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## A NEW SPECIES OF *XANTUSIA* (SQUAMATA: XANTUSIIDAE) FROM ZACATECAS, MEXICO

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**ABSTRACT:** We describe a new species of *Xantusia* from near the Río Juchipila in southwestern Zacatecas, México. This southernmost known member of the genus is found in a semitropical habitat on the Pacific versant and lives under exfoliating bark of live mesquites, *Prosopis*. It is most similar in morphology to *X. vigilis* but differs in numbers of undivided fourth toe lamellae and scales composing the caudal annulus.

**Key words:** Squamata; Xantusiidae; *Xantusia sanchezi* new species; Night lizards; México; Zacatecas; Biogeography

LIZARDS of the genus *Xantusia* are found in the arid and semi-arid regions of North America from the Great Basin in Utah to the southern Chihuahuan Desert in Durango and Zacatecas (Fig. 1). Three species previously were known from México, *X. henshawi*, *X. vigilis*, and *X. bolsonae*, the last representing a national endemic found only in the Bolsón de Mapimí of Durango (Flores Villela, 1993a). The species of *Xantusia* are notable for their restriction to specific microhabitats, particularly rock crevices and decaying yuccas and agaves. Within the Xantusiidae, members of the genus *Xantusia* are morphologically unique in having elliptical pupils.

In 1982, while cutting poles for netting bats along the Río Juchipila in southwestern Zacatecas, Oscar Sánchez Herrera (Instituto de Biología, UNAM) discovered a strange individual of *Xantusia* under the bark of a live mesquite. This is an unusual microhabitat for *Xantusia*, 450 km south of the nearest previously known occurrence of the genus, and our examination of the specimen revealed the presence of unique morphological features. Subsequent field work by the authors resulted in additional material from the locality, and comparisons with all other members of the genus confirm that the specimens represent a previously undescribed species.

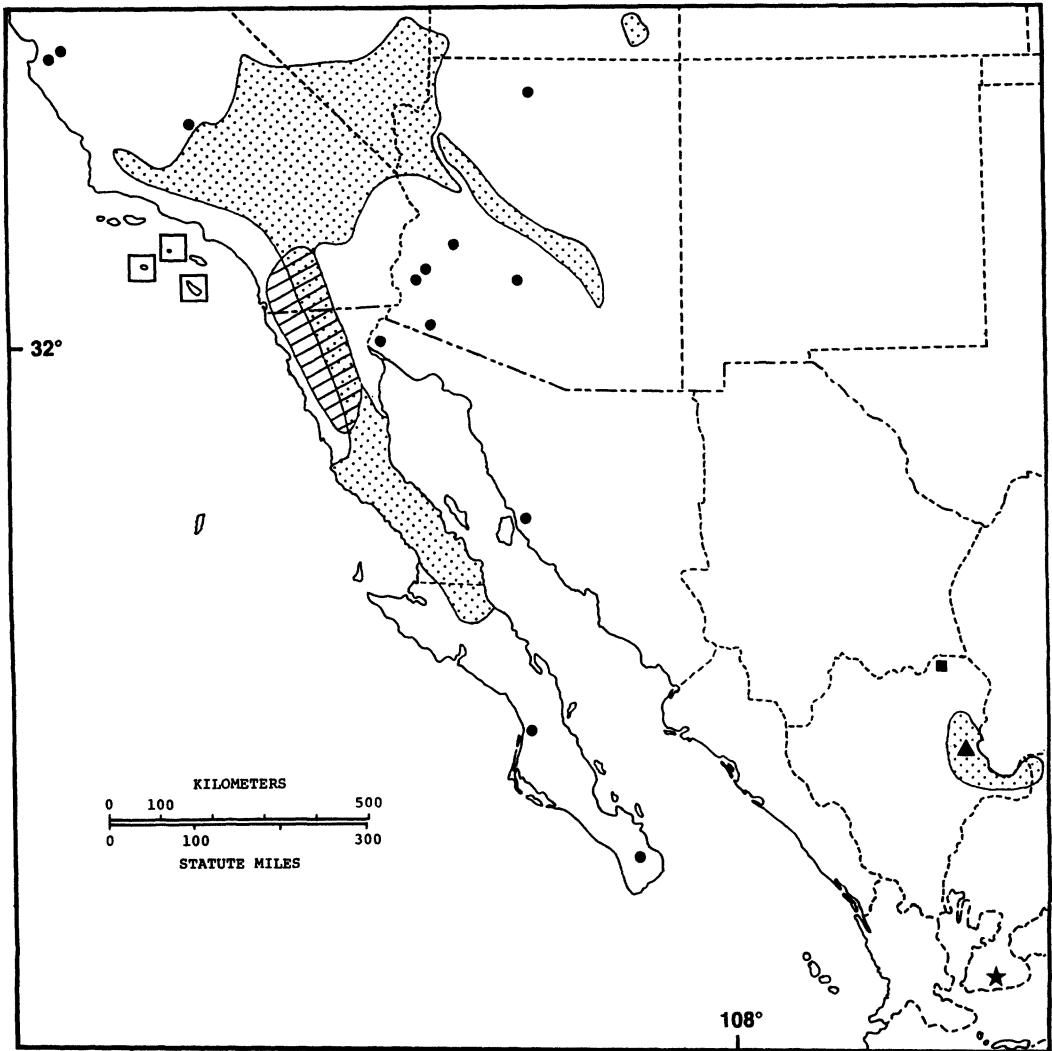


FIG. 1.—Geographical distribution of the five living species of the genus *Xantusia*. Open boxes = *X. riversiana*; diagonal lines = *X. henshawi*; stippled pattern and solid dots = *X. vigilis*; solid triangle = *X. bolsonae*; solid star = *X. sanchezi*; solid box = unassigned specimen (see text).

#### MATERIALS AND METHODS

Comparative data were taken from a total of 160 specimens representing all nominal species of *Xantusia* and all nominal subspecies of *X. vigilis* (Appendix I). We used BMDP statistical software (Dixon, 1990) for data analysis. The karyotype preparation and terminology follow Bezy (1972).

We recorded data for a total of 17 characters of scalation (scale terminology generally follows Savage, 1963): femoral pores

(one leg; FP); lamellae under the fourth toe (FTL); undivided lamellae under fourth toe (i.e., lacking a mid-ventral suture; FTLU); scales in second caudal annulus (CAW); gulars (along mid-ventral line) between fold and first labial suture (GUL); supralabials from anterior-most (contacting rostral) to last supralabial contacting the orbit (SLO); supralabials (anterior-most to above rictum; SL); enlarged infralabials bordering labium (excluding small scales at the posterior end of the

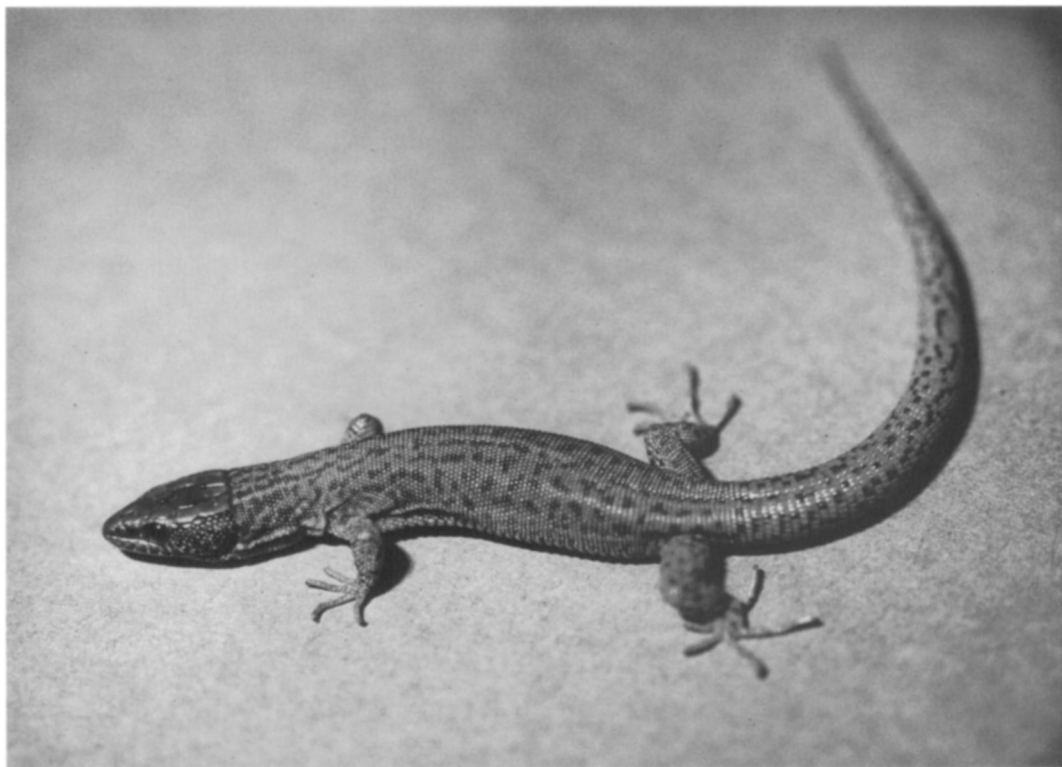


FIG. 2.—The holotype (MZFC 4756; snout-vent length = 43 mm) of *Xantusia sanchezi* in life.

row; ILE); total enlarged infralabials (including large scales separated from labium by small anomalous scales along the posterior labial border; ILT); ventrals (along midline) from the anterior-most enlarged transverse row to the vent and including preanals (V); dorsals around midbody (i.e., above transverse row of ventrals that is half of total number of transverse ventral rows; DAB); number of scales in sixth longitudinal row (from the ventral midline) contacting a string of 20 ventrals in the adjacent fifth longitudinal ventral row (V6); number of scales in seventh longitudinal row (from the ventral midline) along a string of 20 ventrals in the fifth longitudinal ventral row (V7); interpostparietal length/postparietal length (RIPP); eye height/fifth supralabial height (RE); sixth infralabial height/fourth infralabial height (RIL6); and seventh infralabial height/fourth infralabial height (RIL7).

*Xantusia sanchezi* sp. nov.

Sanchez's Night Lizard

*Holotype*.—MZFC 4756 (field no. OFV 369; Fig. 2), an adult male from 5 km (via Hwy 54) N Moyahua de Estrada, Municipio de Moyahua, Zacatecas, México (21° 19' N, 103°10' W; approximately 1200 m elev.) on 23 September 1990 by O. Flores Villela and R. L. Bezy.

*Paratypes*.—MZFC 4759–62, LACM 144220–21: topotypes (Fig. 3); MZFC 3120: 4 km N Moyahua, Zacatecas, México.

*Diagnosis*.—*Xantusia sanchezi* differs from *X. riversiana*, *X. henshawi*, and *X. bolsonae* (Table 1) in having fewer dorsals around midbody (38–40 versus 46–80) and fewer than 14 longitudinal rows of ventrals at midbody. For the populations of *X. vigilis*, it differs from all (except some specimens of *X. v. vigilis*) in having more than six undivided fourth toe lamellae (i.e., la-

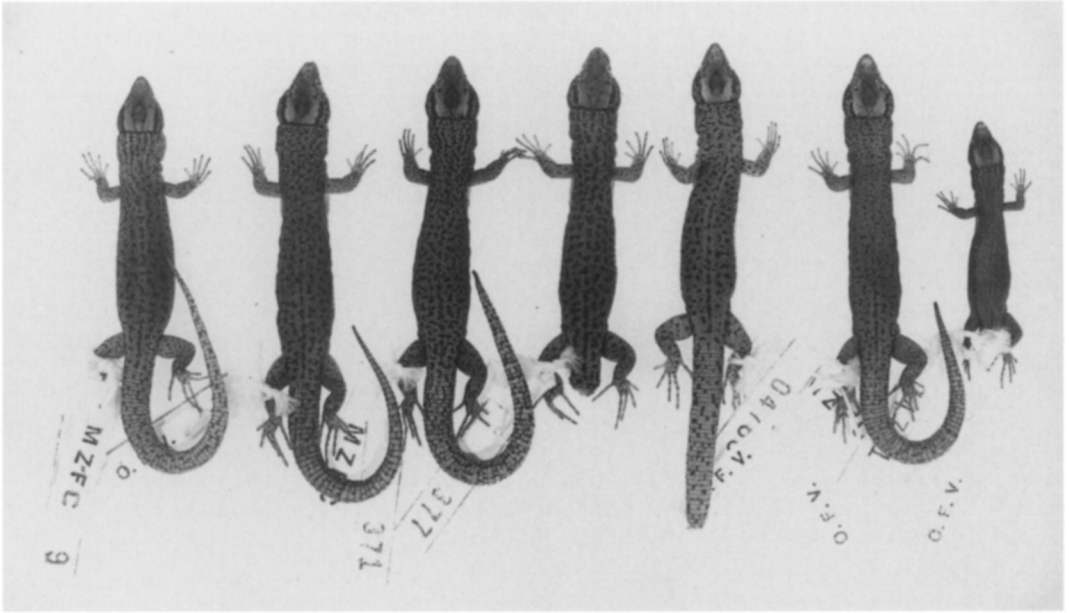


FIG. 3.—The type series of *Xantusia sanchezi* illustrating variation in dorsal color pattern.

mellae that lack midventral sutures) and from all (except some specimens of *X. v. wigginsii*) in having fewer than 29 scales composing the second caudal annulus. In addition to these two characters, *X. sanchezi* differs from the currently recognized subspecies of *Xantusia vigilis* by the following scale characters, most of which are non-overlapping (Table 1): from *X. v. extorris*, in having more femoral pores (9–11 versus 6–7), and a larger sixth infralabial (1.40–2.00 versus 0.73–1.39); from *X. v. gilberti*, in having more femoral pores (9–11 versus 6–7), more fourth toe lamellae (21–23 versus 16–18), more dorsals around midbody (38–40 versus 30–36), more scales in the sixth longitudinal row of ventrals (28–38 versus 21–27), a larger interpostparietal (0.25–1.00 versus 0.12–0.20), and a larger eye (2.41–3.11 versus 1.50–1.89); from *X. v. wigginsii*, in having more femoral pores (9–11 versus 6–8), a larger sixth infralabial (1.40–2.00 versus 0.93–1.39), and usually more fourth toe lamellae (21–23 versus 18–21); from *X. v. arizonae*, in having fewer fourth toe lamellae (21–23 versus 24–30) and fewer dorsals around midbody (38–40 versus 43–49); from *X. v. utahensis*, in having more total enlarged

infralabials (7–8 versus 6), more ventrals (33–36 versus 31–32), more scales in the sixth longitudinal row of ventrals (28–38 versus 23–25), a larger interpostparietal (0.25–1.00 versus 0.09–0.11), a larger sixth infralabial (1.40–2.00 versus 1.10–1.36), and a larger seventh infralabial (1.00–1.68 versus 0.56–0.75); from *X. v. sierrae*, in having fewer dorsals around midbody (38–40 versus 41–44) and usually fewer gulars (30–38 versus 38–44); and from *X. v. vigilis*, usually in having more ventrals (33–35 versus 30–33).

*Description of holotype.*—Measurements (in mm): snout–vent length, 43; tail length, 57 (complete); head length, 9.9; head width 6.4; head depth, 3.9; orbit length, 1.9; fourth toe length, 5.1.

**Dorsal surface of head:** rostral broader than high, followed in order by two nasals (in contact medially); a frontonasal; two prefrontals (in broad contact); a median prefrontal; two frontals (in narrow contact); an interparietal (with parietal organ faintly visible) separating (lateral) parietals; and two postparietals (separated by a large median interpostparietal). **Lateral surface of head:** nostril bordered by rostral, nasal, postnasal, and first supralabial.

TABLE 1.—Variation in 17 scale characters for 17 samples of *Xantusia*. In each cell the upper figure is the mean, the middle is the standard error, and the lower are the observed limits of variation.

Sample	<i>v. vigilis-1</i>	<i>v. vigilis-2</i>	<i>v. vigilis-3</i>	<i>v. sierrae</i>	<i>v. utahensis</i>	<i>v. arizonae-1</i>	<i>v. arizonae-2</i>	<i>v. wigginsii-1</i>
<i>n</i>	10	20	10	10	3	10	10	10
FP	9.0 0.15 8-10	9.0 0.14 8-10	8.8 0.29 8-10	11.0 0.21 10-12	10.3 0.33 10-11	11.7 0.34 10-14	10.9 0.23 10-12	7.0 0.26 6-8
FTL	19.4 0.27 18-20	21.2 0.32 19-23	20.6 0.22 20-22	23.0 0.26 22-24	23.3 0.33 23-24	27.3 0.56 25-30	26.6 0.50 24-29	19.8 0.29 18-21
FTLU	4.0 0.87 1-11	5.1 0.61 1-12	2.4 0.81 0-8	3.3 0.37 2-6	4.0 0.58 3-5	0.2 0.13 0-1	2.2 0.59 0-6	0.8 0.29 0-2
CAW	31.6 0.22 30-32	31.7 0.22 30-34	33.5 0.40 32-36	32.6 0.43 30-34	31.0 0.58 30-32	32.2 0.36 30-34	30.3 0.40 29-33	29.7 0.42 28-32
GUL	33.2 0.44 32-36	34.0 0.36 32-37	32.9 0.31 32-35	41.0 0.61 38-44	38.7 0.33 38-39	38.8 0.71 36-43	35.4 0.72 31-39	31.6 0.50 29-34
SLO	6.1 0.10 6-7	6.0 0.05 5-6	6.1 0.10 6-7	6.7 0.15 6-7	7.0 0.57 6-8	6.2 0.13 6-7	6.6 0.16 6-7	6.1 0.10 6-7
SL	8.2 0.20 7-9	8.0 0.08 7-9	8.0 0.0 8	8.3 0.21 7-9	9.0 0.58 8-10	8.1 0.23 7-9	8.5 0.17 8-9	8.0 0.0 8
ILE	5.0 0.15 4-6	5.0 0.05 4-5	6.3 0.30 5-7	5.0 0.0 5	5.0 0.0 5	5.3 0.15 5-6	5.4 0.27 5-7	5.0 0.0 5
ILT	6.6 0.16 6-7	6.6 0.15 5-8	7.0 0.15 6-8	6.7 0.15 6-7	6.0 0.0 6	6.5 0.27 5-8	7.3 0.21 6-8	6.9 0.10 6-7
V	31.2 0.29 30-33	30.9 0.17 30-32	31.5 0.27 31-33	33.0 0.26 32-34	31.3 0.33 31-32	32.3 0.30 31-34	32.3 0.26 31-34	30.6 0.27 29-32
DAB	34.5 0.34 33-36	36.8 0.35 34-40	37.3 0.34 36-39	42.2 0.39 41-44	38.0 0.58 37-39	45.3 0.54 43-49	44.6 0.48 43-47	34.8 0.55 33-38
V6	31.7 0.67 28-35	24.5 0.62 20-28	24.3 0.30 23-26	28.5 0.86 25-34	24.0 0.58 23-25	34.4 1.28 29-43	30.8 0.98 27-37	28.4 0.92 25-35
V7	46.5 0.48 44-49	42.0 0.75 36-49	39.6 0.40 38-42	43.8 0.94 39-49	41.0 0.58 40-42	51.0 1.33 47-62	44.8 1.07 40-49	43.9 0.99 39-48
RIPP	0.14 0.01 0.11-0.17	0.20 0.02 0.10-0.44	0.24 0.02 0.16-0.36	0.18 0.02 0.12-0.28	0.10 0.01 0.09-0.11	0.30 0.01 0.23-0.35	0.34 0.08 0.17-1.00	0.28 0.03 0.41-0.41
RE	2.59 0.04 2.42-2.82	2.33 0.05 1.98-2.68	2.57 0.06 2.32-2.81	2.71 0.07 2.41-3.14	2.77 0.09 2.66-2.94	3.19 0.07 2.87-3.56	3.21 0.05 2.97-3.51	2.46 0.06 2.15-2.75
RIL6	1.27 0.07 0.92-1.69	1.13 0.04 0.77-1.45	1.46 0.06 1.28-2.00	1.57 0.08 1.25-1.97	1.26 0.08 1.10-1.36	1.05 0.07 0.76-1.54	1.57 0.13 0.78-2.06	1.15 0.04 0.98-1.39
RIL7	0.86 0.05 0.57-1.09	0.81 0.05 0.45-1.29	0.99 0.08 0.67-1.67	0.97 0.07 0.67-1.40	0.67 0.06 0.56-0.75	0.81 0.06 0.50-1.07	1.11 0.8 0.72-1.57	0.89 0.03 0.75-1.07

Postnasal followed by anterior loreal, posterior loreal, four loreolabials (lowermost minute), and three preoculars. Postnasal contacting nasal, frontonasal, anterior lo-

real, and first supralabial; anterior loreal contacting postnasal, frontonasal, prefrontal, and first and second supralabial; posterior loreal contacting anterior loreal, pre-

TABLE 1.—Continued.

<i>v. wigginsi-2</i>	<i>v. gilberti</i>	<i>v. extorris-1</i>	<i>v. extorris-2</i>	<i>species-1</i>	<i>sanchezi</i>	<i>bolsonae</i>	<i>henshawi</i>	<i>riversiana</i>
10	10	10	8	1	8	10	10	10
7.6	6.9	6.5	6.8	8.0	10.0	7.1	12.1	10.4
0.16	0.18	0.17	0.16	0.0	0.27	0.18	0.18	0.27
7-8	6-8	6-7	6-7	8	9-11	6-8	11-13	9-11
18.4	17.1	21.7	18.4	23.0	21.9	24.5	23.9	22.2
0.37	0.28	0.21	0.38	0.0	0.35	0.34	0.38	0.25
17-20	16-18	21-23	17-20	23	21-23	23-26	22-26	21-23
2.8	1.1	4.2	2.3	9.0	7.5	10.3	9.8	7.5
0.25	0.38	0.29	0.41	0.0	0.27	0.80	0.87	0.79
1-4	0-3	3-6	0-3	9	7-9	7-14	6-14	3-10
28.9	29.7	31.7	31.3	28.0	26.1	29.0	29.2	39.6
0.41	0.30	0.30	0.37	0.0	0.35	0.30	0.47	0.45
28-31	28-31	30-33	30-32	28	25-28	28-30	27-32	38-42
32.5	30.8	36.0	37.6	34.0	34.0	37.8	40.7	46.3
0.50	0.55	0.30	0.38	0.0	0.87	0.42	0.37	0.79
31-36	28-33	35-37	36-39	34	30-38	36-40	39-43	44-51
6.1	6.2	6.0	6.3	6.0	6.0	5.9	6.2	6.0
0.10	0.13	0.0	0.16	0.0	0.0	0.10	0.13	0.0
6-7	6-7	6	6-7	6	6	5-6	6-7	6
8.7	8.2	8.8	9.4	8.0	8.6	8.0	7.4	7.9
0.15	0.13	0.13	0.32	0.0	0.18	0.15	0.22	0.18
8-9	8-9	8-9	8-11	8	8-9	7-9	7-9	7-9
5.2	7.6	5.0	5.4	5.0	5.3	5.1	4.9	5.0
0.13	0.16	0.0	0.18	0.0	0.25	0.10	0.10	0.0
5-6	7-8	5	5-6	5	5-7	5-6	4-5	5
6.6	7.6	6.4	6.5	7.0	7.3	7.0	6.2	5.7
0.16	0.16	0.16	0.19	0.0	0.16	0.30	0.25	0.15
6-7	7-8	6-7	6-7	7	7-8	5-8	5-7	5-6
33.8	32.9	33.4	34.5	36.0	34.1	36.2	36.4	36.7
0.25	0.31	0.16	0.19	0.0	0.23	0.25	0.22	0.34
33-35	32-35	33-34	34-35	36	33-35	35-38	35-37	35-38
33.5	33.4	36.9	37.3	36.0	39.4	48.9	61.9	76.5
0.40	0.64	0.28	0.37	0.0	0.26	0.57	0.81	0.52
32-36	30-36	35-38	36-39	36	38-40	46-51	57-66	74-80
24.2	24.5	24.2	20.4	27.0	32.9	20.9	21.6	20.3
0.53	0.67	0.70	0.26	0.0	1.34	0.35	0.31	0.15
22-27	21-27	22-29	20-22	27	28-38	20-23	20-23	20-21
39.8	40.5	38.7	35.6	43.0	44.1	30.8	28.0	22.3
0.44	0.79	0.50	0.92	0.0	0.48	1.43	0.89	0.50
37-42	37-46	35-41	31-39	43	41-45	25-37	24-32	21-26
0.22	0.16	0.23	0.22	0.43	0.76	0.75	0.39	0.17
0.02	0.01	0.01	0.01	0.0	0.10	0.08	0.04	0.03
0.10-0.33	0.12-0.20	0.17-0.27	0.18-0.26	0.43	0.25-1.00	0.29-1.00	0.18-0.61	0.07-0.36
2.03	1.72	2.29	2.19	2.19	2.67	2.97	2.88	1.27
0.07	0.04	0.05	0.11	0.0	0.08	0.07	0.07	0.08
1.70-2.40	1.50-1.89	2.03-2.55	1.87-2.69	2.19	2.41-3.11	2.67-3.36	2.56-3.24	1.36-2.26
1.15	1.42	1.14	1.05	1.41	1.65	1.10	1.61	0.89
0.04	0.11	0.06	0.09	0.0	0.06	0.05	0.17	0.03
0.93-1.31	0.78-2.00	0.78-1.39	0.73-1.39	1.41	1.40-2.00	0.86-1.30	1.00-2.56	0.71-1.01
0.73	1.01	0.74	0.81	1.02	1.35	1.02	0.93	0.64
0.04	0.08	0.03	0.11	0.0	0.07	0.07	0.11	0.02
0.46-0.90	0.74-1.43	0.64-0.88	0.50-1.54	1.02	1.00-1.68	0.73-1.45	0.61-1.88	0.51-0.70

frontal, first supraocular, loreolabials, and second supralabial. Ocular ring composed of four preoculars, four suboculars, three postoculars, and five supraoculars. Two

pretemporals (anterior in contact with frontal and parietal) followed by six temporals bordering parietal and postparietal. Small pretympans followed by seven au-

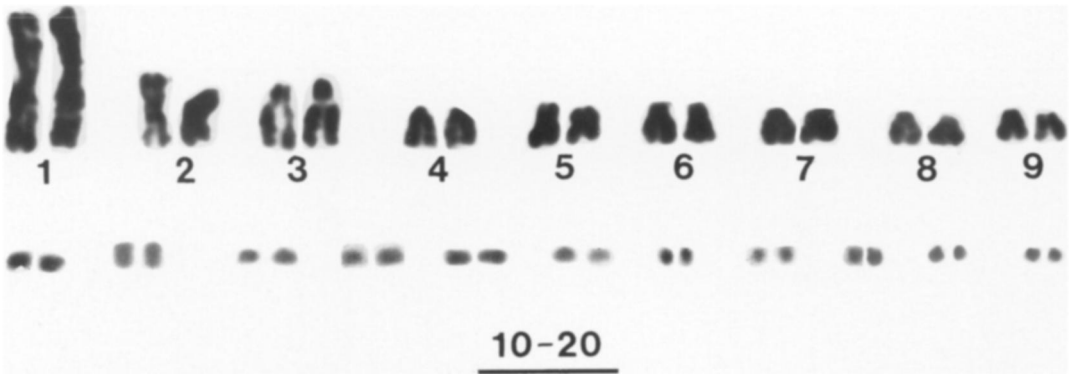


FIG. 4.—Karyotype of *Xantusia sanchezi* (MZFC 4759). Line represents 10  $\mu$ .

riculars along anterior border of tympanic opening. Nine supralabials; seventh and eighth subequal in height; fourth, fifth, and sixth contacting orbital ring. **Ventral surface of head:** large mental followed by seven pairs of infralabials, first pair having broad common median suture, fourth pair smallest, sixth and seventh separated from labium by four small anomalous scales; gular scales small, 33 along midline between fold and first pair of infralabials.

**Dorsal and lateral body surface:** dorsal scales small, granular, unkeeled; 113 along vertebral line between occiput and rump; 40 around the body between the 17th transverse row of ventrals. **Ventral body surface:** ventral scales, flat, smooth, quadrangular, in 12 longitudinal rows at midbody; lateralmost row smallest, 13 scales in length; transverse rows of ventral scales along midline between gular fold and vent, 34, including preanals (two large anterior preanals followed by a transverse row of five small posterior preanals); femoral pores on right leg, 10, on left leg, nine; fourth toe lamellae, 21 (distal eight not divided by mid-ventral suture). **Tail:** complete, unregenerated, encircled with 88 annuli; scales of second annulus, 26.

**Color pattern:** dorsal surface of the body with irregular dark brown spots on dusky tan background (Fig. 2). Dorsal surface of head, light brown; side of head dark brown; each labial suture marked with light brown; distinct dark brown longitudinal stripe along temporal scales. A pair of dark-edged light paravertebral

stripes on neck from occiput to above forelimbs. Ventral surfaces gray.

**Karyotype.**—Examination of 123 cells from testicular tissue from four males (MZFC 4758-60, 4762) indicates that *Xantusia sanchezi* has a diploid number of 40 consisting of 18 macro- and 22 microchromosomes (Fig. 4). Chromosome pairs 1 and 2 are metacentric; pair 5 is submetacentric; pairs 3, 4, 6, 7, and 8 are subtelocentric; and pair 9 is telocentric. The karyotype appears virtually identical to the western ( $\alpha$ ) karyotype of *X. vigilis* (Bezy, 1972).

**Habitat and distribution.**—All specimens of *Xantusia sanchezi* were collected at or near the type locality (see below) on mesquites, *Prosopis* (Fig. 5), and were found under the bark of live trees (trunk diameter of 0.7–1.5 m) between 1 m and 3 m (mode 2 m) above ground. The bark was dry and exfoliating, and in most instances was associated with limbs that previously had been cut (probably for fence posts). The animals were agile and quickly escaped under adjacent bark.

The type locality is situated along an arroyo (possibly the Arroyo Hondo) that drains, approximately 1 km to the west, into the Río Juchipila. According to a local rancher, the locality is situated along the old road to Cuxpala which crossed the Río Juchipila at a point known locally as Crucero San Antonio. The vegetation at the type locality consists of mezquital on the flood plain of the Río Juchipila, whereas the adjacent rocky slopes are covered by



FIG. 5.—Habitat at the type locality of *Xantusia sanchezi* with mesquite, *Prosopis*, in the lower right.

thorn scrub with numerous columnar cacti (Fig. 5). The region was mapped as Bosque Tropical Caudifolio by Rzedowski (1978), but the vegetation is being heavily disturbed by human activities. Several other locations and habitats in the vicinity of the type locality were searched, but none produced additional specimens of the new species. Yuccas and agaves are present, but not abundant, and failed to yield *Xantusia*.

From the description of the area where the first specimen (MZFC 3120) was collected (O. Sanchez H., personal communication), we estimate that it came from very near the type locality. Its location was given as 4 km N Moyahua based on airline (map) distance, whereas the type locality (5 km N Moyahua) is based on distance by highway.

*Etymology*.—The specific name is a noun in the genitive singular case. The taxon is named for Oscar Sánchez Herrera of the Instituto de Biología, Universidad Nacional Autónoma de México, in recognition of his discovery of the first specimen

of the species and his contributions to the knowledge of the vertebrates of México.

#### COMPARISONS AND DISCUSSION

On the basis of morphology, *Xantusia sanchezi* differs most strongly from *X. riversiana* and *X. henshawi*. Although there are many other differences, for the scale characters used in this study (Table 1), *X. sanchezi* differs from those two species, respectively, in having fewer dorsals around midbody (36–40 versus 74–80 and 57–66) and fewer gulars (30–38 versus 44–51 and 39–43). The new species also differs from *Xantusia bolsonae* in having fewer dorsals around midbody (38–40 versus 46–51).

The number of longitudinal rows of ventrals (at midbody) is generally useful for distinguishing species of *Xantusia*: *X. sanchezi* and *X. vigilis* usually with 12 or fewer, *X. henshawi* and *X. bolsonae* with 14, and *X. riversiana* with 16. However, as with most characters used in the systematics of xantusiids, intermediate states exist. The outer (lateralmost) row of ven-



trials may be reduced to varying degrees, that is, it may consist of quadrangular scales that are much smaller than those of the adjacent ventral row and that are interspersed with smaller granular scales resembling the dorsals. We quantified this variation in the outer (lateralmost) ventral rows by counting the number of scales in the sixth and seventh longitudinal rows (lateral to the ventral midline) that occur along a string of 20 scales in the fifth longitudinal row (lateral to the ventral midline). The counts for the seventh longitudinal row in *X. sanchezi* are well above those of *X. bolsonae* (41–45 versus 25–37), indicating that the scales in the seventh row are smaller and more numerous (and thus more similar to dorsals than to ventrals) and that *X. sanchezi* can be considered to have 12 or fewer longitudinal rows of ventrals, whereas *X. bolsonae* has 14 relatively well developed longitudinal rows of ventrals. The counts for the seventh longitudinal row in *X. bolsonae* (25–37) are also lower than those of most *X. vigilis* (31–62), but overlap those of some populations: *X. v. gilberti* (37–46), *X. v. extorris* (31–39), *X. v. vigilis* (36–49), and *X. v. wigginsii* (37–48). From these, *X. bolsonae* differs most strongly in having more dorsals (46–51 versus 30–40). In addition, *X. bolsonae* occurs in sympatry with one population, *X. v. extorris* (Webb, 1965, 1970), indicating that at least these two are distinct “biological species” as well.

*Xantusia sanchezi* differs from the populations of *X. vigilis* in two features which in combination are 100% diagnostic. It has fewer scales in the second caudal annulus than *X. vigilis* (25–28 versus 29–36), with the exception of some specimens of *X. v. wigginsii* (28–32). It also has a larger number of undivided fourth toe lamellae than *X. vigilis* (7–9 versus 0–6), with the exception of some specimens of *X. v. vigilis* (0–12). There are one or more additional differences between *X. sanchezi* and each of the currently recognized subspecies of *X. vigilis* (see Diagnosis).

There are also conspicuous average differences between *X. sanchezi* and *X. vigilis* in several morphological features (Table 1). In *X. sanchezi*, the scales of the sixth

longitudinal row (lateral to the ventral midline) are relatively small compared to those of other *Xantusia* and in some specimens (e.g., MZFC 3120) the row could be judged to be a part of the dorsal rather than the ventral series (i.e., the specimens could be considered to have 10 rather than 12 longitudinal ventral rows), a condition found elsewhere among xantusiids only in the genus *Lepidophyma*. The species has an enlarged interpostparietal that often completely separates the postparietals along the midline, a feature also found in *X. bolsonae* and some populations of *X. v. arizonae*. In *X. sanchezi*, the sixth and seventh infralabials are conspicuously enlarged compared to those of most individuals of *X. vigilis*.

Sequence data for a 307 base pair segment of the mitochondrial cytochrome *b* gene indicate that *X. sanchezi* is a member of an exclusively Mexican gene clade that includes *X. bolsonae* and *X. v. extorris* which is the sister group of a clade containing the other populations of *X. vigilis* plus *X. riversiana* (Bezy and Bolles, unpublished; Hedges et al., 1991, their Fig. 5). For this segment of cytochrome *b*, the haplotype of *X. sanchezi* is quite divergent from that of all other xantusiids, differing from its nearest relatives at 32 (10%, *X. v. extorris*) and 41 (13%, *X. bolsonae*) of the 307 sites.

We consider *Xantusia sanchezi* to be a distinct evolutionary species. It appears to be geographically isolated from other members of the genus and thus to comprise a separate historical lineage. It occupies a unique semitropical microhabitat and is sufficiently distinct in morphology that we consider it to have an independent evolutionary role and fate.

Additional study is required to determine whether some of the geographically isolated populations currently assigned to *X. vigilis* should also be considered separate evolutionary species. Collins (1991) elevated *X. v. utahensis* to species status based on its allopatric distribution and diagnostic features as summarized by Stebbins (1985). The available data (Table 1 and Bezy, unpublished) indicate that *X. v. utahensis* overlaps other populations of *X.*

*vigilis* in morphology, particularly some currently assigned to *X. v. sierrae* and *X. v. arizonae*, and more recently it was relisted as a subspecies by Collins (1997). Pending the completion of a comprehensive analysis of variation in this complex using allozymes (Bezy and Sites, 1987), morphology, and cytochrome *b* (Bezy and Bolles, unpublished), we here continue to employ the current subspecies names (Bezy, 1982; Collins, 1997): *X. vigilis vigilis*, *X. v. arizonae*, *X. v. extorris*, *X. v. gilberti*, *X. v. sierrae*, *X. v. utahensis*, and *X. v. wigginsi*.

The status of the population of *Xantusia* found at Cerro San Ignacio in northeastern Durango (Grenot and Price, 1978) also warrants further investigation. This locality (26° 40' N, 103° 45' W) is over 600 km N of the type locality of *X. sanchezi* (Fig. 1). The specimen examined from the locality (labeled "species-1" in Table 1) resembles *X. sanchezi* in having nine undivided fourth toe lamellae (7–9 in *X. sanchezi* versus 0–6 in *X. v. extorris*) and 28 scales around the second caudal whorl (25–28 in *X. sanchezi* and 30–33 in *X. v. extorris*). However, the specimen differs from *X. sanchezi* in relative eye size and in numbers of femoral pores, ventrals, dorsals around midbody, and scales in the sixth longitudinal row of ventrals, and it occurs in a strikingly different habitat (Grenot and Price, 1978).

The geographic distribution of *Xantusia sanchezi* has important biogeographic implications. Members of *Xantusia*, the northernmost genus of living xantusiids, are separated from the species of *Lepidophyma* to the southeast by the semiarid uplands of the Mesa Central, a recurrent biogeographic pattern in the herpetofauna of México (Flores Villela, 1993b). *Xantusia sanchezi* is a member of one of the most basal clades within the genus (Bezy and Bolles, unpublished), consistent with its southern geographic position between other *Xantusia* and *Lepidophyma*. It thus represents a plausible relict predating the geographic separation of these two genera by the increasing aridity of the southern Mesa Central associated with the uplift of the Sierra Madre Oriental and Occidental.

The occurrence of *Xantusia sanchezi* in extreme southwestern Zacatecas also may help explain the biogeographic history of *X. bolsonae* and *X. v. extorris*, which are isolated in the closed basins in the Bolsón de Mapimí of Durango and northern Zacatecas (Fig. 1). Where and when these taxa may have been geographically connected to other members of the genus is puzzling as they are separated by the Sierra Madre Occidental from populations on the coast of Sonora and by vast expanses of the northern Chihuahuan Desert from those in Arizona. *Xantusia sanchezi* represents a potentially important piece in this puzzle. The species is found along the Río Juchipila, a tributary of the Río Grande de Santiago, which flows through the southern end of the Sierra Madre Occidental to reach the Pacific in Nayarit at a point approximating the former position of the southern tip of the landmass that became the peninsula of Baja California (Fig. 1). This suggests the possibility that *X. sanchezi*, and perhaps other members of the genus in mainland México, historically may have been continuous in the south (rather than the north) with populations of *Xantusia* occurring on the present peninsula of Baja California before it became separated from the mainland in the Miocene (Stock and Hodges, 1989). This hypothesis will be tested by phylogenetic analyses of cytochrome *b* haplotypes for populations of *Xantusia*.

#### RESUMEN

Se describe una especie nueva de *Xantusia* (*X. sanchezi*) de los alrededores del Río Juchipila en el suroeste de Zacatecas, México. Esta especie vive debajo de la corteza de mezquites, *Prosopis* sp. Morfológicamente es muy similar a *X. vigilis*, pero difiere de ésta en el número de lamelas no divididas del cuarto dedo y en el número de escamas que componen el anillo caudal. Datos moleculares (secuencias del citocromo *b*) sugieren que *X. sanchezi* es un miembro del clado único que incluye a *X. bolsonae* y a *X. vigilis extorris*. La distribución geográfica de *X. sanchezi* sugiere la independencia de esta población de otras

del mismo género y representa un interesante problema biogeográfico.

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### APPENDIX I

#### *Specimens Examined*

Museum abbreviations follow Leviton et al. (1985) with the addition of MZFC for the Museo de Zoología, Facultad de Ciencias, Universidad Nacional Autónoma de México.

*Xantusia bolsonae*: MEXICO: Durango: 9.7 km NE Pedriceña: LACM 55956–61, 136781, 136792–94. *X. henshawi*: CA: Riverside Co.: 1.6 km S, 1.6 km E Cabazon: LACM 100716, 100723, 100725, 100737, 100739, 100755–56, 100767–68, 100846. *X. riversiana*: CA: Los Angeles Co.: San Clemente Island: LACM 108652, 108655–57, 108670, 108677, 108681, 108690, 108695, 108705. *X. sanchezi*: MEXICO: Zacatecas: 4 km (air line) N Moyahua: MZFC 3120; 5 km (by Hwy 54) N Moyahua: MZFC 4756, MZFC 4759–62, LACM 144220–21. *X. species-1*: MEXICO: Durango: Cerro San Ignacio: NMSU 4905.

*Xantusia vigilis*: *X. v. arizonae-1*: AZ: Yavapai Co.: vic Yarnell: LACM 134509, 134517–23, 134525, 134528. *X. v. arizonae-2*: AZ: Pinal Co.: Sutton's Summit: LACM 134487, 134489–90, 134493–94, UAZ 28970, 28976, 28978, 32321, 32323. *X. v. extorris-1*: MEXICO: Durango: 9.7 km S Pedriceña: LACM 2014–16, 2019–20, 2027, 2033, 2035, 2041–42. *X. v. extorris-2*: MEXICO: Zacatecas: 5 km NE Cinco de Mayo: UTEP 4335–42. *X. v. gilberti*: MEXICO: Baja California Sur: La Laguna: LACM 101233–36, 101238, 101241–44, 101246. *X. v. sierrae*: CA: Kern Co.: Granite Station: LACM 76128–31, 76133, 76136, 134552–53, 134555, 134558. *X. v. utahensis*: UT: Garfield Co.: Henry Mts.: LACM 136733–35. *X. v. vigilis-1*: CA: San Bernardino Co.: 4.2 km S Hesperia: LACM 136255, 136280, 136283, 136285, 136290, 136292–94, 136298–300, 136302–303, 136305–306, 136311, 136313, 136315, 136320, 136322. *X. v. vigilis-2*: UT: Washington Co.: vic. Castle Cliff: LACM 135227–235, 135238. *X. v. vigilis-3*: MEXICO: Sonora: vic. Desemboque del Río San Ignacio: UAZ 10763–64, 17344–46, 17349, 17368, 28940, 28947, 28955. *X. v. wigginsi-1*: MEXICO: Baja California: 14.5 km E Millers Landing: UAZ 17464–68, 17486–90. *X. v. wigginsi-2*: MEXICO: Baja California Sur: 9.7 km N La Poza Grande: UAZ 17381, 17385–88, 17392, 17394–96, 17399.