

Contracaecum ovale (Nematoda: Anisakidae) from *Rollandia rolland* Quoy & Gaimard 1824 (Aves, Podicipedidae) in Argentina

Contracaecum ovale (Nematoda: Anisakidae) de *Rollandia rolland* Quoy & Gaimard
 1824 (Aves, Podicipedidae) na Argentina

Noelia Adelina Galeano¹; Ruben Daniel Tanzola^{1*}

¹Laboratorio de Patología de Organismos Acuáticos, Departamento de Biología, Bioquímica y Farmacia, Universidad Nacional del Sur – UNS, Bahía Blanca, Argentina

Received April 1, 2011

Accepted May 29, 2011

Abstract

Necropsy on 15 specimens of white-tufted grebe, *Rollandia rolland*, caught in the Mar Chiquita and Chascomús lagoons (Buenos Aires province), revealed the presence of *Contracaecum ovale* (Linstow, 1907). This nematode shows a marked specificity for podicipediform birds. The specimens were identified from morphological study on features such as cephalic and esophageal structures and caudal papillae, using both optical and scanning electron microscopy. This is the first record of *C. ovale* parasitizing *R. rolland* in Argentina.

Keywords: *Contracaecum ovale*, Nematoda, *Rollandia rolland*, Podicipedidae.

Resumo

Necropsia de 15 espécimes de mergulhão-de-orelha-branca, *Rollandia rolland*, coletados nas lagoas Mar Chiquita e Chascomús (Província de Buenos Aires), revelou a presença de *Contracaecum ovale* (Linstow, 1907). Esse nematóide tem uma marcada especificidade pelas aves podicipediformes. Os espécimes foram identificados a partir de características, tais como estruturas morfológicas cefálicas e esofágicas e papilas caudais, utilizando-se microscopia óptica e microscopia eletrônica de varredura (MEV). Esse é o primeiro registro de *C. ovale* parasito de *R. rolland* na Argentina.

Palavras-chave: *Contracaecum ovale*, Nematoda, *Rollandia rolland*, Podicipedidae.

Contracaecum ovale (Linstow, 1907) is an ascaridoid nematode with pronounced specificity for podicipediform hosts. It was first described in *Podiceps cristatus* from Germany. Cram (1927) described this species in the same host and Baylis (1939) included it in a list of the parasites of British birds. Subsequently, Mozgovoï (1953) described it briefly in *P. cristatus* from Russia. Vuylsteke (1953) recorded *C. ovale* in *P. ruficollis capensis* from the Congo. Macko (1961) described it in *P. griseigena* and *P. nigricollis* from the Czech Republic. The only previous record from the Neotropical region is that of Hartwich (1964) in *Podilymbus podiceps* in Brazil. Stock and Holmes (1987) cited *C. ovale* as a member of the parasite communities of *P. griseigena*, *P. nigricollis* and *P. auritus* in Canada. To the best of our knowledge, some details of the external morphology of this species remain unknown.

This note reports *C. ovale* in the white-tufted grebe, *Rollandia rolland*, for the first time in Argentina. White-tufted grebes are the most common grebe in lakes and lagoons throughout Argentina, from Misiones to Tierra del Fuego (STORER, 1967; FJELDSA, 2004). In this paper, *C. ovale* is described using optical microscopy and scanning electron microscopy (SEM).

The helminth specimens, which belong to the author's personal collection, were obtained between 1983 and 1985 from 15 individuals of *R. rolland* (Aves: Podicipediformes) that were killed using a shotgun (with permission for scientific hunting granted by the Fauna Directorate, Ministry of Agrarian Affairs, Government of the Province of Buenos Aires) in the Mar Chiquita lagoon (n = 12) (37° 46' S and 57° 27' W) and Chascomús lagoon (n = 3) (35° 40' S and 58° 00' W) in Buenos Aires province. Once in the laboratory, the birds were dissected and nematodes were collected from the stomach and fixed and stored in 5% formalin. Some specimens were cleared in lactophenol and examined by means of optical microscopy. Drawings were made with the aid of a camera lucida. Measurements, in millimeters, were expressed as

*Corresponding author: Ruben Tanzola

Laboratorio de Patología de Organismos Acuáticos, Departamento de Biología, Bioquímica y Farmacia, Universidad Nacional del Sur, San Juan, 670, CP 8000, Bahía Blanca, Buenos Aires, Argentina
 e-mail: rtanzola@uns.edu.ar

the mean followed by the range in parentheses. Other specimens, fixed in 5% formalin were dehydrated in acetone, dried using the CO₂ critical point method and observed and photographed using scanning electron microscopy (SEM) (Evoup/LEO). The spatial location of the male's papillae was described in accordance with Fagerholm (1991). The voucher specimen was deposited in the Helminthological collection of the Museo de la Plata, Argentina (nº MLP 6313). The measurements made in this study and those given by previous authors are presented in Table 1. Morphological details are shown in Figures 1-8.

The entire body of *C. ovale* is transversally striated (Figure 2). The lips are mostly oval in shape with two small auricles (Figure 3). There are two large double papillae on the dorsal lip and one on each ventrolateral lip (Figure 3) and, additionally, an amphid is present on each ventrolateral lip. The interlabia were triangular in shape and shorter than the lips (Figure 3). The deirids were inconspicuous and button-shaped (Figure 4)

Measurements on male specimens (n = 3): body length 18.5 (18-19); maximum body width 0.69 (0.67-0.72); distance from anterior end to nerve ring and deirids 0.09 (0.08-0.1) and 0.69, respectively; esophagus length (n = 1) 3.4; intestinal caecum length (n = 1) 2.7; ventriculus length (n = 1) 0.16; ventricular appendix length (n = 1) 0.70; spicules of equal length, reaching almost half of the body; spicule length (n = 1) 2.87; and tail length 0.20 (0.17-0.23). The caudal extremity was conical, bearing 12-16 pairs of precloacal papillae. The precloacal transverse stria ("pt") zone included three pairs of precloacal papillae (Figure 5). There was one double paraclonal papilla (*sensu* FAGERHOLM, 1991) and five pairs of single postcloacal papillae: two subventral pairs, two sublateral pairs ("laterodorsal" *sensu* HARTWICH, 1964) and one pair of phasmids at the end (Figure 6).

The distal spicule tip was short and pointed; the length of the free distal end was longer than the spicule width (0.013 versus 0.011). Following Fagerholm's approach (1989), the measurements of the distal end of the spicule (n = 1) in µm were: A-B: 12.6; A-C: 16.3; A-D: 35.6; Dist B*-B°: 12.6; E-F: 8.2; E-H: 23.7; E-I: 30.4; and F-G: 11.1 (Figure 7)

Measurements on female specimen (n = 1): body length 31.85; maximum body width 0.86; distance from anterior end to nerve ring and deirids 0.45 and 0.54 respectively; esophagus length 3.8; intestinal caecum length 2.57; ventricular appendix length 1.1; vulva in anterior half of the body and tail length 0.65 (Figure 8).

The information provided by Mozgovoi (1953) coincides with that of Cram (1927) and so it was not included in Table 1.

The morphology and dimensions of our specimens were concordant with previous reports (CRAM, 1927; MOZGOVOI, 1953; MACKO, 1961; HARTWICH, 1964). Although the complexity of the lips was best discerned by Hartwich (1964), the ultrastructural observations made in the present report showed two small auricles and that the interlabia was one third of the lip height and triangle-shaped, in conformity with this author's findings. Fagerholm (1989) considered that the length of the spicules, morphology of the distal end of the spicule and number and distribution of caudal papillae in the males were other good taxonomic criteria. The number and distribution pattern of the caudal papillae agree with those of

previous descriptions (CRAM, 1927; HARTWICH, 1964), but the details of the distal end of the spicules at ultrastructural level are described for the first time in the present paper. Macko (1961) and Cram (1927) reported 10 pairs of precloacal papillae, but Hartwich (1964) reported 29-35 pairs of precloacal papillae. Previous authors reported a wide range of intraspecific variation with regard to the number of precloacal papillae in anisakids: 60-81 pairs in *C. osculatum* (FAGERHOLM, 1989), 23 - 49 in *C. ogmorhini* (FAGERHOLM; GIBSON, 1987) and 44 - 61 in *Terranova galeocerdonis* (TANZOLA; SARDELLA, 2006). For this reason, we can accept that the differences observed in relation to Hartwich's specimens may correspond to such intraspecific variation.

In Argentina, several species of *Contracaecum* have been reported parasitizing birds from freshwater, brackish water and marine ecosystems. *Contracaecum microcephalum* (Rudolphi, 1809) has been described parasitizing the Ardeidae species *Ardea cocoi* Linnaeus, *Egretta alba* (Gmelin, 1789), *Nycticorax nycticorax* (Gmelin, 1789) and *Casmerodius albus egretta* (Lineé, 1766) in Buenos Aires province and *C. multipapillatum* has been described parasitizing *E. alba* (BOERO; LED, 1971; NAVONE et al., 2000). *Contracaecum travassosi* (Gutierrez, 1943) has been described in *Phalacrocorax atriceps* (= *P. albiventer*) (Lesson, 1831). Garbin et al. (2007) redescribed *C. pelagicum* (Johnston and Mawson, 1942) in *Thalassarche melanophrys* Temminck and *Spheniscus magellanicus* Foster. In the latter host, Pazos et al. (2003) found *C. spheniscus* Boero and Led (1970) and *C. chubutensis* in *P. atriceps* King (GARBIN et al., 2008). The last three species came from Chubut province in Patagonia. This is the first record of *C. ovale* in *R. rolland* in Argentina, and it confirms the marked specificity of this species for podicipediform birds.

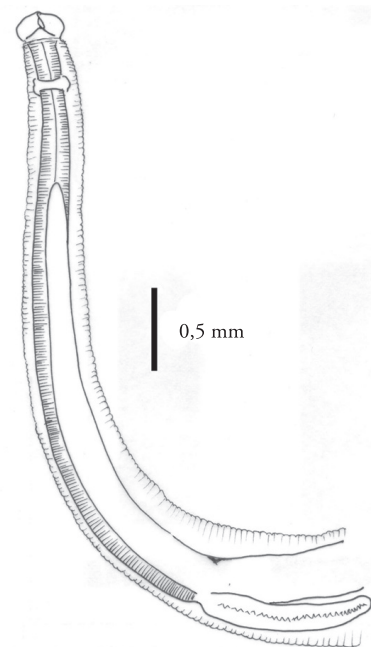


Figure 1. *Contracaecum ovale* (Linstow, 1907) from *Rollandia rolland* in Argentina: anterior end, esophagus, intestinal caecum and ventricular appendix.

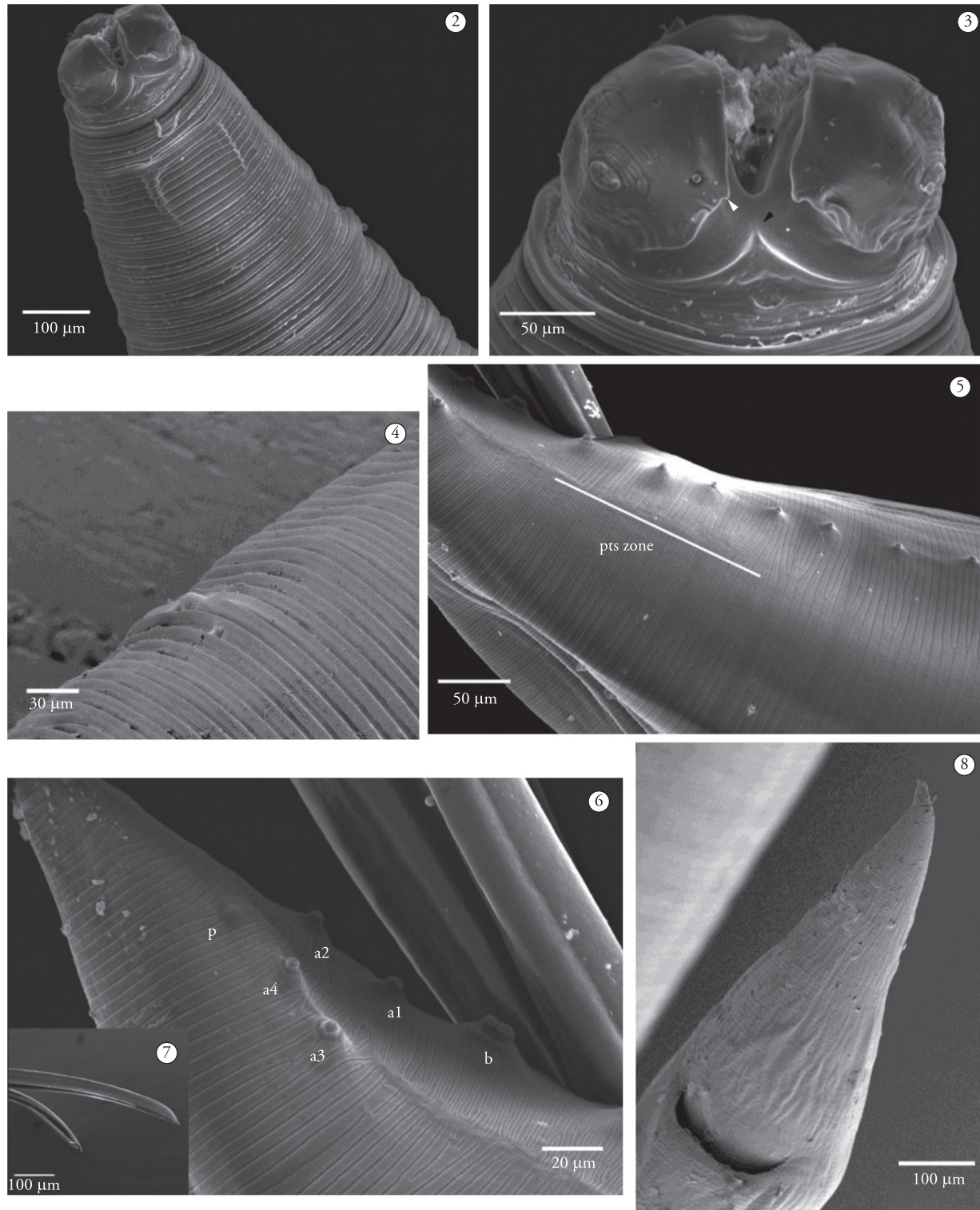


Figure 2-8. *Contracaecum ovale* from *R. rolland* in Argentina. 2) Anterior end, lateroventral view; 3) Anterior end details: lips, interlabia (black arrow), excretory pore, amphid, lip auricular tip (white arrow); 4) Details of a deirid; 5) Proximal precloacal papillae; 6) Male caudal extremity, detail of the postcloacal papillae: a1-a2 subventral papillae, a3-a4 sublateral papillae, p phasmid, b double paracloacal; 7) Distal spicule tip; 8) Posterior female extremity.

Table 1. Comparative morphometric data (in mm) on *Contracaecum ovale*.

References	Macko (1961)	Cram (1927)	Hartwich (1964)	Present study
Host	<i>Podiceps griseigena</i>	<i>Podiceps cristatus</i>	<i>Podiceps cristatus</i>	<i>Rollandia rolland</i>
Localities	Czech Republic	Germany	Brazil	Buenos Aires province, Argentina
<i>Male</i>			n = 6	n = 3
Body length	29	29	16.10-32.8	18.5 (18-19)
Maximum body width	0.88	0.88	0.34-0.67	0.69 (0.67-0.72)
Nerve ring (dae)	-	-	-	0.09 (0.08-0.1)
Deirids (dae)	-	-	-	0.69
Esophagus length	4.83		2.46-5.07	3.4
Intestinal caecum length	4.05	-	1.7-4.1	2.7
Ventricular length	-	-		0.16
Ventricular appendix length	2.89		1.33-2.59	0.70
Spicule length	2.8	2.8	1.55-2.86 1.59-3.01	2.8 2.95
Tail length	-	0.23	0.18-0.25	0.20 (0.17-0.23)
PrPP	10	10	25-35	12- 16
BL/MBW	-	-	47.7 (42.6-55.1)	26.81
BL/EL	-	-	6.27 (5-7.86)	5.44
BL/TL	-	-	104.6 (74.6-160)	28.9
EL/ICL	-	-	1.35 (1.24-1.45)	1.25
EL/VAL	-	-	2.04 (1.74-2.8)	4.85
BL/SL	-	-	9.83 (8.21-11.16)	6.34
<i>Female</i>	-		n = 6	n = 1
Body length	14	44	17.35-50.2	31.85
Maximum body width	1.38	1.38	0.32-0.96	0.86
Nerve ring (dae)	-	-	-	0.45
Deirids (dae)	-	-	-	0.54
Esophagus length	2.33		2.59-5.51	3.8
Intestinal caecum length	1.94	-	1.78-3.97	2.57
Ventricular appendix length	1.39	-	1.20-2.72	1.1
Vulva (dae)	-		6.5-16.5	-
Egg length	0.068	0.068	0.07	0.052
Egg width	0.057	0.057	0.05-0.053	0.04
Tail length	-	0.23	0.35-0.69	0.65
BL/MBW	-	-	45 (36.5-52.8)	37.03
BL/EL	-	-	7.6 (5.82-9.11)	8.38
BL/TL	-	-	63.4 (46-91.2)	49
EL/ICL	-	-	1.43 (1.35-1.5)	1.47
EL/VAL	-	-	2.13 (1.61-3.28)	3.75

dae = distance from anterior end; PrPP: preloacal papilla pairs; BL/MBW: body length/maximum body width ratio; BL/EL: body length/esophagus length ratio; BL/TL: body length/tail length ratio; EL/ICL: esophagus length/intestinal caecum length ratio; EL/VAL: esophagus length/ventricular appendix length ratio; BL/SL: body length/spicule length ratio.

References

- Baylis J. Further records of Parasitic worm from British Vertebrates. *Ann Mag Nat Hist* 1939; 4: 473-498. <http://dx.doi.org/10.1080/00222933908527013>
- Boero JJ, Led JE. El parasitismo de la fauna autoctona. V. Los parasitos de las aves argentinas. *Analect Vet* 1971; 3(1-3): 91-103.
- Boero JJ, Led JE, Brandetti E. Algunos parásitos de la avifauna argentina. *Analect Vet* 1972, 4(1): 17-25.
- Cram E. Birds parasites of nematode suborders Strongylata, Ascaridata and Spirurata. *Bull US Natl Mu* 1927; 140: 155-156.
- Fagerholm HP. Intra-specific variability of the morphology in a single population of the seal parasite *Contracaecum osculatum* (Rudolphi) (Nematoda, Ascaridoidea), with a redescription of the species. *Zool Scr* 1989; 18(1): 33-41. <http://dx.doi.org/10.1111/j.1463-6409.1989.tb00121.x>
- Fagerholm HP. Systematic implications of male caudal morphology in ascaridoid nematode parasites. *Syst Parasitol* 1991; 19(3): 215-229. <http://dx.doi.org/10.1007/BF00011888>

- Fagerholm HP, Gibson DI. A redescription of the pinniped parasite *Contracaecum ogmorhini* (Nematoda, Ascaridoidea), with an assessment of its antiboreal circumpolar distribution. *Zool Scr* 1987; 16(1): 19-24. <http://dx.doi.org/10.1111/j.1463-6409.1987.tb00047.x>
- Fjeldsa J. *The Grebes: Podicipedidae*. New York: Oxford University Press; 2004.
- Garbin LE, Navone GT, Diaz JI, Cremonte F. Further study of *Contracaecum pelagicum* (Nematoda: Anisakidae) in *Spheniscus magellanicus* (Aves: Spheniscidae) from Argentinean coasts. *J Parasitol* 2007; 93(1): 143-150. PMID:17436954. <http://dx.doi.org/10.1645/GE-875R1.1>
- Garbin LE, Diaz JI, Cremonte F, Navone GT. A new anisakid species parasitizing the imperial cormorant *Phalacrocorax atriceps* from the north Patagonian coast, Argentina. *J Parasitol* 2008; 94(4): 852-859. PMID:18837571. <http://dx.doi.org/10.1645/GE-1369.1>
- Hartwich G. Die Typen Parasitischer Nematoden in der Helminthen-Sammlung des Zoologischen Museums in Berlin. I. Ascaridoidea. *Mitt Zool Mus* 1964; 40: 1-53.
- Macko JK. Niektoré pozorovania o premenlivosti druhu *Contracaecum* (*Contracaecum*) *nebli* Karokhin, 1949. *Biol Brat* 1961; 16(10): 740-748.
- Mozgovoi AA. *Ascaridata of animals and man and the diseases caused by them*. Moscow: Akademiya Nauk. Osnovy Nematologii; 1953.
- Navone GT, Etchegoin JA, Cremonte F. *Contracaecum multipapillatum* (Nematoda: Anisakidae) from *Egretta alba* (Aves: Ardeidae) and comments on the species of this genus in Argentina. *J Parasitol* 2000; 86(4): 807-810. PMID:10958460.
- Pazos GE, Laurenti S, Diaz JE. Helminthofauna del pingüino de Magallanes (*Spheniscus magellanicus*) en Península Valdés, Provincia del Chubut. Resultados Preliminares. *Hist Nat* 2003; 2(10): 85-94.
- Stock TM, Holmes JC. Host specificity and exchange of intestinal helminths among four species of grebes (Podicipedidae). *Can J Zool* 1987; 65(3): 669-676. <http://dx.doi.org/10.1139/z87-104>
- Storer RW. Observations on Rolland's Grebe. *El Hornero* 1967; 10: 339-350.
- Tanzola RD, Sardella NH. *Terranova galeocerdonis* (Thwaite, 1927) (Nematoda: Anisakidae) from *Carcharias taurus* (Chondrichthyes: Odontaspidae) off Argentina, with comments on some related species. *Syst Parasitol* 2006; 64(1): 27-36. PMID:16612662. <http://dx.doi.org/10.1007/s11230-005-9015-5>