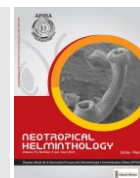




Neotropical Helminthology



RESEARCH NOTE / NOTA CIENTÍFICA

REPORT OF *CHARAXICEPHALOIDES POLYORCHIS* GROSCHAFT & TENORA 1978 (DIGENEA: PRONOCEPHALIDAE) IN A GREEN TURTLE - *CHELONIA MYDAS* (LINNAEUS, 1758) FROM BRAZIL

RELATO DE *CHARAXICEPHALOIDES POLYORCHIS* GROSCHAFT & TENORA 1978 (DIGENEA: PRONOCEPHALIDAE) DE UNA TORTUGA VERDE- *CHELONIA MYDAS* (LINNAEUS, 1758) EN BRASIL

Bruna Cavaco¹, Luis Madeira De Carvalho¹, Lais Modolo Conti² & Max Rondon Werneck^{2*}

¹ Interdisciplinary Animal Health Research Centre (CIISA), Faculty of Veterinary Medicine, University of Lisbon, 1300-477 Lisboa, Portugal

² BW Institute. Rua Profa. Sueli Brasil Flores n.88, Praia Seca, Araruama, RJ (CEP) 28970-000, Brazil

*Corresponding author: max@bwvet.com.br

Bruna Cavaco: <https://orcid.org/0000-0001-94594679>

Luis Madeira de Carvalho: <https://orcid.org/0000-0002-7548-667X>

Lais Modolo Conti: <https://orcid.org/0000-0002-5183-182X>

Max Rondon Werneck: <https://orcid.org/0000-0002-5650-3649>

ABSTRACT

This note paper report the occurrence of *Charaxicephaloides polyorchis* Groschaft & Tenora 1978 collected from a green sea turtle - *Chelonia mydas* (Linnaeus, 1758) from Brazil. Our specimen is larger than the original description and the following descriptions, providing a new information on this species. This represents the first record with morphometric data of *C. polyorchis* in a green turtle from Brazil and the third record with morphometric data of this trematode.

Keywords: Brazil - *Charaxicephaloides polyorchis* - *Chelonia mydas* – Pronocephalidae

RESUMEN

Esta nota informa la ocurrencia de *Charaxicephaloides polyorchis* Groschaft y Tenora 1978 recolectados de una tortuga marina verde – *Chelonia mydas* (Linnaeus, 1758) de Brasil. Nuestros ejemplares son más grandes que la descripción original y las siguientes descripciones, proporcionando nueva información sobre esta especie. Esto representa el primer registro con datos morfométricos de *C. polyorchis* en una tortuga verde de Brasil y el tercer registro con datos morfométricos de este trematodo.

Key words: Brazil - *Charaxicephaloides polyorchis* - *Chelonia mydas* – Pronocephalidae

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INTRODUCTION

The worms of Phylum Platyhelminthes, Class Trematoda, include a wide range of parasites, namely belonging to subclass Digenea, which can be found in a wide sort of terrestrial and aquatic hosts. Particularly, the family Pronocephalidae Looss 1899, belonging to these class and subclass, includes trematodes found in aquatic and marine reptiles and in marine fish from different parts of the world. Currently, 22 genera are accepted and 12 are known in sea turtles (Blair, 2005; Worms, 2021).

The genus *Charaxicephaloides* Groschaft & Tenora 1978 includes a single species (species type: *C. Charaxicephaloides polyorchis* Groschaft & Tenora 1978) and, until now, is considered a species of specialist parasite, reported only in green sea turtles, - *Chelonia mydas* Linnaeus 1758, from Cuba (Groschaft & Tenora, 1978), Costa Rica (Santoro *et al.*, 2009) and Brazil (Gomes *et al.*, 2017). Despite that, there are only two reports with morphometric data of this parasite to date (see Groschaft & Tenora, 1978; Santoro *et al.*, 2009), being the present report, the third article to be published with this information. This article aims to expand the knowledge of *C. polyorchis* by offering new morphometric data for the species.

MATERIAL AND METHODS

A juvenile female turtle (sex determined during necropsy by viewing the ovary) measuring 52.7 cm in curved carapace length and weighing 14.45 kg was found alive in Praia da Barra (21°01'36"S, 40°48'40"W), municipality of Marataízes in the state of Espírito Santo, Brazil. The turtle died during the transport to rehabilitation center, and a necropsy was performed thereafter. Several trematodes were found in the stomach and in urinary bladder.

The collected trematodes were preserved with ethanol 70%, stained with carmine, and cleared with eugenol. Morphometric data was collected with the aid of a Global optics light microscope using the S-EYE software program. Measurements

are reported in micrometers, except when indicated, with the mean and standard deviation followed by the range in parenthesis. The helminths were deposited in the Helminthological Collection of the Instituto Oswaldo Cruz (CHIOC number 38928) in the state of Rio de Janeiro, Brazil.

The identification used in this report followed the taxonomic proposal presented by Blair (2005) and comparisons were made with the original description by Groschaft & Tenora (1978) and the redescription by Santoro *et al.* (2009).

Ethic aspects: For this study formal consent is not required.

RESULTS

During the necropsy, eight specimens of *C. polyorchis* (Fig. 1) were found in the stomach of the green turtle.

Description (Table 1, Fig. 1): Elongated body with tapered anterior region, and posterior region with 2 conical projections; cephalic collar well developed; oral sucker subterminal; oesophagus short, cecal bifurcation at the level of the cephalic collar margin; ceca ending near the posterior end of the body, presenting numerous diverticula at regular intervals that go close to the side of the body; follicular testes ovoid to rounded in two rows, ventral to the ceca, from genital pore to the vitellaria; separated genital pore, to the left of the body, male slightly anterior; small and transversal cirrus sac; ovary round, on the right side of midline, at the level of the end of the vitellaria; Mehlis' gland round, postovarian; uterus occupying the entire medial area of the body, between the ovary and the cirrus sac, its coils do not extend beyond the main body of the cecum; eggs presenting numbers polar filaments.

Other pronocephalids were found in the same host individual: six specimens of *Cricocephalus albus* (Kuhl & van Hasselt, 1822) Looss, 1899 (CHIOC 38929), one specimen of *Pronocephalus obliquus* Looss, 1899 (CHIOC 38936) and three specimens of *Desmogonius baldassinae* Werneck, Conti and Blair, 2021 in stomach and three specimens of

Pyelosomum cochlear Looss, 1899 in urinary bladder (CHIOC 38937).

DISCUSSION

All specimens of *C. polyorchis* analyzed in the present report had an evident cephalic collar, in addition to have testicular follicles arranged in double rows on each side, not separated by uterine coils. These findings are compatible with the data previously published by Blair (2005), in addition to coinciding with the original description (Groschaft & Tenora, 1978) and its redescription (Santoro *et al.*, 2009).

Our specimens have more developed and elongated cecal diverticula, when compared to the drawings by Groschaft & Tenora (1978), but with characteristics closer to those mentioned by Santoro *et al.* (2009). In addition, the genital pore is on the left side of the trematode, as in Santoro *et al.* (2009).

However, in our specimens the Mehlis' gland is located posterior to the ovary as well as in the originals of Groschaft & Tenora (1978), but it differs from the positioning presented by Santoro *et al.* (2009). In our view, this is a morphological change within the species and this does not compromise the identification of the analyzed specimens.

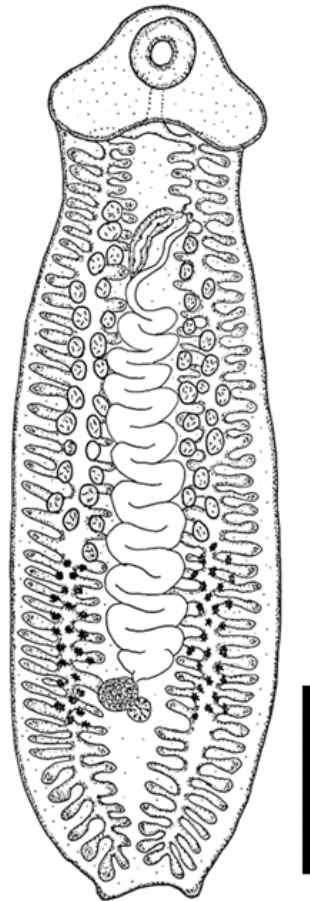


Figure 1. *Charaxicephaloides polyorchis* Groschaft & Tenora, 1978 (Digenea: Pronocephalidae) collected in a *Chelonia mydas* (Testudines: Cheloniidae) from Brazil. Ventral view. Scale bar 3 mm.

Table 1. Morphometric data of *Charaxicephaloides polyorchis* Groshoft & Tenora, 1978 (Digenea: Pronocephalidae) from *Chelonia mydas* (Testudines: Cheloniidae). Measurements in micrometers as range (mean)

	Groschaft & Tenora (1978)	Santoro <i>et al.</i> (2009)	Present report
Locality	Cuba	Costa Rica	Brazil
Site of infection	Stomach (?)	Stomach	Stomach
N	4	35	4
Body length (mm)	4.05 – 4.12 (5.87)	4.6 – 6.2 (5.5)	11.39 – 12.86 (11.9)
Body width (mm)	1.41 – 1.51 (1.84)	1.2 – 2 (1.6)	3.15 – 3.65 (3.2)
Oral sucker length	0.436 – 0.717 (0.733)	0.433 – 0.714 (0.590)	0.840 – 0.998 (0.909)
Oral sucker width	0.499 – 0.748 (0.717)	0.624 (0.484 – 0.765)	0.930 – 1.01 (0.715)
Cephalic collar wide	-	0.8 – 2.0 (1.6)	0.940 – 2.01 (1.4)
Oesophagus length	0.78	0.288 – 0.649 (0.510)	0.460 – 0.720 (0.59)
Cirrus sac length	0.46 (0.78)	0.463 – 0.875 (0.639)	0.547 – 0.630 (0.588)
Cirrus sac width	0.18 (0.17)	-	0.209 – 0.304 (0.256)
Follicles (diameter)	0.15 – 0.21	-	-
Testesc left side (number)	18 – 25	14 – 24	21 – 26 (24)
Testes right side	18 - 25	21 – 26	20 – 23 (21)
Follicles on right side length	-	0.022 – 0.057 (0.037)	0.049 – 0.092 (0.071)
Follicles on right side width	-	0.024 – 0.062 (0.038)	0.070 – 0.106 (0.080)
Follicles on left side length	-	0.027 – 0.065 (0.040)	0.050 – 0.090 (0.074)
Follicles on left side width	-	0.027 – 0.067 (0.041)	0.064 – 0.083 (0.072)
Left testes length	-	0.103 – 0.237 (0.158)	0.268 – 0.393 (0.329)
Left testes width	-	0.103 – 0.206 (0.148)	0.276 – 0.417 (0.338)
Rigth testes length	-	0.112 – 0.206 (0.153)	0.273 – 0.406 (0.338)
Right testes width	-	0.102 – 0.206 (0.143)	0.267 – 0.379 (0.326)
Ovary length	0.234 (0.187)	0.196 – 0.309 (0.252)	0.405 – 0.536 (0.484)
Ovary width	0.343 (0.265)	0.196 – 0.350 (0.259)	0.420 – 0.512 (0.477)
Mehlis' gland length	-	0.175 – 0.309 (0.248)	0.364 – 0.530 (0.432)
Mehlis' gland width	-	0.175 – 0.381 (0.285)	0.397 – 0.538 (0.449)
Eggs length	0.034 – 0.038	0.024 – 0.049 (0.034)	0.029 – 0.034 (0.032)
Eggs width	0.015 – 0.018	0.012 – 0.022 (0.016)	0.012 – 0.018 (0.014)
Eggs filaments length	0.35	0.270 – 0.310 (0.290)	-
Excretory vesicle length	-	0.270 – 0.594 (0.449)	-
Excretory vesicle width	-	0.081 – 0.135 (0.103)	-

Variations also occurred for size, since our specimens are larger than the largest flukes described by Groschaft & Tenora (1978) and Santoro *et al.* (2009). Possibly, the difference between our specimens and the others already described. Such findings likely correspond merely to individual variations of the specimens.

Groschaft *et al.* (1977) describe seven different species of trematodes collected from a green turtle on a hawksbill sea turtle-*Eretmochelys imbricata* Linnaeus, 1766 from Cuba. In the present work, the authors present morphometric and morphological data of *C. polyorchis*, which apparently indicates the same data as originally presented by Groschaft

& Tenora (1978), however the data of the body length and width and the oral sucker were presented with different values. Although morphological and morphometric aspects are available in different publications, there are no records regarding the molecular biology of these individuals, which could contribute to a better understanding of this trematodes.

Santoro *et al.* (2009) redescribed *C. polyorchis* based on 35 specimens collected in the stomach of green turtles from Tortugueiro National Park in Costa Rica, the authors offer, in addition to new morphometric data, broader descriptions of the analyzed parasites.

Gomes *et al.* (2017) analyzed 36 young specimens of green turtle and reported the occurrence of *C. polyorchis* collected in the stomach of 11.1% of the hosts, however, no morphometric or morphological data of the analyzed specimens were presented.

In addition to *C. polyorchis*, specimens of *C. albus*, *P. obliquus* and *D. baldassinae* were found in the stomach and *P. cochlear* in the urinary bladder. These findings are not new and have been described in the Brazilian region (Werneck & Silva, 2015; Werneck *et al.*, 2021).

So far, little is known about *C. polyorchis*, with less than 50 individuals analyzed to date and it appears that the species is restricted to green turtles in the Neotropical region, being reported in green turtles from Cuba (Groschaft *et al.*, 1977; Groschaft & Tenora, 1978), Costa Rica (Santoro *et al.*, 2009) and Brazil (Gomes *et al.*, 2017).

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Conflict of interest: On behalf of all authors, the corresponding author states that there is no conflict of interest.

BIBLIOGRAPHIC REFERENCES

- Blair, D. 2005. *Family Pronocephalidae* Looss, 1899. In A. Jones, RA Bray & DI Gibson (eds.). *Keys to the Trematoda*, Vol. 2. CAB International and The Natural History Museum, London.
- Gomes, MC, Martins, IVF, Werneck, MR & Pavanelli, L. 2017. *Ecologia da comunidade de helmintos gastrointestinais de tartarugas-verdes (Chelonia mydas) recolhidas no litoral do Espírito Santo*. Arquivo Brasileiro de Medicina veterinária e Zootecnia, vol. 69, pp. 644-650.
- Groschaft, J, Otero, AC & Tenora, F. 1977. *Trematodes (Trematoda) from Cuban turtles, Chelonia mydas (L.) and Eretmochelis imbricata imbricata (L.) (Testudinata – Chelonidae)*. Acta universitatis agriculturae, vol. 25, pp. 155-167.
- Groschaft, J & Tenora, F. 1978. *Charaxicephaloides polyorchis* Gen. Nov., Sp. Nov. (Trematoda: Charaxicephalinae) from *Chelonia mydas mydas (Testudinata) in Cuba*. Vestnik Ceskolovenske Spolecnosti Zoologicke, vol. 42, pp. 108 – 111.
- Santoro, M, Brandmayr, P, Greiner, EC, Morales, JA & Rodríguez-Ortiz, B. (2009): *Redescription of Charaxicephaloides polyorchis Groschaft and Tenora 1978 (Digenea: Pronocephalidae) from the green turtle Chelonia mydas in Costa Rica*. Helminthologia, vol. 46, pp. 97-99.
- Werneck, MR & Silva, RJ. 2015. *Some helminth parasites of juvenile green turtles Chelonia mydas (Testudines, Cheloniidae) in Brazil*. Journal of Parasitology, vol. 101, pp. 713-716.
- Werneck, MR, Conti, LM & Blair, D. 2021. *Desmogonius baldassinae n. sp. (Digenea: Pronocephalidae) collected in a green sea turtle - Chelonia mydas from Brazil*. Parasitology Research, *in press*.
- World Register of Marine Species. 2021. *Charaxicephaloides polyorchis* Groschaft & Tenora, 1978. Accessed at: <https://www.marinespecies.org/aphia.php?p=taxdetails&id=728066x>

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