

Unken Reflex in the California Red-legged Frog *Rana draytonii* in Western North America

Jeff A. Alvarez^{1*} and Jennifer L. Haire²

¹The Wildlife Project, PO Box 188888, Sacramento, CA 95818, USA

²ICF, 980 9th Street, Suite 1200, CA 94514, USA

Interspecific interactions of the California red-legged frog have been much studied in recent decades (Alvarez et al. 2003; Cook and Jennings 2007; Bishop et al. 2014). Nevertheless, behaviors of *R. draytonii* specifically related to predator avoidance have either been accepted as putative or remain unpublished. *Rana draytonii* engages in two common defensive behaviors that are typical of most anurans when approached by potential predators: first, immobility, by which the frog eludes notice, and second, a fast leap into surrounding aquatic or upland habitat (Stebbins and Cohen 1995; pers obs.). Less commonly reported, but observed by the senior author, is a third defensive behavior, an alarm call, which is given off by many anurans (Stebbins and Cohen 1995; Duellman and Trueb 1994). Here we report *R. draytonii* engaged in a likely fourth defensive behavior, the “unken reflex”.

While collecting data on the relative abundance of California red-legged frog larvae in the upper Kellogg Creek watershed (aka: Los Vaqueros Watershed) in eastern Contra Costa County, we were dip-netting for the species from numerous cattle stock ponds known to support the species. At the interpretive center pond (location: 37.842275° N, 121.724343° W), we captured an adult male *R. draytonii* (snout-urostyle length ~6.5 cm). As we removed it from the net for release, the frog abruptly assumed what has been reported as the unken reflex (see: Duellman and Trueb 1994; Fig. 1), a posture characterized by an arched back and front limbs extended upward. Among anurans, this posture is thought to be used defensively by the yellow-bellied toad (*Bombina variegata*) and the white-lipped bright-eyed treefrog (*Boophis albilabris*) and has also been more recently reported for the Florida gopher frog (*Lithobates capito aesopus*) (Duellman and Trueb 1994; Andreone 2003; Means 2004). The male frog we observed held the position for 45 to 60 sec before being released. As observed in *B. variegata*, *B. albilabris*, and *L. c. aesopus*, the frog was relatively rigid, its front limbs angled upward toward the eyes and the “palms” pointed upward (Fig. 1). Duellman and Trueb (1994) contend that this behavior allows the brightly colored venter to be exhibited to a potential predator, suggesting an aposematic purpose. Means (2004), however, strongly suggested that this behavior in *L. c. aesopus* is related to protection of the eyes from intraspecific interactions. It may be a combination of these postulated purposes that caused *R. draytonii* to use this behavior as a defensive mechanism, however, further research is required to fully understand this behavior. Our observation suggests that the unken reflex represents a fourth defensive behavior exhibited by this threatened species.

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* Corresponding author: jeff@thewildlifeproject.com



Fig. 1. The unken reflex in *R. draytonii* in eastern Contra Costa County. Photograph by Jennifer L. Haire.

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