

## NATURAL HISTORY NOTES

### Field Observations of Anuran Predation by the Black-necked Gartersnake (*Thamnophis cyrtopsis*) in southern Arizona

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The dietary habits of the Black-necked Gartersnake (*Thamnophis cyrtopsis*) fig. 1, appear to consist largely of anurans (Fouquette 1954, Fleharty 1967, Jones 1990). Fouquette (1954) found that of 40 specimens examined from Texas, 35 contained anurans. For a population of *T. cyrtopsis* in western Arizona Jones (1990) also found that anurans predominated in the diet, as ca. 97% of the prey items in adult *T. cyrtopsis* were anurans.



**Fig. 1-** Black-necked Gartersnake (*Thamnophis cyrtopsis*)

In southern Arizona we have observed *T. cyrtopsis* feeding upon or containing: *Bufo alvarius* (fig. 2), *Bufo punctatus*, *Gastrophryne olivacea*, *Hyla eximia*, *Rana catesbeiana*, *Rana chiricahuensis* (fig. 3), *Rana yavapaensis* (fig. 4) and *Spea multiplicata*. Of particular interest are *B. alvarius*, *G. olivacea*, *H. eximia*, and *S. multiplicata* which appear to have potent skin and/or paratoid toxins. In addition, our observations of *B. alvarius*, *G. olivacea*, and *H. eximia* appear to be the first published records of post-metamorphic individuals of these species in the diet of *T. cyrtopsis*.

The powerful toxins and hallucinogenic properties of *B. alvarius* that have gained this species an unfortunate notoriety have been well documented (Hanson and Vail 1956, Porter and Porter 1967, Erspamer et al. 1967, Cei et al. 1968). Oral exposure to this toad species can be life threatening to domestic pets (Eubig

1999), although Wright (1966), observed a raccoon consuming a *B. alvarius*.



**Fig. 2.** *T. cyrtopsis* regurgitating post-metamorphic *Bufo alvarius*.

Noxious secretions from the granular glands of adult *G. olivacea* may cause irritation and burning of the eyes and mouth in humans (Conant and Collins 1991, pers. obs.). On several occasions during and after handling *G. olivacea* we have endured symptoms that we believe were caused by these small anurnas' skin secretions. After handling *G. olivacea* we have experienced burning in the eyes and mouth, difficulty swallowing, nasal discharge, and sneezing. Similar effects have been noticed for *H. eximia* and *S. multiplicata*.



**Fig. 3-** *T. cyrtopsis* consuming *Rana chiricahuensis*

Certain snakes however, appear to be immune to amphibian toxins. *Heterodon spp* and *Xenodon spp* feed almost exclusively on *Bufo* adults (Duellman and Trueb 1994:260), and Brodie (1968), reported *T. sirtalis* to be resistant to the strong toxins of *Taricha spp*. Greene (1997:68) presents a photo of the colubrid snake *Liophis epinephalus* swallowing the highly toxic Harlequin Frog (*Atelopus varius*) and suggests that the snake possess immunity to the toxins. Our field observations of *T. cyrtopsis* prey items suggest it, and perhaps other gartersnakes may possess immunity to amphibian toxins as well.

On 22 July 2002 at ca. 2252h in a canyon in the Pajarito-Atascosa Mts. complex, Santa Cruz Co., Arizona, we captured and palpated two active *T. cyrtopsis*. TC1 (unsexed) measured 48.5cm SVL, weighed

68g at capture, and regurgitated one adult *G. olivacea* (fig. 5) and one post-metamorphic *B. punctatus*. TC2 (unsexed) measured 62.8cm SVL, weighed 73.5g, and regurgitated one adult *G. olivacea* and one post-metamorphic *S. multiplicata*. The snakes were released at the capture site.



Fig. 4- *T. cyrtopsis* with *Rana yavapaiensis* feed buldge.



Fig. 5- *T. cyrtopsis* with regurgitated *Gastrophryne olivacea*

At ca. 0800h on 7 September 2000, Enderson captured an adult *T. cyrtopsis* on the Buenos Aires National Wildlife Refuge, Pima Co., Arizona that yielded 14 recently metamorphosed *B. alvarius*. On 12 August 1998 at ca. 0930h Enderson force regurgitated a female *T. cyrtopsis* from a canyon in Huachuca Mts, Santa Cruz Co., Arizona that yielded a large adult *H. eximia*.

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Photos by Erik F. Enderson

