REMARKS ON THE MEXICAN KING SNAKES OF THE TRIANGULUM GROUP [1]

HOBART M. SMITH
Department of Zoology, University of Rochester

One of the most intricate herpetological problems in Mexico is the interrelationships and limits of variation of the members of the *triangulum* group of *Lampropeltis*. It is a problem which has received considerable attention, and the fact that a state of some confusion and doubt still exists is perhaps largely due to inadequate locality data for specimens which, with data, would very nearly be sufficient to solve the problems that so far have arisen. Accuracy of locality data cannot be overemphasized; lack of it, and actual misrepresentation of it, have greatly hampered progress toward an understanding of the distribution and status of many forms.

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Lampropeltis triangulum annulata Kennicott

Lampropeltis annulata Kennicott, Proc. Acad. Nat. Sci. Phila., 1860, p. 329 (Matamoras, Tamaulipas).

Lampropeltis triangulum annulata, Blanchard, Bull. U. S. Nat. Mus., no. 114, 1921, pp. 159–164 (*part.*); Taylor, Kans. Univ. Sci. Bull., vol. 26, 1940, p. 466 (Mamulique Pass, Nuevo León).

Diagnosis.—Scales in red areas never black-tipped; snout black, never with light marks; 19 to 26 white rings on body and tail, all complete ventrally; red bands broad, interrupted on belly by broad black areas; belly thus with a series of long, black blotches separated by narow white rings; black rings not confluent dorsally across red areas.

Range.—A lowland-inhabiting subspecies, occurring from extreme southern Texas to central Nuevo León. Presumably intergrades with (or is separated from) *polyzona* in the Tampico area. Intergradation with any other form in Mexico improbable.

Remarks.—Under this name Blanchard confused two distinct subspecies: one of them *annulata* as above diagnosed, the other *arcifera* as below discussed. The latter is represented by the "Puebla" (MCZ) specimen, figured and described in detail by Blanchard, and probably by the "Tehuantepec" specimen (of Boulenger) tentatively referred to *annulata* by Blanchard. Several other specimens, referred to *polyzona* by Blanchard, actually belong to *arcifera*, the characters of which are discussed below. It is here sufficient to remark that *annulata* does not ap-

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proach it either geographically or in pattern, and that in all probability the two do not directly intergrade.

Lampropeltis triangulum nelsoni Blanchard

Lampropeltis triangulum nelsoni Blanchard, Occ. Papers Mus. Zool. Univ. Mich., no. 81, 1920, p. 6, fig. 1 (Acámbaro, Guanajuato); *idem*, Bull. U. S. Nat. Mus., no. 114, 1921, pp. 155–158, fig. 65 (*part.*); Taylor, Kans. Univ. Sci. Bull., vol. 26, 1940, p. 465 (*part.*).

Diagnosis.—Scales in red areas never black-tipped; snout light, mottled; red, white and black rings complete around body; red rings broad, not enclosed dorsally (a tendency toward the eastern part of range).

Range.—A highland-inhabiting subspecies, occurring from southern Sinaloa to Colima, eastward to eastern Michoacán and eastern Guanajuato. Intergrades with *arcifera* in eastern Michoacán. Intergradation with *blanchardi* in Guerrero indicated; intergradation with *annulata* very improbable.

Remarks.—With the exception of specimens from the Tres Marías Islands (*schmidti*), *nelsoni* of Blanchard is the same as that here considered under that name. He notes, however, that "While the color pat-

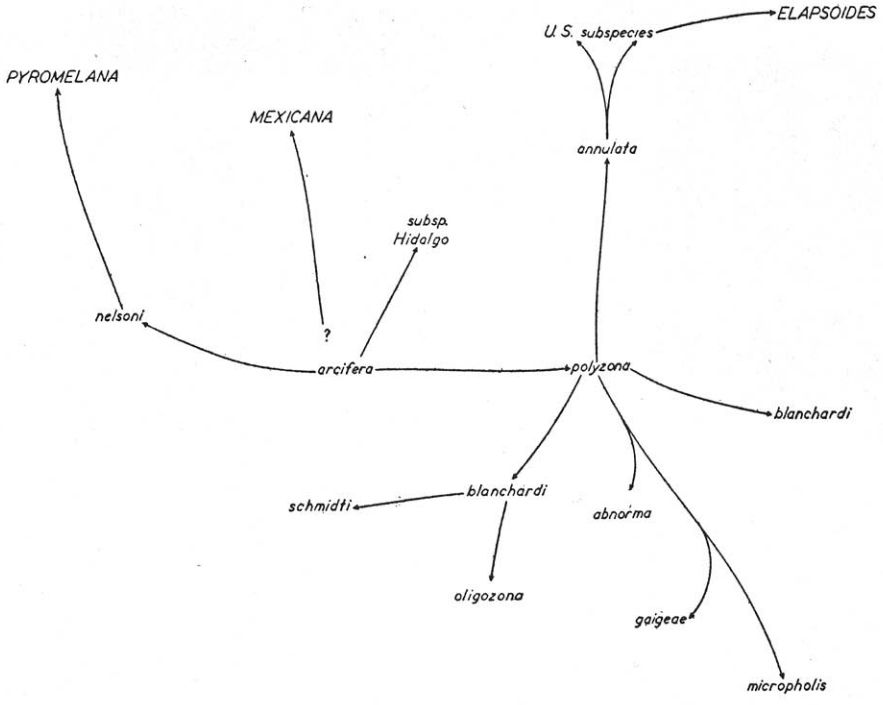

FIGURE 1. Possible phylogeny of the Mexican subspecies of *Lampropeltis triangulum*. Names in capital letters are of subgroups of the *triangulum* group.

tern seems to be constant on the west coast [not the coastal plain], it is very noticeable that toward the interior of Mexico some specimens have the spaces on the belly opposite the dorsal red area partially or completely filled with black, presenting in this a striking approach to *annulata.* The snout, too, may be blacker and the red interspaces between the pairs of black rings may be much narrower and strongly encroached upon by the latter." These tendencies are not toward *annulata,* but toward *arcifera,* a subspecies occupying an adjacent area on the plateau.

It is conceivable that *nelsoni,* with its complete rings, is ancestral to the forms of the *pyromelana* subgroup (see figure 1).

Lampropeltis triangulum arcifera (Werner)

Coronella micropholis arcifera Werner, Zool. Anz., vol. 26, 1903, p. 250 (Mexico).

Coronella micropholis Boulenger, Cat. Snakes Brit. Mus., vol. 2, 1894, p. 205 (*part.;* the "Tehuantepec" specimen).

Lampropeltis polyzona polyzona Blanchard, Bull. U. S. Nat. Mus., no. 114, pp. 139–148, fig. 64 (*part.;* certain specimens from "Mexico," "Orizaba" and "Mirador").

Lampropeltis triangulum annulata Blanchard, *op. cit.,* pp. 159–164 (*part.;* specimen from "Puebla"); Mertens, Abh. Mus. Magdeburg, vol. 6, 1930, p. 160 (Cuautla, Morelos).

Lampropeltis triangulum nelsoni Taylor, Kans. Univ. Sci. Bull., vol. 26, 1940, pp. 465–466 (*part.;* specimen from 15 kilometers west of Morelia, Michoacán).

Diagnosis.—Scales in red areas black-tipped toward the eastern part of range, not toward the western; belly irregularly mottled, or suffused with black, or black areas only opposite red areas; black rings very broad, encroaching upon red areas and sometimes meeting middorsally; red rings seldom longer than a single black ring middorsally; few (usually one) tail bands split with red. (See Plate 1, fig. 1.)

Range.—A highland-inhabiting subspecies, occurring from Morelos and eastern Michoacán eastward to the edge of the plateau in Veracruz, and probably southward toward (not to) Tehuantepec. Intergrades with *nelsoni* and *polyzona,* probably not with *annulata.*

Remarks.—The chief character of this subspecies is the close approximation of the black bands, which frequently meet across the red bands. This peculiarity is found in U.S.N.M. 110823, 30222, from Orizaba (the locality for the former is authentic; it was captured on the city golf links); U.S.N.M. 25012, "Mirador," Veracruz; U.S.N.M. 1854, 32278, no locality; Mus. Comp. Zool. 9555, Puebla (fig. 66, Blanchard); EHT-HMS 15868, 15 km. west of Morelia, Michoacán; a specimen reported by Mertens (*loc. cit.*) from Cuautla, Morelos; and a specimen reported by Boulenger (*loc. cit.*) from "Tehuantepec." These records show a range covering the southern apex of the Mexican plateau. From within this area no other type of pattern has been reported; and from without the *arcifera* type of

pattern is mentioned in only one case: by Stuart (Occ. Pap. Mus. Zool. Univ. Mich., no. 309, 1935, p. 3) for MCZ 29242 from Chichen Itza, Yucatán, in which "the black bands expand dorsally to crowd out the intervening pink." These facts leave little doubt of the validity of *arcifera,* and its separation greatly clarifies an understanding of the interrelationships of the Mexican subspecies.

It is possible that *arcifera* may be further split, since extreme eastern specimens have the scales in the red areas black-tipped, while central and western specimens have the scales uniform red. However, because of the existence of these two phases within *arcifera,* I believe this form is a connecting link between the species *polyzona* and *triangulum* of Blanchard, and that it, not *annulata,* is the most primitive of the group. It gives definite evidence that the *triangulum* group originated from a form with simple black and white rings or blotches—obviously some form not greatly different from certain ones in the *getulus* group.

Lampropeltis triangulum blanchardi Stuart

Lampropeltis triangulum blanchardi Stuart, Occ. Papers Mus. Zool. Univ. Mich., no. 309, 1935, pp. 1–6 (Chichen Itza, Yucatán); Taylor, Kans. Univ. Sci. Bull., vol. 26, 1940, p. 467, pl. 49 (El Limoncito, near Acapulco, Guerrero).

Diagnosis.—"Readily distinguishable from *polyzona,* to which it is closest, by the absence of the white snout band, producing an entirely black snout; by its lower average number of ventrals, 208 as compared with 225 in *polyzona;* and by its lower average number of annuli, 25 in *polyzona* and 19 in *blanchardi.*"

Range.—Lowlands of Yucatán and Guerrero. Intergrades with *polyzona,* perhaps with *nelsoni.*

Remarks.—I can see no reason for separation of Guerrero specimens from Yucatán *blanchardi,* in spite of the fact that the former may (not proved) approach *nelsoni.* Both populations of *blanchardi* are pretty obviously derivatives of *polyzona,* and neither is related to the other except through *polyzona.* If the characters of the two populations are the same, however (as they are, for all practical purposes), and they are derived from the same stock (as they definitely are), I see no reason whatever for holding them as different subspecies, although different populations they undoubtedly are. These perhaps are examples of parallel evolution. It is to be noted that an established trend in *polyzona* and its close relatives is decrease in number of bands; this is followed by *annulata, micropholis, and nelsoni,* as well as *blanchardi.*

It is possible that Guerrero *blanchardi* gave rise to *schmidti,* since it, not *nelsoni,* is the adjacent lowland species on the mainland. The fact that *schmidti* lacks dark spots at the tips of the red scales does not necessarily

mean that it must be a derivative of *nelsoni,* similar in this character, for there is a very marked tendency in northern and high altitude derivatives of *polyzona* to lose these spots: *annulata* toward the north (and all its derivatives in the U. S.) has lost them, as have *nelsoni* toward the northeast, and high altitude Chiapas and Guatemala *polyzona.* Except for ancestral *polyzona* (more properly, eastern *arcifera*) and *lowland* derivatives *toward the south* (*blanchardi, microphalis*), all derivatives of the *polyzona* stock have lost the spots at the tips of the red scales. It is not likely that *nelsoni,* a highland species, was ever distributed over the lowlands of western Mexico and became established on the land that now forms the Tres Marias Islands; it is much more probable that the island form, *schmidti,* was derived from the lowland race, *blanchardi.*

Lampropeltis triangulum schmidti Stuart

Lampropeltis triangulum schmidti Stuart, Occ. Papers Mus. Zool. Univ. Mich., no. 323, 1935, pp. 1–3 (Tres Marías Islands).

Diagnosis.—"A *Lampropeltis* very similar to *Lampropeltis triangulum nelsoni* from which it may be distinguished by: 1. Greater number of ventrals, 228 to 233 in *schmidti* as compared with 200 to 221 in *nelsoni.* 2. Much wider yellow bands between the black annuli, at least 2½ scales wide in middorsal region in *schmidti* as compared with 1 to 1½ scales wide in *nelsoni.* Conversely the red (in life) spaces between the pairs of black annuli are narrower in *schmidti.* 3. Much lighter snout. 4. Posterior chinshields always separated."

Range.—Restricted to the Tres Marías Islands. Not known to occur on the mainland, although lowland specimens on the mainland may prove the same. Does not intergrade with any form, so far as now known, but apparently is a derivative of *blanchardi.*

Lampropeltis triangulum polyzona Cope

Lampropeltis polyzona Cope, Proc. Acad. Nat. Sci. Phila., 1860, p. 258 (Cuatupe, Jalapa, Veracruz).

Diagnosis.—Scales in red areas tipped with black; black rings not encroaching middorsally upon red areas; red rings nearly or quite as long as adjacent triads of black and yellow rings, rarely not at least twice length of a single black ring; usually a white band across top of a black snout; usually white rings closed (black) ventrally; ventrals 208 to 239; annuli 18 to 32.

Range.—Atlantic coastal regions from northern Veracruz into Guatemala, avoiding Yucatán.

Remarks.—The preceding discussion has indicated that Guerrero, Yucatán and all highland specimens from the central plateau of Mexico may

be removed from *polyzona polyzona* of Blanchard. Remaining are specimens from the lowland of Veracruz; the lowland of Guatemala and other Central American countries; the Pacific highland of Chiapas; and the Atlantic highland of Guatemala. I cannot see that the *lowland* Veracruz, Guatemala and Honduras specimens differ appreciably from each other; they appear to me to form a unit, approaching the characters of *microphlolis* toward the south, as pointed out by Dunn (Occ. Pap. Mus. Zool. Univ. Mich., no. 353, 1937, pp. 3–9). This is the race to which Cope's name *polyzona* is applicable.

The residue of specimens are from foothill zones in two isolated areas: one in southern Chiapas and Guatemala, and the other in the Alta Verapaz area of Guatemala. The latter is in some doubt, since the four specimens inferred to be from that area are labelled simply "Guatemala" (U.S.N.M. No. 6761, three specimens collected by H. Hague, and Field. Mus. Nat. Hist. No. 187). These four are characterized by nearly complete or complete absence of dark tips on the red scales (F.M.N.H. specimen not seen), numerous white rings (29 to 37), and numerous ventrals (225 to 239). These specimens may be considered to represent a direct derivative of an ancient population which north of the Isthmus gave rise to *polyzona*. *Coronella formosa abnorma* Bocourt (Miss. Sci. Mex., Rept., livr. 10, 1886, pl. 39, fig. 4) was proposed for a specimen from this area ("Haute Vera Paz"), but it agrees with the other specimens only in the high ventral count (239, p. 614, under *anomala*). The bands on the body number only 25, and although there is no specific reference to the black tips on the red scales, Bocourt's statement that the coloration is identical with that of *L. polyzona* leads to the inference that the black tips are present. The type very possibly is an intergrade between the typical lowland and the typical highland or foothill race. Since there is no other name which could be used for the highland race, it is suggested that Bocourt's name be restricted to it; the name accordingly should stand as *Lampropeltis triangulum abnorma* (Bocourt). The race may possibly enter Mexico in the ranges of northern Chiapas.

A specimen from Huehuetan, southern Chiapas (U.S.N.M. No. 46439), like those from Guatemala, is characterized by the complete absence of black tips on the red scales, but it is unique in having only 17 white rings (18, minimum in *polyzona sensu strictu*). With it is to be associated U.S.N.M. No. 62210, in which the red scales completely lack tips and the white rings number 16; unfortunately this specimen lacks locality data; it was collected by Sumichrast and therefore may be from some locality east of the Isthmus of Tehuantepec in the mountains of Chiapas or extreme eastern Oaxaca. These specimens seem to represent a well-characterized race which was named *Coronella formosa oligozona* by Bocourt (op. cit., p. 614, pl. 39, fig. 8) on the basis of eight specimens from "Tehuantepec" (Sumichrast) and the western slopes of Guatemala. The figured speci-

men (from Tehuantepec) lacks black tips on the scales in the red areas, and the description says the body bands vary from 10 to 16, the ventrals from 206 to 227. A brief diagnosis is appended below.

A final color phase represented by specimens available at present is exemplified by U.S.N.M. No. 7103, from "Orizaba" (almost certainly incorrect) and No. 4506, from "Mexico" (collected by Montes de Oca). These specimens are typical *polyzona,* except that the whole belly is suffused with dark color, and is practically uniform black. This condition is indicated in one of two *polyzona* presumably from Tuxpam, Veracruz, and in an *arcifera* from unknown locality. While this may be merely individual variation in *polyzona,* its occurrence in northern specimens, and especially in *arcifera,* leads me to believe it possibly characterizes a form intergrading with *arcifera* and perhaps with *polyzona.* It cannot be a recognizable lowland form, since *annulata* nearly meets *polyzona* (and may actually do so), and since the identifying character occurs in a specimen of the highland *arcifera.* If such a subspecies does exist, therefore, it may be a highland-inhabiting form. It may occur in the eastern mountains of Hidalgo, since no specimens are definitely known from this area. No name is available for it.

Lampropeltis triangulum oligozona (Bocourt)

Coronella formosa oligozona Bocourt, Miss. Sci. Mex., Rept., livr. 10, 1886, pp. 614–615, pl. 39, fig. 8 (in color).

Diagnosis.—Like *t. polyzona,* except: no black tips on scales in red areas (present in *polyzona*); and white rings on body 14 to 17 (18 to 32 in *polyzona*).

Range.—Foothills of southern Guatemala northwestward through the mountains of southern Chiapas to the Isthmus of Tehuantepec.

Lampropeltis mexicana (Garman)

Ophibolus triangulus mexicanus Garman, Mem. Mus. Comp. Zool., vol. 8, 1883, p. 66 (San Luis Postosí, S. L. P.).

Lampropeltis mexicana Blanchard, Bull. U. S. Nat. Mus., no. 114, 1921, pp. 245–247, fig. 77.

This species, one of the rarest of *Lampropeltis,* is now represented in the Museum of Comparative Zoology by twelve specimens, including the two cotypes. The types are from near the city of San Luis Potosí, while the others are from Alvarez, S. L. P. (Nos. 19022–5,[2] 24976–81). The only other known specimen of the species is the type of *Oreophis boulengeri,* now in the Alfredo Dugès Museum in the State College in Guanajuato city. The latter has been examined by me, and in addition, through

[2] These were reported by Loveridge in 1924 (Occ. Papers Bost. Soc. Nat. Hist., vol. 5, pp. 138–139) as *leonis.*

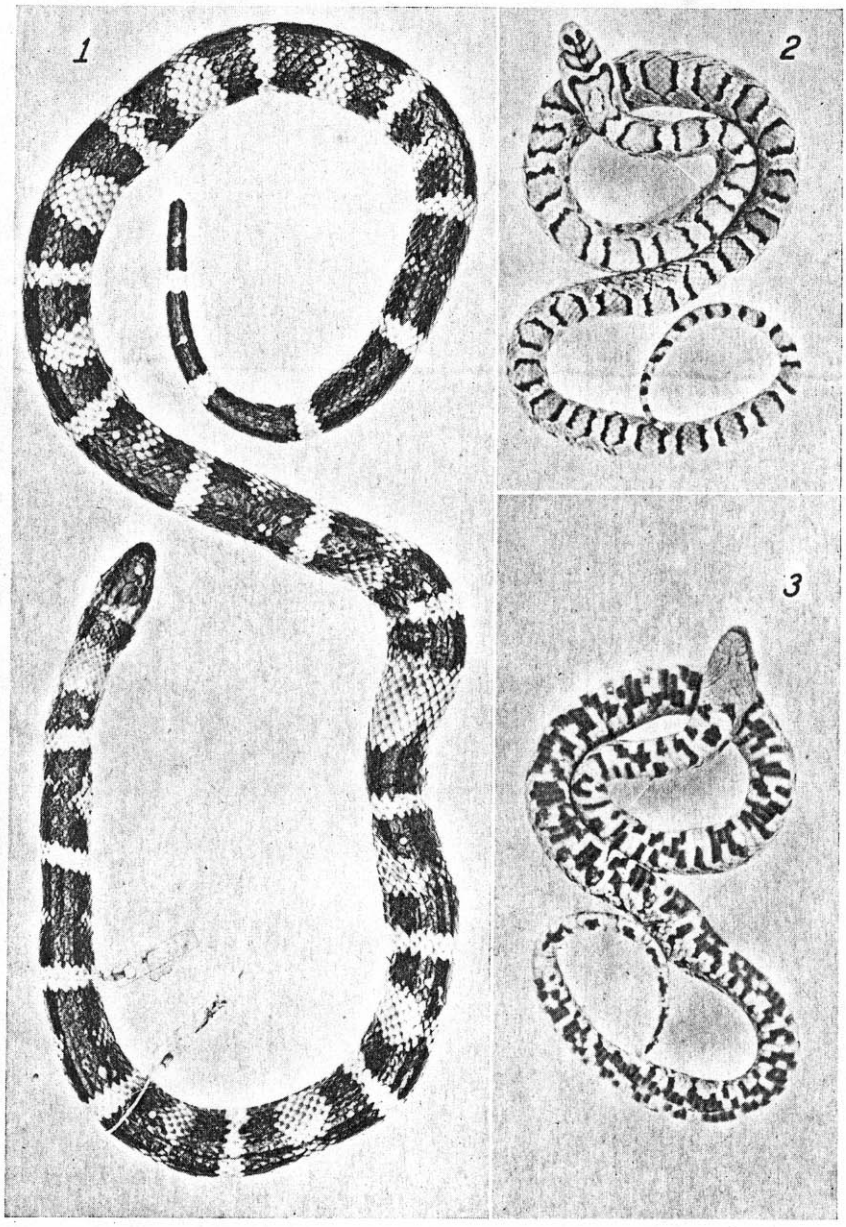

PLATE I

FIGURE 1. *Lampropeltis triangulum arcifera*, dorsal view. From EHT–HMS No. 15868, 15 kilometers west of Morelia, Michoacán.

FIGURE 2. The type of *Oreophis boulengeri*, dorsal view.

FIGURE 3. The type of *Oreophis boulengeri*, ventral view.

the courtesy of Messrs. Loveridge and Shreve, the entire series from Alvarez has been made available to me for study. The following notes on variation are based upon these eleven specimens. (cf. Table 1, p. 207.)

The head patterns of the Alvarez specimens are essentially like that of the type of *Oreophis boulengeri* (plate 1, fig. 2). In none, however, are there two separate extensions of the frontal spot onto the prefrontals, although in several the frontal spot is much enlarged and involves the posterior part of the prefrontals. Usually the black border is incomplete anteriorly when the frontal spot is large. The parietal spots may be fused medially or completely separated (not even the black borders touching) from each other and from the frontal spot. The postocular dark spot is present and well defined in six, absent or poorly defined and small in four.

The nuchal spot is invariably the largest on the body, and usually has a light spot (certainly in seven, possibly in another, absent in two), and occasionally a few other anterior blotches are light-centered.

In one specimen the belly is almost entirely light, with a very few small dark marks toward the sides of the belly. Other specimens show conditions intermediate between this extreme and that represented by the type of *Oreophis boulengeri* (plate 1, fig. 3). The tail is mottled below, and occasionally the dark marks show some tendency toward formation of a midventral line; in none is such a line distinct.

The size of the dorsal blotches varies considerably; they cover from a little less than two to seven and one-half scale lengths; the spaces between them, however, are very constant in size, including one or two scale lengths middorsally. All the tail blotches (except sometimes the extreme distal blotch) are mixed or split with red.

In all specimens measuring 450 mm. or more in total length, the dorsal ground color is heavily suffused with black pigment, except for narrow, irregular areas about the blotches. In smaller specimens the general darkening of the ground color is not obvious, although the same areas show fine, black stippling under the microscope.

Hemipenis of No. 24981 (not everted) about nine caudals long, perhaps very slightly bilobed; extreme distal tip fringed calyces, abruptly grading into an area (equal to the length of about three and one-half caudals) of very small spines; latter somewhat increasing in size toward base, very numerous and closely placed; remainder of hemipenis ridged, each ridge surmounted by a row of widely spaced, extremely minute spicules or spines. Sulcus single.

It is to be noted that the hemipenial characters of this species definitely place it with the *triangulum* group, to which it is similar in essential features of the color pattern.

Lampropeltis alterna (Brown)

Ophibolus alterna Brown, Proc. Acad. Nat. Sci. Phila., 1901 (issued 1902), p. 612, pl. 34 (Davis Mts., Jeff Davis Co., Texas).

Lampropeltis alterna Stejneger and Barbour, Check List N. Amer. Amph. Rept., 1917, p. 87.

A male specimen of *alterna* collected by Mrs. Smith and myself near Saltillo, Coahuila (U.S.N.M. 110819) has a hemipenis typical of the *triangulum* group. It is about seven caudals long; the extreme distal portion is covered by fringed calyces, which grade into an area, reaching to middle of organ, of very numerous, small, straight spines slightly increasing in size proximally.

These hemipenial characters indicate that *mexicana* and *alterna* are more closely related *inter se* and to *triangulum* and *pyromelana* (with their immediate relatives) than any of these is to *elapsoides,* which Blanchard was able to place without question in the *triangulum* group. The chief hemipenial differences of *elapsoides* from the other members of the *triangulum* group are (1) the greater extension of the spinous area toward the base of the organ, and (2) decrease proximally in the size of the spines. In other members of the *triangulum* group the spines reach only to the middle of the hemipenis, and they gradually increase in size proximally.

Accordingly, there is less reason to entertain the idea that *alterna* should not be included in *Lampropeltis* than there is for *elapsoides,* so far as indicated by hemipenial characters. It certainly is closer to *triangulum* than to any member of other groups of the genus, since all others have few, hooked spines on the hemipenis, and the calyces are not fringed. Moreover, it appears that *alterna* may have been derived from *mexicana.* It is apparent that its peculiar pattern, with red in the alternate black bands, rather than in all the black bands as in other members of the group, has been brought about by an antero-posterior contraction of the black bands, carried to such an extreme that only about half the black bands remain with red. Usually these are alternating bands, but not always, for sometimes the "secondary" black bands also have red, as shown by both Murray's specimen from the Chisos Mts. (Contr. Baylor Univ. Mus., no. 24, 1939, pp. 9–12, figs.) and my own from Saltillo. In the former "some of the narrow bands on the anterior portion of the snake are bordered by red," while in the latter several of the posterior bands are split with red. It is apparent that only by mere coincidence did the type specimen of *alterna* have only the alternate bands split with red.

It is obvious that *alterna* must have been derived from a form having many bands, all split with red; from a form with a dark-pigmented ground color; and from one with a tendency toward elimination of head markings. *Lampropeltis mexicana* fits these requirements. There is in that species a tendency toward multiplication of the bands; the head mark-

ings tend to be restricted to three spots (frontal, two parietal); and the ground color obviously tends to be very dark in adults.

An essential link in the *mexicana-alterna* chain is *leonis,* a species known only from the type ("Nuevo León") in the British Museum (well figured by Günther, Biol. Centr. Amer., 1893; pl. 39, fig. A). This species was placed by Blanchard in the *calligaster* group, but it cannot belong there.

In evolution of head pattern, *leonis* exhibits a condition intermediate between that of *mexicanus* and *alterna;* the basic three-spot pattern of the former is shown, but a great reduction in the size of each spot demonstrates a reduction trend which in *alterna* reaches its extreme.

In evolution of nuchal pattern also, *leonis* is intermediate. It shows a reduced, but elongate nuchal blotch, partially split medially, obviously derived by reduction from the type exhibited by *mexicana.* In *alterna* (Saltillo specimen) the blotch is still further reduced to two, elongate, lateral spots in exactly the same position as their counterparts in *mexicana* and *leonis.*

In body pattern *alterna* is intermediate between the other two. It retains almost exactly the usual belly color of *mexicana* (mottled). In *leonis* the pattern is greatly reduced, beyond the condition found in *alterna:* most of the dark ventral marks are eliminated, and on the subcaudal surface there remains only a median longitudinal stripe; scarcely any of the narrower, black bands remain on the dorsal surface, there being only the widely spaced, narrow, red bands bordered with black; the narrower bands, corresponding to those of *alterna,* are mostly reduced to a small, lateral spot, and only one or two remain visible as bands; finally, the lateral extensions of the bands split with red are eliminated.

All three species exhibit a darkened ground color, characteristic of their own subgroup.

It appears, therefore, that *leonis* and *alterna* were derived from a form or forms much like *mexicana.* In the evolution of these species the blotches were increased somewhat in number, from that occurring in *mexicana,* until a considerable crowding of them occurred (as is shown on certain parts of the body in some *mexicana*). As the tendency is to retain a certain distance between blotches, regardless of number, some of them of necessity were so narrow the red was eliminated from them. As in many other groups of snakes, this multiplication in number of spots was the forerunner of general pattern reduction, and not only did certain blotches or bands lose their red, but all of them then were constricted antero-posteriorly. At the same time the head pattern was being reduced. *L. alterna* and *leonis* evolved no further in common (or along parallel paths), but were separated at about this stage. In the former the reduction of head pattern became complete, but change in body pattern was

slowed. In *leonis* the reverse was true. The trend is toward a unicolor snake, nearly approached in *leonis*.

The peculiar method of pattern reduction in the *mexicana* subgroup—by elimination of alternate blotches—is remarkably similar to that apparent in the *biscutatus* group of *Trimorphodon,* in which *quadruplex,* a forms with numerous, subdivided blotches, gives rise to *biscutatus,* a form with about half the complement of the former. In each case suppression of alternate blotches is evident. The same procedure is indicated in the evolution of certain other end forms of *Trimorphodon,* although the evidence is not so complete as in the described cases. Apparently, then, this may be one of the more frequent methods of pattern reduction in snakes.

It appears that *mexicana* and its two relatives form a subgroup in the *triangulum* group, comparable to the *elapsoides* and *pyromelana* subgroups. The arrangement of the subgroups accordingly is as follows:

triangulum subgroup		*pyromelana* subgroup
t. arcifera	t. annulata	thayeri
t. abnorma	t. gentilis	
t. blanchardi	t. amaura	ruthveni
t. schmidti	t. syspila	knoblochi
t. oligozona	t. triangulum	zonata
t. gaigeae	t. temporalis	pyromelana
t. micropholis	*elapsoides* subgroup	*mexicana* subgroup
	e. elapsoides	mexicana
t. nelsoni	e. virginiana	leonis
		alterna

KEY TO MEXICAN LAMPROPELTIS

1. Pattern of narrow crossbands of black, the alternate bands mixed or split with red ..... *alterna*
   Not so 2
2. Pattern without red, of two colors (black or brown, and white) 3
   Pattern with red, of three colors 4
3. Light crossbands separating broader dark rings which are unmarked with white on the dorsal scales ..... *getulus yumensis*
   Light crossbands absent or, if present, separating narrow dark blotches which do not reach the ventral scales; lateral scales white-centered ..... *getulus splendida*
4. A zigzag lateral white line on third and fourth scale rows; red bands (blotches) numerous (70 in types), only a few broken medially by contact of adjacent black borders ..... *knoblochi*
   No such lateral line; red bands (blotches) rarely so numerous, and when about 70, most are broken medially by contact of adjacent black borders 5
5. Pattern of dark-edged dorsal blotches of red 6
   Pattern in rings 7
6. No markings on sides of body; blotches on body 27; separated from each other by twice (or more) their own length, areas between covering four to seven scale lengths ..... *leonis*
   Irregular dark markings on sides of body; blotches on body 31 to 47, the spaces between covering one to one and one half scale lengths (less than the length of a single blotch) ..... *mexicana*

7. White rings or crossbands on body and tail more than 40 ..... *pyromelana*
   White rings less than 40 8
8. Scales in red areas black tipped 9
   Scales in red areas not black tipped 12
9. Red rings narrowed middorsally by expansion of the black rings, which sometimes meet across red areas; latter seldom longer than a single black ring middorsally ..... *triangulum arcifera*
   Red rings not distinctly narrowed middorsally, longer middorsally than black rings 10
10. Whole belly suffused with black ..... *triangulum* subsp. (Hidalgo?)
    White bands usually interrupted ventrally, black bands complete; belly sometimes mottled, but not wholly suffused with black 11
11. Ventrals 208 to 239, usually 220 or more; white annuli on body and tail 18 to 35, usually 21 or more ..... *triangulum polyzona*
    Ventrals 203 to 219; annuli on body and tail 17 to 22, usually 20 or less ..... *triangulum blanchardi*
12. Red rings narrowed middorsally by expansion of the black rings, which sometimes meet across red areas; latter seldom longer than a single black ring middorsally ..... *triangulum arcifera*
    Red rings not distinctly narrowed middorsally, longer than black rings 13
13. Red bands interrupted on belly by broad black areas connecting the black rings, white rings complete about body ..... *triangulum annulata*
    Red bands not interrupted completely; white rings complete or interrupted .. 14
14. Head uniform black to tips of parietals; white rings on body and tail 30 ..... *ruthveni*
    Head with light markings 15
15. A red band or blotch on top of head, remainder of head mottled white and black; white rings on body and tail 31 ..... *thayeri*
    Head black and white, not mottled (except snout) 16
16. White rings two and one half scale lengths middorsally; ventrals 228 to 233 .... *triangulum schmidti*
    White rings narrower, about one and one-half scale lengths 17
17. Ventrals 200 to 224; snout light ..... *triangulum nelsoni*
    Ventrals 227 to 235; snout dark, with a transverse white bar ..... *triangulum oligozona*

TABLE 1.

Variation in LAMPROPELTIS MEXICANA (*Garman*).

Number	Sex	Scale Rows	Vent.	Caud.	Supl.	Infl.	Proc.	Ptoc.	Spots	Total Length (mm.)	Tail Length (mm.)
19022	♂	21–23–19	199	60	7–7	10–10	1–1	2–2	36–9	257	43
19023	♂	21–23–19	191	58	7–7	9–9	1–1	2–2	39–11	245	41
19025	♂	21–23–19	193	56	7–7	10–10	1–1	2–2	35–11	250	41
24977	♂	19–23–19	192	59	7–7	9–9	1–1	2–2	31–9	594	100
24979	♂	21–23–19	195	56	7–7	9–9	1–1	2–3	41–9	288	46
24981	♂	23–23–19	194	57	7–7	9–9	1–1	2–3	37–10	777	128
19024	♀	21–23–19	196	53	7–7	10–10	1–1	2–2	47–11	745	118
24976	♀	21–23–19	193	..	7–7	9–10	1–1	2–2	32–?	643+	93+
24978	♀	23–23–19	199	56	7–7	9–10	1–1	2–2	36–9	638	105
24980	♀	23–26–21	199	..	7–7	10–10	1–1	2–2	34–9	622+	95+
4652	♀	23–21–19	193	55	7–7	10–10	1–2	2–2	39	803	...
4653	♀	23–21–19	199	55	7–7	10–10	1–1	2–2	39	452	...
Gto.	♀	21–23–19	191	51	7–7	10–10	1–1	2–2	33–8	380	60