

NOTES

WIDESPREAD USE OF HIGHWAY GUARDRAILS AND OTHER ANTHROPOGENIC FEATURES BY THE COLORADO CHECKERED WHIPTAIL (*ASPIDOSCELIS NEOTESSELATUS*)

LAUREN J. LIVO

1835 South Van Gordon Street, Lakewood, Colorado 80228, USA, email: LJLivo@aol.com

Abstract.—The Colorado Checkered Whiptail (*Aspidoscelis neotesselatus*) is a triploid, parthenogenetic lizard with a native range endemic to southeastern Colorado. It occurs in a variety of habitats, often associated with slopes. In its natural habitat, these lizards spend much of their time actively foraging often followed by a period where they rest in sites at the margin of sun and shade. As ectotherms, they move into sunlight or retreat to shade to maintain a narrow range of body temperatures. Herein I report on use of anthropogenic features, especially highway guardrails, used by *A. neotesselatus* as habitat.

Key Words.—*Aspidoscelis sexlineatus*; structures; Colorado; fences; lizards; *Sceloporus consobrinus*.

The Colorado Checkered Whiptail (*Aspidoscelis neotesselatus*) is a triploid, all-female parthenogenetic lizard with a native range endemic to Colorado (Livo 2009). In southeastern Colorado, it occurs in eight counties along the Arkansas River and its tributaries (Walker et al. 2025). Introduced arrays are present in northern Colorado in Adams, Denver, and Douglas counties (Taylor et al. 2015; Livo et al. 2019, 2023). In Otero and Las Animas counties, this lizard is sympatric with its maternal progenitor, the diploid parthenogenetic Common Checkered Whiptail (*Aspidoscelis tessellatus*), and is also broadly sympatric with its diploid gonochoristic paternal progenitor Six-lined Racerunner (*Aspidoscelis sexlineatus*; Walker et al. 1997a). Hybridization of a female *A. tessellatus*, which contributed its diploid genome, and a male *A. sexlineatus*, which contributed a haploid genome, resulted in the formation of the triploid *A. neotesselatus* (Walker et al. 1997a). The dorsal pattern of stripes, bars, and spots along with the streamlined body shape and long tail of *Aspidoscelis neotesselatus* make it easy to distinguish from most other lizards with which it is sympatric in Colorado. The exception to this is distinguishing it from *Aspidoscelis tessellatus* in the limited areas of sympatry. The presence of an irregular white strip on the rear of one or both thighs usually is present on *Aspidoscelis neotesselatus*, while *A. tessellatus* has thighs that lack this stripe and have more prominent spots (Walker et al. 1997a; Livo 2009).

Parthenogenetic *Aspidoscelis* species have often been termed weeds based on their occurrence in disturbed habitats, often in habitats minimally available to sexual species in the genus (Wright and Lowe 1968). *Aspidoscelis tessellatus* and its derived parthenogen *A. neotesselatus* occur in rocky habitats compared to the flatter habitats preferred by the bisexual *A. sexlineatus* (Wright and Lowe 1968). In Colorado, *A. neotesselatus* frequents such habitats as rocky canyons, slopes above drainages (with or without permanent water), and sparsely vegetated hillsides

(Walker et al. 1997b; Livo 2009).

Sloped terrain usually occurs in the vicinity of anthropogenic features such as guardrails and bridges of roadways. In many respects, *A. neotesselatus* could be expected at least occasionally to be present in the vicinity of these features simply because of the association of this lizard with slopes. There is no information in the literature pertaining to usage of features such as guardrails and metal chain link fences by *A. neotesselatus*. In a search of volumes 1–54 of Herpetological Review for the terms guardrail and guard rail, I was unable to find any instances of use of these features by whiptails or any other lizard. Regarding other *Aspidoscelis* species, James W. Walker brought to my attention an unpublished manuscript in which he and J.E. Cordes observed the frequent exploitation of guardrails by *Aspidoscelis tessellatus* and the Texas Spotted Whiptail (*Aspidoscelis gularis gularis*) in part of the Palo Duro Canyon system along Highway 207 in Armstrong County, Texas.

Here I summarize the geographically widespread usage of guardrails, bridges, fences, and other selected anthropogenic features by *A. neotesselatus* in Colorado. During my fieldwork between 2018 and 2024, I opportunistically encountered *A. neotesselatus* in association with guardrails and other anthropogenic structures. I attempted to photograph these instances and included this information in my field notes. I have omitted countless occasions where *A. neotesselatus* used human-made or modified slopes associated with bridges, railroad embankments, retaining walls, etc., if they lacked shade-producing structures such as guardrails or chain link fences. I made no effort to apportion observations equally between structure types. In particular, I more frequently observed lizard use of guardrails in southeastern Colorado and fences in northern Colorado. This was due in large part to more general explorations in southeastern Colorado where I checked bridges and other

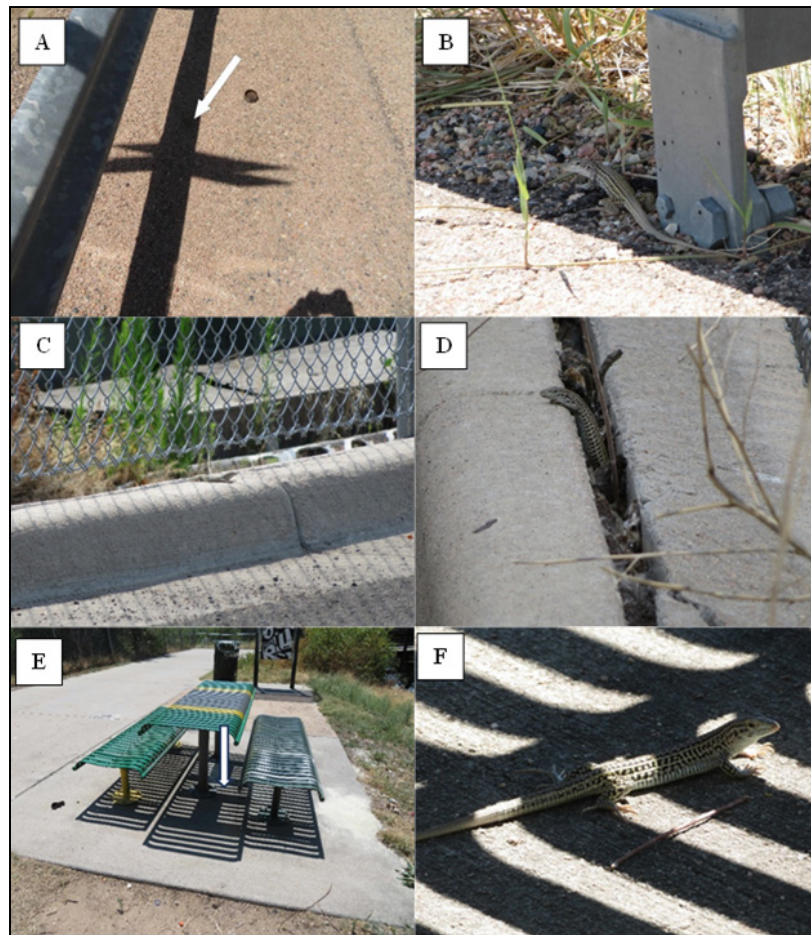


FIGURE 1. (A) A Colorado Checkered Whiptail (*Aspidoscelis neotesselatus*) in the shade of the guardrail at arrow (Pueblo County); (B) *Aspidoscelis neotesselatus* in the shade of a guardrail near a bridge (Crowley County); (C) *Aspidoscelis neotesselatus* basking on the curb under a chain link fence (Denver County); (D) View from the side of an *Aspidoscelis neotesselatus* in the gap under a chain link fence; (E) Metal table and nearby garbage can used by *Aspidoscelis neotesselatus* as shade (Adams County); (F) Closeup view of *Aspidoscelis neotesselatus* shaded under metal table (Adams County). (Photographed by Lauren J. Livo)

areas along highways with guardrails versus my regular survey efforts in northern Colorado that mostly occurred along a pedestrian/bicycle path where particular fences were present and guardrails absent (Livo et al. 2019; Livo et al. 2022; Walker et al. 2025).

While I observed *A. neotesselatus* both foraging (actively moving, flicking the tongue, and digging) along features such as guardrails and fences (Fig. 1), I more frequently saw them apparently resting either in the shade or at the boundary between sunlit and shaded substrate when associated with those features. The most frequently observed use of anthropogenic features was comprised of guardrails, especially those associated with bridges. Substrates under guardrails included both paved surfaces and gravel/dirt surfaces, depending on location. I observed 38 *A. neotesselatus* using eight different sections of guardrail in five different Colorado counties in both the native range and an area to which this species has been introduced. When I observed lizards at guardrails on one occasion, a repeated visit by me even years apart under appropriate weather and time conditions frequently resulted in additional observations of *A. neotesselatus* at or

near the guardrails. Most guardrails were relatively short (< 40 m in length) and I usually saw only one to three lizards along these guardrails on any particular visit to a site, although lizards might also be observed nearby but not using the guardrails. In contrast, I counted eight *A. neotesselatus* along guardrails approximately 1-km long set along a highway as it descended a hillside.

Of 20 observations of *A. neotesselatus* using fencing, 17 took place along a single chain link fence bordering the parking lot near Carpio Sanguinette Park, Denver County (Fig. 1). In four cases between 2018 and 2024, I observed two lizards using this fence at the same time. The lizards basked on the cement curb in the shade of the chain link fence or associated poles or shelter in a gap between the curb and adjacent cement. In addition, these lizards used the shade/sun boundary of fence lines, free-standing poles, and even a metal table and garbage can located on a cement pad (Fig. 1; Appendix Table). In Colorado, I most frequently observed *A. neotesselatus* at guardrails and other anthropogenic features in late morning and early afternoon, after their primary foraging period would be expected to be completed.

Aspidoscelis sexlineatus ranges across eastern Colorado and occurs in sympatry with *A. neotesselatus* at many localities (Walker 1997b; Walker et al. 2025). Despite having observed hundreds of *A. sexlineatus* during my fieldwork, I only have two records where I noted their presence along the shade of a fence (22 July 2018 and 1 June 2019) despite dozens of observations of the sympatric *A. neotesselatus* using these structures. I have a single observation of an *A. sexlineatus* in the vicinity of a guardrail (1 July 2021) in southeastern Colorado, and for this observation the lizard was moving parallel to the guardrail, but a meter or so away where the guardrail appeared to have little if any influence on the lizard.

Use of anthropogenic features is in part due to how these features serve as alternates to natural features used during portions of the daily activity pattern of *A. neotesselatus*. After emerging from overnight shelters, *A. neotesselatus* begin actively foraging. They are most active between about 0800 and 1100 (Aubrey et al. 2019). After foraging, usually by late morning or early afternoon, *A. neotesselatus* often can be observed resting along the margins of vegetation, such as grasses, forbs, and shrubs, in the shaded areas of south-facing boulders, or at the juncture of a ring of grasses or forbs adjacent to bare ground surrounding anthills (pers. obs.) These sites are also used occasionally by the sympatric *A. sexlineatus*. One or more individual *A. neotesselatus* might share these sites, apparently without conflict (Fig. 2). All of these situations allowed the lizards to have their bodies in either sun, shade, or a combination, presumably to maintain a preferred body temperature. The guardrails used by *A. neotesselatus* were along highways and roads with relatively low traffic volume; single-date monitoring occurred at six stations near guardrails with traffic volumes ranging from 335–1,427 vehicles per day (<https://dtdapps.coloradodot.info/otis>). Although it is possible that *A. neotesselatus* in the vicinity of guardrails sometimes fall victim to vehicular traffic, I did not observe any whiptail carcasses on the roads.

Other lizards make frequent use of anthropogenic habitats. For example, in the neotropics many nocturnal gecko species make extensive use of buildings and walls, especially in the vicinity of lights that attract potential prey items (pers. obs.). Members of the genus *Sceloporus*, which are diurnal lizards, frequently employ anthropogenic habitats as perches and shelters. Indeed, I often observed perching by a saxicolous morph of the Prairie Lizard (*S. consobrinus*) on some of the guardrails at bridges simultaneous with the guardrail use by *A. neotesselatus* including in Crowley, Otero, and Pueblo counties. While *S. consobrinus* occupying guardrails frequently perched on the top of the structures, as they would on boulders or rocky outcrop areas, they also made use of shaded areas at times, either retreating into crevices within the structure or clinging to the shaded faces of upright wooden posts. I never saw the *A. neotesselatus* climb any of the guardrail structures other than low curbs, so the perching *S. consobrinus* and ground-dwelling *A.*

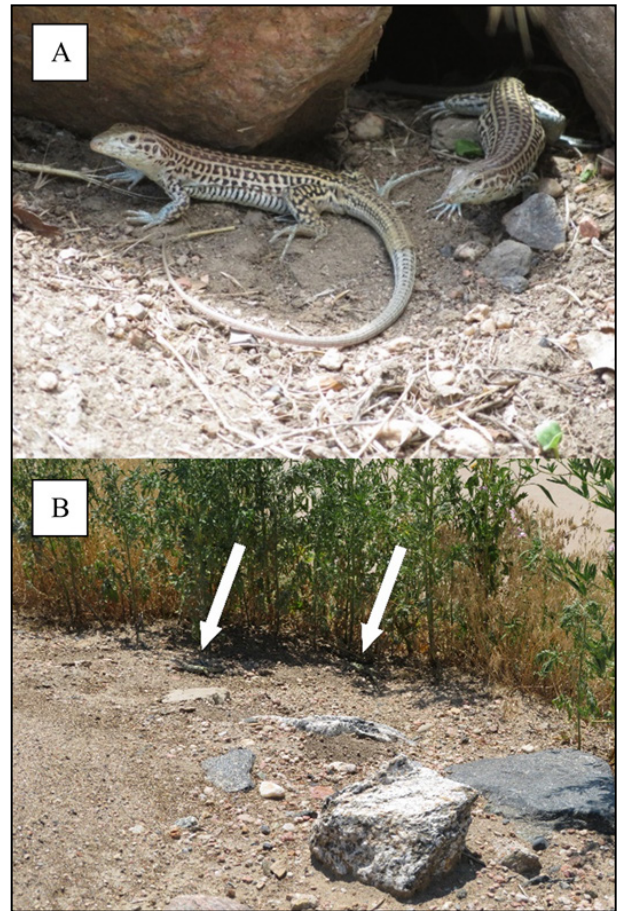


FIGURE 2. (A) Two Colorado Checkered Whiptails (*Aspidoscelis neotesselatus*) sharing the shade of a rock wall under a bridge in early afternoon (Denver County). (B) Two Colorado Checkered Whiptails (*Aspidoscelis neotesselatus*), indicated by arrows, at margins of opening around an ant hill (Denver County). (Photographed by Lauren J. Livo)

neotesselatus effectively used distinctly different parts of the available guardrail habitat.

Because vegetation was usually some distance away from the guardrails, grasses, forbs, and shrubs did not provide the usual retreat from potential danger that was typical of natural sites, such as the margins of anthills or other patches of open ground with adjacent vegetation. Although hatchlings were sometimes observed at sites with guardrails, I did not observe any hatchlings using these structures. This may be due to different foraging or thermoregulation needs compared to adult lizards or simply due to the opportunistic character of my observations. With the way the adult lizards oriented themselves, the primary use of these anthropogenic structures appears to be associated with opportunities for thermoregulation.

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APPENDIX TABLE. Dates and numbers (in parentheses) of Colorado Checkered Whiptails (*Aspidoscelis neotesselatus*) associated with anthropogenic structures. At several localities, the number of lizards does not reflect the number that may have been in the general area on a particular date but that were observed some distance from the structure.

Guardrails

Adams County: York Street: 30 July 2022 (1). **Crowley County:** Hwy 167: 19 May 2018 (1); 28 July 2018 (1). Hwy 207: 20 May 2018 (2); 2 June 2018 (1); 12 June 2019 (1); 16 May 2020 (1). **Fremont County:** Hwy 210: 1 August 2022 (1). **Otero County:** Hwy 109: 24 June 2020 (3); 25 June 2020 (1). **Pueblo County:** Beulah Road: 17 May 2020 (2); 17 May 2020 (3); 18 May 2020 (8). Hwy 209: 19 May 2018 (2); 2 June 2018 (1); 28 July 2018 (1); 24 August 2018 (2). Burnt Mill Road: 25 June 2019 (2); 12 July 2019 (3).

Fencelines

Adams County: Fence near pedestrian bridge: 5 August 2024 (1). **Denver County:** Carpio Sanguinette Park: 25 May 2018 (1); 28 May 2018 (2); 15 June 2018 (1); 30 June 2018 (1); 27 July 2018 (2); 29 July 2018 (1); 1 August 2019 (1); 7 August 2019 (1); 12 August 2019 (1); 14 August 2019 (2); 1 August 2020 (2); 22 June 2021 (1); 17 July 2021 (1); 19 July 2021 (1); 5 August 2021 (1); 28 August 2021 (1); 30 July 2022 (1). **Pueblo County:** Metal sports field perimeter: 7 July 2018 (4); 24 August 2018 (1).

Metal table/can

Adams County: 19 August 2023 (1); 22 August 2023 (1); 5 August 2024 (1).



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 the Pond Slider (*Trachemys scripta*), Colorado Checkered Whiptail (*Aspidoscelis neotesselatus*), and Chihuahuan Spotted Whiptail (*A. exsanguis*). (Photograph by Steve Wilcox).