Social display in the Curaçao Whiptail (*Cnemidophorus murinus* Laurenti)

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Three teiid species (Squamata: Teiidae) are endemic to the ABC islands (Aruba, Bonaire, and Curaçao) of the former Netherlands Antilles: the Aruba Whiptail (*Cnemidophorus arubensis*) of Aruba, the Bonaire Whiptail (*C. ruthveni*) of Bonaire and Klein-Bonaire, and the Curaçao Whiptail (*C. murinus*) of Curaçao and Klein-Curaçao. Before now, social displays have been described only for one of these three species: *C. ruthveni* (Baird et al. 2003). All three species engage in an arm-waving display that involves forelimb circumduction (Baird et al. 2003; van Buurt 2005; van Buurt 2011), which conveys social signals to conspecifics in some iguanian and lacertid lizard species (Carpenter et al. 1970; Verbeek 1972; Mitchell 1973). However, this behavior in the ABC island species of *Cnemidophorus* has not been shown to have a social function (Baird et al. 2003). Instead, experimental evidence demonstrates that in *C. ruthveni* it functions as a pursuit deterrent display that is performed in response to approaching humans, whom the lizard may view as potential predators (Cooper et al. 2004), although there are not yet any published reports of *C. ruthveni* performing the display in response to the approach of a non-human predator. My observations and those of others (van Buurt 2011) also confirm that in *C. arubensis* the display is performed in response to approaching humans.

Baird et al. (2003) documented social displays of *C. ruthveni*. These include a challenge display between males, in which a male aggressor dorsally arches his neck and shoulder area while lowering his head, holding his tail on the ground, and laterally compressing his torso. A subsequent display by the challenger and the opponent involves dewlap extension and dorsoventral sigmoidal bobbing of the head and shoulder region while moving slowly forward. In some cases, an aggressor male adds a display in which he turns in a circle with his body flattened to the ground. The courtship display of a male toward a female resembles the challenge display with simultaneous dewlap extension and dorsoventral sigmoidal bobbing of the head and shoulder region while moving toward the female.

The study in which the social displays of *C. ruthveni* were described listed the lizard species as *C. murinus* because, at the time, the Bonaire and Curaçao populations of *Cnemidophorus* were considered to be two subspecies of *C. murinus*. However, the two are now considered distinct species (Ugueto and Harvey 2010). Most that has been published on the natural history of *C. murinus* sensu lato (e.g. Bennett and Gleeson 1979; Bennett and Gorman 1979; Dearing and Schall 1992, 1994; Schall and Dearing 1994; Schall 1996, 2000; Cooper et al. 2003, 2004) pertains to *C. ruthveni*. The natural history of *C. murinus* has been comparatively little studied. Reports have been published on its parasites (Specian and Whittaker 1980), pathology (Hughes and Delis 2014), clutch size (van Buurt 2011), conservation (van Buurt 2006), diet (Senter 2024), and interactions with tourists (van Buurt 2011), but not on its social displays. Van Buurt (2011) illustrated a male *C. murinus* performing a challenge display resembling that of *C. ruthveni*, but no further social displays have been reported in this species before now. Here, I report an observation of social display in *C. murinus*.

This observation occurred between 11.00 and 13.00 h during sunny weather on 29 December 2023, at Playa Kenepa Grandi, Curaçao. The population density of *C. murinus* at Playa Kenepa Grandi is high, and on this day I observed numerous instances of lizards foraging within 50 cm of each other, without conflict and ignoring each other. But I did observe an aggressive encounter between an adult and a juvenile about half the length of

the adult, on a concrete path near the parking lot (12.351111, -69.151667; elevation 8 m asl). The two lizards were moving about on the concrete path, apparently ignoring each other until they were near each other. When the adult was about 50 cm to the juvenile's right, with its anterior end oriented toward the juvenile's right flank, the adult suddenly lunged at the juvenile, without displaying and with a posture typical of locomotion (i.e. without noticeable arching or flattening or other elements typical of display). The juvenile immediately responded by quickly arching its dorsum upward so that its torso was convex dorsally, upon which the adult abruptly stopped the lunge about 10–20 cm from the juvenile. The juvenile then resumed its previous foraging posture, and the two continued to forage without interacting, each moving in a different direction. All of these behaviors, including the lunge, the response, the resumption of normal posture, and the resumption of foraging in different directions, took place in less than 2 s.

It is noteworthy that the display that the juvenile performed is not part of the known repertoire of display behavior in *C. ruthveni*. In the latter, a male challenging another male or courting a female arches its anterior body, but the behavior reported here is thus far the only reported instance of arching of the dorsum as a response to a perceived threat in any species of *Cnemidophorus*, although it has been observed in other teiids (Bostic 1966; Herrel et al. 2009).

Arching of the dorsum is a phylogenetically widespread element of display in lizards, and its known use differs between lizard taxa. It is part of a challenge display between males in numerous gekkotan, lacertid, and iguanian species (Verbeek 1972; Carpenter 1978, 1982; Marcellini 1997) and in the teiid *Aspidoscelis hyperythrus* (Bostic 1966). It is part of a defensive display, directed at humans, in numerous gekkotan species (Marcellini 1997) and in the teiid *Salvator merianae* (Herrel et al. 2009). It has been observed as part of an aggressive, antipredator threat display toward a snake in the phrynosomatid *Sceloporus grammicus* (Pruett et al. 2015). It is part of the male courtship display in several gekkotan species (Marcellini 1997) and is part of a rejection display by females toward males in several iguanian species (Carpenter 1962, 1963, 1967; Ávila and Cunha-Avellar 2006; Vaz e Nunes et al. 2008; Pruett 2014). In *Varanus komodoensis*, it is part of a display by smaller individuals when approaching larger ones, a display that has been termed an appeasement display and which seems to function as the reptilian equivalent of a humble request to exist unmolested nearby (Auffenberg 1978). Displays that appear to serve the same purpose in other lizard species have been termed assertion displays (Carpenter 1967, 1982). They involve arching of the dorsum in the iguanid *Dipsosaurus dorsalis* (Carpenter 1961) and the teiids *Aspidoscelis hyperythrus* and *A. labialis* (Bostic 1966). The behavior in the juvenile *C. murinus* reported here appears to have functioned similarly to the appeasement or assertion displays of other lizard species. Appeasement/assertion displays have not previously been reported for any species of *Cnemidophorus*.

The variety of social displays in *C. ruthveni* (Baird et al. 2003) and the high population densities of its congeners on Aruba and Curaçao suggest that a variety of undocumented social displays might be present in *C. arubensis* and *C. murinus*. *C. murinus* is abundant at Playa Kenepa Grandi and other locations on Curaçao, providing plentiful opportunities to further document other social displays in this species.

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