

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

Authors: McAllister, Chris T., and Upton, Steve J.

Source: Journal of Wildlife Diseases, 23(4) : 686-688

Published By: Wildlife Disease Association

URL: <https://doi.org/10.7589/0090-3558-23.4.686>

The BioOne Digital Library (<https://bioone.org/>) provides worldwide distribution for more than 580 journals and eBooks from BioOne's community of over 150 nonprofit societies, research institutions, and university presses in the biological, ecological, and environmental sciences. The BioOne Digital Library encompasses the flagship aggregation BioOne Complete (<https://bioone.org/subscribe>), the BioOne Complete Archive (<https://bioone.org/archive>), and the BioOne eBooks program offerings ESA eBook Collection (<https://bioone.org/esa-ebooks>) and CSIRO Publishing BioSelect Collection (<https://bioone.org/csiro-ebooks>).

Your use of this PDF, the BioOne Digital Library, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Digital Library content is strictly limited to personal, educational, and non-commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne is an innovative nonprofit that sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

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

Chris T. McAllister¹ and Steve J. Upton² ¹Renal-Metabolic Lab, Veterans Administration Medical Center, 4500 South Lancaster Road, Dallas, Texas 75216, USA, and Department of Biological Sciences, North Texas State University, Denton, Texas 76203, USA; ²Division of Biology, Kansas State University, Ackert Hall, Manhattan, Kansas 66506, USA

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 nema-

todes 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 ($\bar{x} \pm \text{SE}$ 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 $\mu\text{g}/\text{ml}$ 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, *Notophthalmus 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).

We thank K. L. Fry for allowing us to collect toads on his property, J. E. Ubelaker for confirming our parasite identifications and two anonymous reviewers for improving the manuscript.

LITERATURE CITED

- BAKER, M. R. 1978. Transmission of *Cosmocercoides dukae* (Nematoda: Cosmocercidae) to amphibians. *The Journal of Parasitology* 64: 765–766.
- CONANT, R. 1975. A field guide to reptiles and amphibians of eastern and central North Amer-

- ica. Houghton-Mifflin, Boston, Massachusetts, 429 pp.
- DYER, W. G. 1986. Cestodes of some Ecuadorian amphibians and reptiles. *Proceedings of the Helminthological Society of Washington* 53: 182-183.
- FREIBERG, R. E. 1951. An ecological study of the narrow-mouthed toad (*Microhyla*) in northeastern Kansas. *Transactions of the Kansas Academy of Science* 54: 374-386.
- GLEICH, J. G., F. F. GILBERT, AND N. P. KUTSCHA. 1977. Nematodes in terrestrial gastropods from central Maine. *Journal of Wildlife Diseases* 13: 43-46.
- HARWOOD, P. D. 1932. The helminths parasitic in the Amphibia and Reptilia of Houston, Texas and vicinity. *Proceedings of the United States National Museum* 81: 1-71.
- HOLL, F. J. 1928. Two new nematode parasites. *Journal of the Elisha Mitchell Society* 43: 184-186.
- KAZUBSKI, S. L., AND B. GRABDA-KAZUBSKA. 1973. *Isospora lieberkuehni* (Labbé, 1896) and *I. neos* Yakimoff et Gousseff, 1936 (Eimeriidae) in frogs in Poland. *Acta Parasitologica Polonica* 21: 3-8.
- KUNTZ, R. E. 1941. The metazoan parasites of some Oklahoma anura. *Proceedings of the Oklahoma Academy of Science* 21: 33-39.
- LEWIS, P. D., JR. 1973. Helminths from terrestrial molluscs in Nebraska. I. New host and locality records for *Cosmocercoides dukae* (Holl, 1928) Travassos, 1931 (Nematoda: Cosmocercidae). *Transactions of the American Microscopical Society* 92: 286-287.
- NELSON, C. E. 1972. *Gastrophryne olivacea*. In *Catalogue of American amphibians and reptiles*, R. G. Zweifel (ed.). Society for the study of Amphibians and reptiles, New York, New York, pp. 122.1-122.4.
- TODD, K. S., AND J. V. ERNST. 1977. Coccidia of mammals except man. In *Parasitic protozoa*, Vol. 3, J. D. Kreier (ed.). Academic Press, New York, New York, pp. 71-99.
- WALTON, A. C. 1949. Parasites of the Ranidae (Amphibia). *The Journal of Parasitology* 35(Suppl.): 39.
- . 1950. Parasites of the Brevicipitidae (Amphibia). *The Journal of Parasitology* 36(Suppl.): 40.
- YAKIMOFF, W. L., AND W. F. GOUSSEFF. 1936. Eine neue kokzidie des frosches. *Zentralblatt für Bakteriologie. I. Abteilung Originale* 138: 43-44.

Received for publication 5 February 1987.