Helminth Parasites of Unisexual and Bisexual Whiptail Lizards (Teiidae) in North America. III. The Chihuahuan Spotted Whiptail (Cnemidophorus exsanguis)

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Helminth Parasites of Unisexual and Bisexual Whiptail Lizards (Teiidae) in North America. III. The Chihuahuan Spotted Whiptail (*Cnemidophorus exsanguis*)

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ABSTRACT: Twenty-four of 87 (28%) parthenogenetic Chihuahuan spotted whiptails (*Cnemidophorus exsanguis*) from nine counties of New Mexico and seven counties of Texas were infected with one or more endoparasites. These included a linstowiid cestode (*Oochoristica bivitellobata*) in seven (8%), a larval spirurid nematode (*Physaloptera* sp.) in nine (10%) and an oxyurid nematode (*Pharyngodon warneri*) in 10 (11%). This note, the third in a series of reports on helminths of *Cnemidophorus* spp., documents parasites in *C. exsanguis* for the first time.

Key words: Cestoidea, *Cnemidophorus exsanguis*, Cyclophyllidea, helminths, lizards, *Oochoristica bivitellobata*, Oxyurida, *Pharyngodon warneri*, *Physaloptera* sp., Spirurida, survey.

The Chihuahuan spotted whiptail (*Cnemidophorus exsanguis*) is a parthenogenetic (all-female) lizard that ranges from western Texas to northcentral New Mexico and west to southeastern Arizona through Chihuahua to northwestern Sonora, Mexico (Wright and Lowe, 1968; Stebbins, 1985). The species inhabits desert grasslands, canyon bottoms, rocky hillsides and arroyos but unlike other congeners, prefers mesic regions (pine-oak associations) at higher elevations. This clonal complex is thought to be an allotriploid resulting from hybridization of *C. costatus*, *C. inornatus* and *C. septemvittatus* (Good and Wright, 1984). There is a plethora of information on various aspects of the ecology of *C. exsanguis* (Echternacht, 1967; Medica, 1967; Scudday and Dixon, 1973; Schall, 1978; Smith, 1989); however, to my knowledge, nothing is known concerning its parasites. For example, Ayala and Schall (1977) did not find hemoparasites in 29 *C. exsanguis* from four counties of southwestern Texas. This note, the third in a series of reports on helminths of *Cnemidophorus* spp. (see McAllister, 1990a, b), provides information from a survey on the identity, prevalence and intensities of helminths infecting the species in New Mexico and Texas (USA).

Eighty-seven female *C. exsanguis* with snout–vent lengths (SVL) ranging from 31 to 104 mm ($\bar{x} \pm SE = 75.3 \pm 1.6$ mm) were examined for helminths. These specimens had been fixed previously in formalin, stored in 70% ethanol and borrowed from the Museum of Southwestern Biology of the University of New Mexico (UNM, Albuquerque, New Mexico 87131, USA), Laboratory for Environmental Biology of the University of Texas at El Paso (UTEP, El Paso, Texas 79968, USA), Sul Ross State University Museum (SRSU, Alpine, Texas 79830, USA) and Dallas Museum of Natural History (DMNH, Dallas, Texas 75226, USA). Lizards were collected between April and September from 1962 through 1986 in Bernalillo (35°05′N, 106°39′W) (n = 2), Doña Ana (32°18′N, 106°46′W) (n = 1), Eddy (32°50′N, 104°24′W) (n = 4), Grant (32°45′N, 108°07′W) (n = 22), Hidalgo (31°56′N, 108°48′W) (n = 11), Luna (32°16′N, 107°45′W) (n = 2), Otero (33°04′N, 106°01′W) (n = 2), San Miguel (35°36′N, 105°13′W) (n = 2) and Socorro (34°03′N, 106°53′W) (n = 1) counties of New Mexico and Brewster (30°12′N, 103°15′W to 30°00′N, 103°40′W) (n = 11), Culberson (31°55′N, 104°43′W) (n = 2), El Paso (31°50′N, 106°03′W) (n = 4), Hudspeth (30°20′N, 103°40′W to 31°50′N, 105°55′W) (n = 4), Jeff Davis (30°30′N, 103°45′W to 30°35′N, 104°07′W) (n = 7), Pecos (30°10′N, 102°45′W) (n = 1) and Presidio (30°00′N, 104°03′W to 30°15′N,

104°40'W) (n = 8) counties of Texas. Elevations at these sites typically ranged from 1,100 to 1,950 m.

Lizards were separated into three size/age classes as follows: class I, hatchlings, juveniles and immatures (31–70 mm SVL, n = 23), class II, young adults (71–80 mm SVL, n = 25) and class III, reproductively-active and older adults (81–104 mm SVL, n = 39). Methods for processing lizards and staining and preparation of helminths have been described elsewhere (McAllister, 1990a). Representative helminth specimens are deposited in the United States National Museum Helminthological Collection (United States Department of Agriculture, Beltsville, Maryland 20705, USA; accession numbers are 80987 to 80991 for *Oochoristica bivitellobata*, 80992 for *Physaloptera* sp., and 80993 for *Pharyngodon warneri*).

Twenty-four of 87 (28%) *C. exsanguis* (SVL 66 to 95 mm, 82.2 ± 1.5 mm) were infected with at least one of three helminths, including *Oochoristica bivitellobata*, *Physaloptera* sp., and *Pharyngodon warneri*. Two lizards (DNMH 148, 87 mm SVL; SRSU 5565, 71 mm SVL) were infected with two helminths and 63 were parasite free. When lizards are divided into three size (age) classes and examined for prevalence, only seven of 48 (15%) of the smaller/younger lizards (classes I, II) were infected compared to 17 of 39 (44%) of the class III, larger/older whiptails (χ^2 = 7.67, 1 df, $P < 0.05$). In addition, prevalence was more than two-fold higher in Texas populations of *C. exsanguis* (16 of 40, 40%) compared to New Mexico populations (eight of 47, 17%) (χ^2 = 4.62, 1 df, $P < 0.003$). Interestingly, an opposite trend was reported for *C. neomexicanus* (McAllister, 1990b). Monthly prevalence varied, as only two of 24 (8%) of the lizards collected in April, May and September harbored helminths whereas 22 of 63 (35%) of the lizards collected during summer were infected (χ^2 = 4.89, 1 df, $P < 0.003$).

Forty-three linstowiid cestodes (*O. bivitellobata*) were found in the duodenum of seven (8%) *C. exsanguis* (82.0 ± 2.4, range 71 to 88 mm SVL); mean intensity was 6.1 ± 2.3 (range 1 to 18). Three of the hosts were collected in June and July in Eddy and Grant counties, New Mexico (UTEP 1536 to 1537, 1959) whereas the other four were collected in July and August in Brewster, Culberson and Hudspeth counties, Texas (DMNH 148, SRSU 3562, 4154, 5565). As in *C. neomexicanus* (McAllister, 1990b), three distinct life cycle stages of *O. bivitellobata* were found in *C. exsanguis*.

Larval *Physaloptera* sp. were collected from the stomach of nine (10%) lizards (83.4 ± 2.8, 66 to 95 mm); mean intensity was 9.0 ± 4.6 (1 to 45). Eight of the infected lizards were collected between May and August from Brewster, Jeff Davis and Presidio counties, Texas (DMNH 148, 972, 1392, 4224, 4731, SRSU 3342, 4473, 5667) and a single lizard was collected on 24 June 1971 in Grant County, New Mexico (UTEP 1673).

Ten (11%) lizards (80.5 ± 2.3, 71 to 88 mm SVL) were infected with *Pharyngodon warneri*; mean intensity was 17.0 ± 5.2 (1 to 50). Four of the hosts were collected between June and August in Grant, Hidalgo and Otero counties, New Mexico (UTEP 1957, 4427, UNM 36969, 47062) and six were collected during June and July in Culberson, El Paso, Hudspeth, Pecos and Presidio counties, Texas (UTEP 1900, SRSU 4163, 4361, 4403, 5565, 5567).

At least one or more helminths reported herein are now known to be shared with other whiptail lizards, regardless of geographic location, including *C. burti*, *C. inornatus*, *C. laredoensis*, *C. neomexicanus*, *C. septemvittatus*, *C. sexlineatus*, *C. tesselatus*, *C. tigris* and *C. uniparens* (see McAllister, 1990a, b). Following the theoretical guidance of Humphrey-Smith (1989), a highly host-specific, non-pathogenic parasite fulfills the prerequisite for following host evolution and exhibiting phylogenetic specificity whereas a poorly host specific, non-pathogenic parasite cannot be used to understand phylogenetic

relationships between unrelated host groups. The survey data suggests that parasites of whiptail lizards appear to be host specific at the generic level. Whether or not some of their parasites are species specific awaits further study.

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