

## Kingsnakes Allied with *Lampropeltis mexicana*: Taxonomy and Natural History

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*Lampropeltis alterna*, *L. blairi*, *L. thayeri*, and *L. greeri* are reduced to subspecific status under *L. mexicana* on the basis of clinal variation in scutellation and coloration. Intergradation between *alterna* and *blairi*, *mexicana* and *thayeri*, and the basic morphological similarities among all considered forms furnish additional evidence of this conspecific relationship.

*L. mexicana* differs from all other kingsnakes in having an alternating sequence of black, red, black, white, gray, white markings on the body. It is further distinguished by its wide head distinct from neck, mottled gray snout, dark postocular mark, dorsal

head pattern, large eye, enlarged nuchal blotch, large number of posterior dorsal scale rows, and relatively long tail.

New data on the type and only known specimen of *L. leonis* provide no new evidence of its relationships. This species is judged to be closest to the *mexicana* complex.

*L. mexicana* occupies xeric to subhumid habitats on the Mexican Plateau and adjacent mountains from Guanajuato, Mexico, north to southwestern Texas. Its elevational range is approximately 1,300 to 7,500 feet. It is chiefly nocturnal, but feeds to a great extent on diurnal lizards.

WHILE collecting in western Texas during the summer of 1960, each of us procured a kingsnake which superficially re-

sembled *Lampropeltis blairi* Flury. Upon later examination and comparison with *L. alterna* (Brown), *L. mexicana* (Garman),

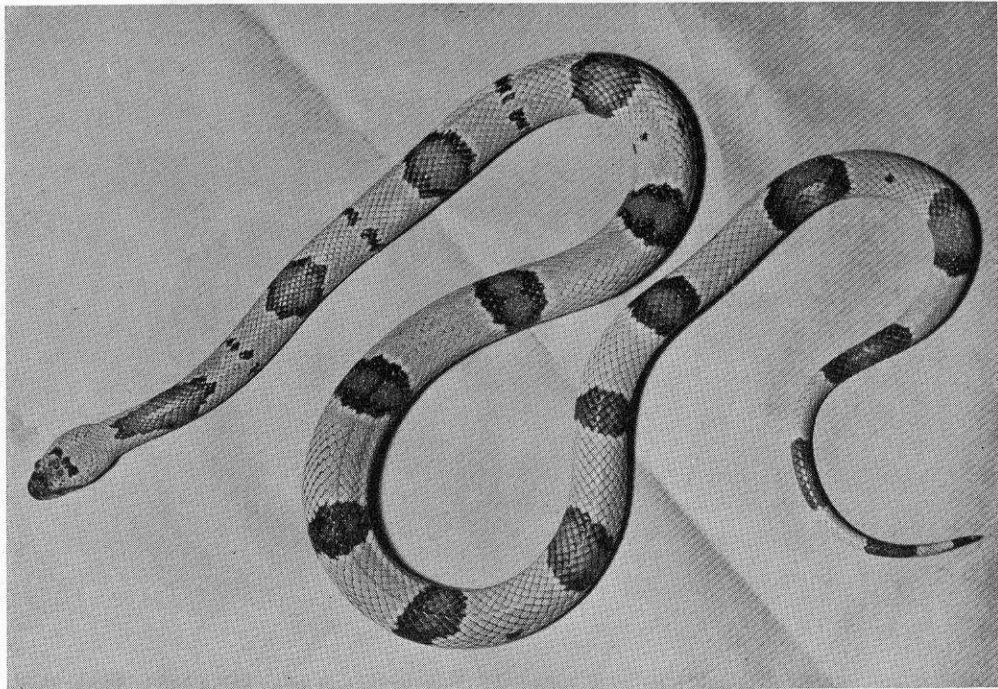


Fig. 1. Kingsnake (UMMZ 122688) intermediate between *Lampropeltis blairi* and *L. alterna*. Collected 23 mi. SW Rocksprings, Edwards Co., Texas. Photographed in life (820 mm total length).

*L. thayeri* Loveridge, *L. greeri* Webb, and *L. blairi*, one of our specimens was intermediate between *blairi* and *alterna*, and the other had features unrecorded in *blairi* or related forms. The existing allopatric distribution and basic morphologic resemblance of the above "species" invited further critical study. All available specimens including types were examined. Only in the case of one unobtainable individual of *blairi* (Axtell, 1951) and one of *mexicana* (Smith and Necker, 1943:206) were published data utilized.

#### RELATIONSHIPS

Smith (1942: 206) proposed several groups of related species in the genus *Lampropeltis*, one of which contained *alterna*, *mexicana*, *leonis*, and subsequently *thayeri* (Smith, 1944: 141). Flury (1950) followed Smith's arrangement in discussing the relationships of *blairi*, but did not include *thayeri* in his comparisons. Webb (1961) added *greeri* to the *mexicana* complex and, primarily on the basis of coloration, described its interrelationships and the affinities of *mexicana*, *thayeri*, and *leonis* with *Lampropeltis calligaster* and *L. pyromelana*. Both Smith (1944: 141) and

Webb (1961) constructed phylogenies for the *mexicana* complex, but no one has adequately defined this complex and compared it with kingsnakes of similar coloration and morphology (*L. doliata*, *L. pyromelana*, *L. zonata*). Since the relationships of the single known specimen of *leonis* have been reviewed, we omit this species from the following comparisons but describe it in greater detail in a separate account below.

In contrast to all other species of *Lampropeltis*, the forms comprising the *mexicana* complex (*alterna*, *blairi*, *greeri*, *mexicana*, *thayeri*) have a basic color pattern of black-bordered, orange-red blotches, bands, or rings alternating with white-bordered, medium to dark gray interspace markings of various shapes (Fig. 1). They are further characterized by: a widened temporal region rendering the head very distinct from the neck; mottled gray snout; dark postocular stripe or spot; red centered blotch on frontal-parietal region, anteriorly trilobed or broken into remnant black and/or red fragments; large eye (13.6 to 19.1 per cent of head length,  $\bar{x} = 16.0$ ); dorsal scale rows reduced to no less than 18 at anus; enlarged first

TABLE 1. VARIATION (RANGE AND MEAN) IN FORMS OF THE *Lampropeltis mexicana* COMPLEX.

Name	(N)	Ventrals	Subcaudals	Red Body Blotches	Red Tail Blotches	Total Length (mm)	Tail Length / Total Length
Males							
<i>mexicana</i>	(6)	190-198 (193.7)	55-59 (57.0)	30-41 (36.3)	9-12 (10.0)	244-870 (426.7)	14.7-17.0 (16.1)
<i>thayeri</i>	(1)	196	62	24	7	874	17.2
<i>greeri</i>	(1)	202	59	34	9	364	15.9
<i>blairi</i>	(4)	208-229 (222.0)	61-64 (62.8)	13-14 (13.8)	3-5 (3.5)	669-1,145 (875.8)	15.0-17.7 (16.0)
<i>alterna</i>	(4)	216-225 (220.5)	62-67 (64.3)	25-33 (28.0)	7-11 (8.7)	452-864 (663.8)	14.6-17.7 (16.0)
Females							
<i>mexicana</i> <sup>1</sup>	(7)	191-200 (195.7)	51-55 (53.8)	30-47 (34.7)	8-11 (8.6)	380-830 (629.4)	14.7-16.1 (15.6)
<i>thayeri</i>	(3)	204-212 (207.7)	56-60 (58.0)	27-28 (27.3)	7-9 (7.7)	246-280 (262.0)	15.0-17.3 (16.5)
<i>blairi</i>	(1)	217	57	14	4	820	15.8
<i>alterna</i>	(5)	213-229 (220.0)	57-62 (59.4)	15-21 (18.4)	3-5 (4.2)	545-835 (700.8)	14.7-16.2 (15.5)

<sup>1</sup> Two specimens with incomplete tails included in ventral scale and body blotch analyses only.

red body or nuchal blotch (often reduced or absent in *alterna*); and long tail (14.6 to 17.7 per cent of total length,  $\bar{x}$  = 16.0). No other species of *Lampropeltis* have this combination of characters and very few races of *doliata*, *pyromelana*, or *zonata* have more than three of these nine features manifest in a single individual.

*L. zonata* is probably conspecific with *doliata* (Zweifel, 1952). The two are similar in having, among other features, a relatively short tail (12 to 17 per cent of total length,  $\bar{x}$  = 14.5; data from Blanchard, 1921), red or black snout (with some white in certain races), and a head but slightly distinct from neck. On the other hand the *mexicana* complex and *pyromelana* are closest in each of these characters, differing from *doliata-zonata* by possessing a longer tail (15 to 18 per cent of total length,  $\bar{x}$  = 16.5; data in part from Blanchard, 1921), predominantly white or gray snout, and widened head. We do not agree with Flury (1950:215) that *blairi* has the general proportions of *doliata*, or with Webb (1961:330) who implied that *mexicana* and *thayeri* do not have distinctly widened heads and long tails.

BODY FORM

Each member of the *mexicana* complex has the widened head, large eye, and a rather

slender, subcylindrical body, flattened to a greater degree ventrally than in most species of *Lampropeltis*. These kingsnakes are of medium size (see Wright and Wright, 1957: 7) with an average adult length of approximately 800 mm (Table 1). The largest specimen, a male of *blairi* (UMMZ 121400) measures 1,145 mm in total length; the smallest are hatchlings of *mexicana* (MCZ 19023) and *thayeri* (CNHM 30821), 244 mm and 246 mm in total length respectively. The tail is proportionally long in all forms. There is some suggestion that the tail is relatively longer and eye relatively larger in juveniles, hence, the longer tail of available females of *thayeri* may reflect only a juvenile characteristic. Males have longer tails than females and a correspondingly greater number of subcaudal scales (Table 1).

HEMIPENIS

With the aid of hemipenial characters, Smith (1942:204) indicated the close relationship of *mexicana* and *alterna*; he further described similarities with *pyromelana* and *triangulum* (= *doliata*). Since Smith's descriptions of the hemipenis of *alterna* and *mexicana* are somewhat incomplete, we present redescriptions following the example of Dowling and Savage (1960). The hemipenis of *blairi* is also described and compared.

TABLE 2. NUMBER OF DORSAL SCALE ROWS (RANGE AND MODE) IN FORMS OF THE *Lampropeltis mexicana* COMPLEX. COUNTS MADE AT THE LEVEL OF THE 20TH, 50TH, ETC. VENTRAL SCALES; EVEN NUMBERS DUE TO ASYMMETRY IN LOSS OR ADDITION OF A ROW

Name	(N)	20	50	100	150	Last
<i>mexicana</i>	(13)	20-23 (21)	23	23-25 (23)	19-23 (19)	19-21 (19)
<i>thayeri</i>	(4)	21	21-23 (23)	22-23 (23)	19	18-19 (18)
<i>greeri</i>	(1)	25	23	25	19	19
<i>blairi</i>	(5)	23-25 (25)	23-25 (25)	25-27 (25)	21-23 (21)	19
<i>alterna</i>	(9)	23-25 (25)	23-25 (25)	23-27 (25)	21-23 (21)	19-21 (21)

The hemipene of *mexicana* (USNM 120823, 870 mm total length), *alterna* (USNM 110819, 864 mm), and *blairi* (UMMZ 121400, 1,145 mm) are extremely similar. Inverted they extend to the level of the seventh (*alterna*) to tenth (*blairi*) subcaudal scale. They are simple, possibly very slightly bilobed, and subcylindrical in form with a simple sulcus terminating at the tip. Ornamentation consists of distal, heavily spinulated calyces grading smoothly or abruptly (*blairi*) into large spines which decrease in size and grade into a basal area of longitudinal ridges. These ridges are naked proximally, but decorated with spinules at the extreme distal ends; they may not be part of actual ornamentation (Dowling and Savage, 1960:25). Calyculate, spinose, and ridged regions extend over an area of two, two to three, and three (five in *blairi*) subcaudals respectively.

#### SCUTELLATION

Ventral and subcaudal scale counts vary geographically (Table 1). A south to north increase (top to bottom of Table 1) is apparent. Subcaudal counts overlap strongly in *thayeri*, *blairi*, and *alterna*. Neither the number of ventrals nor subcaudals distinguishes *blairi* from *alterna*. *L. mexicana* is most distinct in these counts; however, the male of *thayeri* falls well within the range of ventrals of *mexicana*. Similarly the single male of *greeri* is very close to *mexicana*, although more like *alterna* in coloration (see below and Webb, 1961); additional specimens may prove it to be intermediate between *alterna* and *mexicana*.

All subcaudals (terminal spine not included in counts) are divided and the anal plate is entire. In one specimen of *blairi* (UMMZ 121400), one *alterna* (CNHM 47090), and one *thayeri* (CNHM 30820) the ultimate ventral scute is divided, al-

though all others are entire. The first ventral (here considered the first widened scute in the throat region) is distinctly broader than scales anterior to it, one or two of which may separate the posterior pair of elongated chin shields.

Dorsal scale rows also vary geographically (Table 2). They show a clinal increase from south to north as do the ventrals, subcaudals, and labials (compare Tables 1, 2, 3). The only form with less than 19 dorsals at the anus and no more than 23 near midbody is *thayeri*. Both *alterna* and *blairi* have 27 near midbody, a high not recorded in the other forms, and no less than 23 on the neck. Dorsal scale formulae for *blairi* (Flury, 1950) and *greeri* (Webb, 1961) are comparable with the generalized formula for all species of *Lampropeltis* (Dowling, 1958:36). Chief differences are the greater number of posterior scale rows and loss of more dorsally located rows on the neck in the *mexicana* complex. Some dorsals on at least one specimen of each form have two, rather indistinct apical pits which may be observed more

TABLE 3. NUMBER OF LABIAL AND OCULAR SCALES IN FORMS OF THE *Lampropeltis mexicana* COMPLEX. EACH SPECIMEN IS REPRESENTED BY COUNTS FROM BOTH SIDES OF THE HEAD

Name	(N)	Supralabials/ Infralabials			Preoculars- Postoculars	
		7/9	7/10	7/11	1-2	1-3
<i>mexicana</i>	(13)	10	16		24	2
<i>thayeri</i>	(4)	8			8	
<i>greeri</i>	(1)	1	1		2	
<i>blairi</i> <sup>1</sup>	(4)		6		3	5
<i>alterna</i>	(9)	1	13	4	13	5

<sup>1</sup> The type is anomalous in that a small, aberrant scale of the lower labial series does not reach the edge of the lip, and the sixth upper labial is divided; we give the count as 8/10 on both sides contrary to Flury (1950:215).

readily in the neck region of living individuals.

Ocular scales show less geographic variability than the other head scales (Table 3). The number of anterior and posterior temporals is too often bilaterally unbalanced to be taxonomically useful. The most frequent, balanced count in 16 individuals is 2+3; one specimen of *blairi* has 2+2; two of *mexicana* have 2+4; one of *alterna* has 3+3, another 3+4, and a third has 2+4. All other head scales are typical of *Lampropeltis* as described by Blanchard (1921:5).

#### COLORATION

In discussing *alterna*, Blanchard (1921:249) said, "Its style of coloration is . . . quite different from anything else in the genus, but knowing how easily one pattern may be changed into another radically different in appearance, we can not assign great importance to this fact alone." We concur and can demonstrate how the basic elements of color-pattern are modified in each form of the *mexicana* complex. Even a feature of pattern predominant in any one "species" may be found to some degree in another form. In the following discussion catalogue numbers represent only the best of illustrative specimens; many of the details we will mention can be seen in Fig. 1. Illustrations of all forms are available in the literature (see below).

The enlarged nuchal blotch (Fig. 2), elongate and usually oval in outline, may have a light gray or buff center (MCZ 19025—*mexicana*, MSU 190—*greeri*) and may connect anteriorly with dorsal head markings (MCZ 24976—*mexicana*, TNHC 4181—*alterna*). It is usually broken into black fragments or indistinct in *alterna* (SM 6444) but may be well developed (TNHC 4181). Light centers, including some with dark borders, are evident in other red body blotches (USNM 120823—*mexicana*, CNHM 30819—*thayeri*); they are not the usual condition.

The manner in which these light centers may have enlarged to split a blotch into two is suggested by the outline of the eleventh red blotch in a specimen of *mexicana* (MCZ 24979) and the fourth in one of *blairi* (UMMZ 121400). These examples have the anterior and posterior halves separate on one side, joined on the other, and the light center is much enlarged. Such multiplication of body markings was suggested by

Smith (1944:142), but specific examples were not offered. White-bordered, solid black spots or broken rings in the gray interspaces of *alterna* may be remnants of this process in a progenitor of the *mexicana* complex (Smith, 1942:204; 1944:142).

Rarely do the red blotches lack lateral, black borders in *mexicana* (AMNH 77602). This is usually the condition in *thayeri* (MCZ 19551) which has a ringed rather than blotched pattern. However, in one individual of *mexicana* (MCZ 24977) and the single *greeri*, certain dorsal blotches connect with lateral marks which extend onto the ventrals producing a ringed effect. A blotched pattern prevails anteriorly in one specimen of *thayeri* (CNHM 30820) and posteriorly in another (CNHM 30819). Middorsally expanded rings or saddles characterize both *alterna* (SM 6444) and *blairi* (TNHC 4772), but laterally truncated blotches are present only in *alterna* (CNHM 47090) in addition to *greeri* and most *mexicana*. One individual of *alterna* (WGD 1427) has unexpanded body rings.

A ringed pattern is also found in the distal tail blotches of some specimens of each form. Red may be entirely absent from such blotches (AMNH 77602—*mexicana*, CNHM 47090—*alterna*) and others on the body of *alterna* (TNHC 4181, WGD 1427).

Black spotting on the white venter varies from sparse (MCZ 24976—*mexicana*, MSU 190—*greeri*, CNHM 47090—*alterna*) to heavy, often presenting a black-bellied appearance (MCZ 24978—*mexicana*, CNHM 30820—*thayeri*). With the latter condition, a mid-ventral light streak may be visible (TNHC 4181—*alterna*). Lateral black body spots connecting or not with lateral black borders of the red blotches may extend onto the ventral scales to be limited medially by the light streak (SM 6444—*alterna*) or run across the belly as black rings (MCZ 19551—*thayeri*, UMMZ 121400—*blairi*). These rings have a light center and alternate with white spaces containing black blotches with or without light centers in *thayeri* (MCZ 19551) and all specimens of *blairi*.

In *mexicana* and *thayeri* the dorsal head marking is usually a black-bordered, anteriorly trilobed red blotch occupying adjacent portions of the frontal, prefrontals, parietals, and supraoculars. It may be broken into separate spots (MCZ 19023—*mexicana*, MSU 190—*greeri*, TNHC 4181—*alterna*), or the

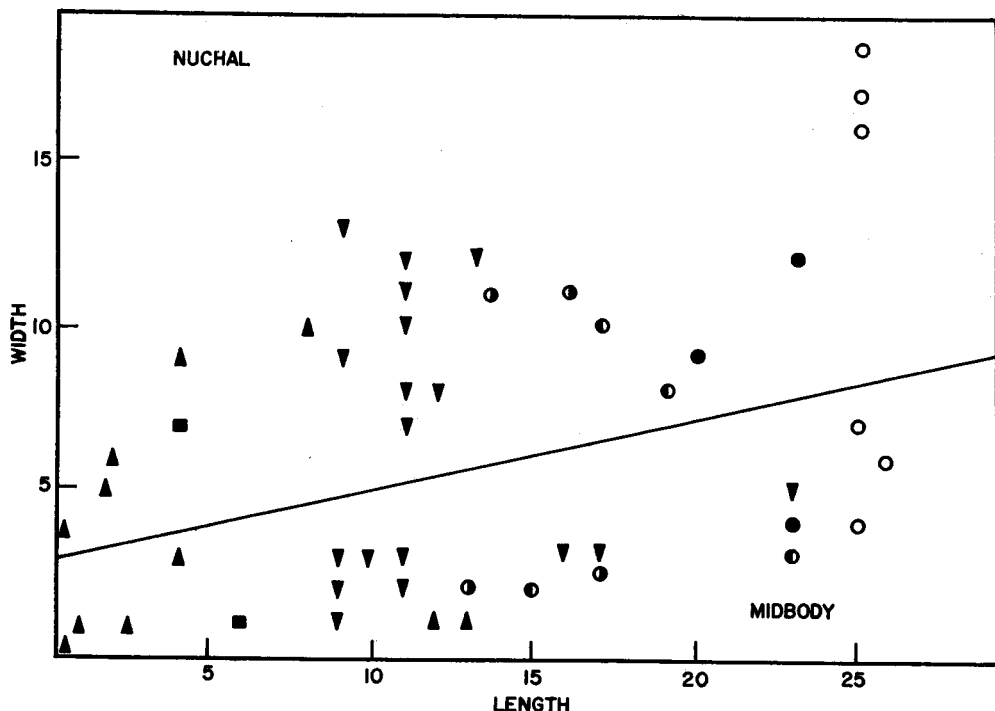


Fig. 2. Width-length relationships of nuchal (above diagonal line) and midbody red markings in forms of the *Lampropeltis mexicana* complex. Triangles represent *alterna*, squares *greeri*, inverted triangles *mexicana*, solid circles *thayeri*, hollow circles *blairi*; circles with a solid right half are *blairi*  $\times$  *alterna*, with a solid left half *mexicana*  $\times$  *thayeri*. Duplications are omitted.

black border may be diffuse or missing anteriorly (USNM 120823—*mexicana*, MCZ 19551—*thayeri*). Extreme reduction or loss of the dorsal head marking coupled with reduction of the nuchal blotch is usual in *alterna*, but remnant black spots and parts of the red center may be present (ANSP 14977). One specimen of *blairi* (UMMZ 121400) has a uniformly black head; all other specimens of each form have gray heads with darker dorsal and postocular markings. The snout is typically gray, mottled with black.

A postocular black stripe, extending from the postocular scales through the anterior temporals to the last two or three supralabials, is typical of all forms. However, it may be limited to a single spot on one postocular scale (MCZ 19022—*mexicana*, MCZ 19551—*thayeri*, MSU 190—*greeri*) or expanded into a rounded blotch (CNHM 30820—*thayeri*). It is usually light-bordered.

Variation in the number of black-bordered red blotches is also indicative of subspecific relationships (Table 1). These markings, squarish in *mexicana*, decrease in number

to the north where they become successively, rings in *thayeri* and broad saddles in *blairi*. This trend is reversed to the west in *greeri* which has narrow saddles, and in *alterna*, the northernmost form, which has many small rings or saddles with apparent sexual dimorphism in this character. On each specimen red scales were counted longitudinally along the body midline and diagonally to include the most red scales from one side of the body to the other, thus, providing a width-length blotch size relationship (Fig. 2).

#### INTERMEDIATE SPECIMENS

At least four specimens combine color characteristics of geographically adjacent forms (compare Figs. 2, 3). However, the degree to which scale characters vary renders interpretation of intergrades difficult on this basis alone. Of the three juveniles of *thayeri* from near Galeana, Nuevo León, Mexico, only one (CNHM 30821) has the characteristic ringed pattern. The others are both blotched and ringed (see above); the blotches are, in outline, like those of a

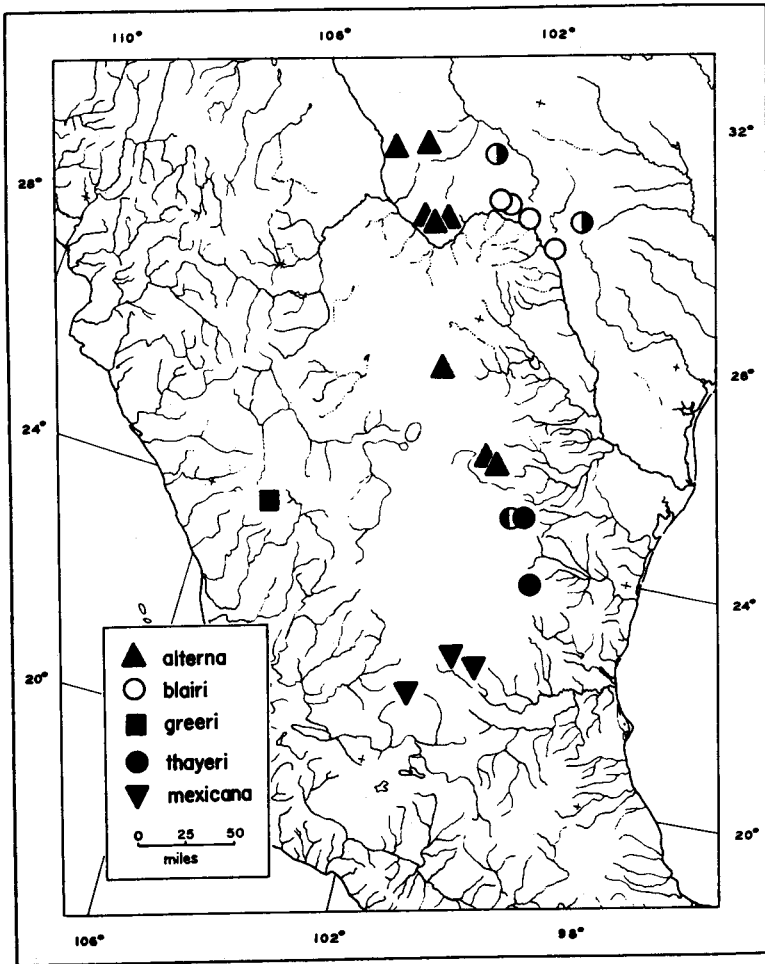


Fig. 3. Distribution of forms of the *Lampropeltis mexicana* complex in Texas and Mexico. Half-solid symbols as in Fig. 2.

typical juvenile of *mexicana* (MCZ 19025). Furthermore, CNHM 30820, a female, has only 204 ventrals, closely approximating the 200 maximum known in females of *mexicana* (Table 1). Some blotches, joined in an aberrant zig-zag pattern, are broken mid-dorsally in this specimen.

The kingsnake referred to *alterna* (TNHC 7420) by Mecham and Milstead (1949) is geographically and morphologically close to *blairi*. It has a large, well-defined nuchal blotch and only 15 narrow, red body blotches, but like *alterna* has broken black bands or spots in all gray interspaces. A specimen from the opposite end of the range of *blairi* resembles TNHC 7420 in the shape and relative number of blotches (Fig. 1). Its

black bands or spots are limited to the first four interspaces anteriorly with remnant spots in four posteriorly. No other individuals of *blairi* have prominent interspace markings. Red body blotches caudad of the nuchal are four or more scales wide mid-dorsally in *blairi*, one to three scales wide or absent in *alterna* (Fig. 2); they are one to four scales wide in TNHC 7420 and one to six in UMMZ 122688.

In preceding meristic analyses, TNHC 7420 is grouped with *alterna*, UMMZ 122688 with *blairi*, and CNHM 30819-20 with *thayeri* in agreement with predominant color characteristics and geography. Only color pattern distinguishes the majority of specimens of each form (see Webb, 1961:331),

although the number of dorsal scale rows and labials may supplement diagnosis of *thayeri*, *alterna*, and *blairi*, and number of ventrals will aid in determining *mexicana*. We consider *alterna*, *blairi*, *greeri*, *thayeri*, and *mexicana* to be conspecific in view of their basic resemblances and the clinal nature of variation in this complex. We relegate each name to subspecific status.

*Lampropeltis mexicana mexicana* (Garman)

*Ophibolus triangulus* var. *mexicanus* Garman, 1883: 66.

*Coronella mexicana*, Günther, 1893: 110.

*Oreophis boulengeri* Dugès, 1897: 284-85, figs. a-h; Smith and Necker, 1943: 206-8, fig. 3.

*Lampropeltis leonis* (nec. Garman), Loveridge, 1924: 138-39.

*Lampropeltis mexicana*, Blanchard, 1921: 245-47, fig. 77; Smith, 1942: 202-6, pl. 1, figs. 2, 3; Smith, 1944: 141-42; Webb, 1961: 326-33.

*Lampropeltis mexicana alterna* (Brown)

*Ophibolus alterna* Brown, 1902: 612-13, pl. 34.

*Ophibolus alternus*, Strecker, 1915: 39.

*Lampropeltis alterna*, Blanchard, 1921: 247-49, fig. 78; Murray, 1939: 9-12, fig. p. 10; Smith, 1942: 204-6; Smith, 1944: 141-44; Wright and Wright, 1957: 331-42, map 31, fig. 103; Webb, 1961: 326-33.

*Lampropeltis mexicana thayeri* Loveridge

*Lampropeltis thayeri* Loveridge, 1924: 137-39; Smith, 1944: 140-42; Webb, 1961: 328-32, fig. 2.

*Lampropeltis mexicana blairi* Flury

*Lampropeltis blairi* Flury, 1950: 215-17; Axtell, 1951: 313, pl. 1; Wright and Wright, 1957: 343-45, map 31, fig. 102; Webb, 1961: 328-32.

*Lampropeltis mexicana greeri* Webb

*Lampropeltis greeri* Webb, 1961: 326-33, fig. 1.

*Lampropeltis leonis* (Günther)

From examination of the type (BMNH 89.7.3.41, reregistered as 1946.1.4.10), Charles F. Walker has provided the following new data: paired apical scale pits present on some dorsal scales (originally described as absent);

labials 7/10 left, 6/8 right; dorsal scale rows, 21-23-21; total length, 599 mm; tail length, 92 mm; tail abruptly narrowed behind vent suggesting that it is female; head distinct from neck but not strongly so; black blotches scattered widely either on left or right side of belly; tail marked below with a median, quasi-symmetrical black band on basal two-thirds, broadly interrupted three times on distal third. Concerning the head shape and pattern, Walker (*in litt.*) states, "figures in Biologia seem quite an accurate representation." J. C. Battersby (*in litt.*) concurs in the presence of scale pits and adds that 197 ventrals and 51 subcaudals are present excluding the anal plate and tail spine.

*L. leonis* has been omitted from preceding comparisons, since the above information sheds little new light on its relationships. For the present we regard it as a distinct species related to *mexicana* (see Smith, 1942, 1944). Blanchard (1921:138) and Webb (1961) consider *leonis* close to *Lampropeltis calligaster*.

#### NATURAL HISTORY

Kingsnakes of the *mexicana* complex occur in xeric to subhumid habitats from Guajuato and San Luis Potosí, Mexico, north to Jeff Davis and Pecos counties, Texas (Fig. 3). This distribution lies within the confines of the Mexican Plateau and adjacent mountains and approximates the Chihuahuan Desert ecologic formation (see Jaeger, 1957: map p. 35; Milstead, 1960: fig. 1). It is similar to the ranges of *Elaphe subocularis* and *Trimorphodon wilkinsoni* among medium-sized, nocturnal colubrid snakes.

Specimens of *blairi* are recorded from 2,200-2,800 feet elevation (Wright and Wright, 1957:343). The senior author took one at 1,350 feet in a limestone area characterized by saltbush, mesquite, yucca, and desert willow. *L. m. alterna* has been collected in catclaw-gramma (Jameson and Flury, 1949:68) and mesquite-creosote (Milstead, Mecham, and McClintock, 1950:545) associations, and ranges from 1,500 to at least 6,000 feet (Minton, 1959:48; Wright and Wright, 1957:337). Specimens recently collected by William G. Degenhardt in the Chisos Mountains, Texas, are from 5,290 and 5,600 feet. Two individuals of *alterna* were discovered in rock crevices (Murray, 1939:11; Smith, 1941). The single specimen of *greeri* came from 7,400 feet in a

rocky canyon covered with yellow pine, scrub oak, juniper, and madroño (Webb, *in litt.*). Ecological data are not available for *thayeri* or *mexicana*.

A specimen of *blairi* × *alterna* was taken by the junior author in Dunbar Cave, Edwards County, Texas, a limestone sinkhole surrounded by juniper, scrub oak, algerita, and opuntia. Such sinks are natural traps for epigeal species that cannot climb out and, therefore, must not be considered typical habitat. *Crotalus atrox*, *Elaphe obsoleta*, *Hypsiglena torquata*, *Thamnophis cyrtopsis*, *Bufo punctatus*, *B. speciosus*, *Rana pipiens*, *Syrrophus marnocki*, and *Eleutherodactylus augusti* have also been collected in Dunbar Cave. Only the last two frogs are natural inhabitants; the absence of lizards is significant.

Diurnal lizards constitute the chief prey of *L. mexicana*, although mammals may occasionally be eaten. We found *Eumeces* sp. in one juvenile of *mexicana*. Smith (1944: 140) reported *Sceloporus grammicus* in *thayeri*, and Mecham and Milstead (1949) took *S. undulatus* from *alterna* × *blairi*. Murray's (1939:11) specimen of *alterna* was attempting to swallow *S. poinsetti* when discovered; a dead *alterna* found by Degenhardt (pers. comm.) contained *Cnemidophorus* sp. In captivity a *blairi* × *alterna* kept by the junior author ate *S. undulatus*; Axtell (1951) and Wright and Wright (1957:345) reported that *blairi* accepted mice, *Sceloporus merriami*, *S. olivaceus*, *S. variabilis*, and *Holbrookia texana*. *L. m. alterna* has also eaten mice in captivity (Degenhardt, pers. comm.). Axtell (1951) said that his specimen of *blairi* did not use close, constricting coils in feeding as did other *Lampropeltis*.

Individuals of *alterna*, *blairi*, and *greeri* have been caught between 9:15 PM and midnight (Axtell, 1951; Degenhardt, *in litt.*; Jameson and Flury, 1949; Mecham and Milstead, 1949; Webb, 1961). This indicates nocturnal foraging habits as suggested by the large eye characteristic of these kingsnakes. However, Axtell (1951) has noted crepuscular in addition to nocturnal activity in a captive of *blairi*. A freshly killed specimen of *blairi* was collected by the senior author at 6:15 PM when the air temperature was 93°F, and Murray (1939:11) observed *alterna* active at 8:00 AM.

## SPECIMENS EXAMINED

*L. m. mexicana*. MEXICO.—San Luis Potosí: (MCZ 4652-3, co-types), Alvarez (MCZ 19022-5, 24976-9; AMNH 77602; USNM 120823). *L. m. alterna*. MEXICO.—Coahuila: Cuatro Ciénegas (CNHM 47090), Cruz Verde Mt. nr. Saltillo (USNM 110819), 12.6 mi. NNW Saltillo (ECT 864); UNITED STATES.—Texas: Brewster Co., Casa Grande Peak, Chisos Mts. (SM 6444), Upper Green Gulch, Chisos Mts. (WGD 1680), Basin, Chisos Mts. (WGD 1427), Presidio Co., Fox Hollow, Sierra Vieja Mts. (TNHC 4181), Jeff Davis Co., Davis Mts. (ANSP 14977, type). *L. m. thayeri*. MEXICO.—Tamaulipas: Miquihuana (MCZ 19551, type), Nuevo León: Ojo de Agua nr. Galeana (CNHM 30821). *L. m. blairi*. UNITED STATES.—Texas: Terrell Co., 8.8 mi. W Dryden (TNHC 4772, type), 10 mi. W Dryden (RWA 1456), Val Verde Co., 0.7 mi. NNE Langtry (UMMZ 121400). *L. m. greeri*. MEXICO.—Durango: 29 mi. WSW Cd. Durango (MSU 190, type). *L. m. blairi* × *alterna*. UNITED STATES.—Texas: Pecos Co., 15 mi. W Bakersfield (TNHC 7420), Edwards Co., 23 mi. SW Rocksprings (UMMZ 122688). *L. m. mexicana* × *thayeri*. MEXICO.—Nuevo León: Ojo de Agua nr. Galeana (CNHM 30819-20).

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