

NOTES

TRIPLOID PARTHENOGENETIC *ASPIDOSCELIS NEOTESSELATUS* (COLORADO CHECKERED WHIPTAIL): PERSISTENCE IN FRAGMENTED URBAN HABITAT

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Abstract.—Triploid parthenogenetic *Aspidoscelis neotesselatus* (Colorado Checkered Whiptail), the only endemic reptile in Colorado, USA, has a natural geographic distribution that is limited to a small area in the southeastern part of the state. Nevertheless, the species is highly variable with four distinctive color pattern classes designated A, B, C, and D. We undertook this study to determine the ecological status of hybrid-derived *A. neotesselatus* at the Chain of Lakes (COL) area in the city of Pueblo, Pueblo County. This narrow component of Lake Pueblo State Park, situated between a busy urban highway and the Arkansas River, comprises the smallest and most fragmented acreage of habitation known to us for this squamate. A visit to COL by LJL ca. 20 years after discovery and collection of the species there by JMW in September 1999 and June 2000 revealed that it remains abundant at the site based on 17 lizards observed between 0813 h and 0950 h on 18 June 2021.

Key Words.—abundance; Colorado; fragmented habitat; parthenogenetic reproduction; whiptail lizards

Resumen.—*Aspidoscelis neotesselatus* (Huico Teselado de Colorado), triploide partenogenético, es el único reptil endémico de Colorado, EE.UU., tiene una distribución geográfica natural que se limita a una pequeña área en la parte sureste del estado. Sin embargo, la especie es muy variable según cuatro clases de patrones de color distintivos designados A, B, C y D. Llevamos a cabo este estudio para determinar el estado ecológico de *A. neotesselatus* derivado de híbridos en el área de la Cadena de Lagos (COL) en la ciudad de Pueblo, Condado de Pueblo. Este estrecho componente del Parque Estatal Lake Pueblo, situado entre una transitada carretera urbana y el Río Arkansas, comprende la superficie habitada más pequeña y fragmentada que conocemos para esta lagartija. Una visita a COL por LJL ca. 20 años después del descubrimiento y recolección de la especie en ste sitio por parte de JMW en septiembre de 1999 y junio de 2000, reveló que sigue siendo abundante en el sitio según.

Palabras Clave.—abundancia; Colorado; hábitat fragmentado; largartos cola de látigo; reproducción partenogenética

The taxonomic and nomenclatural status of Colorado Checkered Whiptail (*Aspidoscelis neotesselatus*) is based on the following studies: report of its existence though included in *Cnemidophorus* = *Aspidoscelis tessellatus* as pattern classes A and B (Zweifel 1965), description of the triploid species (Walker et al. 1997), generic status (Reeder et al. 2002), and grammatical implications of the generic name *Aspidoscelis* on the suffixes of species names (Tucker et al. 2016). We have studied this triploid parthenogenetic lizard in most of the areas within its small natural geographic distribution in southeastern Colorado, USA, in parts of Crowley, El Paso, Fremont, Huerfano, Las Animas, Otero, Pueblo, and Teller counties. We note that the adaptability of the species, which is likely one major advantage of parthenogenetic reproduction (Taylor and Livo 2023), is indicated by presence of the following introduced arrays (= groups): Colorado in Denver and Adams counties (Livo et al. 2019, 2022), Douglas County (Taylor et al. 2015b; Livo et al. in press), and in distant Grant County, Washington (Weaver et al. 2011). The biology of the species has been most intensively studied in either Pueblo County (e.g.,

Knopf 1966; Taylor et al. 2006; Walker 2012) or it and Otero counties (e.g., Parker and Selander 1976; Walker et al. 1995, 1997, 2012; Taylor et al. 2015a). Interstate Highway 25 seems to be the dividing line between areas in the city of Pueblo conducive to continuing success of *A. neotesselatus* to the west and areas where it apparently has been extirpated to the east (Walker et al. 1996; Walker, unpubl. data). Sites west of Interstate 25 either very near Lake Pueblo State Park (e.g., Nature and Raptor Center of Pueblo) or within the park proper (e.g., Juniper Breaks Campground, Arkansas Point Campground, Park Headquarters, Chain of Lakes, and Remote Launch Ramp) support this species in abundance (Walker et al. 1997; Walker 2012) and are critical to its conservation status. Although little human activity takes place at the abandoned Remote Launch Ramp site bordering Pueblo Lake, elsewhere in the area *A. neotesselatus*, which is not noted for its wariness, carries on normal diurnal activities in campground and scenic areas intensively used by humans who are either oblivious to or tolerant of the presence of this all-female squamate (pers. obs.).

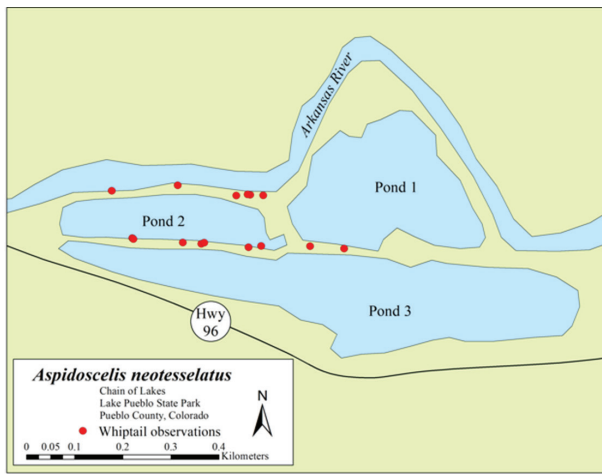


FIGURE 1. Map of Chain of Lakes area of Lake Pueblo State Park, Pueblo County, Colorado, showing points of observations and images of 17 triploid parthenogenetic *Aspidoscelis neotesselatus* A made 18 June 2021 between 0813 and 0950 (multiple lizards were observed at some waypoints).

Of the sites of occurrence mentioned for *A. neotesselatus* in Pueblo County (Walker et al. 1997 and herein), the habitat used by *A. neotesselatus* in the Chain of Lakes (COL) area constitutes the most unusual known for the species. One of us (JMW) serendipitously discovered the species there 6 September 1999 when only young-of-year (YOY) were active in what was then known as Valco Ponds State Wildlife Area. A visit to the site the next day also revealed only YOY; however, on 10 June 2000, JMW observed several year classes including gravid females. The purpose of the recent visit to COL was to assess the status of *A. neotesselatus* there over 20 y after its discovery and collection (see Walker 2012).

The COL component is narrowly sandwiched between the north side of Colorado Highway 96 (i.e., Thatcher Avenue) and the Arkansas River west of metropolitan

Pueblo, Pueblo County. The site (38.259361°N, 104.705824°W, WGS84; elevation 1,445 m) is on the opposite side of the river from the Nature and Raptor Center of Pueblo, which is also inhabited by *A. neotesselatus*. The COL site was purchased by the state in 2005 and developed as a public wildlife sanctuary and recreational area (Fig. 1). It was subsequently incorporated into Lake Pueblo State Park. We have no evidence that the state was aware of the importance of the site to the Colorado endemic *A. neotesselatus* per se at the time of the property transfer. Surveys conducted in 2010 documented occurrences of *A. neotesselatus* in parts of the state park, and while the COL area was identified as habitat for this species, no records were reported at that time (Clinte Henke, pers. comm.). Although the entirety of COL encompasses about 104 ha and features seven ponds, five stocked with species of game fishes and available to the public, as little as about 2.1 ha of this total acreage appears to be suitable habitat for *A. neotesselatus* (Fig. 2), which occurs there in the absence of gonochoristic congener Prairie Racerunner (*A. sexlineatus viridis*). A management plan for COL has been proposed. The ponds, wetlands, and wildlife areas are mostly either reclaimed gravel pits or their surroundings. Ponds 1–3 are separated from the Arkansas River (Fig. 1) by a narrow band of habitat of about 20–30 m in width used by whiptail lizards (Fig. 2).

We here provide the results of a visit to COL 18 June 2021. During the visit between 0813 and 0950, we took photographic vouchers of 17 *A. neotesselatus*, including adults and pre-reproductive individuals (Fig. 3). The route included the narrow trail between ponds 2 and 3, a short distance between ponds 1 and 3, and the area north of Pond 2 between it and the Arkansas River, a total distance of approximately 1.4 km. The included images of lizards in situ at COL (Fig. 3) provide evidence of dorsal color and pattern variability based on ontogenetic

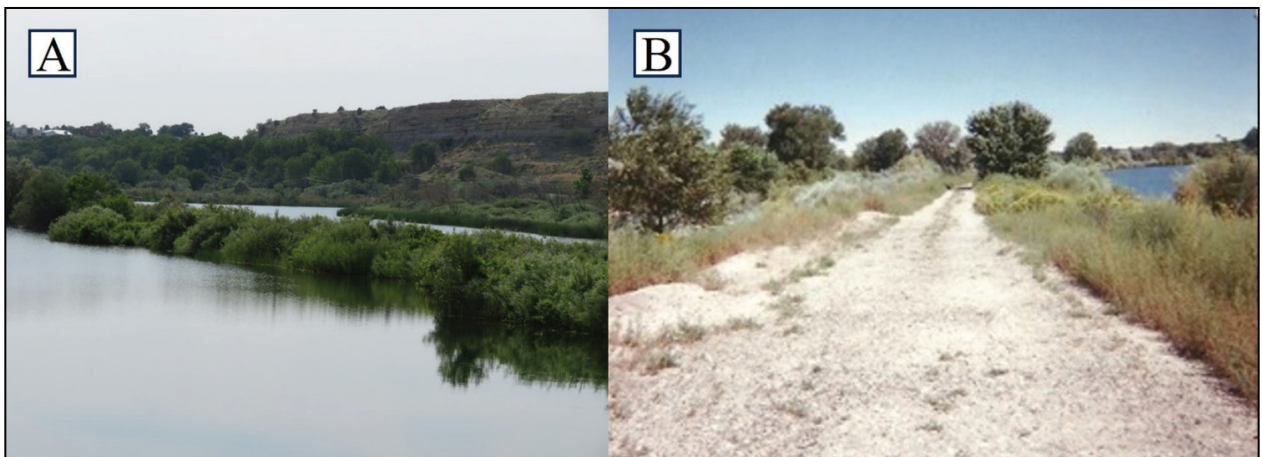


FIGURE 2. (A) View looking to the southeast 19 June 2021, showing narrow vegetated area inhabited by *Aspidoscelis neotesselatus* A between ponds 2 and 3 (Fig. 1) of Chain of Lakes (COL), Pueblo, Pueblo County, Colorado. (Photographed by Lauren Livo). (B) Looking eastward 6 September 1999 on the narrow roadway on the levee between the Arkansas River on the left and a pond on the right at COL, Pueblo, Pueblo County, Colorado, featuring highly productive habitat for *A. neotesselatus* A in September 1999 and June 2000. (Photographed by James Walker).



FIGURE 3. (A) Young adult *Aspidoscelis neotesselatus* A, relative age indicated by uninterrupted lateral stripe and pattern of spots, on relatively open substrate between ponds 2 and 3 (Fig. 1) at Chain of Lakes (COL), Pueblo, Pueblo County, Colorado. (B) Older adult *A. neotesselatus* A, relative age indicated by interrupted lateral stripe and pattern of many spots, on relatively open substrate between a pond and the Arkansas River at COL. (C) Pre-reproductive *A. neotesselatus* A, relative age status indicated by body size and dorsal color pattern of lizard, on debris-cluttered substrate at COL. (D) Pre-reproductive *A. neotesselatus* A, relative age status indicated by body size and dorsal color pattern of lizard, on debris-cluttered substrate at COL. (Photographed by Lauren Livo).

and individual variation for triploid parthenogenetic *A. neotesselatus* based on specimens previously collected. The images also depict the substrate characteristics of habitat frequented by lizards at COL in 2021.

In 1999 and 2000, we found *A. neotesselatus* A at COL in large numbers (unpubl. data). In those years, lizards were present along the approximately 3 m wide by 300 m long forest trail running west from the parking lot along the Arkansas River. The only exposed substrate was that of the trail, which seemed critical to the presence of lizards living in this narrow band of habitat where they were frequently forced to retreat from foraging and basking behaviors by humans. In 1999 and 2000, most of the lizards observed were located east of the westerly Valco Parking Lot on the approximately 80 m long road/levee between the Arkansas River and pond 2 (Fig. 1). In 2021, more than 20 y after discovery of *A. neotesselatus* at the site, we covered additional areas east of the Valco Parking Lot and found a continued abundance of this species in a strikingly constricted habitat association.

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LAUREN J. LIVO for several years conducted research on the Boreal Toad (*Anaxyrus boreas*) in collaboration with the Colorado Division of Wildlife. After receiving a Ph.D. from the University of Colorado, Boulder, USA, she continued her work on the Boreal Toad as a post-doctoral fellow at the University of Colorado. Subsequent to retiring, she has been documenting the geographic distribution and phenology of amphibian and reptile species in Colorado, especially that of various introduced species including Pond Sliders (*Trachemys scripta*), *Aspidoscelis neotesselatus*, Plateau Striped Whiptails (*A. velox*), and Chihuahuan Spotted Whiptails (*A. exsanguis*). (Photographed by Steve Wilcox).



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