Bashkirovitrema canadense (Trematoda: Digenea: Echinostomatidae) from Northern River Otter, *Lontra canadensis* (Carnivora: Mustelidae), from Southeastern Oklahoma

Chris T. McAllister
Science and Mathematics Division, Eastern Oklahoma State College, Idabel, OK 74745

Thomas J. Fayton
Gulf Coast Research Laboratory, University of Southern Mississippi, Ocean Springs, MS 39564

The northern river otter, *Lontra canadensis* (Schreber) is a large semi-aquatic mustelid that ranges from Alaska and most of Canada south to northern California and northern Utah in the west and from Newfoundland southward to Florida in the east (Reid 2006). In Oklahoma, *L. canadensis* is found sporadically in 15 counties of the state, primarily in the eastern portion (Hatcher 1984; Caire et al. 1989; Barrett and Leslie 2010). Unfortunately, *L. canadensis* populations have been severely affected because of habitat destruction, human settlement, unregulated harvest and water pollution (Larivière and Walton 1998). The river otter primarily feeds on fish, but crayfish, amphibians, reptiles, birds, and other mammals are also taken (Tumlison et al. 1986; Melquist et al. 2003; Ligon and Reasor 2007; Reed-Smith 2012).

Concerning helminth parasites, *L. canadensis* has been the subject of several surveys conducted on populations in 14 US states, including Alabama, Alaska, Arkansas, Florida, Georgia, Louisiana, Maryland, Massachusetts, Michigan, Montana, New York, North Carolina, Oregon and Tennessee, and Newfoundland and Ontario, Canada (summarized by Fleming et al. 1977; Shoop and Corkum 1981; Tumlison et al. 1984; Addison et al. 1988; Snyder et al. 1989; Forrester 1992; Hoberg et al. 1997; Kollars et al. 1997; Kimber and Kollias 2000; Dronen 2009; Crait et al. 2015). Interestingly, Kimber and Kollias (2000) reported that during an Oklahoma reintroduction program of river otters originally from Louisiana, 40% of the *L. canadensis* were infected with nematodes, *Capillaria* sp. and one infection was a concurrent *Ancylostoma* spp. infection. To our knowledge, however, nothing has been published on any parasite from river otters originating from Oklahoma. Here, we report on a digenean found in a single *L. canadensis* from the southeastern corner of the state.

On 13 July 2015, an adult male *L. canadensis* was found dead on the road north of Broken Bow off US 259, McCurtain County (34.054366°N, 94.73956°W) and salvaged under an Oklahoma Department of Wildlife Conservation Scientific Collecting Permit. The nearest watershed is Yanubbee Creek, approximately 500m due east of the collection site. The river otter was immediately taken to the laboratory and necropsied for helminth parasites. A midventral incision was made and the entire gastrointestinal tract from the esophagus to anus was removed and split lengthwise and several 15 cm segments were cut and placed in Petri dishes and their contents rinsed in 0.9% saline. The lungs, heart, kidneys, liver and gonads were also similarly examined

under a stereomicroscope. Six trematodes (Fig. 1A) were removed from the stomach and upper small intestine, fixed in near boiling distilled water without coverslip pressure and placed in 70–95% DNA grade ethanol. They were stained in acetocarmine or Ehrlich's hematoxylin, cleared in methyl salicylate and mounted in Canada balsam. A host voucher specimen (skull only) was deposited in the Henderson State University Collection (HSU), Arkadelphia, Arkansas, with the skin retained in the Eastern Oklahoma State College-Idabel collection; parasite vouchers were deposited in the Harold W. Manter Laboratory of Parasitology (HWML), Lincoln, Nebraska as HWML 101026–101027.

All trematodes found possessed 27 collar spines (Fig. 1B), and with their arrangement, a bipartite internal seminal vesicle, and vitelline fields confluent in the post-testicular region our species belongs in *Bashkirovitrema* Skrjabin, 1944 (Digenea: Echinostomatidae). Measurements of five adult specimens (in µm, long × wide) are as follows: body 14,560–19,382 × 1,033–1,305; forebody 895–1,527 long, representing 5–8% body length (BL); oral sucker 266–308 × 261–308; ventral sucker 583–1,037 × 840–963; head collar 425–537 × 485–625; lateral collar spines 93–150 × 27–33; corner collar spines 140–165 × 41–50; postcecal space 105–292, representing 0.6–2.0% BL; pharynx 202–285 × 147–192; esophagus 612–874 long; anterior testis 845–1,527 × 315–369; posterior testis 878–1,240 × 278–368, separated from anterior testis by distance of 50–223, representing 0.4–1.0% BL; cirrus sac 612–874 × 284–383, representing 3.4–6.0% BL; ovary 268–298 × 273–293, separated from anterior testis by 150–283, representing 0.7–1.6% BL; posterior extent of vitelline field 108–425, representing 0.6–2.8% BL; eggs 97–107 × 55–66. These measurements and the relative position of morphological features falls within the range of those reported for *B. canadense* Dronen, 2009 from *L. canadensis* reported from Georgia, Louisiana, New York, North Carolina, and Ontario, Canada by Dronen (2009). However, our specimens are unique in the posterior extent of the ceca and vitelline field and in the condition of the excretory vesicle. Dronen (2009) describes the ceca and vitelline field as terminating "…some distance from the posterior extremity…" and, although no measurements for the position of termination of these features are provided, measurements from his illustration of *B. canadense* (see his Fig. 8) indicate that the posterior extents of the ceca and vitelline field are approximately 95.8% and 94.8% of BL, respectively, whereas those of our specimens are 98–99.4% and 97.2–99.4%, respectively, with posterior extents nearly reaching the end of the body (Fig. 1C). As to whether the posterior

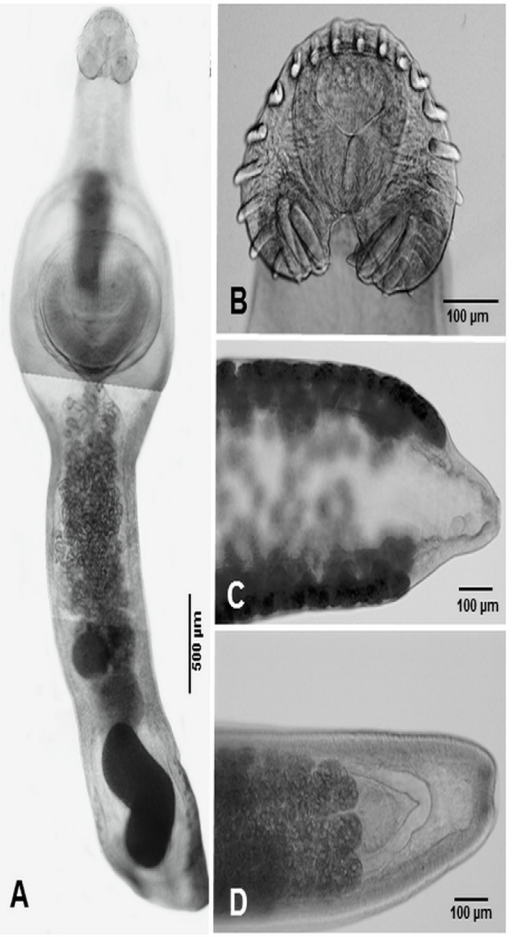

Figure 1. *Bashkirovitrema canadense* from *Lontra canadensis*. A. Ventral mount. B. Anterior end showing oral sucker and collar spines. C. Posterior end showing posterior extent of vitelline field. D. Posterior end showing relative positions of looping diverticula and posterior extent of ceca and vitelline field.

extent of the ceca and vitelline fields in our specimens represents intraspecific variation for *B. canadense* requires examination of type material, and this would be well supplemented through DNA sequencing of *Baskirovitrema* from Oklahoma and elsewhere in the Nearctic. Our specimens also possessed prominent lateral diverticula extending from the excretory vesicle that distinctly loop near the posterior end of the body (Fig. 1D), a feature that has not been previously described for *B. canadense*.

In summary, we document a new distributional record (Oklahoma) for *B. canadense* and add comparative morphological data on the parasite. Further research needs to include molecular sequencing to differentiate between interspecific and intraspecific morphological variation in the genus *Bashkirovitrema*.

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