculate yellow, except a black shade at the base of the extremity of a few of the scuta, which is only visible on stretching the latter apart.

This handsome form resembles the *Eutænia elegans brunnea* in general form and appearance, but the latter has no nuchal spots nor black labial borders, nor band beneath the lateral stripe. It belongs to a different section of the genus. Its nuchal spots and labial borders are like those of the *Eutænia cyrtopsis*, but it is not a slender-bodied species, and the scales are wider than in that form, representing a different type in the genus.

I have seen but one specimen of this subspecies, which I took near Lake Valley, in southern New Mexico. There is no specimen in the U. S. National Museum.

*Eutænia leptcephala* Bd. and Gird.

Cope in Yarrow's Reptilia, Vol. v; Rep. U. S. G. G. Surv. W. of 100th Mer., p. 550; Catalogue of Serpents, 1853, p. 29; Proc. Acad. Phila., 1883, p. 23; *Eutænia cooperii* Kennicott, U. S. Pac. R. R. Surv., XII, Pl. ii, p. 296; Cope, l. c., 551; *Eutænia atrata* Kennicott, loc. cit.; *Tropidonotus sirtalis*, var. *leptcephala*, Jau. Icon. Gen. Ofid., II, 25; IV, Fig. 2.

This is a diminished or depauperate form of the *E. sirtalis* series, with a tendency to reduction in the number of the scale rows and labial plates, and subdivision of the preocular plate. Of twenty-four specimens twelve have nineteen, and twelve have seventeen rows of scales. The latter character has given rise to the synonym *E. cooperii*. Rather less than half the specimens have two preoculars, while in about one-fourth, a fusion of two or more of the superior labial plates on one or both sides is seen, reducing the number to six or five. The two most frequently fused are the third and fourth, which bound the orbit below, and next, the fifth is fused with the fourth.

The stripes are sometimes very distinct and the spots fused into a black band between them, and all stages exist between this condition and that in which the colors are light and both stripes and spots are indistinct. All the specimens come from the coast region of the Pacific district north of Humboldt Bay, California.\*

\* *EUTÆNIA SCALARIS* Cope, Proc. Acad. Phila., 1866, p. 306; *Thamnophis scalaris* Cope, l. c., 1860, p. 369. States of Puebla and Vera Cruz, Mexico.

*EUTÆNIA PULCHRILATUS* Cope, Proc. Amer. Philos. Soc., 1884, pp. 173, 174. States of Mexico, Hidalgo, Puebla, and Vera Cruz, Mexico.

*Eutaenia sirtalis* Linn.

Bd. and Gird., Cat. Serpt., 1853, p. 30; Cope Check List N. Amer. Batr. Rept., 1875, p. 41.

*Coluber sirtalis* Linn., Syst. Nat., i, 1766, p. 383.

*Tropidonotus sirtalis* Holbrook, N. Amer. Herpetology, III, 1842, 41, Pl. XI.

*Coluber ordinatus* Linn., Syst. Nat., i, 1766, p. 379; Merrem Tentamen, p. 93.

*Tropidonotus ordinatus* Boie, Isis von Oken, 1827, p. 535; Holbrook N. Amer. Herpet., IV, Pl. 12; Günther, Cat. Colubr. Snakes Brit. Mus., 1858, p. 83.

*Tropidonotus bipunctatus* Schlegel, Physionomie des Serpents, 1837, 320; Dum. Bibr. Erp. Gen., VII, 1854, p. 582.

This species ranges over all North America, being limited to the North by its capacity for enduring cold, and extending south to Mexico. In its essential characters it is quite constant, but it varies in color so as to include several races or subspecies. Of one hundred and two specimens examined, but three have twenty-one rows of scales, the rest having nineteen. Of the same number examined, but six have eight superior labials on both sides, and the additional labial is generally smaller than the others, so as to be an evident abnormality, though sometimes they are regular. In nine specimens the additional labial appears on one side only. These abnormalities are distributed as follows:

	No. exam- ined.	21 rows scales.	Sup. labs. 8-8	Sup. labs. 8-7
<i>E. s. dorsalis</i> .....	6	0	0	1
<i>E. s. sirtalis</i> .....	53	1	3	4
<i>E. s. parietalis</i> .....	37	2	2	4
<i>E. s. pickeringii</i> .....	8	0	1	0
Total .....	102	3	6	9

## The subspecies differ as follows:

## I. No stripes nor spots above.

Color green; a spot near end of each gastrostego ..... *E. s. graminea*.

## II. No stripes; two rows of square spots on each side.

Spots all distinct, not separated by red interspaces; gastrostegal spots.

*E. s. ordinata*.

## III. Both stripes and spots.

Spots all distinct, not separated by red interspaces; gastrostegal spots; dorsal stripe yellowish, not black bordered ..... *E. s. sirtalis*.

Spots distinct, not separated by red interspaces; the anterior become opposite and confluent, and extending across the lateral stripe forming half cross-bars; gastrostegal spots ..... *E. s. semifasciata*.

Inferior row of spots only visible; separated by red interspaces; dorsal stripe red, black bordered; gastrostegal spots ..... *E. s. dorsalis*.

Superior row of dorsal spots confluent into a longitudinal band in contact with the inferior row of spots, which are separated by red interspaces; no gastrostegal spots ..... *E. s. parietalis*.

Like the last, but the inferior spots connected below by a black band inclosing the red spots; throat and lips red; belly black ..... *E. s. cinnna*.

Three longitudinal lines on the middles of the second and median rows of scales, mostly blue; belly black ..... *E. s. pickeringii*.

## IV. Bands but no spots.

Four longitudinal black stripes separated by a red stripe on each side.

*E. s. tetratænia.*

Three well defined bluish bands of usual width; belly black.... *E. s. trilineata.*

A yellow dorsal band; the lateral less distinct; belly green and with gastro-tegal spots ..... *E. s. obscura.*

These subspecies are distributed as follows:

Eastern region.	Austroriparian region.	Central region.	Pacific region.
<i>E. s. graminea.</i>			
<i>E. s. ordinata</i> .....	<i>E. s. ordinata.</i>		
<i>E. s. sirtalis</i> .....	<i>E. s. sirtalis</i> .....	<i>E. s. dorsalis.</i>	
		<i>E. s. parietalis</i> .....	<i>E. s. parietalis.</i>
<i>E. s. semifasciata</i> .....			<i>E. s. concinna.</i>
<i>E. s. obscura</i> .....	<i>E. s. obscura</i> .....		<i>E. s. tetratænia.</i>
			<i>E. s. trilineata.</i>
			<i>E. s. pickeringii.</i>

***Eutænia sirtalis graminea* Cope.**

Proc. U. S. Nat. Mus., 1888, p. 393.

Found rather rarely from Massachusetts to Indiana, inclusive.

***Eutænia sirtalis ordinata* L.**

Cope, Check List N. Amer. Batr. Rept., Bull. U. S. Nat. Mus., I, 1875, p. 41; Wheeler's Surv. Zoölogy, v., p. 546.

*Coluber ordinatus* Linn., Sys. Nat., I, 1866, 379; *Tropidonatus ordinatus* Holbrook, N. Amer. Herpetol., III, 1842, 45 Pl. XII. *Eutænia ordinata* Bd. and Gird., Cat. 1853, p. 32.

Found sparingly throughout the Eastern and Austroriparian regions except Texas.

***Eutænia sirtalis sirtalis* Linn.**

Cope, Check List N. Amer. Batr. Rept., Bull. U. S. Nat. Mus., I, 1875, p. 41: do. in Yarrow's Rept. U. S. G. G. Exp. Surv. W. 100th Mer., Vol. v, p. 546.

*Eutænia sirtalis* Bd. and Gird. Cat. 1853, p. 20.

Found throughout the Eastern and Austroriparian regions except Texas. The most western locality known is Fort Kearney, now Junction City, in the eastern third of Kansas. This form reaches a larger size than any other species or subspecies. A melanistic specimen from Tennessee is in the U. S. National Museum. All parts of the body are black, but the spots and stripes may be all traced.

***Eutænia sirtalis semifasciata* Cope, subsp. nov.**

This subspecies or geographical race is represented by a number of specimens in the national collection from northern Illinois and Wisconsin. It resembles in general the *E. s. sirtalis* in color and proportions. The lower surface and the stripes are olivaceous, and the lateral and median stripes are separated by two rows of spots which occupy the entire width of the space on the skin, but which do not touch each other as scale markings, the upper row being ranged along the median stripe, and the lower along the lateral stripe. The peculiarity of the

form consists in the fact that on the anterior fifth or sixth of the length of the body the spots of the inferior row extend across the lateral stripe, breaking it up into sections. In many of the specimens the spots of the superior row become opposite to those of the inferior row, and join them, and the latter again join a row which is below the lateral stripe. The three rows of spots thus become confluent, form cross bars interrupted only by the median dorsal stripe, as in the *Eutænia scalaris*. The bars are much less regular than in that species, the part that crosses the lateral stripe being distinctly contracted, and the superior part being much widened.

In four specimens (8070) of this form the tail measures, respectively,  $4\frac{1}{2}$ ,  $4\frac{2}{5}$ ,  $4\frac{3}{5}$ ,  $4\frac{4}{5}$  of the total length. Gastrosteges in one of the same, 153; anal 1; urosteges 61. Length of same specimen, 520 millimeters; length of tail, 104 millimeters. Length of a larger specimen, 914 millimeters; of tail, 196 millimeters. In several of the specimens a delicate black line borders the median stripe on each side.

Catalogue No.	No. of specimen.	Locality	From whom received.	Nature of specimen.
8070	24	Aux Plaines, Ill. ....	R. Kennicott. ....	Alcoholic.
1018	2	do .....	do .....	Do.
1051	1	Wisconsin .....	do .....	Do.

In the lot 8070 are included three specimens of the *E. sirtalis sirtalis*.

#### *Eutænia sirtalis dorsalis* Bd. and Gird.

*Eutænia dorsalis* Bd. and Gird., Cat. Serpt. N. Amer., 1853, p. 31, Cope Check List N. Amer. Batr. Rept., 1875, p. 41. *Eutænia ornata* Bd. and Gird., Yarrow Reptilia U. S. G. G. Ex. W. 100th mer. v, p. 550-553; Check List N. Amer. Batr. Rept. Bull. U. S. Nat. Mus., No. 24, 1883, p. 122; not of Bd. and Gird. *Tropidonotus sirtalis* var. *dorsalis*, Jan, Icon. Gen. Ofid. 11 25, 1v, fig. 1.

This form, which is easily distinguished in life by its red dorsal stripe, inhabits principally the Rio Grande Valley, being associated with the *E. elegans marciana*. It is nearest to the *E. s. parietalis*, but it lacks the wide black band on each side of the dorsal stripe which is in contact with the lower series of lateral spots in that form. It has instead, a narrow black border of the dorsal stripe, which does not touch the small distinct lateral spots. Intermediate forms, however, occur, in which the black borders are wider and the lateral spots larger. Such is No. 954, from Salt Lake, Utah, and another specimen from California.

#### *Eutænia sirtalis obscura* Cope.

Check List N. Am. Batr. Rept., 1875, p. 41, in Yarrow's Report Reptiles U. S. G. G. Survey W. of 100th mer., 1875, v, p. 546.

This form is a derivation from both *E. s. sirtalis* and *E. s. parietalis* by a fusion of the spots into black bands. The specimens in the National Museum are from remote localities, viz.: Westport, Nova Scotia; Lac que Parle Minn.; Fort Benton, Mont. and California.

*Eutænia sirtalis parietalis* Say.

Cope in Yarrow's Report Reptiles U. S. G. G. Survey W. of 100th mer., v, 1875, p. 546; *Coluber parietalis* Say in Long's Exped. Rocky Mtns., 1823, I, p. 186; Harlan Journ. Acad. Phila., v, 1827, p. 349. *Eutænia parietalis* Bd. and Gird., Cat. 1-53, p. 28. *Eutænia pickeringii* Bd. and Gird., Cope Proc. Acad., Phila. 1883, p. 21; Check List N. Am. Batr. Rept., 1875, p. 41, not of Bd. and Gird. *E. ornata* Bd. and Gird., U. S. Mex. Bound. Surv., II, Rept. 1859, p. 16, pl. —, fig. —.

This subspecies covers the entire central region, and the Pacific region. It is most abundant in the northern part of the latter, but is found as far South as Fresno, Cal.

*Eutænia sirtalis concinna* Hallow.

*Tropidonotus concinnus* Hallowell, Proceed. Acad. Phila., VI, 1852, p. 182; *Eutænia concinna* Bd. Gird., Cat. 1853, p. 146; Cope, Proc. Acad. Phila., 1883, p. 23.

From the western part of Washington and Oregon.

*Eutænia sirtalis tetratænia* Cope.

In Yarrow's Report in U. S. Expl. Surv., W. of 100th mer., v, 1875, p. 546.

In the typical specimen the tip of the tail is injured, but it can be restored with considerable probability, so that I estimate that the length enters the total length four and one-fifth times. The superior labials eight, the anterior rather crowded, so that it may be that the normal number is seven instead of eight, in which case this form should be referred to the *E. sirtalis* rather than to the *E. infernalis*. The loreal is as high as long, and the temporals are 1—2—3. The frontal is wider than the superciliaries, and does not reach the preocular. The postgenials are longer than the pregenials. Gastrosteges, 158; urosteges, 68+. Total length, 800 millimeters; of tail (tip lost), 118+.

The ground color is seen in the dorsal stripe and in the belly as high as the third row of scales inclusive. This is bluish olivaceous. The scales mentioned are black at their bases and on their adjacent edges, and in the first row of scales the black covers the angular extremity of the gastrosteges. No regular spots on the gastrosteges, as in most subspecies of *Eutænia sirtalis*. There is no distinct lateral stripe. The dorsal stripe covers one and two half rows of scales. Externally on each side it is bounded by a black stripe, which also covers one and two half rows of scales, and which extends to the base of the tail. Exterior to this on each side is a red stripe, which also covers one and two half rows of scales. Exterior to this on each side is a second black stripe on each side which covers one and a half rows of scales and extends to the base of the tail, beyond which it is broken up into a series of black spots. It is also broken up into spots for a short distance posterior to the head. These spots have no connection with the superior black band. Head olive gray with two pale parietal spots; no nuchal spots. Superior labials with narrow black posterior borders on the fourth, fifth, and sixth. Throat and chin yellowish, unspotted. No black marks on middle of belly and tail below.

The color pattern of this subspecies is entirely different from that of any other and is the result of a confluence of the spots, one phase of which is seen in the *E. sirtalis concinna*. As in that form, the inferior row of spots has become a longitudinal band, but, unlike that form the red spaces between the superior row of spots, has also become a stripe instead of remaining separate.

*Eutænia sirtalis tetralænia* Cope.

Catalogue No.	No. of specimens.	Locality.	Whence obtained.	Remarks.
866	1 2	Puget Sound, Wash..... Pitt River, Cal.....	..... .....	Alcoholic. do.

*Eutænia sirtalis pickeringii* Bd. and Gird.

Cope in Yarrow's Rept. U. S. G. Survey W. of 100th Mer., v, p. 546; *Eutænia pickeringii* Bd. and Gird. pt., Cat. 1853, p. 27; Cope, Check List N. Amer. Batr. Rept., 1875, p. 41.

Two specimens only known, both from Puget Sound, Washington.

*Eutænia sirtalis trilineata* sub. sp. nov.

General color above and below black. Three longitudinal bluish stripes present, of the usual width; *i. e.*, the lateral on the second and third, and the dorsal on the median, and the half of each adjacent row of scales. Middle of belly lead colored. Head black.

This form resembles the *E. s. pickeringii*, but has the stripes of the usual width. It differs from the *E. s. obscura* in the black belly and well-defined lateral stripe.

Five specimens have come under my observation: No. 5274 (1) from Port Townsend, Oregon, and 5493 (4) from Fort Benton, Montana.

*Eutænia nigrilatus* Brown.

Proc. Acad. Phila., 1889, p. 421.

From Tucson, Arizona; one specimen known.

*Eutænia multimaculata* Cope.

Proc. Amer. Philos. Soc., 1885, p. 284; *Atomarchus multimaculatus* Cope, American Naturalist, 1883, p. 1300.

From Southern New Mexico and Arizona and Chihuahua, Mexico.\*

\* *EUTÆNIA MELANOGASTER* Cope, Proc. Amer. Philos. Soc., 1885, p. 386. *Tropidonotus melanogaster* Weigmann, Peters, Monatsber. Ak. Sci. Berlin, 1864, 389. *Atomarchus melanogaster* Wieg. Cope. *Tropidonotus mesomelanus* Jan, Icon. Gen. Ofid., II, 27, v, Fig. 3; VI, Fig. 2. The valley of Mexico.

**Eutænia rufopunctata** Cope.

*Chilopoma rufopunctatum* Cope, Report U. S. Expl. Surv. W. of 100th Mer., v, Reptiles, by Yarrow, 1875, p. 541: *Tropidonotus rufipunctatus* Garman, Mem. Mus. Comp. Zool. Cambr., viii, 1883, p. 136. *Stypocemus rufopunctatus* Cope, Proceeds. Amer. Philos. Soc., 1885, p. 387.

Southern Arizona.

**TROPIDOCLONIUM** Cope.

Proc. Acad. Phila., 1860, p. 76; Proc. Amer. Philos. Soc., 1886, p. 495; Bull. U. S. Nat. Mus., 1887, p. 69; *Microps* Hallow., Proc. Acad. Phila., 1856, p. 241.

Head not distinct from body. Teeth equal. Scales keeled; and subcaudal scuta divided. Cephalic scuta normal; two internasals, rostral not prominent. One nasal, one loreal, one preocular. Anal plate entire.

This genus shows its position to be in the Natricinæ by the presence of the vertebral hypapophyses on the posterior centra; and in its pattern of coloration it resembles the genus *Eutænia*, and especially such a species as *E. leptocephala* Bd. and Gird., where the head is not very distinct. It is probably a terrestrial modification of that genus, as the *Clonophis kirtlandii* is of *Natrix*. But one species of the genus is known. The *T. storckrioides* has a divided anal and must be placed in *Natrix*.

**Tropidoclonium lineatum** Hallow.

Cope, Proc. Acad. Phila., 1860, p. 76; Check List Batr. Rept. N. Amer., 1875, p. 42; *Microps lineatus* Hallowell, Proc. Acad. Phila., 1856, p. 241.

This species is especially characteristic of the western part of the Mississippi Valley, occurring in both the eastern and central regions. It is not uncommon in northern Texas, the Indian Territory, and southern Kansas, extending north to Iowa inclusive.

**LIODYTES** Cope.

Proc. Amer. Philos. Soc., 1884, p. 194; loc. cit., 1886, p. 495; Bull. U. S. Nat. Mus. 32, 1887, p. 60.

Posterior maxillary tooth longer than those in front of it and separated from them by an interspace. Cephalic plates normal, except that there is but one internasal plate. Nostril subvertical. Two nasal plates and one loreal. Scales smooth, no fossæ. Anal scutum divided.

This genus is allied to *Helicops* Wagler, a form found only in continental South America. It differs from it in the smoothness of the scales.

It includes but one species, which has been found so far in Florida only.

Scales in eighteen rows; labials eight; internasal wider than long. Five rows of caudal scales keeled. Dark brown, with two lateral brownish-yellow stripes on each side; below straw color. . . . . *L. allenii*.

**Liodytes allenii** Garman.

Cope, Proc. Amer. Philos. Soc., 1886, p. 495.

*Helicops allenii* Garman., Proc. Bost. Soc. Nat. Hist., 1874, 92; Cope, Check List Bat. Rept. N. Amer., 1875, p. 43.

Florida only.

**TRIX** Laurenti.

Specimen Synopsis Reptilium, 1761, p. 73; Bonaparte, Fauna Italica, 1840, pp. 172, 173; Cope, Proceeds. U. S. Natl. Mus., 1888, p. 392. *Tropidonotus* Kuhl, Isis von Oken, 1826, p. 205; Boie, loc. cit., 1827, p. 518; Wagler, Systema, 1830, p. 179; Schlegel, Physionomie des Serpens, 1837, 296; Duméril et Bibron, Etp. Généralé, VII, pp. 549-724, 1854; Günther, Cat. Brit. Mus., 1858, p. 59; *Nerodia* Bd. and Gird., Cat. Rept. Serpents, 1853, p. 38; *Régina* Bd. and Gird., loc. cit., p. 45.

Teeth generally longer on the posterior than the anterior parts of the maxillary bone, ungrooved. Two internasal, two prefrontal, and two nasal scuta; one loreal; parietals distinct. Anal plate divided. Scales keeled; scale-pits double. Gastrosteges well developed, not angulated or keeled.

This genus is widely distributed throughout the northern hemisphere, embracing numerous species in North America and in Eurasia, but is wanting on the Pacific district of the former. On the American continent a single species, *N. rhombifer* Hallow., extends as far south as Vera Cruz from its North American range.

I find twelve well distinguished species in North America, which are characterized as follows:

## I. Temporal scuta 1-2 or 3; parietal scuta normal.

α Oculars 2-2; scales in nineteen rows.

Smaller, muzzle wider; three black stripes above; four brown ones below.

*N. leberis.*

Larger, muzzle narrower; no black bands above; two, sometimes three or four, imperfect bands below . . . . . *N. grahamii.*

Muzzle short; brown above with a broad median band; below yellow, with two rows of spots . . . . . *N. rigida.*

αα Oculars 1-2; scales in twenty-one rows.

Superior labials eight; head elongate; brownish yellow, immaculate. *N. usta.*

ααα Oculars 1-3; scales in 19-21 rows.

Four brown bands above; a median row of yellowish spots below. *N. clarkii.*

Three rows of brown spots above, which may form stripes anteriorly and cross-bands posteriorly; median row of yellow spots below.

*N. compressicauda.*

A row of lateral spots, often indistinct; below, uniform; tail slender, cylindrical. . . . . *N. valida.*

αααα Oculars 1, 2-3; scales in 23-25 rows.

Superior labials nine; preoculars two; spots longitudinal. . . . . *N. bisecta.*

Superior labials eight; preoculars one; spots, when present, transverse.

*N. fasciata.*

ααααα Oculars 1, 2-3, 4; scales in 27-29 rows.

Eye resting on (usually) one labial; alternating wide dorsal and lateral spots, connected at angles . . . . . *N. rhombifera.*

Eye separated from labials by scales; numerous narrow cross-bands, sometimes broken . . . . . *N. cyclopius.*

II. Temporal scales 2, 4-5; parietals much reduced in size.

α Oculars 1-2; scales 31-33 rows.

Eye resting on one labial; alternating dorsal and lateral square spots which do not touch ..... *N. taxispilota*.

Of these species *N. leberis* and *N. fasciata* are distributed over both the eastern and the Austroriparian districts. The other species belong to the Austroriparian district, except the *N. valida*, which is the only species of the Sonoran district. The *N. grahamii* extends up the Mississippi River to north of the Austroriparian limits to northern Illinois and Indiana, and is not known from east of the latter State. *N. rhombifera* has a similar distribution, except that it remains within the boundaries of the Austroriparian district, not extending north of southern Illinois and Indiana. *N. cyclopius* has not been found out of this district, while the *N. compressicauda* and *N. usta* are restricted to Florida. *N. taxispilota* is confined to the eastern part of the Austroriparian region and Florida; while *N. rigida* has a similar range, omitting Florida, and apparently extending north to Pennsylvania. *N. bisecta* is known from but one specimen.

#### ***Natrix leberis* Linn.**

*Coluber leberis* Linn., Syst. Nat., Ed. xi, 1766, 216; Gmel., Linn. Syst. Nat., Ed. XIII, LIII, 1788, 1086; Shaw, Gen. Zool, III, pt. 2, 1802, p. 433; Daudin, Hist. Nat. Rept., VI, 1803, 218.

*Tropidonotis leberis* Holbr., N. Amer. Herpt., IV, 1842, 118, Pl. XII; Dekay, N. York Fauna Rept., 1842, 45; Pl. xi, Fig. 23; Dum. Bibr., Erp. Gen., VII, 1854, 579; Günther, Cat. Col. Snakes, Brit. Mus., 1858, p. 78; Jan, Icon. Gen. Ofid., II, 27, v. Fig. 2.

*Regina leberis* Bd. and Gird., Cat. Serpt. N. Amer., 1853, p. 45.

*Coluber septemvittatus* Say, Journ. Acad. Phila., 1825, p. 243; Harlan, l.c., 1827, p. 355.

Eastern and Austroriparian regions.

#### ***Natrix grahamii* Bd. and Gird.**

*Regina grahamii* Bd. and Gird., Cat. Serpt. N. Amer., 1853, p. 47.

*Tropidonotus grahamii* Günther, Cat. Col. Snakes Brit. Mus., 1858, p. 78; Cope, Check List Batr. Rept. N. Amer., 1875, p. 42; Jan, Icon. Gen. Ofid., II, 27, v, Fig. 1.

Austroriparian region.

#### ***Natrix rigida* Say.**

*Coluber rigida* Say, Journ. Acad. Phila., 1825, p. 39; Harlan, l. c., 1827, p. 355.

*Tropidonotus rigidus* Holbr., N. Amer. Herpt., 1842, III, p. 39, Pl. x.

Cope, Check List Batr. Rept. N. Amer., 1875, p. 42.

Austroriparian region.

#### ***Natrix usta* Cope.**

Proc. U. S. Nat. Mus., 1888, p. 392; *Tropidonotus ustus* Cope, Proc. Acad. Phila., 1860, p. 340.

Florida.

**Natrix clarkii** Bd. and Gird.

*Regina clarkii* Bd. and Gird., Cat. Serpt. N. Amer., 1853, p. 48; *Tropidonotus clarkii*. Cope, Proc. Acad. Phila., 1861, v. 74: Check List Batr. Rept. N. Amer., 1875, p. 42.

*Tropidonotus medusa* Günther, Cat. Col. Snakes Brit. Mus., 1858, p. 78.

Texan district of Austroriparian region, east to New Orleans.

**Natrix compressicauda** Keun.

Cope, Proc. U. S. Mus., 1888, p. 392; *Nerodia compressicauda* Kennicott, Proc. Acad. Phila., 1860, p. 335; *Tropidonotus compressicaudus* Cope, Check List N. Amer. Batr. Rept., 1875, p. 42.

## Florida.

Scales in nineteen rows; above, blackish brown with numerous closely placed pale cross-bands; one row of yellow gular spots..... *N. c. compsolæma*.

Scales in twenty-one rows; numerous dark cross-bands, narrowed on the side; three gular yellow bands; a postocular band..... *N. c. bivittata*.

Scales in twenty-one rows; three rows of dorsal brown spots forming longitudinal bands on neck; one row of yellow gular spots; no postocular band.

*N. c. compressicauda*.

Scales in twenty-three rows; yellowish, with narrow brown cross-bands; one yellow gular band; no postocular band..... *N. c. walkerii*.

**Natrix compressicauda compressicauda** Kenn.

Cope, Proc. U. S. Nat. Mus., 1888, p. 392.

*Nerodia compressicauda* Kenn, Proc. Acad. Phila., 1860, p. 335.

## Florida.

**Natrix compressicauda bivittata** Cope.

Proc. U. S. Nat. Mus. 1888, p. 392; Pl. xxvi, Fig. 4.

## Florida.

**Natrix compressicauda walkerii** Yarrow.

*Tropidonotus walkerii* Yarrow, Proc. U. S. Nat. Mus., 1883; p. 154.

The scuta of this subspecies are quite as in the last, as in the form of the rostral internasal and frontal plates and the relation of the orbit to the superior labials. Its chief peculiarities are in its twenty-three rows of dorsal scales and in its coloration. In the latter it approaches the *N. c. compsolæma*. Color above, brownish yellow, crossed by numerous brown cross-bars, which are as wide as the spaces which separate them, viz, two scales, and which extend to the first row of scales. These bars become wide on the part of the body near the head, and are split by the ground color without forming bands, except short ones, which form a V on the parietal plates. No postorbital band. Labials dusky, yellow-bordered front; genials the same, with a large medium yellow spot on each. Abdomen dusky, with a median row of round yellow spots, which soon become irregular in number and posi-

tion. Ends of gastrosteges yellow on the anterior fifth of the length. 10681: 137+1+?; 467<sup>mm</sup>, ? (tail injured).

Catalogue No.	No. of specimens.	Locality.	From whom received.	Nature of specimen.
10681	1	Clearwater, Fla.....	S. T. Walker.....	Alcoholic.

***Natrix compressicauda consolæma* Cope.**

*Tropidonotus consolæmus* Cope, Proc. Acad. Phila., 1860, p. 368; Check List N. Am. Batr. Rept., 1875, p. 42.

Key West, Florida.

***Natrix valida* Kennicott.**

*Regina valida* Kenn., Proc. Acad. Phila., 1860, p. 334.

Scales in twenty-one rows, the inferior smooth. Head distinct from body, elongate and tapering to the muzzle. Internasals longer than wide; rostral elevated. Oculars 2-3 and 1-3; temporals 1-2. Superior labials eight, eye over fourth and fifth. Tail not compressed at base. Gray or brown, with more or less distinct small spots on the sides. Belly not spotted.

There are two subspecies of the *Natrix valida*, as follows:

Spots small, no bands; belly pale..... *N. v. valida*.  
Lateral spots large; a vertebral dark, and lateral light bands; belly dark... *N. v. celæno*.

***Natrix valida valida* Kenn.**

*Regina valida* Kenn., Proc. Acad. Phila., 1860, p. 334.

*Tropidonotus validus* Cope, Proc. Acad. Phila., 1860, p. 310; Check List Batr. Rept.

N. Amer., 1875, p. 42, Geol. Surv., W. 100th mer., 1875, p. 612, Pl. xxi.

*Tropidonotus tephroleptra* Cope, Proc. Acad. Phila., 1860, p. 341.

Lower California, Sonora.

***Natrix valida celæno* Cope.**

*Tropidonotus celæno* Cope, Proc. Acad. Phila., 1860, p. 341; *Tropidonotus validus celæno* Cope, Check List N. Am. Batr. Rept., 1875, p. 42.

Lower California.

***Natrix bisecta* Cope.**

*Tropidonotus bisectus* Cope, Proc. U. S. Nat. Mus. 1887, p. 146.

Washington, District of Columbia. But one specimen known.

***Natrix fasciata* Linn.**

Cope, Proc. U. S. Nat. Mus. 1888, p. 392; *Coluber fasciatus* plus *C. sipedon* Linn., Syst. Nat. I, 1766, pp. 378-379; *Tropidonotus fasciatus* Dum. Bibr., Erp. Gen., VII, 1854, p. 566; Günther, Cat. Col. Snakes Brit. Mus., 1858, p. 76.

*Tropidonotus sipedon* Cope, Check List Batr. Rept. N. Am., 1875, p. 42.

Scales in twenty-three or twenty-five rows, all keeled, the external larger than the others. Eight superior labials, center of eye over

suture between the fourth and fifth. Orbitals 1-3; temporals 1, 2 or 3. Rostral plate not much elevated; internasal scuta each longer than wide; frontal plate rather narrow; parietal plates each as long as frontal and prefrontal plates together. Pre and postgenials subequal.

General color above from bright reddish brown to gray, marked by large dark brown transverse spots variously arranged, or immaculate. Below yellowish or reddish with or without chestnut or reddish brown spots which are not tessellated, but are more or less rounded. Length about a meter.

This abundant and widely distributed species presents several well-marked varieties which have been described as species. These generally have a definable geographical range. Together they occupy the entire Eastern and Austroriparian regions.

Belly spotted; back with broad transverse spots on a light ground; head pale, with a dark postocular band.....*N. f. fasciata*.  
 Belly spotted; back with brown spots which extend to the sides anteriorly only, but which mostly alternate with lateral spots; no postocular band....*N. f. sipedon*.  
 Belly spotted; dorsal bands transverse anteriorly; posteriorly wanting, and lateral spots only.....*N. f. pleuralis*.  
 Belly unspotted; dorsal and lateral spots alternate to the head.....*N. f. transversa*.  
 Belly unspotted; neither dorsal nor lateral spots.....*N. f. erythrogaster*.

These subspecies belong to the Austroriparian region except *N. f. sipedon*, which is nearly confined to the Eastern, and *N. f. transversa*, which belongs to the Texan district.

#### ***Natrix fasciata fasciata* Linn.**

Cope, Proc. U. S. Nat. Mus. 1888, p. 392.

*Coluber fasciatus* Linn., Syst. Nat. i, 1766, p. 378; 1788, p. 1094; Holbrook, N. Amer. Herp. i, 1838, p. 33, Pl. xx.

*Tropidonotus fasciatus* Holbrook, N. Amer. Herp. 2 ed. iii, 1842, p. 25, Pl. v; DeKay, New York Fauna Rept., p. 47, 1842; do. var. A Günther, Cat. Col. Snakes, Brit. Mus. 1858, p. 76; Cope, Check List Batr. Rept. N. Amer., 1875, p. 42.

*Nerodia fasciata* Bd. and Gird., Cat. Serpt. N. Amer., 1853, p. 39.

*Coluber porcatus* Latreille Hist. Nat. des. Rept. iv, 1822, p. 32, Pl. —, Fig. 1; Daudin Hist. Nat. Rept. vi, 1803, p. 204; Harlan, Journ. Acad. Phila. 1827, p. 356.

#### **Austroriparian region.**

#### ***Natrix fasciata sipedon* Linn.**

*Coluber sipedon* Linn., Syst. Nat. xii, 1766, i, p. 379; Gmel., Linn. Syst. Nat. xiii, i, iii, 1788, 1098; Shaw Gen. Zool. iii, pt. ii, 1802, p. 496; Merrem Tentamen, 1820, p. 124; Harlan, Jour. Acad. Phila. 1827, p. 351; Storer, Rept. Mass. 1839, p. 228; Thompson, Hist. Vermont 1842, p. 118.

*Tropidonotus sipedon* Holbrook, N. Amer. Herp. iii, 1842, 29 Pl. vi; Dum. Bibr. Erp. Gen. vii, 1854, p. 568.

*Nerodia sipedon* Bd. and Gird., Catal., 1853, p. 38.

*Tropidonotus sipedon sipedon* Cope, Check List Batr. N. Amer. 1875, p. 42.

*Tropidonotus fasciatus* var. B. Günther, Cat. Col. Snakes Brit. Mus. 1858, p. 75.

*Coluber pacilogaster* Wied, Reise nach N. Amerika i, 1839, p. 106.

#### **Eastern region.**

There is considerable doubt whether this subspecies enters the Austroriparian fauna. If so, it appears sparingly, and only on the northern borders. Specimen No. 9008, from Montgomery, Alabama, might be almost as well placed with the *N. f. transversa*, as the belly is unspotted, but the anterior half of the body is cross-banded, as in the *N. f. fasciata*.

***Natrix fasciata pleuralis* Cope.**

Scutellation as in the species generally; scales in twenty-three rows, the inferior more weakly keeled and of larger size than the others. Internasals longer than wide; oculars 1-3; middle of orbit above suture between fourth and fifth superior labials.

The color characters are quite peculiar. On the anterior part of the body brown bands cross the ground color reaching to the gastrosteges, the lateral parts having parallel sides, and being separated by spaces wider than themselves. The dorsal parts of these cross-bands gradually disappear, and posterior to the middle or last third of the length are wanting, so that the coloration consists of lateral erect parallelogrammic spots separated by spaces of a yellow or gray ground color equal to or a little wider than themselves. Belly yellow, with brown rounded spots on the anterior parts of the gastrosteges; spots few on the anterior third in the type. Head brown without markings; labials lighter.

1092; 131+1+30 ♀; 23; 517<sup>mm.</sup>, 120? (♀ injured).

8786; 144+1+73; 23.

8786; 136+1+2; 23; 1087 to anus; tail injured.

This form is Austroriparian, but seems to be rare, as but three specimens have come under my observation. They approach the forms of *N. f. sipedon* with lateral spots well separated.

The large specimen in No. 8766 referred to this subspecies is so dark colored that the pattern is only made out when immersed in fluid. The belly also is marked by a narrow transverse blotches on the external parts of the gastrosteges, which afterwards blend and involve the whole surface.

***Natrix fasciata pleuralis* Cope.**

Catalogue No.	No. of specim. mens.	Locality.	From whom received.	Nature of specimen.
1092	1	Mississippi .....	(♂)	Alcoholic.
8786	2	Augusta, Ga. ....	Wm. Phillips .....	Do.

***Natrix fasciata transversa* Hallow.**

*Tropidonotus transversus* Hallow., Proc. Acad. Phila., 1852, p. 177.

*Nerodia transversa* Bd. and Gird., Cat. Serpt. N. Amer., 1853, p. 148.

*Nerodia woodhousei* Bd. and Gird., Cat. Serpt. N. Amer., 1853, p. 42; Rept. U. S. Pac. R. R. Surv., x, 1859, Whipple's Rept., 41.

*Tropidonotus woodhousei* Jan, Icon. Gen. Ofid., II, 26, IV, Fig. 1.

**Texan district.**

**Natrix fasciata erythrogaster Shaw.**

Cope, Proc. U. S. Nat. Mus., 1888, p. 392.

*Coluber erythrogaster* Shaw, Gen. Zoöl., III, 1802, p. 458; Holbrook, N. Amer. Herp., II, 1838, p. 91, Pl. XIX.

*Tropidonotus erythrogaster* Holbr., N. Amer. Herp., 2d ed., III, 1842, p. 33, Pl. VIII; Dum. Bibr. Erp. Gen., VII, 1854, p. 570.

*Nerodia erythrogaster* Bd. and Gird., Cat. Serpt. N. Amer., 1853, p. 40.

*Tropidonotus sipedon erythrogaster* Cope, Check List Batr. Rept. N. Amer., 1875.

Austroriparian region, entering rarely the eastern.

**Natrix rhombifera Hallow.**

*Tropidonotus rhombifer* Hallowell, Proc. Acad. Phila., 1852, p. 177; Cope, Check List N. Amer. Batr. Rept. 1875, p. 43; *Nerodia rhombifer* Bd. and Gird., Cat. Rept. Serpt., 1853, p. 147; *Nerodia holbrookii* Bd. and Gird., l. c., p. 43.

*Tropidonotus pogonias* Dum. Bibr., Erp. Gen., 1854, p. 574.

*Tropidonotus fasciatus* var. *pogonias* Jan, Icon. Gen. Ofid. II, 26, III, Fig. 1.

*Tropidonotus cyclopium* Jan, Icon. Gen. Ofid. II, 26, VI Fig. 1, not of D. and B.

In thirteen specimens in which I counted the rows of scales, I found but one in which the number is not twenty-seven; this was in No. 10759, a small and starved individual, which has twenty-five rows. In dimensions this water snake rather exceeds the *N. s. fasciatus*, and is only exceeded in our fauna by the *N. taxispilota*.

The Lower Mississippi is the headquarters of this species, where it is very abundant. It is not yet known from east of that river, but ranges north to the limits of the Regio Austroriparia, to southern Illinois, and west throughout Texas. It is the only one of our water snakes which extends to the Tierra Caliente of Mexico, having been brought by the Commission Exploradora from Misantla, in the State of Vera Cruz.

**Natrix cyclopium Dum. Bibron.**

*Tropidonotus cyclopium* Duméril & Bibron, Erpetologie Générale VII, p. 576; Günther, Cat. Col. Snakes Brit. Mus., 1858, p. 77; Cope, Proc. Acad. Phila., 1861, p. 299; Check List N. Amer. Batr. Rept., 1875, p. 43.

This well-marked species is much less abundant than its allies the *N. rhombifera* and *N. taxispilota*. The few specimens in the National Museum collection come from the three extreme points of the Austroriparian district, viz, Florida, New Orleans, and south Illinois.

The *N. cyclopium* is nearest the *N. rhombifer*. The pattern of coloration is quite different; and the scutellation also differs in several important respects. In the *N. cyclopium* the nasal plates are shorter anteroposteriorly, and there are only two scuta which are properly postocular. The posterior temporals are smoother, and not keeled, and the body scales are emarginate, which they are not in the *N. rhombifera*.

The possession of a series of scales below the orbit, while present in all known specimens of this species, is not confined to it. I have seen it in a specimen of the *N. taxispilota*, and it is found in the only known specimen of the *Natrix anoscopus*\* Cope, from Cuba.

\* *Tropidonotus anoscopus* Cope, Proc. Acad. Phila., 1861, p. 299.

**Natrix taxispilota** Holbrook.

Cope, Proc. U. S. Nat. Mus., 1888, p. 392.

*Tropidonotus taxispilotus* Holbrook, N. Amer. Herpet., iv, 1843; p. 35, Pl. 8, Dum. Bibr., Erp. Gen. vii, 1854, p. 605; Jan, Icon. Gen. Ofid., ii, 26, v. Fig. 1.

*Tropidonotus taxispilotus* ? var *Brocki* Heilprin, Transac. Wagner Free Inst. Science 1, 1887, 129, Pl. 17.

This is the largest American water snake. Its range is limited, extending in the Austroriparian region from the Potomac River to New Orleans and to Florida, inclusive.

**CLONOPHIS** Cope.

Proc. U. S. Nat. Mus., 1888, p. 391; *Cora* Jan, Elenco Sist. 1863, p. 74, not of Selys, 1853, nor Bonap., 1854.

Teeth of equal length. Head not distinct from body. Scales keeled; anal scutum and subcaudal scuta divided. Cephalic plates normal; two internasals, rostral not prominent. One nasal, one loreal, and one preocular.

But one species of this genus is known. I formerly placed it in *Tropidoclonium*, but that form has an undivided anal plate. Both are burrowing snakes of affinities to the water snakes.

**Clonophis kirtlandii** Kenn.

Cope, Proc. U. S. Nat. Mus., 1888, p. 391; *Regina kirtlandii* Kennicott, 1856, p. 95; *Tropidoclonium kirtlandii* Cope, Proc. Acad. Phila., 1860, p. 340; Check List Batr. Rept. N. Amer., 1875, p. 42. *Ischnognathus kirtlandii* Jan, Icon. Gen. Ofid. ii, 30, Fig. 1.

This species has a limited range; it has been recorded so far from northern Illinois and Michigan only.

**STORERIA** Bd. and Gird.

Cat. Rept. N. Amer., Pt. i, Serpt., 1853, p. 135. *Ischnognathus* Duméril, Prodrôme des Ophidiens, 1853, p. 72; Dum. Bibron, Erp. Gen. vii, 1854, p. 506.

Head distinct from the body. Cephalic plates normal. Loral plate absent. Orbitals, posterior and anterior. Nasals, two. Body subcylindrical; tail comparatively short, tapering. Dorsal scales carinated. Anal scutum bifid. Subcaudals divided. Teeth small, numerous, of equal lengths, none grooved.

This genus is a reduced type of *Natrix*, to which it is connected by the Mexican *N. storeriodes* Cope. Its range is Nearctic, extending south as far as the plateau of Vera Paz and Guatemala.

There are three species of the genus, which differ as follows:

- Oculars 1-2, seven upper labials, the posterior wide; nostril between nasals; belly grayish white; a black spot below orbit.....*S. dekayi*.
- Oculars 1-2; six upper labials, the posterior narrow; nostril between nasals; no black spot below orbit; belly grayish white.....*S. tropica*.\*
- Oculars 2-2; five or six upper labials, the posterior narrow; nostril in anterior nasal; a dark spot below orbit; belly red.....*S. occipitamaculata*.

\* *STORERIA TROPICA* Cope, Proc., Amer. Philos. Soc., 1884, p. 175; Guatemala.

**Storeria dekayi** Holbrook.

Bd. and Gird., Cat. Rept. N. Amer., Pt. 1, Serpents, 1853, p. 135; Cope, Check List N. Amer. Rept. Batr., 1875, p. 42.

*Tropidonotus dekayi* Holbrook, N. Amer. Herpet., III, 1842, p. 53, Pl. XIV; Dekay, New York Fauna Rept., 1842, p. 46; *Ischnognathus dekayi* Dum., Bibr. Erp. Gen., VII, 1854, p. 507; Günther, Catal. Col. Snakes Brit. Mus., 1858, p. 81; Jan, Icon. Gen. Ofid., II, p. 30, Figs. 3, 4; *Tropidonotus ordinatus* Storer, Rept. Mass., 1839, 223.

United States, exclusive of Pacific region; Mexico.

**Storeria occipitomaculata** Storer.

Bd. and Gird., Cat. Serpt. N. Amer., 1853, p. 137; Cope, Check List Batr., Rept. N. Amer., 1875, p. 42; *Tropidonotus occipitomaculatus* Storer, Rep. Rept. Mass., 1839, p. 230; *Ischnognathus occipitomaculatus* Günther, Cat. Colubr. Snakes Brit. Mus., 1858, p. 81; Jan, Icon. Gen. Ofid., II, p. 30, Fig. 2; *Coluber venustus* Hallow., Proc. Acad. Phila., 1847, III, p. 274; loc. cit., IV, 1849, p. 245.

United States, exclusive of Pacific region; Mexico.

**AMPHIARDIS** Cope.

Proc. U. S. Nat. Mus., 1888, p. 391.

Head not distinct; teeth equal. Scales keeled; anal and subcaudal scuta divided. Cephalic scuta of upper surface normal. Rostral not prominent; two internasals. Two nasals; one loreal, which extends to the orbit. No preocular. Pupil round.

This genus embraces as yet but a single species. It is most nearly allied to *Haldea*, from which it differs only in the presence of two inter-nasal plates. The species is little known.

**Amphiardis inornatus** Garman.

Cope, Proc. U. S. Nat. Mus., 1888, p. 391; *Virginia inornata* Garman, Mem. Mus. Comp. Zool. Cambr., VIII, 1883, p. 97.

From near Dallas, Tex.

**HALDEA** Bd. and Gird.

Cat. Rep. N. Amer. Serpents, 1853, p. 122; *Conocephalus* Duméril, Prodrome des Ophi-diens, p. 46, 1853; *Falconeria* Theobald, teste Boulanger.

Head elongated, ellipsoid, distinct from the body. Internasal plate single. Prefrontals large, entering together with the loreal into the orbit, thus suppressing the anteorbitals. Postorbital one. Two nasals. Pupil circular. Scales carinated. Postabdominal scutella bifid. Sub-caudals divided.

This genus has the form and probably the habits of the Calamarinæ, but the continuity of the vertebral hypapophyses throughout the vertebral column indicates that its affinities are with the Natricinæ, of which group it is probably a degenerate offshoot.

**Haldea striatula** Linn.

Bd. and Gird., Cat. 1853, 122; Cope, Check List Batr. Rept. N. Amer., 1875, p. 35; *Coluber striatulus* Linn., Syst. Nat., i, 1766, p. 375; Gm. Linn. Syst. Nat., Ed. XIII. 1788, 1887; Harlan, Journ. Acad., Phila., v, 1827, p. 354; *Calamaria striatula* Schleg. Ess. s. Physion. Serpt., 1837, p. 43; Holbrook, N. Amer. Herp., III, 1842, 123, PL XXIX; *Conocephalus striatulus* Dum. Bibr., VII, 1854, p. 140; Jan, Icon. Gen. Ofid., i, p. 12, iii, Fig. 1.

North America; Austroriparian region.

**ERYTHROLAMPRUS** Boie.

Isis von Oken, 1826, p. 981; Cope, Bull. U. S. Nat. Mus. 32, 1887, p. 55; *Coniophanes* Hallow., Proc. Acad. Phila., 1860, p. 484; Cope, loc. cit., 1860, p. 248; *Glaphyrophis* Jan, Elenco List. Ophid. 1863, p. 54.

Posterior maxillary teeth elongate, grooved. Cephalic shields normal; two nasals, loreal present. Scales smooth, without fossa. Anal and subcaudal scuta divided. Pupil round.

The type of this genus is found throughout tropical America (*E. venustissimus* L.), and a second (*E. dromiciformis* Pet.), is found on the Pacific slope of the Andes near the equator. The remaining nine species belong to Central America and Mexico, and one of them has been taken in the United States on the lower Rio Grande. The typical species is red with black annuli in coloration, while most of the remainder are striped. The transition is effected by the *E. lateritius* Cope, which is a red species with black head and neck. The only species which enters our limits is characterized as follows:

Scales in nineteen rows; superior labials eight; one preocular; light brown with blackish sides and dorsal stripe; below red, unspotted.....*E. imperialis*.

**Erythrolamprus imperialis** Bd. and Gird.

Cope, Bull. U. S. Nat. Mus. 32, 1887, p. 77; *Teniophis imperialis* Bd. and Gird., U. S. Mex. Bound. Surv., II, 1859, 23, Pl. XIX, Fig. 1; *Coniophanes imperialis* Cope, Proc. Acad. Phila., 1861, p. 74; *Tachymenis imperialis* Garman, Mem. Mus. Comp. Zool. Cambr., VIII, 1883, p. 154.

Besides Cameron County, southwest Texas, this species has been found near Tuxpan by Lincecum, and at Jicaltepec, Vera Cruz, by the Comisión Geográfica de México.

**SIBON** Fitzinger.

Neue Class. d. Reptilien, 1826, p. 29. *Heterurus* Dum. Bibr., Erp. Gen., VII, 1854, p. 1170. *Leptodira* Günther, Cat. Col. Snakes, Brit. Mus., 1858, p. 165 (e nom. nud. Fitzingerii, 1843). *Eteirodipsas* Jan, Elenco Sist. d. Ofidi, 1863, p. 105.

An elongate grooved tooth on the posterior part of the maxillary bone; other teeth subequal. Head plates normal; one loreal. Preanal and subcaudal scuta double; scales smooth, with two apical pits. Pupil vertical.

This genus has near allies among the Dipsadine group, to which it belongs. From *Dipsas* it is distinguished by the divided preanal plate; from *Himantodes*\* by the double scale-pits, that genus having but one. From *Trimorphodon* it differs in the equality of the ungrooved maxillary teeth and the single loreal plate. The greater number of species of this genus are Mexican and Central American, one species (*S. annulatum*) extending its range throughout tropical South America. One species only has been found on the Rio Grande River, and extends within our borders. The species are closely allied and are subject to some variation. One only (*S. rhombiferum* Gthr.) I have not seen, and I give its characters on the authority of Günther. All the species known have but one temporal plate in the first row. The species differ as follows:

I. Superior labials eight to nine.

a Scales in 21-5 rows.

Body slender, compressed; scales in twenty-one rows; preoculars two; dorsal spots small, no postocular band ..... *S. annulatum* † L.

Body robust, cylindric; scales in twenty-one rows; preoculars two; dorsal spots large, wide; a conspicuous black postorbital band.

*S. yucatanense* ‡ Cope.

Robust; scales 23-5 rows; preoculars three; conspicuous dorsal spots, and postorbital band. .... *S. septentrionale* Kenn.

Robust; scales twenty-one; one preocular; numerous transverse black dorsal rhombs, and no lateral spots; top and sides of head black.

*S. personatum* § Cope.

Robust; scales twenty-five; loreal longer than deep; brown with yellow cross-bars and black-edged brown dorsal rhombs. . . *S. rhombiferum* || Gthr.

Robust; scales twenty-three; preoculars two; loreal square; black with narrow gray cross-bands; a conspicuous postocular band; labials nine.

*S. frenatum* ¶ Cope.

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\* *Himantodes* Dum., Bibr. Erp. Gen., VII, 1854, p. 1064. The four species of this genus may be distinguished as follows:

1. Two temporal plates in anterior row.

A row of large vertebral scales; very slender; tail one-third. .... *H. cenchoa* L.

A larger vertebral row; less slender; tail three and one-third times in length.

*H. leucomelas* Cope.

No larger vertebral row; dorsal spots to gastrosteges; slender.

*H. tenuissimus* Cope.

2. One temporal scale of first row.

No large vertebral row; less slender. .... *H. gemmistratus* Cope.

*H. cenchoa* is South American and extends north to Vera Cruz; the other species are Central American and Mexican.

† *Leptodira annulata* Gthr., *Dipsas annulata*, D. and B.; South America, Panama, Costa Rica.

‡ *Sibon annulatum yucatanense* Cope, Proceeds. Acad. Phila., 1866, p. 127; Yucatan, Belize.

§ *Leptodira personata* Cope, Proc. Acad. Phila., 1868, 310, Mazatlan, Mexico.

|| *Leptodira rhombifera* Günther, Ann. Magaz. Nat. Hist., 1872, 32.

¶ Proc. U. S. Nat. Mus., 1886, p. 184. Jalapa, Mex.

$\alpha\alpha$  Scales in nineteen rows.

Robust; preoculars two; loreal short; parietal quite or nearly touching postocular; cross-bands much wider than interspaces; a postocular stripe.

*S. nigrofasciatum* \* Gthr.

## II. Superior labials seven.

Robust; scales nineteen rows; preoculars two; pale brown, with several rows of small blackish spots; a blackish half collar above; head paler; no postocular band ..... *S. pacificum* † Cope.

### *Sibon septentrionale* Kennicott.

*Dipsas septentrionalis* Kennicott, U. S. Mex. Bound. Surv., Reptiles by Baird, II, p. 16, Pl. 8, Fig. 1. *Sibon annulatum septentrionale* Cope, Check List Batr. Rept. N. Amer., 1875, 38; Catal. Batr. Rept. Centr. Amer. Mex., 1887, 67.

The largest species of the genus, ranging from Panama to Cameron County, Texas, inclusive.

### TRIMORPHODON Cope.

Proc. Acad. Phila., 1861, p. 297; Bull. U. S. Nat. Mus. 32, 1887, p. 68.

Posterior maxillary tooth elongate, grooved; anterior teeth of both jaws elongate; intermediate teeth of the maxillary series, shorter. Head plates normal; two nasals; two loreals, one in front of the other. Pupil vertical. Head very distinct. Scales smooth, subequal. Anal scutum divided; subcaudal scuta in two series.

This genus includes species which inhabit Central America, Mexico, and the adjacent parts of the United States. It is allied to *Sibon*, from which the elongate anterior teeth and the two loreal scuta distinguish it. No species of *Sibon* is known to possess two loreals, one anterior to the other. The species of *Trimorphodon*, with their wide triangular head, narrow neck, and slitlike pupil, considerably resemble venomous snakes, which their pugnacious disposition does not diminish. They differ as follows:

#### I. Scales in twenty-one rows; superior labials nine.

Head with brown chevrons above; nape with a brown collar; back with diamond-shaped spots ..... *T. lambda* Cope.

Head with a lyre-shaped pattern above, nape with parallel stripes; dorsal spots in pairs ..... *T. lyrophanes* Cope.

#### II. Scales in twenty-three rows; superior labials seven.

Top of head black with a white T-shaped spot; dorsal spots entire transverse diamonds ..... *T. tau* Cope.

#### III. Scales in twenty-three (4) rows; superior labials eight.

Top of head brown, with a small V-shaped mark; dorsal spots transverse diamonds, more or less transversely divided by paler; nape with a brown collar ..... *T. epsilon* Cope.

\* *Leptodira nigrofasciata* Gthr., Ann. Magaz. Nat. Hist., 1868, 425. *L. mystacina* Cope, Proc. Amer. Philos. Soc., 1869, p. 151. Dr. Günther describes a specimen in which the inferior preocular is abnormally absent or he has overlooked it, and the inferior postocular is wanting. My type is abnormal in lacking a labial, and in having a temporal in excess. My specimens, five in number (mostly normal), are from the west coast of Mexico (Tehuantepec) and Central America.

† *Leptodira pacifica* Cope, Proc. Acad. Phila., 1868, 360; Mazatlan, Mexico.

## IV. Scales in twenty-three (4) rows; superior labials nine.

Top of head brown; dorsal spots numerous, transverse, more or less divided diamonds ..... *T. collaris* Cope.\*

Top of head white, with three round black spots; dorsal spots few transverse undivided black rhombs, with pale edges ..... *T. wilkinsonii* Cope.

## V. Scales in twenty-five (7) rows; superior labials nine.

Top of head with chevron bands; dorsal spots formed of four confluent spots and inclosing a pale center ..... *T. biscutatus* Dum. Bibr.

Of the preceding species I have before me one each of the *T. lambda*, *tau*, *collaris*, and *wilkinsonii*. Of the *T. lyrophanes* there are six specimens; of the *T. upsilon* six, and of the *T. biscutatus*, four.

The type of the genus is the *T. lyrophanes*. It is the only species found within the limits of the United States.

*Trimorphodon lyrophanes* Cope.

Proc. Acad. Phila., 1861, p. 297; Proc. Amer. Philos. Soc., 1885, p. 286; *Lycodon lyrophanes* Cope, Proc. Acad. Phila. 1860, p. 343; *Sibon biscutatum* Garman, Mem. Mus. Comp. Zool. Cambr., VIII, 1883, p. 134.

Arizona; Lower California.

## III.—PROTEROGLYPHA.

## ÉLAPIDÆ.

## ELAPS Schneider.

Historia Amphib., 1801, II, p. 289; Dum. Bibr., Erp. Gen., VII, 1854, 1191; Günther, Cat. Snakes Brit. Mus., 1858, 229; Cope, Bull. U. S. Nat. Mus., 32, 1887, p. 62.

Maxillary bone without solid teeth behind the perforated tooth. Cephalic plates normal; rostral not modified. Two nasal plates; no loreal; oculars few. Scales not keeled, without fossa. Subcaudal scutella in two rows; anal plate divided. Pupil a vertical oval. Head little distinct.

This genus embraces twenty or more species of the Neotropical realm, three of which have their principal habitat in the southern portions of the Nearctic. They are of rather elongate body and short tail, and have small eyes. They approximate in general appearance the Calamarine Colubridæ, so that their discrimination, except on examination of the dentition, from snakes of this group, can only be accomplished by experts in species characters. The scutellation of the head is exactly that of the genus *Tantilla*. The coloration is brilliant, consisting of red and black, with less yellow, arranged in rings or parts of rings. The red is generally the ground color, and the black rings are either single or in sets of three. The latter may be much narrower than the ground color, or may be so wide as to reduce it to very small proportions (*E. semipartitus*, *E. imperator*). The epidermis is beautifully iridescent, especially on the black spaces. The colors are much like those of the mineral labradorite, and are probably due to a similar physical cause, viz.,

\**Eteirodipsas biscutata* Jan, Icon. Gen. Ofid., II, 39, Fig. 3 (not *T. biscutatus* D. & B.).

a microscopic lamination of the surface. On direct and antero-posterior views the color is peacock purple; on transverse views it passes from brassy yellow through brassy green to maroon and brown. The colors do not appear if the scales are wet.

The bite of some of the larger species, as *E. surinamensis* and *E. marginatus*, is said to be dangerous, but that of the smaller ones is innocuous to man and the larger animals.

Three species are found within the limits of the Nearctic realm, which differ as follows:

I. Temporal scales 1-1; a black ring immediately behind head; internasals much smaller than prefrontals.

Tail one-seventh to one-eighth total length; black rings wide, covering from seven to ten scales; red spaces above and below black spotted; three or four black rings on tail; muzzle and chin black.....*E. fulvius*.

Tail one-seventh total length; black rings narrow, covering two to three scales; red spaces above and below not black spotted; tail with seven black rings; nose and chin red.....*E. distans*.

II. Temporal scales 1-2; internasals equal or nearly equal prefrontals; a red ring immediately behind head.

Tail very short, one-fourteenth total length; black rings six or seven scales wide, with very wide yellow borders; interspaces above and below unspotted; tail with two black rings; nose and chin black...*E. euryzanthus*.

#### *Elaps fulvius* Linn.

Cuv., Regn. Anim., II, 1817; Fitz. N. Class. Rept., 1826, 61; Holbr., N. Amer. Herp., II, 1838, 87, Pl. XVIII, and 2d, III, 1842, 49, Pl. X; Bd. and Gird., Cat. Serpt. N. Amer., 1853, p. 21; Duméril and Bibron, Erp. Gen., VII, 1854, p. 1215; Günther, Cat. Colubr. Snakes Brit. Mus., 1858, p. 235; Cope, Check List Batr. Rept. N. Amer., 1875, p. 34; Jan, Icon. Gen. Ofid., II., 421, Fig. 2.

*Coluber fulvius*, Linn., Syst. Nat., I, 1766, 381; Gm., Linn., Syst. Nat., ed. XIII, I, III, 1788, 1104.

*Vipera fulvia* Harl., Journ. Acad. Nat. Sci. Phila., v, 1827, 364.

*Elaps tener* Bd. and Gird., Cat. Serpt. N. Amer., 1853, p. 22; *E. tristis* Bd. and Gird., loc. cit., p. 23.

#### Austroriparian region.

Specimens from western Texas (Indianola, on the Gulf of Mexico, and the Pecos River, in the north) differ somewhat from those from farther east, and furnish the basis for the supposed species *E. tener* Bd. and Gird. Generally the frontal plate is not wider than the superciliary, but in one specimen it is as wide as in the typical form (No. 8574). The red spaces are more closely spotted and blotched with black, the blotch on the belly being especially large. The yellow borders are also wider, covering two and one and a half rows of scales, while those of the typical *E. fulvius* cover but one. A specimen from New Orleans is intermediate in these points of coloration (No. 4804), and in specimens from Pensacola (8783) and St. Johns River (8230), Florida, the yellow borders are one and a half and even two scales wide. I do not find the Texas forms to represent a subspecies.

The number of black rings on the body and tail varies within rather narrow limits. I give the following account of them as they occur on

sixteen specimens. The first number represents those on the body; the second that on the tail.

11-3, 8574; 12-3, 6045, 6081, 1137; 12-4, 1135, 4804, 8230; 13-3, 7776; 13-4, 8783; 14-4, 1142, 4716; 15-4, 1120, 10606, 10674; 16-4, 9933; 17-4, 8813. In coloration the *Elaps fulvius* represents the type with single rings in approximation to that with triple rings, since the black spots of the ground are most dense next the yellow borders, thus foreshadowing narrow rings at these points, such as exist in the *Elaps lemniscatus*.

The *Elaps fulvius* ranges from North Carolina (exclusive) to the Tierra Templada of the State of Vera Cruz, Mexico. A specimen is in the National Museum from Jalapa.

***Elaps distans* Kennicott.**

Proc. Acad. Phila., 1860, p. 334; Cope, Check List N. Amer. Batr. Rept., 1875, p. 34.

**Florida.**

The characters which distinguish this species from the *Elaps fulvius* are those of color only, as in structural characters the two are identical. Many of the species of the genus differ in such characters only, and they are often very constant. The present species displays equal constancy in the known individuals.

The specimen alleged by Dr. Yarrow (Check List, p. 82) to have been sent from Chihuahua, Mexico, belongs to the *E. euryxanthus*. *E. distans* has been found only in Florida.

***Elaps euryxanthus* Kennicott.**

Proc. Acad. Phila., 1860, p. 337; Cope, Check List N. Amer. Rept. Batr., 1875, p. 34.

The proportions of the head plates in this species are very different from what is observed in *E. fulvius* and other species, and mark it as one of the most distinct species of the genus. Its geographic range is the Sonoran region, beyond which it has not been found.

Prof. F. Cragin, of Topeka, Kans., sent me a specimen of this species which he obtained at Guaymas, on the Gulf of California. The specimen (1123) from the Rio Grande River, referred to this species by Yarrow (Check List, p. 82), belongs to the *E. fulvius*.

#### IV.—SOLENOGLYPHA.

##### CROTALIDÆ.

**ANCISTRODON** Beauvois.

Trans. Amer. Philosophical Society, iv, 1799, p. 381; Bd. and Gird., Cat. Serpt. N.

Amer., 1853, p. 17; Cope Bull. U. S. Nat. Mus. 62, 1887, p. 63.

*Cenchrus* Daudin, Hist. Nat. Reptiles, v, 358, 1803; Wagler Nat. Syst. Amphib., 1830, p. 175.

*Toxicophis* Troost, Amer. Lyc. Nat. Hist. N. York, III, 1833, 190; Bd. and Gird., Cat. Serpt. N. Amer., 1853, p. 19.

Nine symmetrical plates on top of the head, the superciliary bounding the orbit above. Nasal plates two. Scales keeled, bifossate. Anal

plate and caudal scuta undivided. No rattle. Body and tail cylindric.

Three species of this genus are known, two of which belong to the Nearctic, and one to the northern part of the Neotropical Realm. They are snakes of robust habit, and their bite is highly dangerous. One is terrestrial in habit, and the other semiaquatic. They differ as follows:

I. No loreal; two small plates behind the parietals; eye resting on labials.

Scales in twenty-five rows; brown with broad blackish-brown cross bands with zigzag borders, and the lateral centers pale and with a median dark spot; a light stripe from superciliary plate and one from below eye, which reaches labial border of last upper labial ..... *A. piscivorus*.

II. Loreal present; plates behind parietal rudimental; eye separated from labials by scales.

Scales in twenty-five rows; dark grayish with brown crossbands, wide on the middle line, and with imperfect yellow borders; belly black, with transverse yellow spots on the sides; a yellow stripe from end of muzzle and superciliary plate; other yellow stripes on borders of rostral plate and through centers of superior labials. .... *A. bilineatus*.\*

Scales in twenty-three rows; grayish with copper-colored cross bands, much narrowed on the middle line, and with pale centers laterally; no stripes on head, but a color border from middle of orbit to top of last upper labial; belly whitish, with black spots on sides. .... *A. contortrix*.

Baird and Girard have proposed to separate the *A. piscivorus* as type of a genus *Toxicophis*, on account of the presence of a pair of postparietal scuta and the absence of loreal. The *A. bilineatus* is, however, intermediate between that species and the *A. piscivorus* in having traces of the postparietals and a loreal plate.

Several characters are common to the species of *Ancistrodon* which are also found in other genera of *Crotalidæ*. As in all genera with scuta on the top of the head, the superior plane of the muzzle makes a right angle with the sides, forming a strong canthus rostralis, which is continued round the apex of the rostral plate. The fossæ of the epidermal scales are situated farther back than in the genera of the harmless snakes, and a small tuberosity of the true scale fits into each of them. There are frequently several divided urosteges near the end of the tail, but their number is irregular, and they are sometimes absent, as in *Ancistrodon contortrix* No. 10361. The last of the caudal vertebræ consists of an osseous splint with acute apex, which is ensheathed in three modified scales, two above and one below, which is better developed than in most harmless snakes. This process is thrown into rapid vibration when its possessor is alarmed, and produces a buzzing sound when among dry leaves or other objects. It foreshadows the rattle of the *Crotali*. It is especially developed in the Neotropical genus *Lachesis*. It is variable in size in the *Ancistrodons*.

\**ANCISTRODON BILINEATUS* Günther, Ann. Magas. Nat. Hist. 1863, November. The U. S. National Museum possesses two specimens from Tehuantepec (west side), Mexico, from Francis Sumichrast. The largest is equal to an average sized *Ancistrodon contortrix*.

*Ancistrodon piscivorus* Lacépède.

- Cope, Proc. Acad. Phila., 1859, p. 336; Check List Batr. Rept. N. Amer., 1875, p. 34.  
*Crotalus piscivorus* Lacépède, Serpens II, 1787, p. 424.  
*Scytalus piscivorus* Latreille, Hist. Nat. Reptiles III, 1801, p. 163; Daudin Hist. Rept. v, 1803, p. 344; Harlan, Med. Phys. Res., 1835, p. 129.  
*Natrix piscivorus* Merrem, Tentamen, 1820, p. 131.  
*Trionocephalus piscivorus* Holbrook, N. Amer. Herp. III, 1842, p. 33, Pl. 7; Dum. et Bibron, Erp. Gen. VII, 1854, p. 1492; Jan, Icon. Gen. Ofid. II, 46, IV, Fig. 1-2-4.  
*Toxicophis piscivorus* Bd. and Gird. Cat. 1853, 19.  
*Coluber aquaticus* Shaw, Gen. Zool. III, 1802, p. 425, Pl. 3, from Catesby "Water Viper," Carol. II, Pl. 43, 1754.

## The Austroriparian region.

In some specimens from western Texas the superior labial plates have a slight anterior position at the expense of the second, which is somewhat narrowed, especially toward the labial border. In one specimen (No. 822) this plate is a triangle with the apex downward, which does not reach the labial border. In another it enters the border by a narrower edge than in typical forms. The character is thus variable. The same displacement of the labials brings the fourth labial into the border of the orbit by a short edge in some specimens, but this character is also quite inconstant. On such specimens Baird and Girard proposed their *Toxicophis pugnax*, but under the circumstances the form does not seem to be distinguishable.

In the young of the *Ancistrodon piscivorus* the colors are brighter, the colors more contrasted, and the pattern therefore more distinct.

*Ancistrodon contortrix* Linn.

- Bd. and Gird., Cat. Serp. N. Amer., 1853, p. 17; Cope Check List Batr. Rept. N. Amer., 1875, p. 34.  
*Boa contortrix* Linn, Syst. Nat., 1766, I, p. 373; do. Syst. Nat. Ed. 13, 1788 I, Pt. III, p. 1082.  
*Ancistrodon mokeson* Pal de Beauvois, Trans. Amer. Philos. Soc. IV, 1799, p. 381.  
*Cenchris mokeson* Daudin, Rept. v, 1803, p. 358, Pl. 40, Fig. 3; Harlan Univ. Phys. Res., 1835, p. 128.  
*Scytalus cupreus* Rafinesque, Amer. Journ. Arts Sci., 1834, I, p. 85; Harlan, p. 130.  
*Trionocephalus cenchris* Schleg., Ess. s. la Phys. des Serpents, II, 1837, 553, Pl. 20, Figs. 10-11.  
*Trionocephalus contortrix* Holbrook, N. Amer. Herpetol. III, 1842, p. 39, Pl. 8; Duméril et Bibron Erp., Gen. VII, 1854, p. 1494; Jan, Icon. Gen. Ofid., II, 46, v, Fig. 1.

Eastern and Austroriparian regions; extending eastward to central Massachusetts.

In eleven specimens six have the superior labials 8-8, two have them 7-8, and three have them 7-7. The reduction to seven may be regarded as abnormal, since in that case there is generally irregularity. It arises sometimes from the fusion of the seventh and eighth plates, and sometimes from the exclusion of the sixth or seventh from the labial border by contraction below. In the latter case the plate becomes sub-

triangular, and resembles a temporal. The modification is of the same character as that which sometimes affects the second superior labial in the *A. piscivorus*.

### CROTALOPHORUS Gray.

Ann. Philosophy, 1825, p. 205; Cat. Brit. Mus., 1849, p. 17; Holbrook, N. Amer. Herp., 1842, III, 25; Bd. and Gird., Cat. Serpt., Smiths. Inst., 1853, p. 11; Cope, Bull. U. S. Natl. Mus., 32, 1887, p. 63; Gmelin, Syst. Nat., 1788, I, 1080; Bonnaterre, Ophiologie, 1790, p. 1; Merrem, Tent. Syst. Amphib., 1820, p. 156; Boie, Isis, 1827, p. 562.

*Caudisona* Fitzinger, Neue Class. Rept., 1826, p. 63 (not of Laurenti, 1768); Wagler, Nat. Syst. Amphib., 1830, 176; Bonaparte, Saggio, 1832, p. 24; Gray, Zool. Misc., 1842, p. 51; Fitzinger, Syst. Rept., 1843, p. 29.

*Sistrurus* Garman, Mem. Mus. Compar. Zoölogy, Camb. VIII, No. 3, p. 118, 1883.

Tail with a rattle at extremity. Head with nine symmetrical plates above. Nostril between two plates. Urosteges undivided. Scales carinated.

This genus, as is immediately perceived, differs from *Crotalus* only in the possession of the nine cephalic scuta common to most harmless, and the Proteroglyph snakes, and the genera *Trigonocephalus* and *Ancistron* in *Crotalidæ*. The species do not reach so large a size as those of *Crotalus*, and they are hence less dangerous. Their range is also more restricted, since no species is known from South America or Mexico south of Vera Cruz.

Mr. S. W. Garman has named this genus *Sistrurus*, on the ground that the name *Crotalophorus* was preoccupied at the time it was employed by Gray. This does not, however, seem to be the case. It is true that Linnæus uses it instead of *Crotalus* in the sixth edition of the *Systema Naturæ* (1748, p. 35), but the system of nomenclature thus adopted is not binomial, so that the names are not authoritative as against later ones. In case *Crotalophorus* should be adopted from this use of it by Linnæus, it must take precedence of *Crotalus* of the tenth and later editions. In my opinion, however, authors have been justified in regarding it as an unused name until applied to the present genus by Dr. J. E. Gray in 1825.

Three well defined species are known, which differ as follows :

- Rostral plate wider than high, recurved above; canthus rostralis obscure; loreal plate separating nasal and preocular; head not banded; dorsal spots few, longer than wide; rattle medium..... *C. rarus*.\*
- Rostral plate higher than wide, not recurved above; canthus rostralis sharp; loreal separating nasal and preocular; rattle minute; head banded; light stripe, commencing at eye; dorsal spots many..... *C. miliaris*.
- Rostral plate higher than wide, not recurved above; canthus rostralis sharp; nasal and preocular in contact; rattle larger; head banded; light stripe commencing at nasal plate; two light stripes below fossa; dorsal spots many .... *C. catenatus*

These three species occupy three distinct regions. The *C. rarus* belongs to the Tierra Caliente of eastern Mexico; the *C. miliaris* to the

\*CAUDISONA RAVA Cope, Proc. Acad. Phila., 1865, p. 191. Mexico. The types came from the State of Vera Cruz and belong to the National Museum. A larger specimen in my private collection came from either the State of Vera Cruz or Puebla.

**Austroriparian** region of North America, and the *C. catenatus* to the Eastern region, except that part of it that lies east of the Allegheny Mountains. The species do not occur on the dry plains of the interior, nor in the Pacific region; a subspecies of the *C. catenatus* ranges west to Arizona.

***Crotalophorus miliaris* Linn.**

Gray, Ann. Philos., 1825, p. 205; in Griff. Règne Anim., 1830, p. 78; Holbrook, N. Am. Herp., 1842, p. 25; Gray, Cat. Brit. Mus., 1849, p. 17; Bd. and Gird., Cat. Serpt., Smiths. Inst., 1853, p. 11; Baird, U. S. Pac. R. R. Expl. Rep., x, 1859. Whipple's Rept., p. 40.

*Crotalus miliaris* Linn., Syst. Nat. Ed., xii, v. 1, 1766, p. 372; Gmelin, Linn., S. N., 1, 1788, p. 1080; Lacépède, Hist. Serp., ii, 1789, p. 421; Bounaterre, Ophiol., 1790, p. 1; Shaw, iii, 1802, p. 336; Daudin, Hist. Rept., v, 1802, p. 328; Cuvier Règne Animal, ii, 1817, p. 79; Merrem, Syst. Amphib., 1820, p. 156; Boie, Isis, 1827, p. 562; Schlegel, Essai, ii, 1837, p. 569, exclus. homon. *C. tergeminus* Say; Duméril, Bibron, Erp. Gen., vii, 1854, p. 1477.

*Caudisoma miliaria* Fitzinger, Neue Class., 1826, p. 63; Wagler, Nat. Syst. Amph., 1830, p. 176; Gray, Zool. Misc., 1842, p. 51; Fitzinger, Syst. Rept., 1843, p. 29.

Icones. Catesby, Hist. Car., ii, t. XLII. Bounaterre, Ophiologie, t. i, f. 1, Schlegel; Essai, t. xv, f. 17, 18. Holbrook, N. Amer. Herp., iii, t. iv, Dum., Bibr., Erp. Gen., LXXXIV bis. f. 5. U. S. Pac. R. R.

Surv. Rept., x, Reptiles, t. xxiv, f.

**Austroriparian Region.**

***Crotalophorus catenatus* Rafinesque.**

*Crotalinus catenatus* Raf., American Monthly Magazine, iv, 1818, p. 41, teste Garman Mem. Mus. Comp. Zool., Cambr., viii, 3, p. 118.

Two geographical races or subspecies of the *catenatus* have been described. They differ as follows:

Scales in twenty-three rows; colors paler; dorsal spots narrower; lateral spots smaller ..... *C. c. edwardsii*.  
Scales in twenty-five rows; colors darker; dorsal spots wider; lateral spots larger ..... *C. c. catenatus*.

***Crotalophorus catenatus edwardsii* Bd. and Gird.**

*Crotalophorus edwardsii* Bd. and Gird., Cat., 1853, p. 15; Duméril, Bibron, Erp. Gen., vii, 1852, 14; Baird, U. S. and Mex. Bound. Surv., 1851, p. 15.

*Caudisoma edwardsii* Cope Check List Batr. Rept. N. Amer., 1875, 34.

*Crotalus miliaris* Jan. Icon. Gen. Ofid., ii, 46, iii, fig. 6.

Icones. U. S. Pac. R. R. Expl. Rept., x, Reptiles, tab. xxiv, f. 8, (loreal plate incorrect); U. S. and Mex. Bound. Surv., t. v, f. 1.

***Crotalophorus catenatus catenatus* Raf.**

*Crotalinus catenatus* Raf., Amer. Month. Magaz., iv, 1818, p. 41.

*Sistrurus catenatus* Garman, Mem. Mus. Comp. Zool., Cambr., viii, 3, p. 118.

*Crotalus tergeminus* Say, Long's Exped. Rocky Mts., i, 1823, p. 499; Boie, Isis, 1824, p. 270; Harlan, Journ. Acad. Nat. Sci., v, 1827, p. 372; Boie, Isis, 1827, p. 563; Duméril, Bibron, vii, 1-54, 1479.

*Crotalophorus tergeminus* Gray, Synops. Rept., 1830, p. 78; Holbrook, N. Amer. Herp., iii, 1842, p. 29; Gray, Cat. Brit. Mus., 1849, p. 18; Baird and Girard, Catal., 1853, p. 14.

- Crotalophorus kirtlandii* Holbrook, N. Amer. Herp., III, 1842, p. 31; Gray, Cat. Brit. Mus., 1849, p. 18; Baird and Girard, Catal., 1853, p. 16.
- Crotalophorus massasauga* Kirtland, Baird, Serpents of New York, 1854, p. 11; Agassiz, Lake Superior, 1850, p. 381.
- Caudisoma tergemina* Wugler, Nat. Syst. Amph., 1830, p. 176; Cope, Check List N. Am. Batr. Rept., 1875, p. 35.
- Icones. Holbr. N. Amer. Herp., III, f. 5, 6; Agassiz, Lake Superior, t. VI, f. 8; Baird, Serp. New York, t. I, f. 2; Ibid., U. S. Pac. R. R. Expl. Rep., x, Rept., t. xxv, figs. 9, 11.

Northwestern and north central eastern region.

### CROTALUS Linn.

- Systema Naturae, ed. x, 1758, p. 214; ed. XII, 1766, p. 572; Lacépède, Histoire Naturelle des Serpens, II, 1789, p. 130 (nec Linnæi); Daudin, Histoire Naturelle des Reptiles, v, 1802, p. 297; Cuvier, Règne Animal, II, 1817, p. 77; Wagler, Naturlich. Syst. der Amphibien, 1830, p. 176; Schlegel, Essai sur la physionomie des Serpens, II, 1837, p. 555; Gray, Zoological Miscellany, 1842, p. 51; Fitzinger, Systema Reptilium, 1843, p. 29; Gray, Catal. Brit. Museum, 1849, p. 19; Baird et Girard, Catal. Serps. Smiths. Inst., 1853, p. 1; Duméril, Erp. Générale, vu, 1854, p. 1453; Cope, Bull. U. S. Natl. Museum, 32, 1887, p. 63.
- Caudisoma* Laurenti, Spec. Syn. Rept., 1768, p. 92; Cope, Smithsonian Contrib. to Knowledge, Researches on the venom of the Rattlesnake, by S. W. Mitchell, M. D., 1860, p. 119.
- Uropsophus* Wagler, Natur. Syst. der Amph., 1830, p. 176; Gray, Zool. Misc., 1842, p. 51; Fitzinger, Syst. Rept., 1843, p. 29; Gray, Cat. Brit. Mus., 1849, p. 19.
- Urocrotalon* Fitzinger, Systema Reptilium, 1843, p. 29.

Urosteges individed; tail terminating in a jointed rattle. Top of head covered with scales. Body cylindric.

The above simple diagnosis embraces the characters which distinguish the genus *Crotalus*. This type, the most specialized of the order Ophidia, is chiefly distributed in North America, to which, if we regard the Mexican plateau as a part of it, twelve of the fifteen species are restricted. Two species are found in South America, but none occur in the West Indies. Within the Regio Neartica the distribution of species is very unequal. Thus but one species, the *C. horridus*, is confined to the eastern district. A second, the *C. adamanteus*, exists in the Austroriparian district, but extends itself from this region westward across and through the Sonoran district as far as the Pacific Ocean, occupying also the Lower Californian district. This distribution is only imitated by the *Bascanium flagelliforme* among North American reptiles. The Central and Pacific districts are occupied by another species, *C. confluentus*, which also extends over the northern part of the Sonoran district. To the latter are confined five species: *C. molossus*, *C. tigris*, *C. cerastes*, *C. lepidus*, and *C. pyrrhus*, which are all of rather small dimensions except the first and last named. Two others are confined to the Lower Californian Peninsula, *C. mitchellii* and *C. enyo*, while two are restricted to the Mexican plateau and its western slope, the *C. polystictus* and *C. basiliscus*.

The variation in structure of these species is not great, and they

form a compact generic division. Dr. Cones has proposed to separate the *C. cerastes* as type of a separate genus distinguished by the prolongation of the free border of the superciliary plate into a hornlike process. Were this process distinctly articulated at the base from the superciliary plate, as is the case in the viperine genus *Cerastes*, we should be compelled to adopt such a division; but at present I do not see the way to separate it, especially as the process is often but little pronounced. I have also proposed a generic division for the *C. lepidus* based on the single nasal plate, but the plate is sometimes divided in part, and for the present I do not adopt the division or at least until I can see more specimens of the species.

The origin of the curious epidermal structure at the end of the tail known as the rattle is as yet a subject of speculation only. We have, however, so many rudiments of it in other generic divisions of the *Crotalidæ* that its origin from some of these is evident, and that it occurred at no very late period of geologic time is probable. The terminal caudal vertebræ are coöstitied and compressed and expanded into a vertical body which enters the first or basal button of the rattle. Such a modification is found in a rudimental condition in the genus *Lachesis*, where it is covered by a simple horny sheath, grooved at the sides. In *Crotalophorus* the rattle is of absolutely and relatively small size, and here we can see the beginnings of the segmentation and inflation of the joints, which constitutes the perfected structure. The physiology of formation of these segments has not been studied as yet, but the general theory of the origin of the entire stricture is probably the same in this case as in others in the animal kingdom. The violent vibrations into which most snakes throw their tails when excited has determined nutritive processes to its extremity and produced the excessive growth.

The species of this genus are of rather sluggish movements, and are not quick to bite, unless trodden on. They throw the body into a coil and sound the rattle, giving a sigmoid flexure to the anterior part of the body, on which the head is poised with open mouth ready for action. At this time drops of the poisonous saliva fall from the fangs, and by a violent expulsion of air from the lungs are thrown at their enemy. In the act of biting the movement is threefold. First, there is the spring of the body, which never exceeds two-thirds of its length; second, the bite proper, caused by the seizing by the jaws; and, third, the clutch with the fangs themselves, which are moved freely backwards and forwards by the flexor and extensor muscles of the maxillary bone on the prefrontal as a fixed point. This grasping movement may be observed in *Crotali* when very much excited and anxious to bite, and may be performed by the snake's head when severed from the body. I had a narrow escape from being bitten in this way by the head of a *Crotalus molossus*, which was attached to the body by skin only.

Rattlesnakes live in all kinds of ground, but naturally persist longest in rocky regions, where they have abundant places of concealment.

Some of the species grow to a very large size, particularly the *C. adamanteus* of North, and the *C. durissus* of South America. The former is probably the larger of the two; at least we have information of larger specimens. I am credibly informed that specimens have been found on the islands of the Gulf coast of Florida of 8 feet in length. Some specimens of the Western subspecies *C. a. atrox* also reach a large size. The third species in dimensions is the *C. horridus*, which grows on the coast of North Carolina to a length of 5 feet, and proportionate thickness. The species of the plains, *C. confluentus*, rarely reaches so large a size. Its gray-greenish color readily conceals it in the sparse vegetation and it is only observed when closely approached. It is very abundant north of the Missouri River, and extends north to the Saskatchewan, beyond the line of distribution of any other species.

The following synopsis of the characters of the species of *Crotalus* is the result of long familiarity with them. Some of the forms originally regarded as species are treated as subspecies, owing to the evanescence of their characters. In spite of the subdivision of their head plates, the homologues of the plates of harmless snakes may be traced. Thus there are from two to three preoculars, and from one to four loreals. The nasals are never more than two, and the nostril is always between them. There is one pair of genaeals. The species of section I display homologues of internasal and prefrontal plates, while the same, more divided, are seen in species of section II.

The transitional forms or subspecies in this genus, as is usually the case, furnish instructive evidence as to the evolution of the characters of the species. It is not improbable, as already remarked, that their origin is from some genus like *Lachesis*, which has a scaly head and no rattle.

I. Top of muzzle with three pairs of symmetrical shields in contact. (Scales in twenty-nine rows.)

Longitudinal bands on neck; tail uniform brown above; four rows of scales below orbit; yellow with black rhombs embracing yellow centers.

*C. durissus.*

Longitudinal bands on neck; four rows of scales below orbit; brown above with darker, light edged rhombs.....*C. terrificus.*

No longitudinal bands on neck; tail yellow brown; large adjacent chestnut red yellow-bordered dorsal rhombs, alternating with lateral chestnut spots; labials fourteen; two and three scales below eye...*C. basiliscus.*

No longitudinal bands on neck; tail black; brownish yellow above, with small transverse reddish dorsal rhombs, the angles produced as vertical lateral bands; five scales below eye.....*C. molossus.*

II. Top of muzzle with numerous scales.

A. Nasal plate in contact with rostral; superciliary border not extended into a process.

α. Tail entirely black.

Rostral plate elevated; scales of canthus rostralis larger than those between them; postocular band passing above mouth angle; angular spots above uniting into double chevroned cross-bands; scales twenty-five;

*C. horridus.*

αα. Tail light, with black cross-bands.

Postocular band reaching mouth anterior to canthus; dorsal rhombs on a paler ground; no neck stripes; scales 25-9 ..... *C. adamanteus*.

ααα. Tail with brown or indistinct bands.

β. Rostral plate more elevated.

Muzzle with the marginal scales larger than the median; scales 23-7; three rows of brown dorsal spots, the median large; postocular band passing above canthus oris..... *C. confluentus*.

Eight smooth longitudinal plates on top of muzzle; two loreals; scales twenty-seven rows; a postorbital spot; five rows of dorsal spots;

*C. polystictus*.

Six smooth square plates on top of muzzle; one loreal; scales twenty-three rows; three rows of dorsal spots, the median large ..... *C. triseriatus*.

ββ. Rostral plate less elevated.

Eight smooth plates on top of muzzle; scales in twenty-three rows; green with black rings; no postocular band..... *C. lepidus*.

Small smooth scales on top of muzzle; one loreal; colors pale; subquadrate dorsal spots which become transverse bands posteriorly..... *C. tigris*.

Small keeled scales on top of muzzle; two loreals; colors contrasted; dark brown spots above becoming first transverse rhombic and then cross-bands posteriorly; a postorbital band passing above canthus ..... *C. enyo*.

AA. Nasal plate in contact with rostral; border of superciliary produced into a horn-like process.

Small smooth scales on top of muzzle; colors pale, the dorsal spots small; cross-bands on tail of the same color; scales twenty-one rows ... *C. cerastes*.

AAA. Nasal plate separated from rostral by scales: superciliary not prolonged. Rostral low; tail black-ringed; one loreal plate; yellow with quadrate punctulate brown dorsal spots, becoming cross-bands posteriorly;

*C. mitchellii*.

Rostral low; tail brown and black-ringed; four loreal plates; red with dark red spots becoming cross-bands..... *C. pyrrhus*.

### *Crotalus molossus* Bd. and Gird.

*Crotalus molossus* Bd. and Gird, Cat. Rept. N. Amer. 1853, p. 10; Baird, U. S. et Mex. Bound. Surv. Reptile, 1859, p. 14; Cope Check List N. Am. Batrach. and Rept. 1875, p. 33; Cope and Yarrow U. S. G. G. Surv. W. of 100th Mer. v, 1875, p. 533; Cope Proc. Acad. Phila., 1883, p. 12.

*Crotalus ornatus* Hallowell, Proc. A. N. S. Phila. VII, 1854, 192, U. S. Pac. R. R. Expl. Rept., 1859; Parke's Rept. Reptiles, p. 23.

Icones. U. S. Pac. R. R. Rept. Reptiles, XXIV, f. 5. *Ibid.*, Parke's Rept. tab. ii. U. S. and Mex. Bound. Surv., tab. III.

The Sonoran region; as yet only near the Mexican boundary.

### *Crotalus adamanteus* Beauv.

Palisot de Beauvois Trans. Amer. Philos. Soc. IV, 1799, 368; Cope, Check List N. Amer. Batr. Rept. 1875, p. 33.

The subspecies differ as follows:

Entire top of head covered with irregular flat scuta larger than the usual scales; body colors paler than tail bands; dorsal rhombs with truncated angles; one loreal plate..... *C. a. scutulatus*.

Top of head with large plates on canthus rostralis, but scales elsewhere; two loreal plates; dorsal rhombs complete, not paler than caudal bands; last caudal band a wide ring..... *C. a. adamantus*.

Top of head with plates on canthus, and scales between; generally one loreal plate; dorsal rhombs paler than bands of tail, which is not black at end;

*C. a. atrox.*

Scales of canthus rostralis not larger than those between them; one loreal plate; red, dorsal rhombs not distinct; tail white with black bands;

*C. a. ruber.*

***Crotalus adamanteus scutulatus* Kenn.**

Cope, Check List Batr. Rept. N. Amer., 1875, p. 33; Report U. S. G. G. Surv. W. 100th Mer., V. 1875, p. 607; Proc. Am. Philos. Soc., 1885, p. 287.

*Caudisona scutulata* Kenn., Proc. Acad. Phila. 1860, p. 207; Cope, Proc. Acad. Phila., 1866, p. 307-309.

**Arizona and Chihuahua.**

***Crotalus adamanteus adamanteus* Beauv.**

Cope, Check List Batr. Rept. N. Amer., 1875, p. 33.

*Crotalus adamanteus* Pal. de Beauvois, Trans. Am. Phil. Soc. iv, 1799, 368; Holbrook, N. Am. Herp., III, 1842, 17; Bd. and Gird., Cat. Serpt. N. Amer. 1853, p. 3; Le Conte, South. Med. and Surg. Journ. ix, 1853, 664, Jan Icon. Gen. Ofid. 46 ii, Fig. 2.

*Crotalus horridus* Bonnat. Ophiologie, 1790, p. 1. Excl. cit. Linn. Mus. Ad. Fried, et Tab.

*Crotalus rhombifer* Latreille, Hist. Rept. III, 1801, 197"; Daudin, Hist. Rept., v, 1802, 525; Duméril, Bibron, Erp. Gen., VII, 1854, 1471.

*Crotalus durissus* Shaw, Gen. Zoöl., II, 1802, 333.

*Crotalus terrificus* Le Conte, Proc. Acad. Nat. Sci. Phila. VI, 1853; Excl. homon. *Caudisona terrifica* Laur. p. 418; Cope, loc. cit. 1859, p. 337. Excl. homon. *terrifica* Laur.

*Crotalus oregonus* Holbrook, N. Amer. Herp. III, 1842, 21; Bd. and Gird.; Cat. Serpt. 1853, p. 145.

Icones, Shaw, Gen. Zoöl. III, t. I. xxxix. Daudin, Hist. Rept. v, Pl. ix, Figs. 22, 23. Holbrook, N. Amer. Herp., III, t. II. U. S. Pacific R. R. Rept. Reptiles, tab. xxiv, f. 2.

**Austroriparian region.**

***Crotalus adamanteus atrox* Bd. and Gird.**

Cope, Check List Batr. Rept. N. Amer., 1875, p. 33; Report U. S. G. G. Survey W. 100th Mer. v, 1875, p. 607.

*Crotalus atrox* Bd. and Gird., Cat. Serp. N. Amer., 1853, p. 5; Baird, U. S. and Mex. Bound. Surv. Reptiles, 1859, p. 1; U. S. Pacific R. R. Rept., x, Whipple's Rept.

Icones, U. S. and Pac. R. R. Rept. Reptiles, t. xxiv, f. 3, U. S. and Mex. Bound. Surv., Reptiles, t. I. *Crotalus adamanteus* Jan, Icon. Gen. Ofid. III, 46, ii, Fig. 1.

**Sonoran region; dry parts of Texas; Lower California.**

***Crotalus adamanteus ruber* Cope.**

Rostral plate a little wider than high; plates of upper side of canthus rostralis smaller than in other subspecies, the posterior especially smaller than the anterior, and partly decurved laterally. One loreal. Five rows of scales between orbit and labial; eight rows between super-

ciliary plates. Second pair of inferior labials with the marginal portion cut off from the postsymphyseal portion. (Perhaps an abnormality.)

The color is light red, marked above with deep red spots. These are of a longitudinal oval form anteriorly, but posteriorly they have a diamond-shaped form. They have no distinct lateral borders, either light or dark; but they are separated on the median line of the back by a single row of yellow-tipped scales. Traces of brownish red indefinite spots opposite their lateral angles as well as their intervals. Head without marking, except a faint trace of a pale line from the eye to the border of the mouth below it. Inferior surfaces yellow. Tail white with five black cross bands, of which all but the first are complete rings.

9209; 27, 17: 186, 26: 1245<sup>mm</sup> (with rattle); 122<sup>mm</sup> with rattle; rattle (seven joints and a button) 44<sup>mm</sup>.

This peculiar and handsome form is connected with the subspecies *atrox* by the specimen 8856, which has a similar head scutellation. The absence of either light or dark borders to the dorsal spots in the *C. a. ruber* gives it a much more aberrant appearance.

*Crotalus adamanteus ruber* Cope.

Catalogue No.	No. of specimen.	Locality.	From whom received.	Nature of specimen.
9209	1	.....	.....	Alcoholic.

*Crotalus confluentus* Say.

Say Longs. Exped. Rocky Mountains II, 1823, 48; Cope Check List N. Amer. Batr. Rept., 1875, p. 33, Cones' Report U. S. G. G. Survey W. of 100th Mer., p. 604; Cope, Proc. Acad. Phila., 1883, p. 11.

Top of muzzle with smaller scales between large ones of the canthus rostralis. Rostral plate elevated, in contact with the prenasal. One or two loreals; three or four rows between eye and labial scales. Body scales in twenty-three to twenty-seven rows, all keeled except the external three on each side.

Color light brown, with one row of dark-brown spots, usually paler edged on the median line of the back, which are generally longer than wide anteriorly, but soon become transversely oval, and ultimately assume the form of crossbands. Tail of the same color as the body, with crossbands of the color of the dorsal spots. Belly unspotted, but with dark shades in some forms.

Four well-defined subspecies are embraced in this species; they are defined as follows:

Cephalic scales larger; four rows between superciliary plates; four rows below orbit; dorsal spots and cephalic bands light edged; few posterior crossbands. *confluentus*.  
Cephalic scales intermediate; six rows between superciliaries; three rows below orbit (probably sometimes four); dorsal spots square, with the headbands not light-edged; posterior crossbands more numerous; colors dotted with brown specks. .... *pulverulentus*

Cephalic scales smallest; eight rows between superciliaries; four rows below orbit; dorsal spots with light centers and brown borders light-edged or not; headbands obsolete; numerous posterior crossbands.....*lecontei*.

Head scales small as in *C. c. lecontei*; colors dark; dorsal spots and bands not pale-centered and closer together than in *C. c. lecontei*; head wide, rounded...*lucifer*.

The distribution of these subspecies is as follows: The typical one inhabits the plains, including also western Texas and southern California; *C. c. lecontei* belongs to the Great Basin; the *C. c. pulverulentus* is a form of the Sonoran district; while the *C. c. lucifer* inhabits the Pacific district to its eastern limit, the northern Rocky Mountains.

***Crotalus confluentus confluentus* Say.**

Cope, Proc. Acad. Phila., 1883, p. 11.

*Crotalus confluentus* Say, Long's Exped. Rocky Mts., II, 1823, p. 48; Bd. and Gird. Cat. Serpt. 1853, N. Amer., p. 8; Baird, U. S. and P. R. R. Surv. Rept., 1859, Whipple's Rept., p. 40; U. S. and Mex. Bound. Surv., Reptiles, p. 14; Cooper et Suckley, Nat. Hist. Wash., 1859, Ter., p. 295.

Icones.—Sitgreave's Exped. Colorado and Zuñi, Tab. XVIII, (icon. pej.), U. S. Pac. R. R. Surv. Rept., Reptiles, Tab. XXIV, Fig. 4; *Ibid.*, Williamson's Rept., Reptiles, Tab. III; Cooper and Suckley, Nat. Hist. Wash. Ter., Tab. XII.

Central and Sonoran regions; southern California.

***Crotalus confluentus pulverulentus* Cope.**

Proc. Acad. Phila., 1883, p. 11.

Southern New Mexico.

***Crotalus confluentus lecontei* Hallow.**

*Crotalus lecontei* Hallow., Proc. Acad. Nat. Sci. Phila., VI, 1852, p. 80; Rept. Exp. Zuñi and Colorado River, Sitgreaves, p. 139, 1853; U. S. Pac. R. R. Rept., x; Williamson's Rept., 1859, p. 18.

*Crotalus confluentus lucifer* Cope, Proc. Phila. Acad., 1883, p. 77.

The Great Basin (Oregon to Arizona).

***Crotalus confluentus lucifer* Bd. and Gird.**

*Crotalus lucifer* Bd. and Gird., Proc. Acad. Nat. Sci. Phila., 1852, p. 177, et (1853) Cat. p. 6, Girard, Herpetology, U. S. Expl. Exped. 1858, p. 187; Baird, U. S. Pacif. R. R. Rept., x; Williamson's Rept., 1859, p. 10; Cooper et Suckley, Nat. Hist. Wash. Ter., 1859, p. 295.

Icones.—U. S. Pac. R. R. Surv. Rept., Williamson's Rept., Reptiles, Tab. XI; Girard, Herp., U. S. Exp.; Tab. XV, Figs. 1-6.

Pacific Region.

***Crotalus lepidus* Kenn.**

*Crotalus lepidus* Kennicott, Proc. Acad., Phila., 1861, Phila., p. 206; Cope, *loc. cit.* 1873, p. 13.

*Aplouspis lepida* Cope, Report U. S. G. G. Surv. W. of 100th Mer., 1875, p. 535; Cope Check List Batr., Rept. N. Amer., p. 33.

New Mexico; south Arizona.

*Crotalus tigris* Kenn.

*Crotalus tigris* Kennicott, U. S. and Mex. Bound. Surv., II, 1859, p. 14; Cope in Yarrow, U. S. G. G. Surv. W. of 100th Mer., v, 1875, p. 534; Cope Check List N. Amer. Batr., Rept., 1875, p. 33.

Icones.—U. S. Mex. Bound. Surv., *loc. cit.*, Tab. IV.

New Mexico; Arizona

*Crotalus enyo* Cope.

*Crotalus enyo* Cope, Proc. Acad. Phila., 1861, p. 293; Cope, Check List N. Amer. Batrach. and Reptiles, 1875, p. 33.

Lower California; southern California.

*Crotalus horridus* Linn.

Syst. Nat., Ed. x, 1758, p. 214, et XII, I, 1766, p. 572; Primó cit., Mus. Ad. Fr., I, 39; ubi "Frons tecta squamis obtusissimus, palpebræ superiores planæ magnæ" legatur. Porro Catesby Caro. Hist. (A.) et Amœnitat. Acad. (B.) citantur. (A. "*Vipera caudisæna*, *Americana*" et "*V. C. a. minor*" describuntur, pp. 41, 42; sed *V. C. a. minor caputscutis magnis instructum habet.*") (B. In *Amœn. Acad.*, II, p. 139, *C. durissæ* (*hujus enumerationis*) (*Amœn. Acad.*, I, 500) citatur! et "*Virginianis rattlesnake*" denominatur!) Secundo cit. Seba, 95, f. 1, ubi *C. terrificæ* delineatur!! Shaw Gen. Zoöl., III, 1802, p. 317; Cuvier, Règne Animal, II, 1817, p. 78; Gray, Synopsis Rept., 1830, p. 78; Guérin Incongr., R. Anim., † 1830, Tab. u. 23, f. 2; Griffith, Cuv. Règne Animal, IX, 1831, p. 267; Le Conte, Proc. Acad. Nat. Sci., Phila., VI, 1853, p. 417; Cope, Proc. Acad. Phila., 1859, p. 338.

*Crotalus durissus* Latreille, Hist. Rept., III, 1801, p. 190; "Daudin, Hist. Rept., v, 1802, p. 304, exclus. cit. Linn., Laurenti, Lacép.; Harlan, Journ. Acad. Nat. Sci., Phila., 1825, p. 368, exclus. cit. Linn., Laur.; *Ibid.*, Med. and Phys. Res., 1825, p. 132; Schlegel, Essai sur le Phys. Serp., II, 1837, p. 365, exclus. descrip. color., p. 366, et homon. *Uropsochus triseriatus* Wagl., et *Crot. confluentus* Say; Storer, Report Rept. Mass., 1839, p. 233; Holbrook, N. Amer. Herp., III, 1842, p. 9, exclus. cit. Linn.; Dekay, Zoöl. of New York, Pt. III, 1842, p. 55, exclus. cit. Linn., Say, Le Conte, Southern Med. and Surg. Journ., 1853, p. 663; Bd. and Gird., Cat. Serp. Smiths. Inst., 1853, p. 1, exclus. cit. Linn., Baird, Serpents of New York, 1854, p. 9, exclus. cit. Linn., Duméril, et Bibron, Erp. Gen., VII, 1854, p. 1465, exclus. cit. Linn., Latreille, Wagler, Baird, U. S. Pac. R. R. Expl. Surv., x, 1859. Whipple's Rept. Reptiles, 1859, p. 39, exclus. cit. Linn.; † Jan. Rev. et Mag. de Zoöl., 1859, p. 153; Jan. Icon., Gen. Ofid., III, p. 46; Figs. 1 and 2.

"*Crotalus atricaudatus* Latreille, Hist. Rept., III, 1801, p. 209;" † Boie, Isis von Oken, 1827, p. 562; Wagler, Nat. Syst. Amphib., 1830, p. 177; Gray, Zoöl. Miscell., 1842, p. 51.

*Urocrotalon durissus* Fitzinger, Syst. Rept., 1843, p. 29.

*Urosophus durissus* Gray, Cat. Brit. Mus., 1849, p. 19, exclus. cit. Linn. et homon.

*Confluentus* Say, *rhombifer* Latr., *triseriatus* Wiegman, Wagl., Gray.

† *Crotalus catesbei* Hempr., Fitz., Neue class, 1826, p. 63, fide Gray.

† *Urocrotalon Catesbyanum* Fitz., Diesing, Syst. Helminth., II, 1851, p. 431.

Icones.—Catesby, Hist. Car., II, Tab. XLII; Lacépède, Serp.; II, Tab., XVIII, f. 3.; Shaw, Zoöl., III, T. LXXXVII. Daudin, v. Tab. LXVIII. Guérin, Iconogr. R. Animal, T. XXIII, f. 2; Schlegel, Essai, xx, f. 15, 16; Dict. Univ. Hist., Nat. Atlas, II, T. XIII, f. 1; Dum., Bibr. Erp., Gen. Atlas, t. LXXXIV, bis. Fig. 1; Holbrook, N. Amer. Herp., III, T. 1; Dekay, Zoöl. New York, Pt. III, Atlas, Fig. 19; Baird, Serp. New York, T. I, f. 1; U. S. Pac. R. R. Expl. Rept. x, Reptiles, T. xxiv, Fig. 1.

Eastern and Austroriparian regions, except Floridian district; river bottoms of eastern part of central region to central Kansas.

This is not the *C. durissus* of Linn, as supposed by various authors. That the latter name applies to the South American species is shown by the description given by Linnaeus Syst. Nat. Ed. xii, 1766, p. 572.

***Crotalus cerastes* Hallow.**

*Crotalus cerastes* Hollowell, Proc. Acad. Nat. Sci., 1854, Phila., p. 95; Hallowell, U. S. Pac. R. R. Expl. Report, 1859; Williamson's Rept. Reptiles, p. 17; Baird, U. S. and Mex. Bound. Surv., 1859, Reptiles, p. 14; Cope Check List N. Amer. Batr., 1875, Rept. 33.

*Crotalus (Echmophrys) cerastes* Coues, Report U. S. G. G. Surv. W. of 100th Mer., 1875, p. 609.

Arizona.

***Crotalus mitchellii* Cope.**

*Crotalus mitchellii* Cope, Proc. Acad. Phila., 1861, p. 293, Check List, N. Amer. Batr. Rept., Cope, 1875, p. 33; Cope; Yarrow in Report U. S. Geol. G. Surv. W. of 100th Mer., 1875, p. 535.

Lower California; southern California.

***Crotalus pyrrhus* Cope.**

*Caudisoma pyrrha* Cope, Proc. Acad. Phila., 1886, pp. 308-310; Coues, U. S. G. G. Surv. W. of 100th Mer., 1875, p. 608.

*Crotalus pyrrhus* Cope., U. S. G. G. Surv. W. of 100th Mer., 1875, p. 535, Pl. xxii; Check List, Batr., Rept. N. Amer., p. 33.

Arizona; Lower California, (Angel Id. teste Yarrow).