Catalogue of American Amphibians and Reptiles.

Paulissen, M.A. and J.M. Walker. 1998. *Cnemidophorus laredoensis*.

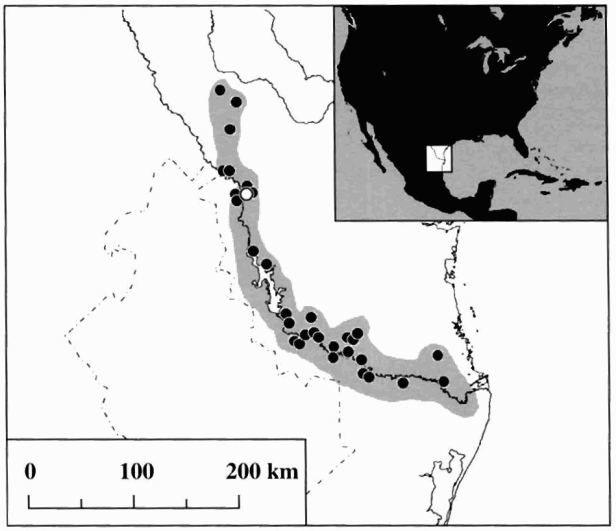
Cnemidophorus laredoensis McKinney, Kay, and Anderson

Laredo Striped Whiptail

Cnemidophorus laredoensis McKinney, Kay, and Anderson 1973:361. Type locality, "Chacon Creek at highway U.S. 83 in Laredo, Webb County, Texas [USA]." Holotype, National Museum of Natural History (USNM) 194520, an adult female, collected by F.R. Kay and R.A. Anderson, 14 July 1971 (not examined by authors).

C.[nemidophorus] 'laredoensis'-A: Walker 1986:436. Non-Linnaean subsequent spelling.

• **CONTENT.** No subspecies are recognized; however, electrophoretically distinguishable clones have been identified and designated with roman numerals within the informal system of classification proposed by Walker (1986). See Nomenclatural History.



MAP. The type locality is indicated by a circle. Dots mark other records; all have been published previously except the two easternmost records in Cameron County, Texas.

• **DEFINITION.** *Cnemidophorus laredoensis* is an obligate parthenogenetic species of medium size; mean adult SVL = 68.8 ± 0.22 mm (SE), range 60–86 mm, and only about 2% of specimens measure 80–86 mm. This species has an allodiploid chromosome number of 46 derived from hybridization between the bisexual species *Cnemidophorus gularis* and *C. sexlineatus*. A member of the *sexlineatus* species group (*sensu* Burt 1931, Duellman and Zweifel 1962), it typically has 3 parietal scales, 2 frontoparietal scales, 4 left and 4 right supraocular scales (Fig. 3), enlarged and angular mesoptychial scales bordering the edge of the gular fold, and moderately enlarged and hexagonal postantebrachial scales (i.e., neither granular nor enlarged and platelike; Fig. 4). Meristic data based on a sample of over 500 specimens examined by the junior author are as follows (all values are mean ± SE): granules around midbody 91.6 ± 0.09 (range 82–103, N = 550); granules from occiput to rump 228.5 ± 0.23 (202–245, N = 536); granules between the paravertebral stripes at midbody 11.0 ± 0.04 (7–15, N = 556); ratio of granules between paravertebral stripes to granules around midbody 11.9 ± 0.04 (7.5–16.6, N = 550); femoral pores (left plus right) 32.8 ± 0.05 (28–37, N = 541); left subdigital lamellae of the fourth toe 33.4 ± 0.05 (30–37, N = 534); circumorbital scales (left plus right) 10.6 ± 0.05 (8–19, N = 546); lateral supraocular scales (left plus right) 29.7 ± 0.15 (20–55, N = 541); enlarged mesoptychial scales bordering the gular fold 17.0 ± 0.04 (13–21, N = 534); interlabial scales (left plus right) 19.6 ± 0.16 (6–31, N = 540).

The dorsal pattern of juveniles (32–35 mm SVL at hatching) consists of a black to black-brown ground color with seven straight, longitudinal stripes including a pair of laterals, a pair of dorsolaterals, a pair of paravertebrals, and a single, narrow, less distinctly defined vertebral stripe. The lateral and dorsolateral stripes are white or cream-colored, the paravertebral and vertebral stripes are cream-colored to vivid yellow-green. Light incipient spots are typically located in the dark fields below the lateral stripes and between the lateral and dorsolateral stripes. The venter is immaculate white; the tail is light bluish gray. Adults between 58 and 70 mm SVL are patterned like juveniles except that the dorsal ground color is greenish-brown, the spots in the lateral dark fields are more distinct, and the tail is greenish blue-gray above and greenish white below. Large adults (>75mm SVL) usually develop short vertical bars extending from the lower to upper dark lateral fields, a semi-reticulated pattern of cream to tan lines on the dorsal surface of the hind limbs, and sky blue color on the ventral surface and throat. All individuals of *C. laredoensis* are female; however, hybrid *C. laredoensis* X *C. gularis* males and females are occasionally found (see Pertinent Literature).

• **DIAGNOSIS.** The persistent dorsal pattern of seven straight, longitudinal stripes, including a single, narrow, cream-colored to vivid yellow-green vertebral stripe, pearly white to light sky blue throat (compared to pink or red in *C. gularis*), faded to distinct light spots in the dark fields between the ventral scales and the lateral stripes and in the dark fields between the lateral and dorsolateral stripes (infrequently in the dark fields between the dorsolateral and paravertebral stripes), circumorbital scale series ending posterior to the frontal scale, and moderately enlarged postantebrachial scales (compared to granular in *C.*

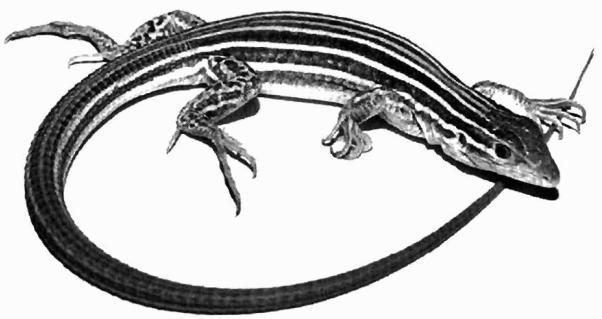


FIGURE 1. *Cnemidophorus laredoensis*, adult female.

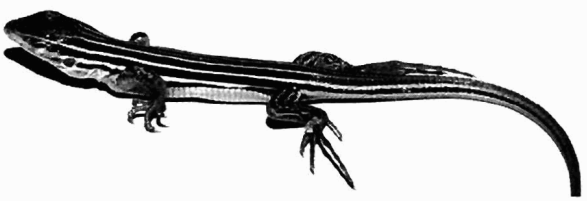


FIGURE 2. *Cnemidophorus laredoensis*, neonate.

sexlineatus and enlarged and platelike in *C. gularis*; Fig. 4) distinguish *Cnemidophorus laredoensis* from all bisexual congeners found in southern Texas and northern Mexico. Neonate *C. laredoensis* have a light bluish-gray tail, whereas *C. gularis* neonates have a red or pink tail. A second all-female species resembling *C. laredoensis* was discovered in southern Texas in 1984 (see Remarks). This newly discovered parthenogenetic species is known only by the informal code names "LAR-B" or "LAR-B(2n)" (see Nomenclatural History). *Cnemidophorus laredoensis* is distinguished from LAR-B by the width and color of the vertebral stripe: narrow (2–4 granules wide), and cream-colored to vivid yellow-green in *C. laredoensis*; wider (>5 granules wide) and tan with a yellowish cast in LAR-B. In *C. laredoensis*, the number of granules around midbody is typically 90 or greater and the number of granules between the paravertebral stripes is typically less than 13; in LAR-B the number of granules around midbody is typically 87 or fewer, and the number of granules between the paravertebral stripes is more than 14.

• **DESCRIPTIONS.** The first description of *Cnemidophorus laredoensis* was that by McKinney et al. (1973). Subsequent descriptions, including comparisons with LAR-B, are in Walker (1987a,c) and Parker et al. (1989). The following field guides also give descriptions of *C. laredoensis* or include *C. laredoensis* in identification keys: Vance (1978), Behler and King (1979), Smith and Brodie (1982), Ballinger and Lynch (1983), Dixon (1987), Garrett and Barker (1987), Conant and Collins (1998), and Powell et al. (1998). Bickham et al. (1976) described the karyotype as 2N = 46 arranged in three sets: Set I – 2 large metacentric macro-chromosomes; Set II – 24 medium-sized telocentric or subtelocentric macrochromo-somes; Set III – 20 microchromosomes. Two pairs of dimorphic chromosomes, chromosomes 4 and 10 within Set II, contain one subtelocentric and one telocentric chromosome (see Remarks).

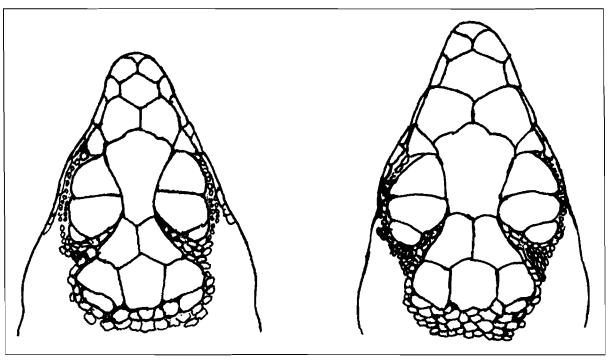


FIGURE 3. Head scutellation of *Cnemidophorus laredoensis* (lefft) and *C. gularis* (right) for comparison.

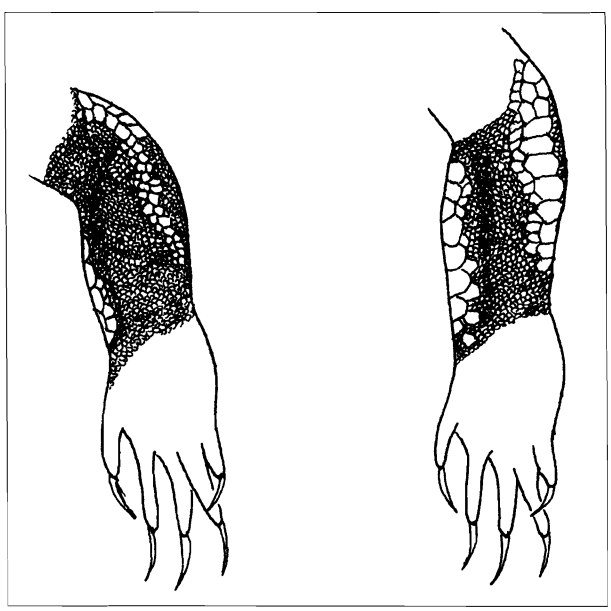


FIGURE 4. Scutellation of the posterior side of the right forearm of *Cnemidophorus laredoensis* (left), and *C. gularis* (right). Note the postantebrachial scales of *C. laredoensis* are only moderately enlarged whereas those of *C. gularis* are large and hexagonal.

• **ILLUSTRATIONS.** Color photographs are in Garrett and Barker (1987) and Wright (1993). Black and white photographs are in McKinney et al. (1973), Walker (1987a,b,c), Walker et al. (1989a,b), Abuhteba (1990), and Walker et al. (1991a,b). A color drawing is in Smith and Brodie (1982); a small black and white drawing is in Behler and King (1979). Bickham et al. (1976) and Abuhteba (1990) illustrated the karyotype. Black and white photographs of *C. laredoensis* X *C. gularis* hybrids are in Walker et al. (1989a,b) and Abuhteba (1990). Walker et al. (1986b) included a black and white photograph of a *C. laredoensis* burrow. Black and white photographs of *C. laredoensis* habitat are in Walker (1987a,b) and Walker et al. (1989a).

• **DISTRIBUTION.** *Cnemidophorus laredoensis* is found only in Dimmit, Webb, LaSalle, Zapata, Hidalgo, Starr, and Cameron counties in southern Texas, U.S.A. and in extreme northern Tamaulipas, México near the Rio Grande. Most of the range extends about 10 km on either side of the Rio Grande from Laredo, Texas, U.S.A./Nuevo Laredo, Tamaulipas, México southeastward along the Rio Grande to Progreso Lakes, Texas, U.S.A./Nuevo Progreso, Tamaulipas, México (Dryden 1985, McCrystal et al. 1985, Walker et al. 1986a, Walker 1987a). An additional site has been located near the Rio Grande NW of Laredo in Webb County, Texas (Walker et al. 1990; the "Mines Road" site), and two unpublished records are known from Cameron County, Texas. *Cnemidophorus laredoensis* also occurs in a few areas 21–90 km N of the Rio Grande in Dimmit, LaSalle, and Starr counties in Texas (Walker 1987a, Walker et al. 1990). Locality information and/or range maps are given in Walker (1987a,c), Paulissen et al. (1988), Parker et al. (1989), Walker et al. (1989a, 1990), and Abuhteba (1990).

All sites at which *Cnemidophorus laredoensis* has been found are characterized by sandy or sandy-loamy soil, grass-weed, grass-weed mesquite, or open thorn scrub vegetation, and large expanses of bare ground (such as trails, roads, ditches, or ant mounds) (Walker 1987a). Some form of disturbance, such as automobile or large animal traffic, cattle grazing, or agricultural activities, characterizes all inhabited sites. The entire range of *C. laredoensis* is contained within the range of the bisexual species *C. gularis* with which it often coexists (Paulissen et al. 1992). However, the range of *C. laredoensis* is nearly perfectly parapatric to the range of the bisexual species *C. sexlineatus* in southern Texas. *Cnemidophorus laredoensis* often coexists with LAR-B in Starr and Hidalgo counties in Texas and adjacent Tamaulipas, México (Walker 1987c); the two also are found together at Mines Road in Webb County, Texas (Walker et al. 1990).

• **FOSSIL RECORD.** None.

• **PERTINENT LITERATURE.** McKinney et al. (1973) and Walker (1987b) provided preliminary data on clutch size, timing of reproduction, and clutch frequency; Trauth and Fagerberg (1993) detailed eggshell stereology. Walker (1987a) described the habitat requirements of *C. laredoensis*; microhabitat usage

was detailed by Paulissen (1994); diet and daily activity cycles were described by Paulissen et al. (1988) and Parker et al. (1989). Population changes were documented by Walker (1987b) and Walker et al. (1996); competition with the bisexual species *C. gularis* was addressed by Paulissen et al. (1992). Paulissen (1999) and Paulissen et al. (1989) reported field body temperatures; Sievert and Paulissen (1996) described thermoregulation in laboratory gradients. Nematode parasites were reported by McAllister et al. (1986). Husbandry notes, emphasizing the importance of ultraviolet light, were reported by Townsend and Cole (1985). Other aspects of the ecology of *C. laredoensis* were discussed in Walker (1987b,c), Walker et al. (1989a, 1990), and Walker and Cordes (1990).

Pseudocopulation has been documented by Paulissen and Walker (1989) and Paulissen (1995b); intra- and interspecific aggression was discussed by Paulissen (1997). Interspecific copulation of *C. laredoensis* females with *C. gularis* males was described by Walker et al. (1991a) and Paulissen (1995b). Interspecific copulation occasionally produces triploid *C. laredoensis* X *C. gularis* hybrids that can be distinguished on the basis of color pattern and scale characters (Walker et al. 1991a, Paulissen 1995b) and by karyotype and histocompatibility analyses (Abuhteba 1990, Walker et al. 1989b). One female *C. laredoensis* X *C. gularis* hybrid captured in the wild has reproduced parthenogenetically in the lab (C.J. Cole, pers. comm.). Antipredator escape behaviors were described by Paulissen (1994, 1995a, 1998); chemosensory exploration was analyzed by Rybiski and Paulissen (1995). Burrow use was documented by Walker et al. (1986b) and Paulissen (1997).

Electrophoretic analysis of allozymes was reported by McKinney et al. (1973), Dessauer and Cole (1989), and Parker et al. (1989); results of mitochondrial DNA restriction site analyses were reported by Wright et al. (1983) and Moritz et al. (1989, 1992). Abuhteba (1990) conducted an extensive skin transplant study of histocompatibility proteins involving *C. laredoensis*, LAR-B, *C. gularis*, and *C. laredoensis* X *C. gularis* hybrids.

The species was included in the checklist of Maslin and Secoy (1986).

• **NOMENCLATURAL HISTORY.** The nomenclature of *C. laredoensis* has been complicated by (1) the discovery in 1984 of a second, all-female, parthenogenetic *Cnemidophorus* species in southern Texas and northern México (Walker 1987c)(see Remarks below) and (2) disagreement as to how parthenogenetic (= clonally reproducing) species that originated from hybrids between bisexual species should be treated within the Linnaean system (Cole 1985, 1990; Walker 1986; Smith 1987; Frost and Wright 1988; Frost and Hillis 1990; Wright 1993). Walker (1986) proposed that, since parthenogens were cloned hybrid populations, they did not warrant formal taxonomic recognition. He proposed an informal system of codes to replace Linnaean names of all parthenogenetic species of *Cnemidophorus*. In this system, *Cnemidophorus laredoensis* McKinney, Kay, and Anderson was designated *Cnemidophorus* 'laredoensis'-A or LAR-A, whereas the second, newly discovered parthenogen was designated *Cnemidophorus* 'laredoensis'-B or LAR-B. Electrophoretic analyses conducted by Parker et al. (1989), later confirmed by histocompatibility studies of Abuhteba (1990), demonstrated that LAR-A consisted of two "cryptic clones," i.e., clones that can be distinguished electrophoretically but not morphologically. These cryptic clones were designated LAR-A-I and LAR-A-II, or alternatively as LAR-A-I(2n) and LAR-A-II(2n) to reflect ploidy level, by Walker (1986). Walker also suggested the designation LAR-A/M(2n) to indicate the multiclonal composition of LAR-A. Subsequently, these informal designations were shortened to LAR-AI and LAR-AII in Paulissen et al. (1988) and to LAR-A(2n) in Walker et al. (1989a). The modified Linnaean name of *C. laredoensis* A was used by Walker et al. (1989b). Frost and Wright (1988) argued that, since parthenogens constitute uniparental historical groups phylogenetically removed from their sexually-reproducing ancestors, they should be recognized as species and given formal taxonomic recognition within the Linnaean system. Wright (1993) recommended that the original name *Cnemidophorus laredoensis* be applied. This recommendation has generally been followed in papers published since 1993 which discuss *C. laredoensis* only (e.g., Trauth and Fagerberg 1993; Paulissen 1995b, 1998; Rybiski and Paulissen 1995). However, the informal designation "LAR-A" has still been used in papers which discuss both *C. laredoensis* and LAR-B (e.g., Paulissen 1994, 1995a, 1997, 1999; Sievert and Paulissen 1996; Walker et al. 1996).

• **REMARKS.** The existence of an all-female species of *Cnemidophorus* in southern Texas was first suspected when a sample of 26 juveniles collected from Laredo was found to be nearly all female and to exhibit extremely high levels of allelic heterozygosity (McKinney et al. 1973). This led the authors to collect additional specimens from Laredo, resulting in the formal description of *Cnemidophorus laredoensis*. Electrophoretic analysis of 15 proteins (controlled by 15 genetic loci) showed that *C. laredoensis* shared alleles with the bisexual species *C. gularis* and *C. sexlineatus* at all 15 loci, but that *C. laredoensis* was heterozygous at four loci at which *C. gularis* and *C. sexlineatus* differed (McKinney et al. 1973). The authors hypothesized that *C. laredoensis* was derived from a hybrid between *C. gularis* and *C. sexlineatus*. Further support was provided by a more comprehensive series of electrophoretic analyses conducted by Dessauer and Cole (1989) who found that *C. laredoensis* was heterozygous at nine loci in a pattern consistent with an origin from a *C. gularis* X *C. sexlineatus* hybrid. The karyological studies of Bickham et al. (1976) showed that *C. laredoensis* is diploid and dimorphic at two chromosomes (Set II, numbers 4 and 10) which differ between *C. gularis* and *C. sexlineatus*. Proof that *C. gularis* is the maternal progenitor of *C. laredoensis* was given by Wright et al. (1983) who showed that, when mitochondrial DNA from all three species is cleaved with restriction enzymes, the electrophoretic pattern of *C. laredoensis* was identical to that of *C. gularis* but not *C. sexlineatus*.

Subsequent studies by James Walker and colleagues identified the geographic distribution of *C. laredoensis* as extending from Webb County, Texas to Cameron County, Texas and adjacent parts of México (Walker 1987a, Walker et al. 1990). These studies also led to the discovery of the second parthenogen currently designated "LAR-B" (Walker 1987c; see also Nomenclatural History). The geographic range of LAR-B extends from Val Verde to Webb County, Texas and adjacent México, and then, after a hiatus, from Starr to Cameron County, Texas and adjacent México (Walker 1987c, Paulissen et al. 1988). The hiatus in the distribution of LAR-B extends from central Webb County, Texas to central Starr County, Texas and adjacent México. *Cnemidophorus laredoensis* (= LAR-A, *sensu* Walker 1986) is widely distributed within the hiatus in the LAR-B distribution; though the two parthenogens are found together at one site in Webb County, Texas, one site in Cameron County, Texas, and at several sites in Starr and Hidalgo counties in Texas and adjacent México (Walker 1987c, Parker et al. 1989). Based on morphological, distributional, and limited electrophoretic data, LAR-B was hypothesized to have originated from a hybridization between *C. gularis* and *C. sexlineatus* completely independent of the one that led to *C. laredoensis* (Walker 1987c, Parker et al. 1989). Support for this hypothesis comes from karyological studies conducted by Abuhteba (1990) which showed that LAR-B is diploid and is dimorphic at the same two

sets of chromosomes as *C. laredoensis*. Reciprocal skin transplant studies showed *C. laredoensis* always rejects skin grafts from LAR-B and vice versa, suggesting that *C. laredoensis* and LAR-B arose independently from *C. gularis* X *C. sexlineatus* hybrids rather than as mutational derivatives from a single hybrid (Abuhteba 1990). The skin graft studies also revealed that LAR-B is comprised of a greater number of cryptic clones than *C. laredoensis*, suggesting that LAR-B has undergone greater evolutionary diversification because it has existed longer than *C. laredoensis*. Abuhteba (1990) proposed that LAR-B originated first from a *C. gularis* X *C. sexlineatus* hybrid and spread through the Rio Grande valley of Texas and México. Sometime later, *C. laredoensis* originated somewhere near the middle of the range of LAR-B from another *C. gularis* X *C. sexlineatus* hybrid and has since been spreading into the former range of LAR-B (perhaps contributing to the disappearance of LAR-B from some parts of its range and creating the hiatus in LAR-B's range seen today; see Walker et al. 1996).

• **ETYMOLOGY.** The name *laredoensis* refers to the type locality in the city of Laredo, Texas (Webb County).

• **ACKNOWLEDGMENTS.** We are grateful to Judy Patterson for drawing Figures 3 and 4.

LITERATURE CITED

Abuhteba, R.M. 1990. Clonal diversity in the parthenogenetic whiptail lizard, *Cnemidophorus* 'laredoensis' complex (Sauria: Teiidae), as determined by skin transplantation and karyological techniques. Unpubl. Ph.D. Diss., Univ. Arkansas, Fayetteville.

Ballinger, R.E. and J.D. Lynch. 1983. How to Know the Amphibians and Reptiles. Wm. C. Brown Co., Dubuque, Iowa.

Behler, J.L. and F.W. King. 1979. The Audubon Society Field Guide to North American Reptiles and Amphibians. Alfred A. Knopf, New York.

Bickham, J.W., C.O. McKinney, and M.F. Mathews. 1976. Karyotypes of the parthenogenetic whiptail lizard *Cnemidophorus laredoensis* and its presumed parental species (Sauria: Teiidae). Herpetologica 32:395–399.

Burt, C.E. 1931. A study of the teiid lizards of the genus *Cnemidophorus* with special reference to their phylogenetic relationships. Bull. U.S. Natl. Mus. (154):viii + 286 p.

Cole, C.J. 1985. Taxonomy of parthenogenetic species of hybrid origin. Syst. Zool. 34:359–363.

—. 1990. When is an individual not a species? Herpetologica 46:104–108.

Conant, R. and J.T. Collins. 1998. A Field Guide to Reptiles and Amphibians of Eastern and Central North America. 3rd ed., expanded. Houghton Mifflin Co., Boston.

Dessauer, H.C. and C.J. Cole. 1989. Diversity between and within nominal forms of unisexual teiid lizards, p. 49–71. *In* R.M. Dawley and J.P. Bogart (eds.), Evolution and Ecology of Unisexual Vertebrates. Bull. 466, New York St. Mus., Albany.

Dixon, J.R. 1987. Amphibians and Reptiles of Texas with Keys, Taxonomic Synopses, Bibliography, and Distribution Maps. Texas A&M Univ. Press, College Station.

Dryden, L.S. 1985. Geographic distribution: *Cnemidophorus laredoensis*. Herpetol. Rev. 16:60.

Duellman, W.E. and R.G. Zweifel. 1962. A synopsis of the lizards of the *sexlineatus* group (genus *Cnemidophorus*). Bull. Amer. Mus. Nat. Hist. 123:155–210.

Frost, D.R. and J.W. Wright. 1988. The taxonomy of uniparental species, with special reference to parthenogenetic *Cnemidophorus* (Squamata: Teiidae). Syst. Zool. 37:200–209.

— and D.M. Hillis. 1990. Species in concept and practice: herpetological applications. Herpetologica 46:87–104.

Garrett, J.M. and D.G. Barker. 1987. A Field Guide to Reptiles and Amphibians of Texas. Texas Monthly Press, Austin.

Maslin, T.P. and D.M. Secoy. 1986. A checklist of the lizard genus *Cnemidophorus* (Teiidae). Univ. Colorado Mus. Contrib. Zool. 1:1–60.

McAllister, C.T., S.E. Trauth, and J.E. Ubelaker. 1986. Nematode parasites of the parthenogenetic whiptail lizard, *Cnemidophorus laredoensis* (Sauria: Teiidae) from south Texas. Proc. Helminthol. Soc. Washington 53:138–139.

McCrystal, H.K., R.H. Dean, and J.R. Dixon. 1985. Range extension for the whiptail lizard *Cnemidophorus laredoensis* (Teiidae). Texas J. Sci. 36:283–284.

McKinney, C.O., F.R. Kay, and R.A. Anderson. 1973. A new all-female species of the genus *Cnemidophorus*. Herpetologica 29:361–366.

Moritz, C., W.M. Brown, L.D. Densmore, J.W. Wright, D. Vyas, S. Donnellan, M. Adams, and P. Baverstock. 1989. Genetic diversity and the dynamics of hybrid parthenogenesis in *Cnemidophorus* (Teiidae) and *Heteronotia* (Gekkonidae), p. 87–112. *In* R.M. Dawley and J.P. Bogart (eds.), Evolution and Ecology of Unisexual Vertebrates. Bull. 466, New York St. Mus., Albany.

—, J.W. Wright, and W.M. Brown. 1992. Mitochondrial DNA analyses and the origin and relative age of parthenogenetic *Cnemidophorus*: phylogenetic constraints on hybrid origins. Evolution 46:184–192.

Parker, E.D., Jr., J.M. Walker, and M.A. Paulissen. 1989. Clonal diversity in *Cnemidophorus*: ecological and morphological consequences, p. 72–86. *In* R.M. Dawley and J.P. Bogart (eds.), Evolution and Ecology of Unisexual Vertebrates. Bull. 466, New York St. Mus., Albany.

Paulissen, M.A. 1994. Microhabitat use and escape behaviors of syntopic clonal complexes of the parthenogenetic whiptail lizard *Cnemidophorus laredoensis*. Amer. Midl. Nat. 132:10–18.

—. 1995a. Comparative escape behavior of parthenogenetic and gonochoristic *Cnemidophorus* in southern Texas. Copeia 1995:223–226.

—. 1995b. Sexual and pseudosexual behaviors of the unisexual lizard *Cnemidophorus laredoensis* in nature. Herpetol. Nat. Hist. 3:165–170.

—. 1997. Aggressive behaviors of lizards of the parthenogenetic *Cnemidophorus laredoensis* complex (Sauria: Teiidae) in southern Texas. Texas J. Sci. 49:49–56.

—. 1998. Laboratory study of escape tactics of parthenogenetic and gonochoristic *Cnemidophorus* from southern Texas. Copeia 1998: 240–243.

—. 1999. Thermal biology of the parthenogenetic whiptail lizards of the *Cnemidophorus laredoensis* complex (Sauria: Teiidae) in southern Texas. Texas J. Sci. 51:in press.

—, J.E. Cordes, and J.M. Walker. 1989. Notes on the thermal biology of the Laredo Whiptail *Cnemidophorus "laredoensis"* (Teiidae). Texas J. Sci. 41:224–228.

— and J.M. Walker. 1989. Pseudocopulation in the parthenogenetic whiptail lizard *Cnemidophorus laredoensis* (Teiidae). Southwest. Nat. 34:296–298.

—, —, and J.E. Cordes. 1988. Ecology of syntopic clones of the parthenogenetic whiptail lizard, *Cnemidophorus* 'laredoensis.' J. Herpetol. 22:331–342.

—, —, and —. 1992. Can parthenogenetic *Cnemidophorus laredoensis* (Teiidae) coexist with its bisexual congeners? J. Herpetol. 26:153–158.

Powell, R., J.T. Collins, and E.D. Hooper, Jr. 1998. A Key to Amphibians and Reptiles of the Continental United States and Canada. Univ. Kansas Press, Lawrence.

Rybiski, L.R. and M.A. Paulissen. 1995. Vomerolfactory exploration of novel environments by the parthenogenetic whiptail lizard *Cnemidophorus laredoensis* (Sauria: Teiidae). Texas J. Sci. 47:39–44.

Sievert, L.M. and M.A. Paulissen. 1996. Temperature selection and thermoregulatory precision of bisexual and parthenogenetic *Cnemidophorus* lizards from southern Texas, U.S.A. J. Therm. Biol. 21:15–20.

Smith, H.M. 1987. The concepts of species and subspecies in uniparental populations, reflected in the nomenclature of *Cnemidophorus* (Reptilia: Lacertilia). Bull. Maryland Herpetol. Soc. 23:125–127.

— and E.D. Brodie, Jr. 1982. A Guide to Field Identification, Reptiles of North America. Golden Press, New York.

Townsend, C.R. and C.J. Cole. 1985. Additional notes on requirements of captive whiptail lizards (*Cnemidophorus*), with emphasis on ultraviolet radiation. Zoo Biol. 4:49–55.

Trauth, S.E. and W.R. Fagerberg. 1993. Comparative eggshell stereology in two species of whiptail lizards (Sauria: Teiidae), p. 245–256. *In* J. W. Wright and L. J. Vitt (eds.), Biology of Whiptail Lizards (Genus *Cnemidophorus*). Univ. Oklahoma Press, Norman.

Vance, T. 1978. A field key to the whiptail lizards (genus *Cnemidophorus*)

part I: The whiptails of the United States. Bull. Maryland Herpetol. Soc. 14:1–9.

Walker, J.M. 1986. The taxonomy of parthenogenetic species of hybrid origin: cloned hybrid populations of *Cnemidophorus* (Sauria: Teiidae). Syst. Zool. 35:427–440.

—. 1987a. Distribution and habitat of the parthenogenetic whiptail lizard, *Cnemidophorus laredoensis* (Sauria: Teiidae). Amer. Midl. Nat. 117:319–332.

—. 1987b. Habitat and population destruction and recovery in the parthenogenetic whiptail lizard, *Cnemidophorus laredoensis* (Sauria: Teiidae), in southern Texas. Texas J. Sci. 39:81–88.

—. 1987c. Distribution and habitat of a new major clone of a parthenogenetic whiptail lizard (genus *Cnemidophorus*) in Texas and Mexico. Texas. J. Sci. 39:313–334.

—, R.M. Abuhteba, and J.E. Cordes. 1991a. Copulation in nature between all-female *Cnemidophorus laredoensis* and gonochoristic *Cnemidophorus gularis* (Teiidae). Southwest. Nat. 36:242–244.

—, —, and —. 1991b. Morphological and experimental verification of hybridization between all-female *Cnemidophorus laredoensis* B and gonochoristic *Cnemidophorus gularis* (Squamata: Teiidae). Herpetologica 47:152–164.

— and J.E. Cordes. 1990. Whiptail lizards (genus *Cnemidophorus*) on ersatz substrates in southern Texas. Southwest. Nat. 35:89–91.

—, —, R.M. Abuhteba, and M.A. Paulissen. 1990. Additions to the distributional ecology of two parthenogenetic clonal complexes in the *Cnemidophorus laredoensis* subgroup (Sauria: Teiidae) in Texas and Mexico. Texas J. Sci. 42:129–135.

—, —, and M.A. Paulissen. 1989a. Hybrids of two parthenogenetic clonal complexes and a gonochoristic species of *Cnemidophorus*, and the relationship of hybridization to habitat characteristics. J. Herpetol. 23:119–130.

—, W.C. Guest, J.E. Cordes, and M.A. Paulissen. 1989b. Morphological and chromosomal evidence of hybridization between all-female *Cnemidophorus laredoensis* and gonochoristic *Cnemidophorus gularis*. Copeia 1989:1059–1064.

—, M.A. Paulissen, and J.E. Cordes. 1996. Apparent changes in the composition of a community of cnemidophorine lizards (Sauria: Teiidae) in a subtropical Texas forest. Southwest. Nat. 41:64–67.

—, S.E. Trauth, J.M. Britton, and J.E. Cordes. 1986b. Burrows of the parthenogenetic whiptail lizard *Cnemidophorus laredoensis* (Teiidae) in Webb Co., Texas. Southwest. Nat 31:408–410.

—, —, J.E. Cordes, and J.M. Britton. 1986a. Geographic distribution: *Cnemidophorus laredoensis*. Herpetol. Rev. 17:26–27.

Wright, J.W. 1993. Evolution of the lizards of the genus *Cnemidophorus*, p. 27–81. *In* J.W. Wright and L.J. Vitt (eds.), Biology of Whiptail Lizards (Genus *Cnemidophorus*). Univ. Oklahoma Press, Norman.

—, C. Spolsky, and W.M. Brown. 1983. The origin of the parthenogenetic lizard *Cnemidophorus laredoensis* inferred from mitochondrial DNA analysis. Herpetologica 39:410–416.

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