

Neoterranova caballaeroi (Nematoda: Anisakidae) from Northern Cottonmouth, *Agkistrodon piscivorus* (Reptilia: Ophidia: Viperidae) in Arkansas

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Abstract: Examination of four adult northern cottonmouths, *Agkistrodon piscivorus* collected from western Arkansas for helminth parasites, yielded three, seven, 21, and 70 stomach nematodes, respectively. The nematodes were identified as the anisakid, *Neoterranova caballaeroi*. Although the species has been previously reported from *A. piscivorus*, this is the first time the nematode has been reported from Arkansas. We document a new geographic record for the parasite and the first report of *N. caballaeroi* from west of the Mississippi River.

Introduction

The northern cottonmouth, *Agkistrodon piscivorus* is a moderately large viperid snake that ranges from extreme southern Illinois, western Kentucky, and southeastern Virginia west to through Arkansas to southeastern Oklahoma and southcentral Texas (Powell et al. 2016). In Arkansas, *A. piscivorus* is found statewide in suitable watersheds, including swamps and sloughs to clear upland brooks (Trauth et al. 2004). Trauth and McAllister (1995) reported that in Arkansas, *A. piscivorus* feeds on fish, anurans, small mammals, and snakes.

McAllister et al. (2023) recently summarized reports of helminth parasites of this snake from throughout its range and included

data on parasites of eight specimens from Arkansas. Those collected from that study harbored three trematodes, two nematodes, an acanthocephalan, and pentastomid. However, in terms of nematodes, only an unknown ascarid larvae and *Physaloptera abjecta* Leidy, 1856 were found; however, Detterline et al. (1984) reported an unidentified nematode from a northern cottonmouth from Alabama and Davis et al. (2016) documented *Capillaria colubra* Pence, 1970 from *A. piscivorus* from North Carolina. In addition, Scholz et al. (2023) reported on tapeworms (Cestoda) of *A. piscivorus* from Arkansas and Oklahoma, some collected from McAllister et al. (2023), but not reported therein. Here we document an additional nematode from this snake in Arkansas as well as report a new geographic distribution record for the parasite.

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Materials and Methods

On 20 June 2024, 29 August 2025 (n = 2), and 27 September 2025, four adult *A. piscivorus* (mean $\pm$ sd snout-vent length [SVL] = 526.8 $\pm$ 88.6, range 402-645 mm) were collected with snake tong from the Ouachita Mountains Biological Station pond, Polk County, Arkansas, and examined for helminth parasites. Snakes were euthanized with a concentrated intraperitoneal injection of tricaine-methanesulfonate solution and a mid-ventral incision was made to expose their gastrointestinal contents. The stomach and intestinal organs were split lengthwise, rinsed with normal saline (0.9% [v/v] NaCl-), placed in a Petri dish with fresh normal saline, and examined

under a stereomicroscope. Live nematodes were observed in the stomach, removed, and fixed in hot distilled water. Specimens were transferred to vials containing 90% DNA grade ethanol. They were later examined as temporary mounts in glycerol.

Voucher specimens of hosts were deposited in the Northeast Texas Community College Vertebrate Collection, Mt. Pleasant, Texas. Voucher nematodes were deposited in the Harold W. Manter Laboratory of Parasitology (HWML), University of Nebraska, Lincoln, Nebraska.

Results and Discussion

Numerous anisakid nematodes (Fig. 1A) were found in the stomach of all snakes. Detailed

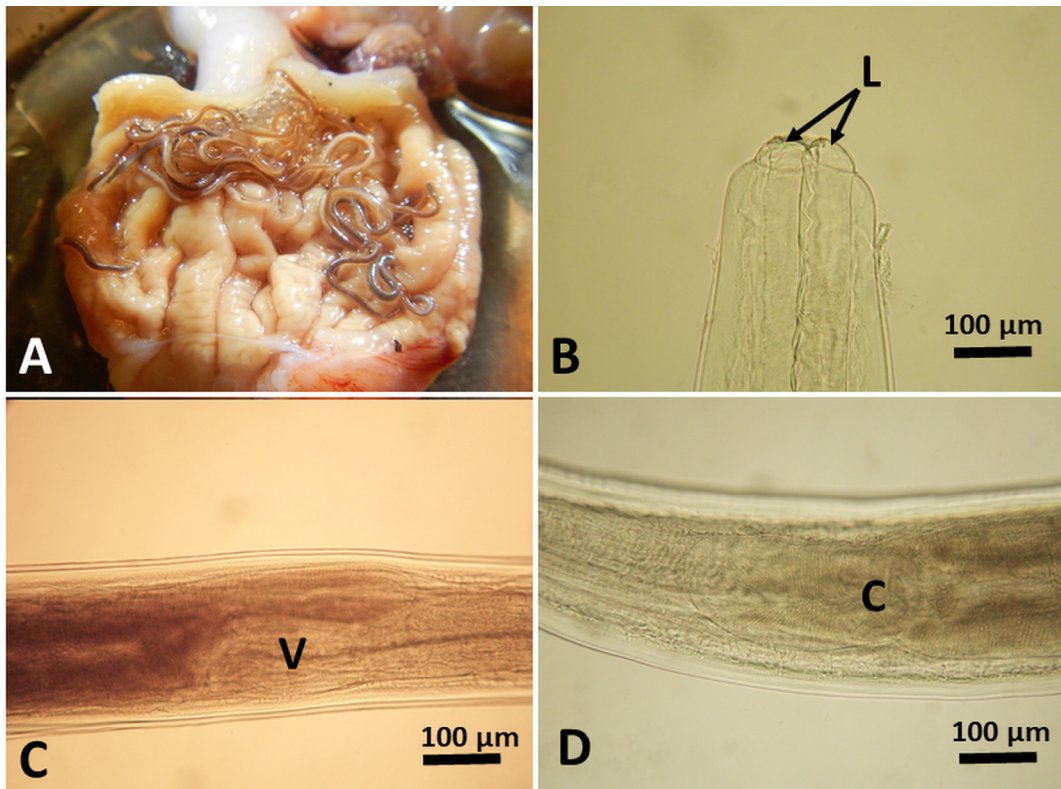


Figure 1. *Neoterranova caballaeroi* from *Agkistrodon piscivorus*. (A) Massive infection showing nematodes in dissected stomach. (B) Cephalic end showing two of three lips (L, arrows) of male specimen. (C) Elongate ventriculus (V). (D) Intestinal caecum (C).

information on this infection is presented below in annotated format.

Nematoda: Rhabditita: Anisakidae

***Neoterranova caballaeroi* Barus and Coy Otero, 1966 (Moravec and Justine, 2020)**

(Figs. 1A-D)

Type host and locality: Cuban racer, *Cubophis canthigerus* (Bibron); Paracoa, Cuba (Barus and Coy Otero 1966)

Host: Northern cottonmouth, *Agkistrodon piscivorus* (Lacépède), four adults, 402, 500, 560, and 645 mm snout-vent length (SVL), collected 20 June 2024, 29 August 2025 ($n = 2$), and 27 September 2025.

Locality: USA: Arkansas: Polk County, Ouachita Mountains Biological Station pond (34°27'43.4484"N, -93°59'54.3264"W).

Deposited material: HWML 119237.

Prevalence: Three of 3.

Site of infection: Stomach.

Intensity: 25.5 ± 26.5 , range 3-70 worms; 3 in 402 mm SVL specimen; 8 in 560 mm SVL specimen; 21 in 500 mm SVL specimen; 70 in 645 mm SVL specimen.

Other reported hosts and localities: North American racer, *Coluber constrictor* L., Florida (Sprent 1979); eastern indigo snake, *Drymarchon couperi* (Holbrook) (Foster et al. 2000); Mississippi green watersnake, *Nerodia cyclopion* (Duméril, Bibron and Duméril), Louisiana (Sprent 1979; Fontenot and Font 1996); eastern hog-nosed snake, *Heterodon platyrhinos* Latreille, broad-banded watersnake, *Nerodia fasciata confluens* (Blanchard), diamond-backed watersnake, *Nerodia rhombifer* (Hallowell), Midland watersnake, *Nerodia sipedon pleuralis* (Cope), brown watersnake, *Nerodia taxispilota* (Holbrook), *A. piscivorus*, Louisiana (Sprent 1979; Fontenot and Font 1996).

Collins (1969) reported a *Neoterranova* (= *Terranova*) sp. from plain-bellied watersnake, *Nerodia erythrogaster* (Forster) from North Carolina that was, in all likelihood, *N. caballaeroi*. However, it was not identified to subgenus and specimens were said to be damaged (Camp 1980). In addition, Camp (1980) reported a *Terranova* sp. from *N. taxispilota* from Georgia that also most likely was *N. caballaeroi*.

Geographic range: USA: **Arkansas** Proc. Okla. Acad. Sci. 105: pp 58-61 (2025)

(**this report**); Florida (Sprent 1979; Foster et al. 2000); Georgia? (Camp 1980); Louisiana (Sprent 1979; Fontenot and Font 1996); North Carolina? (Collins 1969); Cuba (Sprent 1979).

Remarks

Barus and Coy Otero (1966) originally described this nematode as *Terranova caballaeroi* and Sprent (1979) followed this classification. However, more recently, Moravec and Justine (2020) assigned this nematode to the newly established genus *Neoterranova*. The most important characters that distinguish the species are the morphologies of the ventriculus and cecum (see Figs. 1C-D).

In conclusion, examination of a small sample of northern cottonmouths from Arkansas yielded new distributional information on a nematode parasite from the stomach. Additional collection of *A. piscivorus* from the state as well as other parts of its range for helminths in the western extreme of its range in Texas (see Dixon 2013), a region where cottonmouths have not yet been examined, may provide additional information on its helminth parasites.

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