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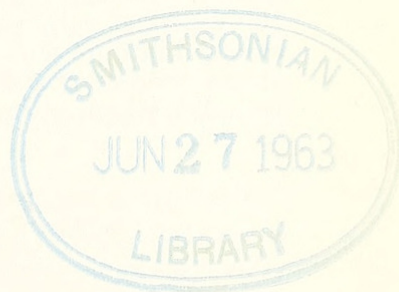
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A COLLECTION OF REPTILES AND AMPHIBIANS FROM THE
HIGHLAND FAUNAL ASSEMBLAGE OF WESTERN MEXICO

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A COLLECTION OF REPTILES AND AMPHIBIANS FROM THE HIGHLAND FAUNAL ASSEMBLAGE OF WESTERN MEXICO

By ROY W. MCDIARMID¹

ABSTRACT: Data taken from 21 species of reptiles and amphibians from western Mexico indicate the herpetofauna to be part of the highland faunal assemblage. Elements of the assemblage are assigned to three separate faunal groups: (1) the coastal lowlands; (2) the foothills of the Sierra Madre Occidental and the western border of the Mexican Plateau; (3) the Mexican Plateau. *Hyla smaragdina* is reported for the first time in Nayarit and *Rana sinaloae* is new to the fauna of Jalisco.

During the past 20 years a number of herpetofaunal studies have been conducted in western Mexico. Most of these studies were reports on amphibians and reptiles from miscellaneous localities. A few workers have approached the faunal studies in this region from an ecologic and geographic aspect. The first such study, by Bogert and Oliver (1945), was on the herpetofauna of Sonora. These authors analyzed the faunal elements from a geographic viewpoint and commented on the transition of various species from the tropical plant formations of the south to the temperate desert regions in the northern part of the state. Duellman (1958) presented a preliminary analysis of the herpetofauna of Colima. Zweifel (1960) discussed the herpetofauna of the Tres Mariás Islands with reference to its derivation from the mainland fauna. Duellman (1961) gave a full account of the species of reptiles and amphibians inhabiting the state of Michoacán. In his presentation he gave a brief description of the natural landscape of the area and analyzed the various species assemblages of the major faunistic groups.

In February and August of 1957 Dr. T. H. Lewis, while conducting research on the medicinal effects on the peyote cactus (*Lophophora*), made a collection of 189 amphibians and reptiles representing 29 species from the states of Nayarit and Jalisco. The greater portion of this collection (that reported herein) was made in a remote part of the Sierra de Los Huicholes along the Nayarit-Jalisco border (Fig. 1). The material was presented to the University of Southern California for study and is deposited in the Los Angeles County Museum (LACM). In the following species account the first number(s) in parentheses are the field number(s), the second number(s) are the LACM museum catalog number(s).

The species taken by Dr. Lewis and discussed in this paper are members of the highland faunal assemblage, according to Duellman (1961). The report adds to existing ideas concerning the highland faunal assemblage and substantiates present ideas concerning the distribution and relationships of various herpetofaunal elements in western Mexico.

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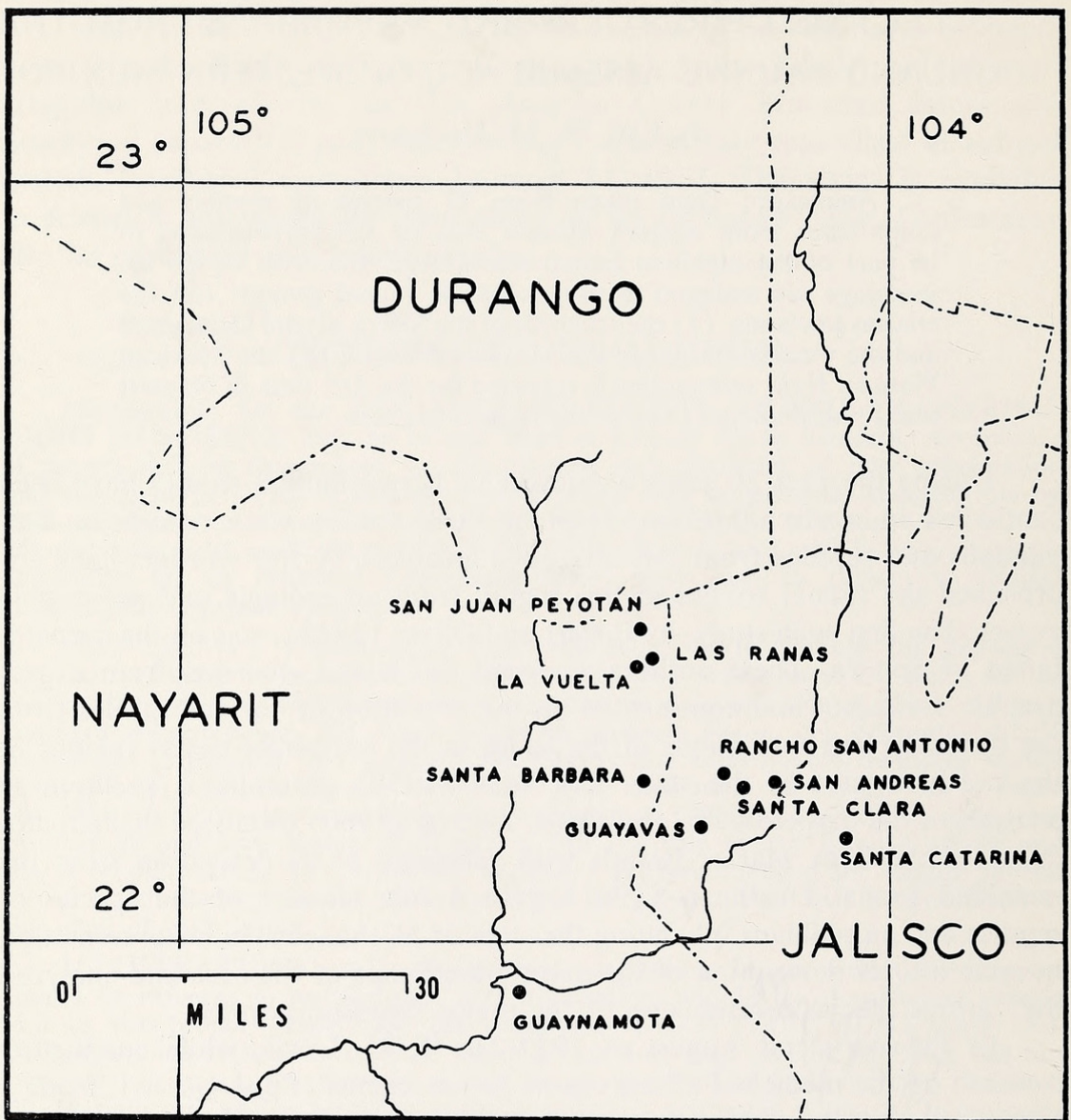


Fig. 1. Map of the Sierra de Los Huicholes along the Nayarit-Jalisco border showing localities at which amphibians and reptiles were collected and key geographic landmarks.

ACKNOWLEDGMENTS

I wish to extend my appreciation to Dr. T. H. Lewis for the privilege of reporting on the collection and for providing valuable information on the specimens and the study area. I also thank Mr. Anthony Gaudin for his exact drawings of the tadpole of *Hyla smaragdina*. I especially extend my appreciation to Dr. Jay M. Savage for his aid in identification of the specimens and for his valuable criticisms of the manuscript.

PHYSIOGRAPHY AND VEGETATION

The entire region, which includes the Sierra de Los Huicholes, is located on the Pacific side of the western edge of the Mexican Plateau. The area is extremely broken in topography with deep barrancas and steep trails. As a result of the irregular terrain the presence of various vegetational elements depends on the elevation and slope.

The vegetation is composed of elements from the oak-woodland and tropical deciduous forest plant associations (Leopold, 1950). The oak-woodland association forms a narrow belt on the western slope of the Sierra Madre Occidental dominated by deciduous oaks and harsh bunch grasses (Fig. 2).



Fig. 2. Oak-woodland association characteristic of the Sierra de Los Huicholes near La Vuelta.

The elements from the tropical deciduous forest are characteristic of the higher elevations of the Pacific Coastal Plain, and are abundant along the larger rivers and streams of western Mexico.

Some of the common plants of this mixed plant formation are *Acacia*, *Pithecolobium*, *Ficus*, *Bursera*, *Bombax*, *Haematoxylon*, and the epiphyte, *Tillandsia*. At somewhat higher elevations, various oaks are dominant, among them *Quercus conspersa* and *Quercus magnoliaefolia*. Pines are found only at the highest elevations in the area.

SPECIES ACCOUNT

SALIENTIA

Bufo marinus (Linnaeus)

Three specimens (215-217; LACM 1797) of this large ubiquitous toad were collected at La Vuelta, Nayarit on August 20, 1957. *Bufo marinus* is abundant throughout Nayarit and coastal western Mexico from southern Sonora to Guatemala.

Bufo mazatlanensis Taylor

Bufo mazatlanensis was collected at two localities in Nayarit. Two adults (22, 249; LACM 1798) and two juveniles (235, 236; LACM 1799) were taken at La Vuelta on August 26, 1957. Cranial crests are not well developed on the juvenile specimens, which measure 21 mm. snout-vent length respectively. A series of nine young toads (240-248; LACM 1800) was obtained on August 10 and 11, 1957, at Las Ranas. The young toads measure from 23 mm. to 33 mm. snout-vent length.

In western Mexico *Bufo mazatlanensis* ranges from northern Sonora southward to northern Jalisco.

Bufo occidentalis Camerano

Two adults (218, 219; LACM 1801), measuring 66 mm. and 64 mm. snout-vent length respectively, were collected on August 20, 1957, at La Vuelta, Nayarit. Six days later two additional toads (253, 254; LACM 1802) were collected at the same locality. They measure 55 mm. and 73 mm. snout-vent length.

The presence of *Bufo occidentalis* near La Vuelta agrees with the study by Duellman (1961) in which he found this toad to be nearly restricted to the pine-oak association above 900 meters in Michoacán. *Bufo occidentalis* is found along the foothills in western Mexico from Sinaloa southward to Tehuantepec.

Eleutherodactylus augusti cactorum Taylor

An adult male (211; LACM 1803) was collected in Santa Barbara, Nayarit, on August 14, 1957. The frog measures 49.5 mm. snout-vent length and agrees with Zweifel's (1956) ratios of measurement and the color pattern of his specimen. *Eleutherodactylus augusti cactorum* ranges along the foothills of the Pacific coast from southern Arizona to the Isthmus of Tehuantepec.

Eleutherodactylus occidentalis Taylor

One specimen (29; LACM 1804), measuring 28 mm. snout-vent length, was secured in San Juan Peyotán, Nayarit, on February 7, 1957. This frog was collected in the same pond with *Eleutherodactylus rugulosus vocalis*.

Eleutherodactylus occidentalis ranges along the western edge of the Mexican plateau from southern Sinaloa to Colima.

Eleutherodactylus rugulosus vocalis Taylor

A series of specimens, ten juveniles (24-33; LACM 1805) and one adult (21; LACM 1806), is referred to this subspecies. All the specimens were col-

lected in a pond in a dry river bed at the bottom of a deep barranca near La Vuelta, Nayarit, on February 7, 1957. The juveniles vary in length from 21 mm. to 36 mm. The adult measures approximately 51 mm. snout-vent length. The nose of this specimen is badly defaced and exact measurements are impossible to determine. Dorsal color of the juveniles in life ranged from dark gray through greenish to brick red. Ventral surface of the hind legs was sulfur yellow.

Eleutherodactylus rugulosus vocalis, as reported by Duellman (1958, 1961), occurs in the foothills of the Sierra Madre Occidental from central Sinaloa southward into Michoacán.

Hyla smaragdina Taylor

On August 21, 1957, five tadpoles and one metamorphosing frog were collected in a swift running stream in a deep barranca near Santa Barbara, Nayarit. All the larvae were adherent to rocks in the stream. Upon examination, the larvae were found to be similar to the tadpoles of the southern Mexican frog *Hyla sumichrasti* figured and described by Starrett (1960), and different from all other larvae of the genus. The tadpoles differ from *sumichrasti* in the following significant characteristics: (1) more depressed body; (2) shorter tail in proportion to body; (3) more elongate and robust spiracle tube located lower on the body; (4) a shorter third row of anterior denticles; and, (5) all six posterior denticle rows of equal length (in *sumichrasti* only the first three are of equal length and the others are shorter). On the basis of these differences the tadpoles from Santa Barbara are assigned to *Hyla smaragdina*, a close relative of *Hyla sumichrasti* from western Mexico. Scrutiny of the metamorphosing froglet reveals striking similarities with *Hyla smaragdina* figured by Taylor (1940) in significant characteristics and confirms the identification.

Description of Tadpole: Six specimens (259; LACM 1807), (Figs. 3-4).

Body elongate and tapering; greatest depth about one-third of length from tip of snout to anal opening and two-thirds of greatest width; tail length one and one-half times as long as body; tail musculature not quite reaching the slightly rounded tip; dorsal tail fin not extending onto body. Eyes dorsal; interorbital distance about one-third of body width; nostrils much closer to eyes than to snout. Spiracle sinistral, forming a tube opening two-thirds of way back on body and two-thirds of depth from dorsal surface; anal tube long, dextral. Dorsal color on body consisting of scattered brown pigment occasionally forming small blotches; belly light; tail musculature exhibiting brown reticulations; blotches of brown pigment on dorsal tail fin, fewer on posterior half of ventral tail fin.

Mouth large, ventrally located; nearly equal to width of body; lips wide, completely bordered by papillae surrounding mouth. Denticle rows 3/6; anterior (upper) two rows about equal in length, third row slightly shorter; denticles of innermost row heaviest; posterior rows complete, all six of about equal

length; denticles heaviest on innermost row decreasing row by row posteriorly; larger specimens show a rudimentary seventh row. Beaks well developed and serrated; lighter triangle in center of anterior beak.

Hyla smaragdina ranges along the Pacific slope of the Sierra Madre Occidental from Morelos northward to Nayarit. The new locality, the first record for Nayarit, extends the known range of the species northward about 200 miles. This species probably occurs along the western slope of the mountains in Sinaloa and Durango.

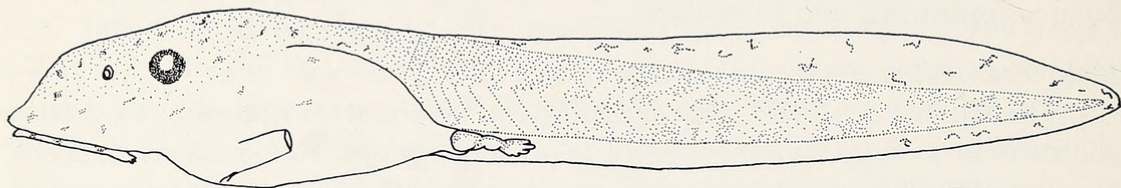


Fig. 3. Lateral view of a tadpole of *Hyla smaragdina*.

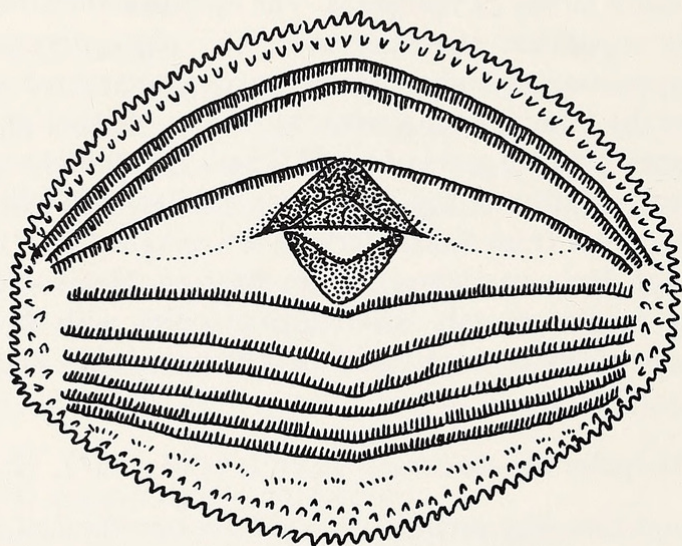


Fig. 4. Mouthparts of a tadpole of *Hyla smaragdina*.

Phyllomedusa dacnicolor Cope

A series of 34 tadpoles (LACM 1808) was collected on different days in August in a slow meandering stream in San Juan Peyotán, Nayarit. The larvae were at various stages of development. One larva has four legs apparent but there is no indication of tail reduction; another larva has two legs; 24 larvae measure about 46 mm. total length; the remaining eight vary in size from 13 to 31 mm. total length. No adults were collected in the area. In coloration and morphology, these tadpoles agree with the description given by Taylor (1942). The anus is dextral; the spiracle is sinistral; the denticle formula is 2/3.

Phyllomedusa dacnicolor is found from southern Sonora southward to Chiapas along the Pacific slope in western Mexico.

Rana pipiens Schreber

Three specimens (23, 225, 227; LACM 1809) of this wide-ranging frog were collected in La Vuelta, Nayarit. They measure from 45 to 50 mm. snout-vent length.

Rana sinaloae Zweifel

Four specimens (222-224, 226; LACM 1810) of this ranid were taken on August 19, and 20 in La Vuelta, Nayarit. The measurements are as follows: snout-vent lengths 50, 41, 45.2, 37 mm.; head widths 17, 14.2, 16.7, 13.9 mm.; head lengths 18, 14.3, 15.8, 13.9 mm.; tibia lengths 28.1, 21.3, 24.1, 21 mm.; tympanum diameters 3.9, 3.1, 4, 3.4 mm. respectively. The tibia length/snout-vent length ratios are 0.562, 0.519, 0.533, and 0.567, respectively. The tympanum diameter/head width ratios are 0.229, 0.214, 0.239, and 0.244, respectively.

Another specimen (256; LACM 1811) was secured on August 22 in Guayavas. This represents the first record of *Rana sinaloae* in Jalisco. Pertinent data for the specimen are: snout-vent length 32.9 mm.; head width 12 mm.; head length 11.9 mm.; tibia length 17.9 mm.; tympanum diameter 2.9 mm. The tibia length/snout-vent length ratio is 0.544. The tympanum diameter/head width ratio is 0.242.

The ratios of tibia length/snout-vent length are slightly higher than that of the holotype (Zweifel, 1954). The highest ratio is about equal to the ratio of the Colima specimen reported by Duellman (1958). The tympanum diameter/head width ratios are higher than that of the type as given by Zweifel and very close to the ratio for the specimen from Colima.

The type locality of *Rana sinaloae* is 14 miles by road southwest of El Batel, Sinaloa at an elevation of 4200 feet. Another individual was collected on the same day 10 miles by road northeast of El Batel at 6400 feet (Zweifel, 1954). Duellman (1958) reports a specimen of *Rana sinaloae* from Pueblo Juarez, Colima at about 1500 feet. Smith (1959) reports a series of seven young *Rana sinaloae* from 18.8 miles northwest of Ahuacatlan, Nayarit. Additional specimens have been collected by me at the type locality in 1960 and again in 1962. The specimens reported in this paper from Nayarit and Jalisco fill in the 175 mile gap between the type locality and the locality reported by Smith in Nayarit.

From the material available it appears that *Rana sinaloae* ranges along the Pacific slopes of the Sierra Madre Occidental from southern Sinaloa to Colima (Fig. 5).

TESTUDINATA

Kinosternon integrum LeConte

A female (201; LACM 1812) of this turtle was collected in a small creek in San Juan Peyotán, Nayarit on August 10, 1957. The specimen measures 116.4 mm. carapace length and 78.9 mm. plastron length. A male *Kinosternon integrum* (213; LACM 1813) was collected near San Juan Peyotán, Nayarit

on August 27, 1957, and measures 164.1 mm. carapace length and 107 mm. plastron length. *Kinosternon integrum* is found in western Mexico from Sonora to Guerrero and eastward to Veracruz.

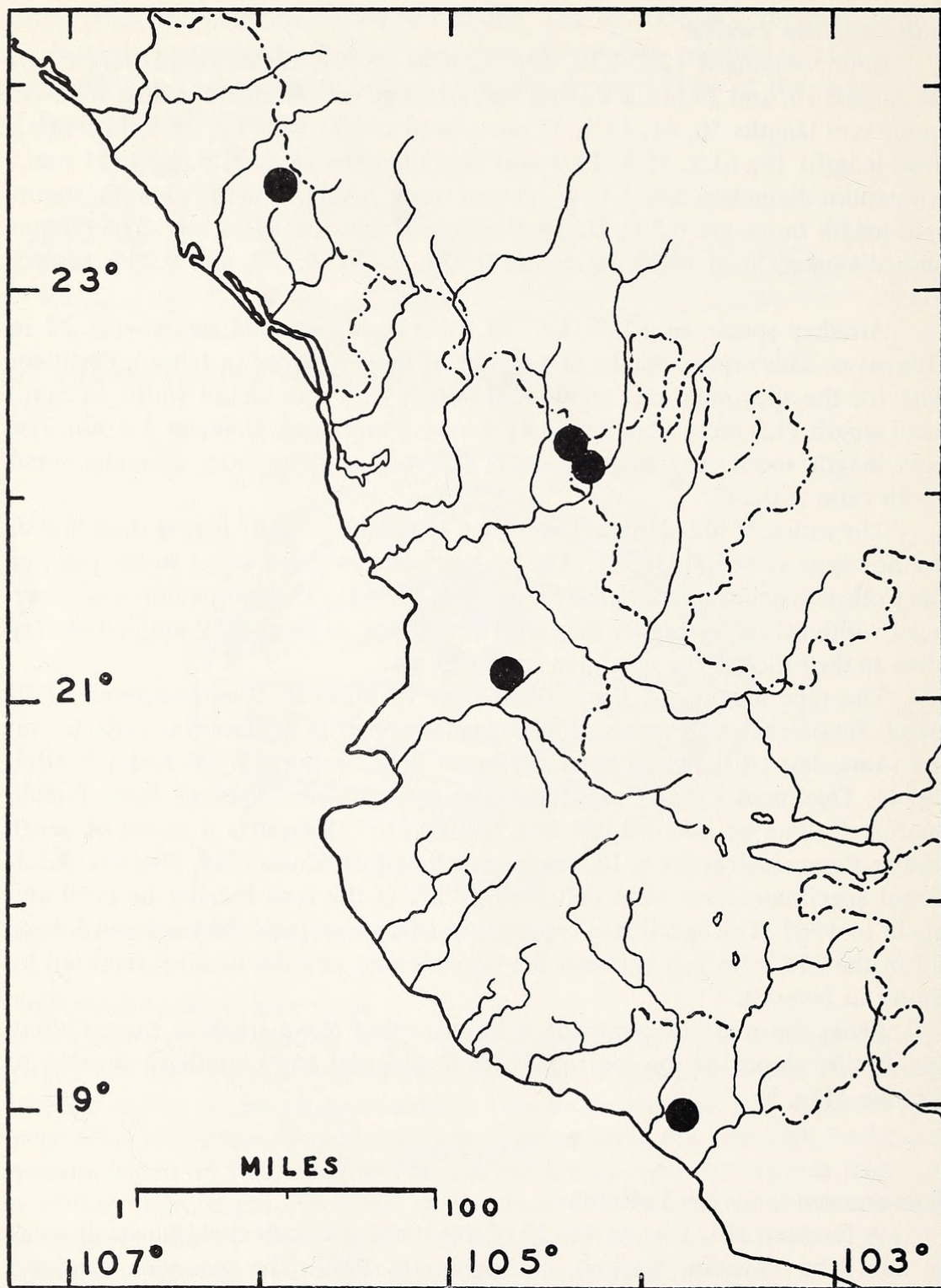


Fig. 5. Map showing the known range of *Rana sinaloae* in western Mexico. Dots indicate localities at which specimens have been collected.

SAURIA

Anolis nebulosus (Wiegmann)

On August 22, 1957, two specimens (220, 221; LACM 1814) of this anole were collected at Guayavas, Jalisco. On August 26 another specimen (257; LACM 1815) was taken at the same locality. The three specimens are females with snout-vent lengths of 40.5, 42.1, 38.8 mm. respectively. *Anolis nebulosus* ranges from Sinaloa to Michoacán.

Phrynosoma orbiculare (Linnaeus)

Two specimens of this lizard were collected in Jalisco. The first (232; LACM 1816) was taken on August 22, 1957, at Guayavas. The specimen, a female, measures 60.8 mm. snout-vent length; 34.5 mm. tail length; 16 mm. head width; 15.4 mm. head length. There are 27 spines on the lateral fringe and 35 femoral pores.

The second specimen (233; LACM 1817) was collected on August 21, 1957 at Santa Clara. This male measures 74 mm. snout-vent length; 56 mm. tail length; 17 mm. head width; 17.8 mm. head length. There are 26 spines on the lateral fringe and 39 femoral pores.

Horowitz (1955) divided *Phrynosoma orbiculare* into five subspecies, *bradti*, *durangoensis*, *cortezi*, *orbiculare* and *orientale*, on the basis of variation in: (1) ratios of total length/snout-vent length; (2) ratios of head width/head length; (3) ratios of occipital horn length/snout-vent length; (4) number of femoral pores; (5) number of spines in the lateral fringe. As presented by Horowitz, the variation expressed by the values for occipital horn length/snout-vent length shows such a great degree of overlap that I consider the ratios of no significance in separating the populations. Examination of the remaining data presented by Horowitz (1955, page 215, Table 1) indicates extensive overlap in the characters which he utilized to distinguish the five subspecies. I am unable to assign the Jalisco specimens to any of the subspecies recognized by Horowitz. Because of the overlap in the range of the variation of characters in the populations recognized by Horowitz, the division of the population into five subspecies is considered unjustified.

Davis (1953) described *Phrynosoma orbiculare alticola* from Morelos, on the basis of comparison with specimens of *Phrynosoma o. orbiculare*. Horowitz's material indicates that the characters of the specimens referred to *alticola* are within the range of variation of *orbiculare*. Under these circumstances *alticola* does not seem to be a valid race.

On the basis of available data in the literature and the studied specimens, it is impossible to segregate *Phrynosoma orbiculare* into recognizable populations. Rather than recognize distinct subspecific populations, it is more reasonable to consider the species as being highly variable and exhibiting minor differences from population to population, and attribute these differences to clinal variation. These conclusions are in accord with the findings of Smith and Laufe (1945).

Phrynosoma orbiculare is known in western Mexico from the Sierra Madre Occidental of Chihuahua, Durango, Jalisco and Zacatecas.

Sceloporus clarkii boulengeri Stejneger

A single male (212; LACM 1818) measuring 109 mm. snout-vent length, was collected on August 14, 1957, at Santa Barbara, Nayarit. The known range of *Sceloporus clarkii boulengeri* is southern Sonora southward to Jalisco.

Sceloporus dugesii dugesii Bocourt

On August 26, 1957, a single specimen (255; LACM 1819) of this *Sceloporus* was collected at La Vuelta, Nayarit. The specimen is a male measuring 46.8 mm. snout-vent length. There is a narrow black nuchal collar, with a posterior light edge passing onto the shoulder; a dark line runs from the eye through the ear to the collar, bordered on both sides by a narrow white line. The dorsal coloration in preservative is blue gray. The specimen agrees in other respects with the diagnosis given by Smith (1939).

The new locality extends the known range of *Sceloporus dugesii dugesii* about 75 miles to the north. The range of the lizard extends from Nayarit to Colima.

Urosaurus bicarinatus tuberculatus Schmidt

Seven specimens of this lizard (8-14) were collected in the Sierra de Los Huicholes south of San Juan Peyotán, Nayarit on February 8, 1957. The specimens were reported by Zweifel (1959c).

Cnemidophorus costatus huico Zweifel

Seven specimens were collected at La Vuelta, Nayarit. Three of these specimens (18-20) were collected on February 8, 1957. The other four (228-231) were taken on August 19, 1957. The seven specimens were reported by Zweifel (1959a).

Heloderma horridum horridum Wiegmann

A beaded lizard was collected on the evening of August 26, 1957 on a trail a few miles south of San Juan Peyotán, Nayarit. The specimen (209; LACM 1820) is a male and measures 293 mm. snout-vent length. Large insect larvae were found in the stomach.

Another male (210; LACM 1821), measuring 315 mm. snout-vent length, was collected on a cool rainy evening in heavy grass above Santa Barbara, Nayarit on August 14, 1957. The stomach of this lizard contained 23 eggs similar in dimensions to quail eggs. The eggs were ruptured and the shells were packed together in a telescopic fashion.

Heloderma horridum horridum is found in western Mexico from central Sinaloa southward to the Isthmus of Tehuantepec.

SERPENTES

Coniophanes lateritius lateritius Cope

A single female (200; LACM 1822) of this seemingly rare snake was collected on August 20, 1957, near Santa Clara, Jalisco. Pertinent data for the

specimen are: 243 mm. snout-vent length; 153 mm. tail length; 136 ventrals; 93 caudals; 19 scales at mid-body; 7 supralabials and 8 infralabials on each side. A black collar extends 8 scale rows posteriorly from the parietals and is bordered posteriorly by a narrow white edge. There are light spots on the head and labial region and dark spots on the throat. The black collar fails to reach the ventrals by one scale row.

The specimen agrees in color and scale counts with the specimen from Puerta Vallarta, Jalisco, described and figured by Smith and Grant (1958) and is similar in color and pattern to the individual from near San Blas, Nayarit, reported by Zweifel (1959c) and again by Wellman (1959). The specimen reported here represents the sixth specimen of this race reported in the literature. Smith and Grant suggest that the type locality of Guadalajara was incorrect and the specimen probably came from a more humid area closer to the coast. Zweifel (1959b) concurs with Smith and Grant. Tanner and Robison (1960) report a specimen from an upland habitat near Magdalena, Jalisco. Duellman (1961) indicates that the subspecies inhabits a broad-leaf forest in the foothills of Michoacán. The latter two records together with the record here reported verifies Guadalajara as the actual type locality, inasmuch as Guadalajara is situated in the same plant formation and at about the same elevation as these localities. *Coniophanes lateritius lateritius* is found in various habitants from central Nayarit southward to Michoacán.

Pituophis deppei deppei Duméril

A large female (214; LACM 1823) was collected on August 21, 1957 at Santa Clara, Jalisco. Pertinent data for the snake are: 1143 mm. total length; 150 mm. tail length; 231 ventrals; 57 caudals; 31 body blotches; 10 caudal blotches; dorsal interspaces 4 to 4½ scales in length.

Pituophis deppei deppei ranges from Chihuahua and southern Coahuila southward on the western slopes of the Sierra Madre Occidental and on the Central Plateau to the Valley of Mexico, southeastern Puebla and adjacent Veracruz.

Thamnophis dorsalis (Baird and Girard)

Three specimens of garter snakes were collected in the study area. A female (250; LACM 1824) was collected on August 20, 1957, at Rancho San Antonio, Jalisco. A second female (251; LACM 1825) was taken at the same locality on August 23, 1957. A third specimen (252; LACM 1826), a male, was collected at Guayavas, Jalisco on August 22. Pertinent data for these snakes are: total lengths 555, 727, 885 mm.; tail lengths 165, 197, 245 mm.; ventrals 158, 159, 158; caudals 91, 79, 91; supralabials 8, 8, 8, respectively.

The color patterns of the three specimens are the same as that described by Milstead (1953) for the subspecies *Thamnophis dorsalis cyclides*. However, the scale characteristics are intermediate between *T. dorsalis dorsalis* and *T. dorsalis cyclides*. These specimens appear to be members of an intermediate population. The intergrading population was discussed by Milstead and

ranges in a wide belt just south of the Tropic of Cancer in southern Sinaloa, Durango and Tamaulipas and in northern Nayarit, Jalisco, Zacatecas and San Luis Potosí.

DISCUSSION

The present report adds to our knowledge of 21 species from a remote part of the Sierra de Los Huicholes along the Nayarit-Jalisco border in western Mexico. It becomes evident that the herpetofauna of the region is a composite of elements from three herpetofaunal groups: (1) the coastal lowlands; (2) the foothills of the Sierra Madre Occidental and the western border of the Mexican Plateau; (3) the Mexican Plateau.

Components of the herpetofauna derived from the coastal lowlands are: *Bufo marinus*, *Bufo mazatlanensis*, *Phyllomedusa dacnicolor*, *Anolis nebulosus*, *Sceloporus clarkii boulengeri*, *Urosaurus bicarinatus tuberculatus*, *Cnemidophorus costatus huico*, *Heloderma horridum horridum*, and possibly *Coniophanes lateritius lateritius*.

Elements from the Mexican Plateau found in the area are: *Phrynosoma orbiculare*, *Pituophis deppei deppei*, and *Thamnophis dorsalis*.

Species which are characteristic of the foothills of the Sierra Madre Occidental and the western part of the Mexican Plateau are: *Bufo occidentalis*, *Eleutherodactylus augusti cactorum*, *Eleutherodactylus occidentalis*, *Rana sinaloae*, and *Sceloporus dugesii dugesii*. *Hyla smaragdina* and *Eleutherodactylus rugulosus vocalis* are species associated with riparian habitats in the area.

Two species, *Rana pipiens* and *Kinosternon integrum*, are widely distributed in both the lowlands and the foothills of the Sierra Madre Occidental.

The highland faunal assemblage described in this paper is a distinct composite of elements from three major faunal groups. Species characteristic of the highland faunal assemblage range in the foothills and along the western edge of the Mexican Plateau from Sinaloa southward to Colima and Michoacán.

Two of the species are state records. *Hyla smaragdina* is new to the fauna of Nayarit, and *Rana sinaloae* is reported for the first time in Jalisco.

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