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RESEARCH NOTE / NOTA CIENTÍFICA

THIRD-STAGE LARVAE OF *DIOCTOPHYME RENALE* (GOEZE, 1782) (NEMATODA: ENOPLIDA) IN *HOPLOSTERNUM LITTORALE* (HANCOCK, 1828) (SILURIFORMES: CALLICHTHYIDAE) FROM SOUTHERN BRAZIL

LARVA DE TERCER ESTADIO DE *DIOCTOPHYME RENALE* (GOEZE, 1782) (NEMATODA: ENOPLIDA) EN *HOPLOSTERNUM LITTORALE* (HANCOCK, 1828) (SILURIFORMES: CALLICHTHYIDAE) IN SUR DEL BRASIL

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ABSTRACT

Dioctophyme renale (Goeze, 1782) has been reported in several species of wild carnivores (canids and mustelids) and also domestic dogs. Aquatic oligochaetes act as intermediate hosts and frogs and fish act as paratenic hosts. This paper reports on the occurrence of third-stage *D. renale* larvae in the fish, *Hoplosternum littorale* (Hancock, 1828) (Callichthyidae), from southern Brazil. Four hosts collected from urban canals from southern Brazil were necropsied. Nematodes were fixed in AFA, preserved in 70°GL glycerinated alcohol, cleared and mounted in Amann's lactophenol. All hosts were infected by third-stage larvae of *D. renale* with one larva per cyst occurring in the body cavity and stomach serous. The occurrence of third-stage larvae of *D. renale* in *H. littorale* suggests that this fish is a potential paratenic host.

Keywords: catfish - giant kidney worm - urban area

RESUMEN

Dioctophyme renale (Goeze, 1782) ocurre en varias especies de carnívoros silvestres (cánidos y mustélidos) y también en perros domésticos. Oligoquetos acuáticos actúan como hospedadores, ranas y peces como hospedadores paraténicos. Este trabajo tiene como objetivo registrar larvas de tercer estadio de *Dioctophyme renale* en *Hoplosternum littorale* (Hancock, 1828) (Callichthyidae), en el sur de Brasil. Cuatro hospedadores recogidos de los canales urbanos del sur de Brasil fueron examinados. Los nematodos fueron fijados en AFA, conservados en el 70 ° GL alcohol glicerinado, y aclarados en lactofenol de Amann. Todos los hospedadores estaban infectados con larvas de tercer estadio de *D. renale*, con una larva por quiste, encontrados en la cavidad del cuerpo y en la serosa del estómago. La ocurrencia de larvas de tercer estadio de *D. renale* en *Hoplosternum littorale* sugiere que este pez tiene potencial como hospedador paraténico.

Palabras clave: cascarudo - gusano gigante del riñón - zona urbana

INTRODUCTION

The giant kidney worm, *Dioctophyme renale* (Goeze, 1782) (Nematoda: Enoplida), is usually found in the right kidney and occasionally in both kidneys and the peritoneal cavity of wild carnivores and domestic dogs (definitive hosts) (Kommers *et al*., 1999; Anderson, 2000; Pesenti *et al.*, 2012; Duarte *et al*., 2013; Hernández-Russo *et al.*, 2014). The life history of *D. renale* was studied in North America, where fish and amphibians act as paratenic hosts when they become infected by ingesting aquatic oligochaetes (*Lumbriculus variegatus*) (intermediate hosts) with third-stage larvae (Mace & Anderson, 1975; Measures & Anderson, 1985). In Brazil, third-stage *D. renale* larvae were reported in frogs, fish, and freshwater turtles (Pedrassani *et al.*, 2009; Abdallah *et al*., 2012; Mascarenhas & Müller, 2015a, 2015b), however, there is a large gap in the knowledge of life cycle of *D. renale*, despite several reports of the parasitic helminth in domestic dogs and wild animals (Mascarenhas & Müller, 2015a).

Hoplosternum littorale (Hancock, 1828) (Siluriformes: Callichthyidae), known as catfish, is restricted in South America and it is identified by having an elongated body, covered by two sets of side plates, absent in the abdominal region (Reis, 1997). The specie presents sexual dimorphism being that adult males have a higher average size, curved pectoral spines and fat deposits in the pectoral fins, just before and during the spawning period (Winimiller, 1987). *Hoplosternum littorale* has benthic feeding and consumes items associated to debris, microcrustaceans, and insects (larvae and terrestrial adults) (Winimiller, 1987; Hahn *et al*., 1997) furthermore tolerate low oxygen levels in the environment (Luquet *et al*., 1990).

In this paper, we report for the first time the occurrence of third-stage *D.renale* larvae in the fish *H. littorale* from southern Brazil**.**

MATERIAL AND METHODS

Four hosts collected with beam trawl with 5 m length, 2.25 high, and 5 mm mesh (knot to knot) employed in the coastal zones from urban canal in Pelotas, Rio Grande do Sul, Brazil (31°45'50.6"S - 52°18'53.5"W). The collections were made under license from the *Instituto Chico Mendes de Conservação da Biodiversidade* (ICMBio/n° 47397) and were approved by the Research Ethics Committee of the Universidade Federal de Pelotas (CEEA – 1859/2015). Fish were necropsied and the nematodes were fixed in AFA (70°GL ethanol, formalin 37% and glacial acetic acid), preserved in 70°GL glycerinated alcohol, cleared and mounted in Amann's lactophenol (phenol, lactic acid, glycerin and water). Specimens were identified according to Mace & Anderson (1975), Measures & Anderson, (1985) and Pedrassani *et al.* (2009) and then deposited in the "*Coleção de Helmintos do Laboratório de Parasitologia de Animal Silvestres (CHLAPASIL/UFPel)*" (Numbers 617 – 622), Rio Grande do Sul State, Brazil. Parasitological indices were according Bush *et al.* (1997).

RESULTS AND DISCUSSION

All hosts were infected by third-stage larvae of *D. renale* with one larva per cyst occurring in the body cavity and stomach serous. The mean intensity (MI) was 4.5 helminths/host (1-5 larvae).

In Canada, third-stage larvae was reported in fish *Lepomis gibbosus* (Linnaeus, 1758) (Perciformes: Centrarchidae) (n=279) with prevalence (P%) and mean intensity (MI) ranged from 5 to 23% and one to two larvae respectively (Measures & Anderson, 1985). In Brazil, larvae were recorded in the intestines of *Gymnotus sylvius* Albert & Fernandes-Matioli, 1999 (Gymnotiformes: Gymnotidae) (n=51)

and *Acestrorhynchus lacustris* (Lütken, 1875) (Characiiformes: Acestrorhynchidae) (n=62) with P% and MI of 20; 1.5 and 5; 1, respectively (Abdallah *et al.*, 2012).

Pedrassani *et al.* (2009) identified the frog, *Rhinella icterica* (Spix, 1824) (=*Chaunus ictericus*) (Anura: Bufonidae) in Santa Catarina State, as a paratenic *D. renale* host with third-stage larvae in 5.17% of hosts. In Rio Grande do Sul State, Mascarenhas & Müller (2015a, 2015b) reported third-stage larvae in *Trachemys dorbigni* (Testudines: Emidydae) (n=32) (P% 87.5; MI 13.9) in urban area of Pelotas, and suggesting that the high prevalence is related to characteristics of the urban zone, where a large population of domestic dogs and eutrophication processes may be contributing to maintenance the life cycle of *D. renale*.

This is the first record of third-stage *D. renale* larvae in *Hoplosternum littorale*, and the occurrence suggests this fish as a potential paratenic host. Further research should be conducted to investigate the cycle´s dynamics the cycle of *D. renale* in the urban area, as well as to contribute to the knowledge of biology this Nematoda. Furthermore, the occurrence of third-stage *D. renale* larvae in fish must be investigated as it may represent a risk to public health, since human infections in the skin and kidneys have been reported in Asia (Hanjani *et al.*, 1968; Urano *et al.*, 2001; Sardjono *et al.*, 2008; Katafigiotis *et al.*, 2013; Tokiwa *et al.*, 2013).

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BIBLIOGRAPHIC REFERENCES

Abdallah, VD, Azevedo, RK, Carvalho, ED & Silva, RJ. 2012. *New hosts and distribution records for nematode parasites os freshwater fishes from São Paulo, Brazil*. Neotropical Helminthology, vol. 6, pp. 43-57.

Anderson, RC. 2000. *Nematode Parasites of Vertebrates: Their development and transmission*, 2nd ed. CABI Publishing, Oxon, UK, 650 p.

Bush, AO, Lafferty, KD, Lotz, JM & Shostak AW. 1997. *Parasitology meets ecology on its own terms:* Margolis *et al. revisited*. Journal of Parasitology, vol. 83, pp. 575-583.

Duarte, J, Costa, AMB, Katagiri, S, Martins, JA, Oliveira, ME & Ribeiro, CM 2013. *Parasitism by* Dioctophyme renale *(Goeze, 1782) in Maned Wolf (Chrysocyon brachyurus), Brazil*. Veterinária e Zootecnia, vol. 20, pp. 52-56.

Hahn, NS, Almeida, VLL & Gaspar da Luz, KD. 1997. *Alimentação e ciclo alimentar diário de* Hoplosternum littorale *(Hancock) (Siluriformes, Callichthyidae) nas lagoas Guaraná e Patos da planície de inundação do alto rio Paraná, Brasil*. Revista Brasileira de Zoologia, Curitiba-Paraná, vol.14, pp. 57-64.

Hanjani, FA, Sadighan, A, Mikakhfar, B & Arfaa, F. 1968. *The first report of human infection with Dioctophyma renale in Iran*. Transcriptions of Royal Society of Tropical Medicine and Hygiene, vol. 62, pp. 47-648.

Hernández-Russo, Z, Supparo-Rizzardini, E, dos Santos-Nuñez, C & Nan-Monte, FN. 2014. Dioctophyma renale *en caninos* (Canis familiaris) *de Uruguay*. Neotropical Helminthology, vol. 8, n.1, pp. 123-130.

Katafigiotis, I, Fragkiadis E, Pournaras C, Nonni, A & Stravodimos, KG. 2013. *A rare case of a 39 year old male with a parasite called* Dioctophyma renale

mimicking renal cancer at the computed tomography of the right kidney. A case report. Parasitology International, vol. 62, pp. 459-460.

Kommers, GD, Ilha, MRS & Barros, CSL. 1999. *Dioctofimose em case: 16 casos*. Ciência Rural, vol. 29, pp. 517-522.

Luquet, P, Boujard T, Planquette, PYM, & Hostache, G. 1990. *The culture of* Hoplosternum littorale*: State of the art and perspectives*, pp. 511-516. *In*: Barret, J. (Ed.). Advances in Tropical Aquaculture.Tahiti, vol. 9.

Measures, LN & Anderson, RC. 1985. *Centrarchid fish as paratenic hosts of the giant kidney worm, Dioctophyma renale (Goeze, 1782), in Ontario, Canada.* Journal of Wildlife Disease, vol. 21, pp. 11-19.

Mace, TF & Anderson, RC. 1975. *Development of the giant kidney worm*, Dioctophyma renale *(Goeze, 1782) (Nematoda: Dioctophymatoidea).* Canadian Journal Zoology, vol. 53, pp. 1552-1568.

Mascarenhas, CS & Müller, G. 2015a. *Third-stage larvae of the enoplid nematode* Dioctophyme renale *(Goeze, 1782) in the freshwater turtle* Trachemys dorbigni *from southern Brazil*. Journal of Helminthology, vol. 89, pp. 630-635.

Mascarenhas, CS & Müller, G. 2015b. *Third-stage larvae of the enoplid nematode* Dioctophyme renale *(Goeze, 1782) in the freshwater turtle* Trachemys dorbigni *from southern Brazil – CORRIGENDUM.* Journal of Helminthology, vol. 89, pp. 774.

Pedrassani, D, Hoppe, EGL, Tebaldi, JH & Nascimento, AA. 2009. Chaunus ictericus *(Spix, 1824) as paratenic host of the giant kidney worm* Dioctophyme renale *(Goeze, 1782) (Nematoda: Enoplida) in São Cristóvão district, Três Barras county, Santa Catarina state, Brazil.* Veterinary Parasitology, vol. 165, pp. 74-77.

Pesenti, TC, Mascarenhas, CS, Krüger, C, Sinkoc, AL, Albano, APN, Coimbra, MAA & Müller, G. 2012. Dioctophyma renale *(Goeze, 1782) Collet-Meygret, 1802 (Dioctophymatidae) in* Galictis cuja *(Molina, 1782) (Mustelidae) in Rio Grande do Sul, Brazil.* Neotropical Helminthology, vol. 6, pp. 301-305.

Reis, RE. 1997. *Revision of the neotropical catfish genus* Hoplosternum littorale *(Osteichthyes; Siluriformes: Callichthydae), with the descrition of two new genera and three new species.* Ichtyology Exploration of Freshwaters, vol. 7, pp. 229-326.

Sardjono, TW, Purmono, BB, Iskandar, A & Gunawan, A. 2008. *Dioctophymatosis renalis in humans: first case report from Indonesia. In: Proceedings of the 3rd ASEAN Congress of Tropical Medicine and Parasitology. Parasites: a Hiddesn Threat to Global Health*, Thailand, Proceedings 3, 90–93. Available *In*: http://www.ptat.thaigov.net/Procasean/090-093PPRS2008.pdf., accessed on 12/05/2013.

Tokiwa, T, Ueda, W, Takatsuka, S, Okawa K, Onodera, M, Ohta N & Akao, N. 2014. *The first genetically confirmed case of* Dioctophyme renale *(Nematoda: Dioctophymatida) in a patient with a subcutaneous nodule*. Parasitology International, vol. 63, pp. 143-147.

Urano, Z, Hasegawa H, Katsumata T, Toriyama K & Aoki, Y. 2001. *Dioctophymatid nematode larva found from human skin with creeping eruption*. Journal of Parasitology, vol. 87, pp. 462-465.

Winemiller, KO. 1987. *Feeding and reproductive biology of the currito* Hoplosternum littorale*, in the Venezuelan llanos with comments on the possible function of the enlarged male pectoral spines.* Environmental Biology of Fishes, vol. 20, pp. 219-227.

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