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Parasites of the Great Plains Narrowmouth Toad (*Gastrophryne olivacea*) from Northern Texas

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ABSTRACT: Forty-nine adult and 14 immature Great Plains narrowmouth toads (*Gastrophryne olivacea*) from Johnson and Somervell Counties of northcentral Texas were examined for parasites. Sixty-four percent of the toads were infected with one or more species of parasites. New host records are reported for an isosporan similar to *Isospora neos*, and for *Cylindrotaenia americana*. The most common parasite in *G. olivacea* was the nematode, *Cosmocercoides dukae*. Prevalence was high among the adult *G. olivacea* (82%); however, none of the immature toads were infected.

Key words: *Cosmocercoides dukae*, *Cylindrotaenia americana*, *Gastrophryne olivacea*, Great Plains narrowmouth toad, *Isospora* sp., survey.

The Great Plains narrowmouth toad, *Gastrophryne olivacea*, is a small, secretive, semifossorial microhylid anuran that ranges from southeastern Nebraska and Missouri to San Luis Potosi, Mexico and west through Texas and northern Mexico to southern Arizona and south to the states of Durango and Nayarit, Mexico (Conant, 1975). Information regarding much of the ecology and natural history of *G. olivacea* was reviewed by Nelson (1972).

Little is known about the parasites of *G. olivacea*. Harwood (1932) reported the common amphibian nematode, *Cosmocercoides dukae*, in *G. olivacea* from southeastern Texas. Kuntz (1941) examined 11 *G. olivacea* from Comanche County, Oklahoma, for metazoan parasites and reported a cestode and nematode. In an annotated list of parasites of the Microhylidae, Walton (1950) reported *Protoopalina ovoidea* and *Trichomonas augusta* in *G. olivacea*. In addition, Freiberg (1951) noted in an ecological study of *G. olivacea* from Kansas that "20% of the individuals contained small white nematodes about 2 mm in length which looked like human pinworms."

In order to obtain more information on the intensity and prevalence of parasites in *G. olivacea* we collected 63 specimens, including 14 transforming tadpoles and juveniles ($\bar{x} \pm$ SE snout-vent length = 10.0 ± 0.5; range = 8–13 mm) and 49 adults (20.8 ± 0.3; 17–26 mm) between May and October 1986 and between February and March 1987 in Johnson and Somervell Counties, Texas. Specimens were either captured by hand by overturning limestone rock shelters or were excavated from shallow burrows in cedar glade habitat. Toads were transported to the laboratory in plastic freezer bags on ice and anesthetized with 0.2% MS-222 (3-aminobenzoic acid ethyl ester, Sigma Chemical Company, St. Louis, Missouri 63178, USA). Blood smears were taken from the exposed heart and fixed in absolute methanol, stained with Giemsa for 1 hr and rinsed briefly in phosphate-buffered tap water (pH = 7.1). The entire length of the gastrointestinal tract was opened and examined for helminths. The lungs, liver, urinary bladder and body cavity were examined also for parasites. Feces from the rectum were collected and placed in vials of tap water supplemented with 100 I.U./ml penicillin-G-100 μg/ml streptomycin (Gibco Laboratories, Grand Island, New York 14072, USA) and examined by microscopy following flotation in Sheather's sugar solution (sp. gr. 1.18) (Todd and Ernst, 1977). Cestodes were fixed in alcohol-formalin-acetic acid mixture for 24 hr and transferred to 70% ethanol. They were later stained in Mayer's hematoxylin, dehydrated, cleared and mounted entire

in permount. Nematodes were killed in hot alcoholic acetic acid (3:1 mixture), placed in 70% ethanol and transferred to glycerol for clearing and examination as temporary mounts.

Forty (64%) of the *G. olivacea* (0% immatures; 82% adults) were infected with one or more parasites. Hematozoa were not observed on blood smears. New host records are reported for an isosporan similar to *Isospora neos* and *Cylindrotaenia americana*. The nematode, *Cosmocercoides dukae*, was the most common parasite found in *G. olivacea*.

Infections with more than one parasite species were observed in 23 (37%) of the *G. olivacea*; four of the nine (44%) *G. olivacea* infected with the isosporan also harbored *C. dukae*, and 16 of 18 (89%) hosts infected with *C. americana* also had infections of *C. dukae*. Only two (3%) of the *G. olivacea* harbored all three species of parasites.

Isospora neos was described originally by Yakimoff and Gousseff (1936) from the feces of *Rana arvalis* in Europe. Walton (1949) extended the host range of the parasite to include *R. terrestris*, also from Europe. The only other report of the parasite is by Kazubski and Grabda-Kazubska (1973), who found the coccidian in the posterior one-half of the small intestine of a single *R. arvalis* in Poland. In our study, only nine (14%) *G. olivacea* were infected with an isosporan similar to *I. neos*. Spherical oocysts measured 18.5 μm in diameter and ovoid sporocysts were 12.7 long by 10.9 μm wide, with a large sporocyst residuum. Although the parasite may be a separate species from *I. neos*, the oocysts observed in the present study were similar to those reported by previous authors. Apparently, this is the first report of an *I. neos*-like coccidian from a host other than *Rana* spp. and from an area other than Europe.

A cyclophyllidean cestode, *C. americana*, was the only cestode found in *G. olivacea*. Eighteen (29%) of the toads were infected, with a mean intensity of 5.7 (range = 1–28) worms per host. One of us (CTM) has found *C. americana* in sympatric spotted chorus frogs (*Pseudacris clarkii*), Blanchard's cricket frogs (*Acris crepitans blanchardi*) and Woodhouse's toad (*Bufo woodhousii woodhousii*) from the same locale. As noted by Dyer (1986), this species is reported from numerous anuran and caudate amphibians in the Western Hemisphere.

Since its original description from the rectum of the eastern newt, *Notophthalamus viridescens* (Holl, 1928), *C. dukae* is reported in many taxa of amphibians and reptiles (Baker, 1978), and from various terrestrial molluscs (Lewis, 1973; Gleich et al., 1977). Harwood (1932) found four of six (67%) *G. olivacea* infected with *C. dukae* and also reported this nematode from a number of North American vertebrates, including 13 amphibian and eight reptilian species from Texas. Thirty-seven (59%) of the toads in the present study were infected with *C. dukae*, with a mean intensity of 10.4 (range = 1–31) worms per host.

Specimens of *G. olivacea* obtained in the present study are deposited in the Arkansas State University Museum of Zoology (ASUMZ 4644, 5896–5900, 5980.1–.9, 5981–5982, 6000–6001, 6009.1–.5, 6319–6334). Representative specimens of helminths are deposited in the U.S. National Parasite Collection, Beltsville, Maryland 20705, USA (Nos. 79572–79573).

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