Systematics and Natural History of the American Milk Snake, *Lampropeltis triangulum*

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pointed out previously, this character should not be utilized as a diagnostic characteristic in island populations. I have, therefore, placed the name *L. t. schmidti* in the synonymy of *L. t. nelsoni*.

I have given the reasons for separating the populations to the northwest (Nayarit, Sinaloa and Sonora) from *L. t. nelsoni* under the subspecies account of *L. t. sinaloae*.

L. t. nelsoni intergrades with *L. t. arcifera* in northern and central Jalisco, in northeastern Colima, and in western and northeastern Michoacán. These specimens are discussed under the subspecies account of *arcifera*.

Natural history

Collecting dates are available for April through August. The only information on activity is that some specimens were collected dead on the road at night. There is no information on food habits and reproduction.

This subspecies is found on the Tres Marías Islands (recorded with certainty only from María Madre Island), which receive about 25 inches of rainfall annually, but are covered by Tropical Deciduous Forest (Zweifel, 1960). The adjacent coastal area of Jalisco and Colima receives approximately 12 to 15 inches of precipitation annually, decreasing in amount to the east (Vivo, 1964). Mainland *L. t. nelsoni* inhabit the northwestern portion of Sierra Madre del Sur and the lower elevations of the western edge of the Mesa Central (West, 1964b). There is no information available on the microhabitat.

Specimens examined (25)

MEXICO. State unknown, "Mexican plateau," USNM 30504-5. *Colima*: "Colima," USNM 31492-3; 4 mi. WNW Bahía de Santiago, USL 12398; 5.7 mi. N jct. Rts. 80-200, LSUMZ 7887; just north Manzanillo (Rt. 200), USL 12386; 5 mi. NE Manzanillo, SAM 1114; 15 mi. N Manzanillo, BYU 23941. *Guanajuato*: "Guanajuato," USNM 12680; Acámbaro, USNM 46552 (holotype). *Jalisco*: Guadalajara, USNM 24967-8; Hacienda de Capulines, Jamay, AMNH 19650; 10 km. N La Huerta (Rt. 80), USL 12344; 4.2 mi. NW Magdalena, TNHC 25443; Hacienda de Santa María, near Magdalena, AMNH 19702; 1 mi. SE Nayarit-Jalisco line (Rt. 15), BYU 13181; Tenacatita Bay, UMMZ 84257. *Michoacán*: Sierra Madre, Río Nexpa, USNM 31491; Tres Marías Islands (*Nayarit*): "Tres Marías," BM 81.10.1.98, UMMZ 79510; María Madre Island, AMNH 78661, 78674, USNM 24684.

Lampropeltis triangulum arcifera Werner
Figures 49–52

Lampropeltis micropholis arcifera Werner, 1903:250.
Lampropeltis ruthveni Blanchard, 1920a:8, pl. 1, fig. 2 (holotype, USNM 46558, from Pátzcuaro, Michoacán, adult, collected 2 August 1892 by E. W. Nelson).
Lampropeltis polyzona: Blanchard, 1921:139–48 (part).
Lampropeltis triangulum arcifera: H. M. Smith, 1942:198–9 (part).

Holotype

Institut Royal des Sciences Naturelles de Belgique 9.422, an adult female from "México." I consider the restriction to Necaxa, Puebla, by Smith and Taylor (1950) to be incorrect.

Definition

Snout is black, or has small amount of white flecks on nasals and loreals; head is black posteriorly; first black ring usually touches angle of the jaw, or is less than one scale long posteriorly, complete in a broad straight line across throat; red and white scales are not black tipped; red body rings number from 14 to 31, mean 21.9. Temporals are usually 2 +3; dorsal scales are usually in 21 rows at midbody.

Range

In general *L. t. arcifera* inhabits the Mesa Central of México excluding the eastern portion. More precisely *arcifera* occurs in Morelos southward into extreme northern Guerrero, in central Michoacán (in the Lake Pátzcuaro area), in south-central Jalisco (east, north, and northeast of Lake Chapala), and in the more arid regions of western Querétaro. This subspecies probably also occurs in southwestern Puebla, eastern México, and western Hidalgo.

Description of the holotype

Supralabials 7, third and fourth entering orbit; infralabials 9, first four touching anterior chin shields; fourth and fifth touching posterior chin shields; chin shields about equal in size, posterior shields separated at posterior end by small scales; loreal 1, slightly longer than wide; preocular 1; postoculars 2; temporals 2 +3; scale reduction pattern

$$23\ \frac{5+6\ (12)}{5+6\ (11)}\ 21\ \frac{4+5\ (141)}{4+5\ (137)}\ 19\ (204);$$

ventrals 204; tail incomplete. Total length 890 + mm, tail incomplete (113 + mm).

Head black to posterior edge of parietals, anterior edge of posterior temporals, and anterior edge of sixth supralabial, except for few white spots on internasals and narrow white border on ventral edge of supralabials; mental and first five infralabials black with few white marks; anterior chin shield borders dark; upper edge of sixth infralabial black; first white ring including tip of parietals and one scale row on body middorsally; first black ring five scales long middorsally, extending anteriorly across angle of jaw and gular scales; first black ring about three gular scale long midventrally; black pigment interrupting the red rings middorsally, except for the first and several posterior rings; all body rings complete across the venter, except on posterior one-fourth body where black pigment interrupts white rings; red body rings 20; red rings completely obscured by black pigment on tail; red scales not black tipped; white scales with scattered dark pigment.

Variation

Meristic and mensural data for this subspecies may be summarized as follows: supralabials 7-8 (7 in 88.8%); infralabials 9; preocular 1; postoculars 2; loreal 1; temporals 2 +3 (95.0%), 1 +2 (4.2%); dorsal body scales predominantly 21-21-19; ventrals in males range from 192 to 217, mean 203.7 (6), in females from 201 to 214,

mean 207.7 (6) (the holotype of *ruthveni* has 188 ventrals, sex undetermined, but probably a male); subcaudals in males range from 43 to 54, mean 47.9 (3), in females from 42 to 52, mean 47.0 (4); total length in males ranges from 286 to 823 mm, in females from 740 to 890 mm; tail length/total length ratio in males ranges from 0.137 to 0.163, mean 0.152 (4), in females from 0.139 to 0.144, mean 0.142 (4).

The head is usually entirely black. A specimen (LACM 37307) from Jalisco has several small white spots on the frontal and prefrontals. One individual (UMMZ 121508) has a narrow white line on the prefrontals. The chin and throat have black pigment on infralabials three to five and on the medial margins of the chin shields; variations consist of having black infralabials one to six (Figure 48), or larger amounts of black pigment on the chin shields, or a reduction of black pigment on the chin shields (Figure 50).

First white ring occurs on the posterior one-fifth to one-fourth parietals and extends one scale length onto body. White body rings are usually one scale long; in one specimen (UIMNH 17782) the white rings are two scales long. The white rings are complete around the body.

The first black ring begins one scale length behind the parietals, and extends posteriorly two to five (usually four) scale lengths middorsally. The black body rings are usually expanded middorsally, often completely interrupting the red rings, and range from two to five scales (usually three) in length. The white scales are not black tipped, but they may contain many small black flecks, especially on the lateral scales.

The first red ring ranges from four to eight scales in length, mean 6.5 (10). It is not interrupted by black pigment middorsally. The red scales are not black tipped. Red body rings number from 14 to 31, mean 21.9 (11). The red rings are usually interrupted ventrally by black pigment. Two specimens (IRSNB 9.422, USNM 46558) have the red rings complete across the venter.

Discussion

L. t. arcifera was revived by (H. M. Smith, 1942) as a subspecies characterized mainly by black pigment interrupting the red rings middorsally. He indicated that this race ranges " . . . from Morelos and eastern Michoacán eastward to the edge of the plateau in Veracruz, and probably southward toward (not to) Tehuantepec." He also noted that specimens from the eastern edge of the range have black tips on the red scales, whereas those to the west lack black tips.

Although agreeing with Smith on the validity of recognizing *L. t. arcifera*, I feel he may have placed too much taxonomic stress on black pigment interrupting the red rings middorsally. It is indeed characteristic of most *arcifera*, but also occurs occasionally in other populations.

The specimens from eastern México with black tips on their red scales, which Smith (1942) referred to *arcifera* do not belong in this subspecies. These specimens are either *L. t. smithi* or represent *L. t. smithi* x *L. t. polyzona* intergrades.

The diagnostic characteristics considered, which I consider important in *L. t. arcifera* as herein delimited, are as follows: black head; black pigment usually interrupting red rings middorsally and ventrally; red and white scales not black tipped; and a low number of ventrals and subcaudals.

The confusion concerning identification of milk snakes from the Jalisco-Michoacán area is apparent from several reports (Duellman, 1961; Zweifel, 1960; Fouquette and Rossman, 1963). The difficulty has at times involved *L. t. schmidti* (Tres Marías, see discussion under *L. t. nelsoni* account), *L. t. nelsoni, L. t. arcifera*, and *L. t. blanchardi*, (*L. t. conanti* in this study). Another factor that must be evaluated in any discussion of milk snakes from this area is Blanchard's (1920a) *Lampropeltis ruthveni*.

Blanchard described *L. ruthveni* from Pátzcuaro, Michoacán. He based the species on the following characteristics (from a single specimen, USNM 46558; skin only, sex unknown): head completely black; high number of annuli 30 (24 red body rings); lack of black tips on red and white scales; black pigment showing little tendency to cross red rings either middorsally or ventrally; and low number of ventrals (188 in type).

I consider three specimens (UMMZ 104694-5; female and male, respectively, and a female (KU 68921) from Coalcomán, Michoacán, two of which were reported as *L. t. blanchardi* by Peters (1954) to be intermediate between *L. t. nelsoni* and the population previously called *L. ruthveni* (Table 21). The red body rings number 27, 24, and 24, respectively; the red rings, although narrow, are complete around the body. These characteristics are typical of Blanchard's *ruthveni*. The three specimens, however, have white snouts, and 219, 212, and 208 ventrals, respectively, both features typical of *nelsoni*.

A male from 5 miles east of Quiroga, Michoacán, has a white snout, 24 red body rings, the red rings complete around the body, and 197 ventrals (Table 21). Six specimens from eastern Colima are also intermediate in several characteristics or in a combination of characteristics (Table 21).

In Jalisco, two males (KU 80753, LACM 38524) from south of Lake Chapala have white snouts, 22 and 24 red body rings, 212 and 205 ventrals, respectively. One specimen (LACM 38524) has the black pigment interrupting or tending to cross the red rings middorsally (Table 21).

A male (BYU 13181) from one mile southeast of the Nayarit-Jalisco line (Route 15), Jalisco, has a black head, black pigment interrupting the red rings both middorsally and ventrally, 16 red body rings, and 213 ventrals. Respective data for three specimens (AMNH 19647, 19649, 19701) from the west-central portion of the northern extension of Jalisco (between Nayarit and Aguascalientes) are as follows: female, male, male; total length (mm) 897, 305, 305; ventrals 215, 211, 218; subcaudals 51, 54, 55; black snout, white snout with considerable black flecking, black snout with white flecks laterally; black not crossing red rings middorsally in first two specimens, tending to cross red rings in latter; red body rings 18, 17, 19.

Table 21. Variation of ventrals, subcaudals, and red rings in *Lampropeltis triangulum sinaloae, L. t. nelsoni, L. t. arcifera,* and *L. t. arcifera* x *L. t. nelsoni* intergrades.

Population	Ventrals		Subcaudals		No. of Red	First	Other Red
	M	F	M	F	Body Rings	Red Ring[1]	Body Rings[1]
sinaloae	216.1 (80)	215.6 (29)	52.7 (70)	48.9 (30)	13.1 (13)	18.3 (65)	10.4 (71)
nelsoni	215.9 (15)	213.4 (8)	51.3 (14)	46.6 (8)	16.0 (23)	11.8 (18)	5.9 (17)
Jalisco[2]	211.2 (6)	215 (1)	51.4 (6)	51 (1)	19.3 (7)	8.2 (5)	3.7 (6)
Colima[2]	212.0 (3)	214.7 (3)	49.0 (5)	46.5 (2)	19.8 (6)	7.0 (4)	3.3 (4)
Coalcomán[2]	212 (1)	213.5 (2)	54 (1)	50.0 (2)	25.0 (3)	7.3 (3)	2.8 (3)
Quiroga[2]	—	197 (1)	—	51 (1)	24 (1)	6 (1)	3 (1)
arcifera	202.7 (6)	207.7 (6)	47.9 (3)	47.0 (4)	21.9 (11)	6.5 (10)	2.1 (5)

[1] Length of red rings given in number of scale lengths.

[2] See Specimens examined section under *L. t. arcifera* x *L. t. nelsoni* for list of specific localities. The Jalisco group contains a single specimen from southern Nayarit. Coalcomán and Quiroga are in the state of Michoacán.

A male (AMNH 87595) from four miles east of Ixtlán del Río, in southeastern Nayarit, has a black head, black pigment crossing the red rings middorsally, 19 red body rings, and 208 ventrals (Table 21).

It is obvious from the description of the above specimens that *L. ruthveni* is invalid as a species distinct from *L. triangulum*. Numerous specimens intermediate between "*ruthveni*" and *nelsoni* are available and have been described above. The validity of "*ruthveni*" as a subspecies must also be seriously questioned, and in my opinion rejected. The populations previously referred to as *L. ruthveni* are either *L. t. arcifera* or *L. t. arcifera* x *L. t. nelsoni* intergrades. Whether possible influence from *L. t. conanti* is occurring must await the collection of material from northwestern Guerrero.

The only distinguishing characteristics between "*ruthveni*" and *arcifera* are the completeness of the red rings and tendency toward a larger number of them in the former. A male (LACM 37307) from 6.5 miles east of Tapalpa, Jalisco, has 31 red body rings, which tend to be interrupted by black pigment, and 192 ventrals. A female (UIMNH 17782) from 15 kilometers west of Morelia, Michoacán, has the black pigment interrupting the 19 red body rings middorsally and 207 ventrals. This latter specimen is from a locality within 25 miles of Pátzcuaro, the type locality of "*ruthveni*." I have not seen a "typical *ruthveni*" reported from Morelia by Duellman (1961).

Specimens of *L. t. arcifera* from Michoacán and Jalisco show some tendencies not found in the few specimens (six) available from other areas. There are more red body rings [19 to 31, mean 22.5 (6)] in *arcifera* from Michoacán-Jalisco, than in other *arcifera* [14 to 21, mean 19.0 (5)]. There is also a tendency in *arcifera* from Michoacán-Jalisco to have the red rings complete around the body rather than interrupted by black pigment.

A specimen (TCWC 29504) of *L. t. arcifera* was recently collected in Querétaro and brought to my attention by C. A. Ketchersid. This specimen, a male, represents the northernmost record of *arcifera*. It is typical of *arcifera*, having black pigment completely separating most red rings both dorsally and ventrally; it has a black head, 201 ventrals, and 49 subcaudals.

A specimen (MCZ 9555) simply labeled "Puebla" is the only record available for this state; the subspecies undoubtedly occurs in the southwestern portion of that state.

Natural history

Collecting dates are available for June through August (data from collecting tags). No information is available on daily activity. Peters (1954) reported a specimen from Coalcomán, Michoacán (*L. t. arcifera* x *L. t. nelsoni* intergrade), which had six juvenile mice (*Reithrodontomys*) in its stomach. No information is available on reproduction in this subspecies.

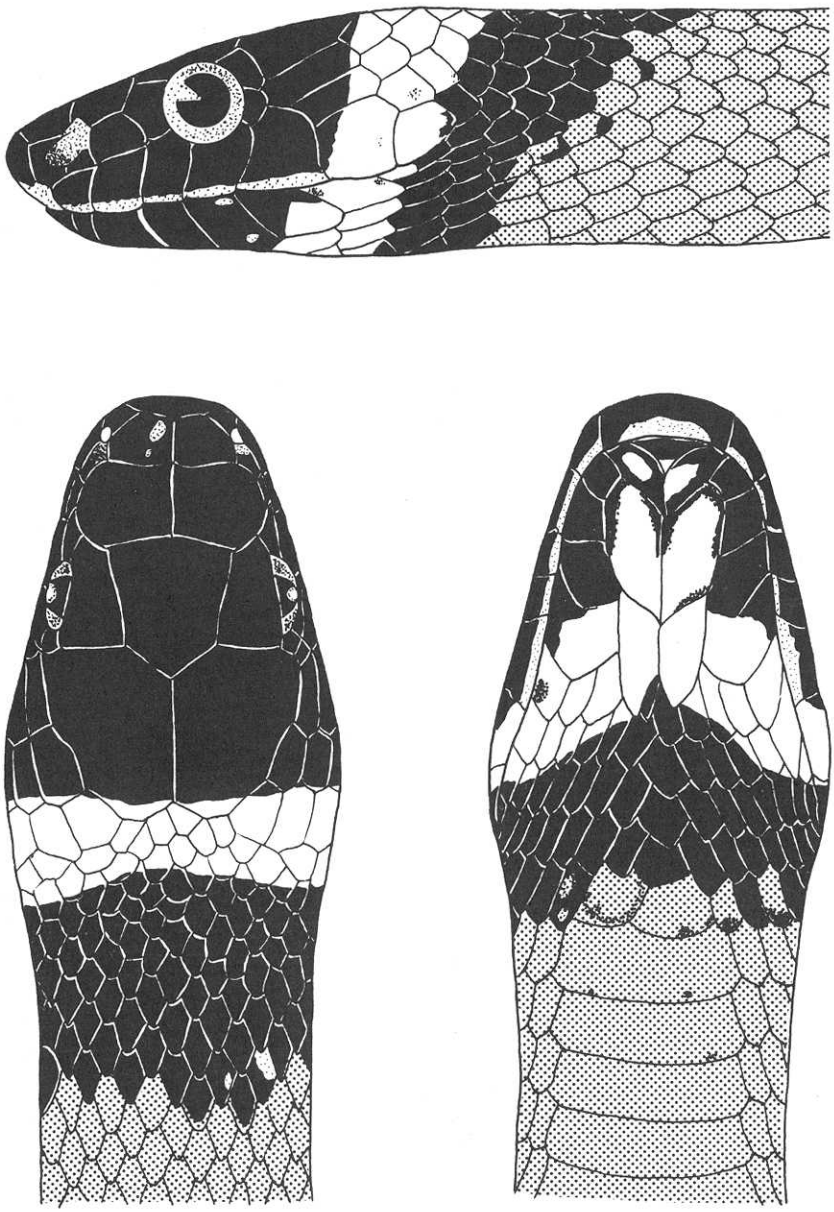

Figure 49. Head pattern of the holotype of *Lampropeltis triangulum arcifera* (IRSNB 9.422) from "México."

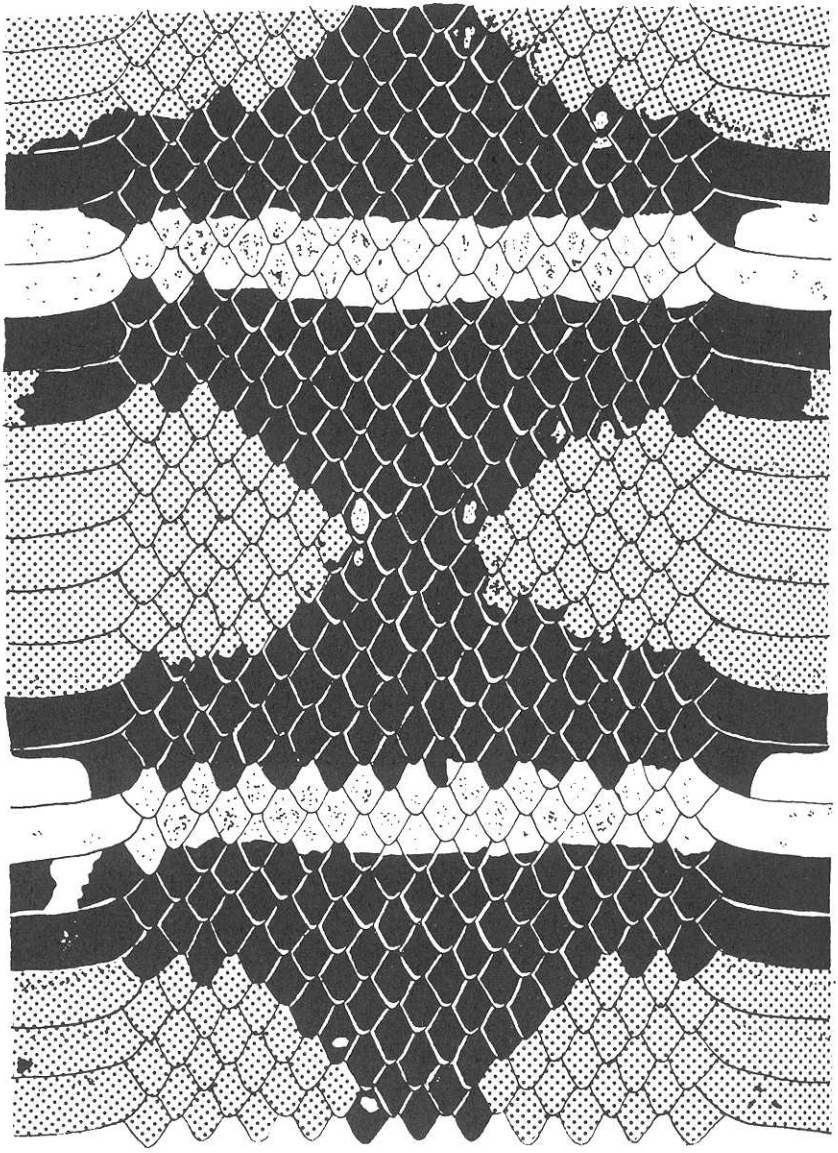

Figure 50. Pattern at midbody of the holotype of *Lampropeltis triangulum arcifera* (IRSNB 9.422) from "México."

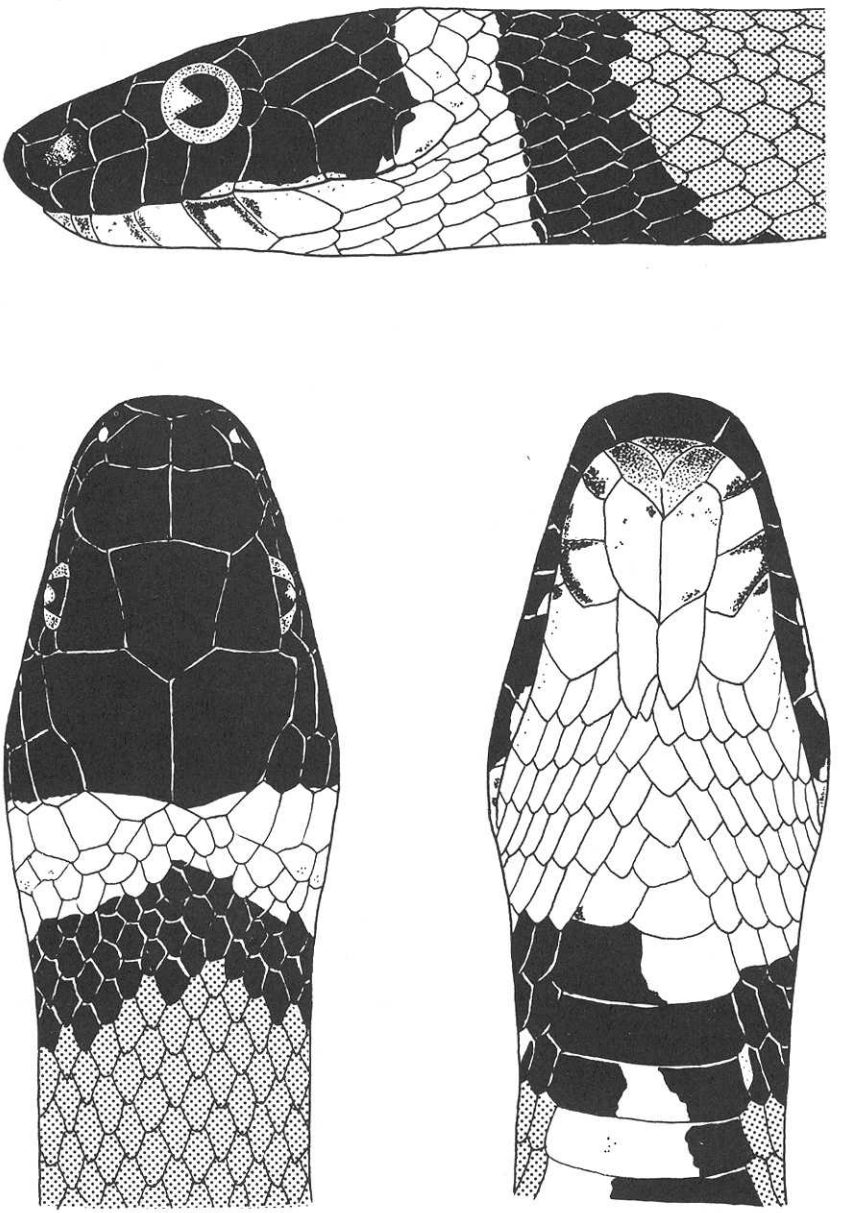

Figure 51. Head pattern of *Lampropeltis triangulum arcifera* (USNM 46558, holotype of *L. ruthveni*) from Pátzcuaro, Michoacán, México.

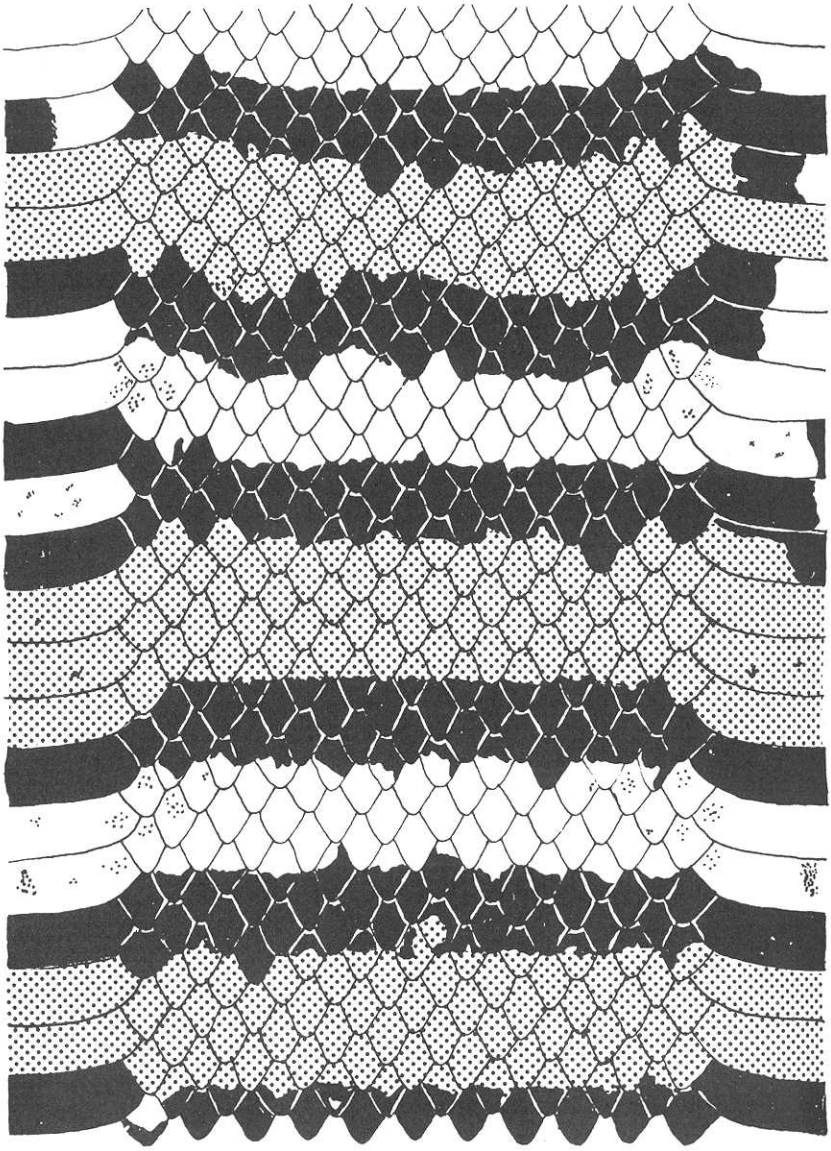

Figure 52. Pattern at midbody of *Lampropeltis triangulum arcifera* (USNM 46558, holotype of *L. ruthveni*) from Pátzcuaro, Michoacán, México.

L. t. arcifera inhabits the Mesa Central of Mexico, except for the eastern one-fourth of that physiographic region (West, 1964a). This is the semiarid region often referred to as the Mexican Plateau. Oliver (1937) also referred to eastern Colima (area of *L. t. arcifera* x *L. t. nelsoni* intergradation) as being semiarid. Duellman (1965a) reported *L. triangulum* in Michoacán as moderately abundant in "arid tropical scrub forest," and rare in "mesquite-grassland," and "pine-oak." He listed *L. ruthveni* as rare in the "mesquite-grassland" habitat in Michoacán. Elevations at which *arcifera* occurs probably range from 700 to nearly 2500 meters (data partly from Duellman, 1965). C. A. Ketchersid informed me (pers. comm.) that the specimen from 2.9 miles north Jalpan, Querétaro, was collected in an arid region at an elevation of 2550 feet. A specimen (TCWC 7435) from northern Guerrero was collected in an arid region at an elevation of 5500 feet; another specimen (TCWC 7312) from Morelos was collected from an elevation of 3500 feet (data for both specimens from TCWC card catalogue).

Specimens examined (13)

MEXICO. State unknown, "Mexico," IRSNB 9.422 (holotype). *Guerrero*: 17 km. S Taxco, TCWC 7435. *Jalisco*: Buena Vista, 40-50 mi. S Istlahuacán, UIMNH 47936; Hacienda de Capulinos, Jamay, AMNH 19650; west of west end of Lake Chapala, AMNH 71364; 6.5 mi. E Tapalpa, LACM 37307. *Michoacán*: 15 km. W Morelia, UIMNH 17782; Pátzcuaro, USNM 46558 (holotype of *Lampropeltis ruthveni*); Uruapán, Parque Nacional, UMMZ 121508. *Morelos*: 12 km. NW Axochiapán, TCWC 7312; Cuatla, SMF 32421. *Puebla*: "Puebla," MCZ 9555. *Querétaro*: 2.9 mi. N Jalpan, TCWC 29504.

***L. t. arcifera* x *L. t. nelsoni*. Specimens examined** (17)

MEXICO. *Colima*: near Buena Vista, UMMZ 80212; Colima, MCZ 27105; 0.25 km. N Colima, UMMZ 80213; 2 mi E Colima, AMNH 85753; 9 mi. E Colima, UMMZ 120224; 15.7 mi. NW Colima, UIMNH 68736. *Jalisco*: near Cerro la Bosca, road to La Yesca (*in* Nayarit), AMNH 19647; 1 mi. NE Contla, KU 80753; Hostotipaquillo near Las Víboras Mine, AMNH 19701; road from Hostotipaquillo to Cinco Minas, AMNH 19649; 1 mi. SE Nayarit-Jalisco line (Rt. 15), BYU 13181; south shore Lake Chapala, LACM 38524. *Michoacán*: Coalcomán, UMMZ 104695; 1.5 mi. S Coalcomán, airfield, KU 68921; 2 mi. NE Coalcomán, UMMZ 104694; 5 mi. E Quiroga, AMNH 82021. *Nayarit*: 4 mi. E Ixtlán del Río, AMNH 87595.

Lampropeltis triangulum conanti subsp. nov.
Figures 53–54

Holotype

University of Michigan Museum of Zoology 85762, an adult male from Sierra Madre del Sur, vicinity of Chilpancingo, Guerrero, México, collected by W. W. Brown.

Definition

Snout is black; the remainder of head is black posteriorly to middle of the parietals or to posterior one-fifth; the chin is usually black; first black ring begins one and one-half to three scale lengths