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Redescription of *Cryptocotyle thapari* McIntosh, 1953 (Trematoda: Heterophyidae), in the River Otter *Lutra longicaudis* from Bolivia

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ABSTRACT: *Cryptocotyle thapari* McIntosh, 1953 (Digenea: Heterophyidae), collected originally from a South American otter that died at the U.S. National Zoo in Washington, D.C., is redescribed from specimens obtained from a river otter, *Lutra longicaudis*, collected from the Río Matos in the Departamento de Beni, Bolivia. These individuals of *C. thapari* are slightly smaller than the type specimens, but they have similar features, including testes arranged in tandem and a well-defined ventrogenital sac. We redescribe this species because the original description was based on only 3 individuals, and the figures lacked detail. This is the first record of *Cryptocotyle* from any species of *Lutra* in South America and is the first record from an otter in Bolivia.

KEY WORDS: *Cryptocotyle thapari*, Digenea, trematode, Heterophyidae, redescription, *Lutra longicaudis*, Beni Department, Bolivia.

In 1985, a single individual "lobito del rio = nutria" or Neotropical river otter, *Lutra longicaudis* Olfers, 1818, was examined for parasites by S.L.G. We follow Anderson (1997, pp. 242–343) in continuing to use the genus name *Lutra* until a more compelling argument to the contrary is published.

Members of the genus *Lutra* Brünnich, 1771, have a cosmopolitan distribution, with 3 of the 8 recognized species occurring in the Neotropical region. *Lutra longicaudis* has the most extensive range of the 3 neotropical forms, extending from northwestern Mexico through Central America and the isthmus of Panama into the lowlands of the Amazon River basin and south into Uruguay.

No parasites have been reported from either of the other 2 species of river otters (*Lutra*) from South America. The southern river otter *Lutra provocax* Thomas, 1908, is known only from Chile and southern Argentina. The marine otter *Lutra felina* Molina, 1782, has an extensive range along the Pacific coast of South America (northern Peru south to Tierra del Fuego, Argentina; Wilson and Reeder, 1993).

The 30 Bolivian specimens of *L. longicaudis*, from several museums, are known from 17 localities in the departments of Santa Cruz, Cochabamba, Beni, and La Paz (Anderson, 1997). As far as is known, only 1 of these specimens has been examined for the presence of parasites (by S.L.G.). The trematodes found in the small intestine were identified as *Cryptocotyle thapari* McIntosh, 1953.

The 11 described species of Digenetic trematodes of the genus *Cryptocotyle* Lühe, 1899, are distributed widely throughout the world. Four species are known from both birds and mammals; *Cryptocotyle concava* (Creplin, 1825) from many different birds and mammals (Yamaguti, 1971); *Cryptocotyle jejuna* (Nicoll, 1907) from gulls and dogs (Nicoll, 1907); *Cryptocotyle lingua* (Creplin, 1825) primarily from marine birds, marine mammals, dogs, cats, and *Rattus* (see Yamaguti, 1971); and *Cryptocotyle americana* Ciurea, 1924, from both marine and freshwater birds and mammals, including the harbor seal *Phoca vitulina* Linnaeus 1758 (see Ciurea, 1924). Only 1, *Cryptocotyle cryptocotyloides* (Issaitschikoff, 1923) has been reported only from birds (the arctic loon, *Gavia arctica* Linnaeus, 1758, in Russia; see Yamaguti, 1971).

Species of *Cryptocotyle* that have been reported previously only from mammals include *Cryptocotyle badamshini* (Kurochkin, 1959) from the Caspian Seal, *Phoca caspica* Gmelin 1788; *Cryptocotyle macrorhinis* (MacCallum, 1916) from the Northern Sealion, *Mirounga angustirostris* (Gill, 1866); *Cryptocotyle quinqueangularis* (Skrjabin, 1923) from the domestic cat, *Felis catus* (Linnaeus, 1758); *Cryptocotyle ransomi* (Isiachkov, 1924) from the domestic dog, *Canis familiaris* (Linnaeus, 1758), and the Norway Rat, *Rattus norvegicus* (Berkenhout, 1769); and *C. thapari* McIntosh, 1953, from the Giant River Otter, Lobito del Río Grande, *Pteronura brasiliensis* (Gmelin *in* Linnaeus, 1748). It is evident that some species have strictly marine life cycles, whereas some have only freshwater cycles,

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Table 1. Comparative morphometrics of *Cryptocotyle lingua*, *Cryptocotyle concava*, and *Cryptocotyle thapari*.

Measurement (μm)	*C. lingua**	*C. concava**	*C. thapari*†	*C. thapari*‡
Body length	550–2,000	1,000	3,120	1,257–2,118
Body width	200–900	850	790	618–933
Oral sucker length	66–100	60–87	70	63–100
Oral sucker width	66–100	60–87	80	72–96
Pharynx length	40–80	60	80	75–106
Pharynx width	30–48	50	65	53–79
Esophagus length	40–60	95	175	70–287
Ventrogenital sac length	120–250	150–300	117	113–149
Ventrogenital sac width	120–250	150–300	100	156–172
Ovary length	70–120	—	250	93–171
Ovary width	140–180	—	340	225–342
Testes length	120–250	300	250	124–249
Testes width	70–130	300	300	280–513
Egg length	49–50	34–38	34	24–37
Egg width	18–25	16–20	18	12–17

* Data from Ransom (1920).
† Data from McIntosh (1953).
‡ Ex. *Lutra longicauda* from Bolivia.

although *C. lingua* might have a cycle that involves either marine or freshwater intermediate hosts.

MATERIALS AND METHODS

One South American River Otter (*L. longicaudis*) was collected from the Río Matos, 6 km east of Estación Biológica del Beni, Departamento del Beni, Bolivia, (14°51′S 66°21′W) on 20 August 1985. At necropsy, 194 trematodes were recovered from the anterior portion of the small intestine, relaxed in river water, transferred to distilled water for a short time, and preserved in 10% (v/v) aqueous formalin. Specimens were stained with Ehrlich's acid hematoxylin or Semichon's acetic carmine, dehydrated in ethanol, cleared in terpineol or xylene, and mounted permanently on microscope slides in Canada balsam.

Other specimens of *Cryptocotyle* that we studied and measured (see Table 1) included the types *C. thapari* McIntosh, 1953, from *Pteronura brasiliensis*, U.S. National Parasite Collection, USNPC 48725 (holotype) and 48748 (paratype); *C. lingua* from the Glaucous-winged Gull, *Larus glaucescens* Naumann, 1840, HWML 1513 (voucher); *C. concava* from *Mustela vison* Schreber 1777, HWML 21370 (voucher); and *C. lingua* from *Otus asio* (Linnaeus, 1758) USNPC 77935 (cotype).

Drawings were made with the use of a drawing tube attached to a Wild™ microscope. Measurements were made with both a calibrated ocular micrometer and a computer-aided image measuring system (Jandel Sigma Scan Pro™) attached to a Zeiss™ Ultraphot research microscope. Measurements are given in micrometers unless otherwise indicated. Statistics and measures of central tendency are based on measurements of 15 gravid specimens. Where different from the number of specimens examined, *n* is the number of individuals or structures examined. The range is followed in parentheses by the mean ± 1 SD and the coefficient of variation (CV). A small CV indicates a low amount of variation in that structure or character over the range of individuals measured. To see the internal organs and to trace the course of the smallest reproductive structures, 1 specimen was submerged in xylene and skinned by hand with a scalpel blade held gently with a camel-hair brush.

Class Cercomeridea Brooks, O'Grady, and Glen 1985
Order Opisthorchiformes
Family Heterophyidae
Cryptocotyle thapari McIntosh, 1953 (Fig. 1, Table 1)

Redescription

Specimens in dorsal or ventral aspect, fusiform. In most specimens, posterior margins of body curl ventrad just at the edges of the vitellaria, creating a ventral concavity.

Body covered with very small spines, 1,257–2,118 (1,735 ± 211) long, CV = 12, by 618–933 (741 ± 83), CV = 11, at maximum body width. Oral sucker 63–100 (80 ± 9), CV = 11, by 72–96 (85 ± 8), CV = 9. Pharynx length 75–106 (94 ± 9), CV = 9, by 53–79 (64 ± 7), CV = 11. Esophagus length 70–287 (223 ± 52), CV = 23. Anterior testis 124–223 (182 ± 31) long, CV = 17, by 313–513 (404 ± 56) wide, CV = 14. Posterior testis 140–249 (204 ± 29) long, CV = 14, by 280–451 (367 ± 57) wide, CV = 16. Ovary 93–171 (136 ± 21) wide, CV = 16, by 225–342 (276 ± 31) long, CV = 11. Seminal receptacle diameter 85–171 (131 ± 20), CV = 16. Eggs operculate when laid, *n* = 45, 24–37 (32 ± 3) long, CV = 9, by 12–17 (14 ± 1) wide, CV = 11.

Oral sucker large, subterminal. Prepharynx usually absent, sometimes present. Pharynx (Fig. 1, pm)

similar in size to oral sucker. Intestinal bifurcation (Fig. 1, ce) anterior to ventrogenital sac. Cecae obscure except in skinned specimens, extending to posterior end of body. Ventrogenital sac (Fig. 1, vs) in median third of body, surrounded by glandular cells (Fig. 1, ga) containing rudimentary acetabulum, genital papilla (Fig. 1, go), genital pore, ejaculatory duct, and metraterm. Genital papilla sometimes protruding through genital pore (Fig. 1, go). Testes tandem, located in posterior portion of body, lobate, and crenated with internal demarcations (Fig. 1, ts), vasa efferentia not observed, vas deferens (Fig. 1, vd) expanded to form an elongated sac dorsal to uterus. Ovary (Fig. 1, ov) in posterior portion of body, mostly dextral relative to the midline, always situated anterior to testes, irregular in shape; distal portion of ovary with relatively large lobes, narrowing toward confluence of lobes and beginning of oviduct. Seminal receptacle a rounded sac (Fig. 1, sr), overlapping ovary posteriorly. Lauer's canal, ootype, oviduct, and Mehlis' gland (Fig. 1, Mg) were observed. Vitelline follicles (Fig. 1, vif) lateral, dorsal, and ventral to caecae, extending slightly anteriad of the ventrogenital sac almost to posterior end of body. Vitelline duct (Fig. 1, vid) approaching Mehlis' gland ventrally. Uterus (Fig. 1, ut) confined to intercecal field consisting of several serpentine loops filled with numerous eggs, located between ovary and ventrogenital sac. Eggs elliptical, slightly pointed at operculate end. Excretory bladder Y-shaped.

Ventrogenital sac with following characteristics: relatively small acetabulum located at about midbody, composed of muscles and glandular tissue typical of these trematodes (Fig. 1). Acetabulum covered with tegument, recessed dorsally, communicating with external environment via small round hole (genital pore) in tegument, about one-fourth the size of acetabulum in width, genital pore containing distal end of metraterm. Genital papilla (Fig. 1) a modified distal end of cirrus sac and ejaculatory duct communicating externally through genital pore.

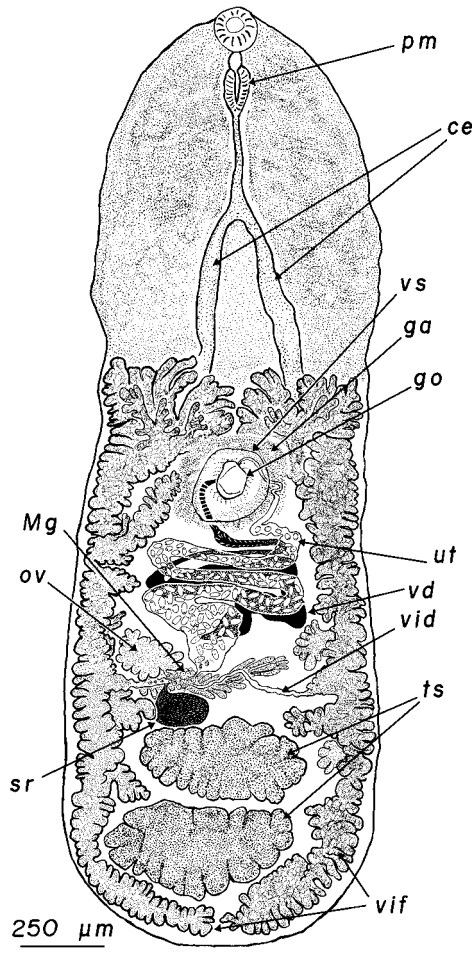

Figure 1. Ventral view of *Cryptocotyle thapari* McIntosh, 1953, from *Lutra longicauda* in Bolivia. ce, cecae; ga, glandular area surrounding ventrogenital sac; go, genital opening; Mg, Mehlis' gland; ov, main lobe of ovary; pm, pharyngeal muscle; sr, seminal receptacle; ts, testes; ut, uterus; vd, vas deferens; vid, vitelline duct; vif, vitelline follicles; vs, ventrogenital sac.

Taxonomic summary

Host voucher deposited (see Frey et al., 1992): The River Otter or Lobito del Río, *L. longicaudis* Olfers, 1818, American Museum of Natural History 261318. Collected by Nancy Olds (Field Catalog N.O. 567). Tissues of the otter are deposited in the Division of Cryogenic Materials of the Museum of Southwestern Biology, The University of New Mexico, Albuquerque, New Mexico, NK13182.

Locality: Bolivia, Departamento del Beni, Río Matos, 6 km east of Estación Biológica del Beni (14°51′S; 66°21′W; 300 m altitude).

Specimens deposited: Vouchers (11 specimens mounted on glass microscope slides under #1 cover glasses in Canada balsam): parasite collection of the Harold W. Manter Laboratory of Parasitology (HWML; University of Nebraska State Museum Parasitology Division) 48208–48218. Trematodes collected by S.L.G. on 21 July 1985, Field Catalog SG-619-85, p. 66.

DISCUSSION

Our specimens differ from those described by McIntosh (1953) in only a few minor characteristics, including smaller body, shorter eggs, and more compact testes (Table 1).

The lack of adequate collection of biological data from rare or endangered mammals severely hampers efforts to understand global biodiversity because the record of even a single host-specific parasite with a complex life cycle has been shown to be useful as a probe for the biodiversity of an area (Gardner and Campbell, 1992; Hoberg, 1996; Hoberg et al., 2003).

The presence of *C. thapari* in otters of Bolivia shows that a complex ecological system is present in the area. As far as is known, these trematodes have a complex life cycle with a mollusk as an intermediate host, but the details of the life cycle of this freshwater species are unknown. For comparison, in *C. lingua*, a parasite of birds, the cercariae develop in rediae in marine snails (*Littorina littorea*) and encyst in the skin of fish. The definitive host becomes infected when it eats infected fish. By inference, we can presume that the occurrence of these trematodes in Bolivian otters shows that the area in which they were found has an intact and healthy ecological community—one in which all parts of the life cycle are present (otter, snail, fish).

Bolivia is just beginning to dedicate resources to the study of its biodiversity. We hope that our basic surveys of the mammals and their parasites will help to ensure that Bolivian students of biology will have adequate resources to build on our preliminary studies.

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