



New data on the occurrence of internal parasitic worms in the *Gymnodraco acuticeps* and *Cygnodraco mawsoni* (Bathypoda) fish in the Ross Sea, Antarctica

Zdzisław LASKOWSKI¹, Anna ROCKA¹, Krzysztof ZDZITOWIECKI¹,
Laura GHIGLIOTTI² and Eva PISANO²

¹ Instytut Parazytologii im. W. Stefańskiego, Polska Akademia Nauk, ul. Twarda 51/55,
00-818 Warszawa, Poland

< laskowz@twarda.pan.pl > < abroccy@poczta.onet.pl > < kdzit@twarda.pan.pl >

² Department of Biology, University of Genova, Viale Benedetto XV, 5, 16132 Genova, Italy
< laura.ghigliotti@virgilio.it > < pisano@unige.it >

Abstract: The two bathypodid species, *Gymnodraco acuticeps* and *Cygnodraco mawsoni*, caught in the Ross Sea (Antarctic summer 2002) were examined for internal parasites. All specimens (four *G. acuticeps* and one *C. mawsoni*) were infected. *G. acuticeps* harboured larval Cestoda (bilocular tetraphyllidean cercoids, diphyllbothriid plerocercoids) and Nematoda (*Contracaecum* spp.), acanthocephalan cystacanths and adult helminths (three species of Digenea and one species of Nematoda). Two specimens of *C. mawsoni* (including data from one additional specimen examined earlier) were infected by larval Cestoda (bilocular cercoid) and Nematoda (*Contracaecum* spp.) and adult helminths (three species of Digenea and one species of Nematoda). The present data are compared and discussed with the relevant literature data.

Key words: Antarctica, Ross Sea, parasitic worms, fish, (Bathypoda).

Introduction

The majority of parasite surveys carried out in the Ross Sea (Antarctica) are related to fish of the Nototheniidae family. Parasites of *Gymnodraco acuticeps* have not been studied from the Ross Sea and only three specimens have been examined in the South Shetland Islands area and found to be infected with larval cestodes (Wojciechowska 1993b) and larval nematodes (unpublished data). The second predatory bathypodid species, *Cygnodraco mawsoni*, was surveyed by Zdzitowiecki *et al.* 1993 (one specimen). Most previous data is poor (with the exception of data on larval nematodes in *C. mawsoni* in the Weddell Sea). In such a situation the present authors are of the opinion that it is useful to publish the results of the examination of five fish of these two species caught in the Ross Sea.

Material and methods

In total, four specimens of *G. acuticeps* and one of *C. mawsoni* were available. The fish were caught in the Terra Nova Bay by Laura Ghigliotti (Antarctic summer 2002), and their viscera isolated, put into fresh water for two hours, fixed in 80% ethanol, stored in a fixative fluid and subsequently examined using a dissecting microscope. Preserved viscera were examined in Poland. Additionally, data from one *C. mawsoni* previously published (see the introduction) are also included. All larval nematodes represented the genus *Contracaecum* were not identified up to the species level. The digeneans were identified according to Zdzitowiecki (1997), cestodes according to Wojciechowska (1993a) and Rocka (2003), acanthocephalans according to Zdzitowiecki (1991) and adult nematodes according to Rocka (1999). All parasite taxa found were compared with specimens collected from other hosts from the Ross Sea and from other areas. Upon indices of infection only data on the intensity are given because of the small numbers of fish examined.

Results

All the examined fish specimens from the Ross Sea and the South Shetland Islands area were infected (Table 1). All four *G. acuticeps* from the Ross Sea were very strongly infected with larval Cestoda (mainly bilocular tetraphyllidean cercoids) and larval Nematoda (Anisakidae: *Contracaecum* spp.). Intensities reached 872 and 727 of these parasites, respectively. Other larval and adult parasites were less numerous and found in one to three host specimens. However, single infections with acanthocephalan cystacanths (*Corynosoma pseudohamanni* Zdzitowiecki, 1984) and diphyllbothriid plerocercoids were high (72 and 46 specimens, respectively). Adult helminths (three species of Digenea and one species of Nematoda) *Neolebouria terranovaensis* Zdzitowiecki, Pisano *et* Vacci 1993, *Genolinea bowersi* (Leiper *et* Atkinson, 1914), *Elytrophalloides oatesi* (Leiper *et* Atkinson, 1914), and *Ascarophis nototheniae* Johnston *et* Mawson, 1945, were much less numerous. The three *G. acuticeps* caught in the South Shetland Islands area were free of adult parasites and Acanthocephala. They were highly infected with cercoids, including mainly bilocular cercoids and less numerous trilocular cercoids; the latter were absent in four fish in the Ross Sea. Other larval helminths, diphyllbothriid plerocercoids and *Contracaecum* spp., were less abundant.

Two specimens of *C. mawsoni* caught in the Ross Sea were infected partially with the same parasites. Acanthocephala and diphyllbothriid plerocercoids were not found. Contrary to the situation of *G. acuticeps*, the dominant parasites were adult digeneans, especially *N. terranovaensis* (maximum intensity 192 specimens).

Discussion

The complete list of helminths reported as parasites of *G. acuticeps* consists of 9 (10) species and larval forms, including three digeneans (*N. terranovaensis*, *G.*

bowersi, and *E. oatesi*), three larval cestodes, bilocular tetraphyllidean cercoid, trilocular cercoid and diphyllbothriid plerocercoid, one acanthocephalan in the cystacanth stage, *C. pseudohamanni*, one adult nematode, *A. nototheniae*, and one form of larval nematode (*Contracaecum* spp.) probably containing two species, *Contracaecum osculatum* (Rudolphi, 1802) and/or *Contracaecum radiatum* (Linstow, 1907).

The complete list of helminths reported as parasites of *C. mawsoni* consists of 7(8) species and larval forms, including three digeneans, *N. terranovaensis*, *G. bowersi* and *E. oatesi*, one larval cestode, bilocular tetraphyllidean cercoid, one adult nematode, *A. nototheniae*, and two/three larval nematodes, *Contracaecum* spp. (*Contracaecum* spp. = *C. osculatum* and/or *C. radiatum*) and *Pseudoterranova decipiens* (Krabbe, 1878). Among them, only *P. decipiens* was not in the present study found. Other forms are listed in the Table 1.

The most extensive previous data on the parasitic worms of *C. mawsoni* can be found in the results of investigations which were restricted to infections with larval nematodes in the Weddell Sea (Klöser *et al.* 1992) and which discriminated representatives of the genus *Contracaecum* into two species, *C. osculatum* and *C. radiatum*. Parasites of *C. mawsoni* were collected from 20 host specimens. In total, 142 specimens of the former species and 43 of the latter were found. Both these species were earlier reported from the same host species in the part of the Antarctic Ocean (South of the Indian Ocean), but without any numerical data (Johnston and Mawson 1945). Palm *et al.* (1994) examined 43 *C. mawsoni* in the Weddell Sea

Table 1
Occurrence of parasitic worms in bathydraconids in the Ross Sea and in the South Shetland Islands area.

Parasites	<i>Cygnodraco mawsoni</i>		<i>Gymnodraco acuticeps</i>					
	Ross Sea		Ross Sea				South Shetland Islands	
	n = 1 + 1 ^a		n = 4				n = 3 ^b	
Digenea								
<i>Neolebouria terranovaensis</i>	192	134	0	6	0	0	0	0
<i>Genolinea bowersi</i>	0	1	0	3	10	0	0	0
<i>Elytrophalloides oatesi</i>	24	11	0	0	3	0	0	0
Cestoda								
bilocular cercoid	106	7	96	24	872	93	ca. 400	ca. 150
trilocular cercoid	0	0	0	0	0	0	13	ca. 20
diphyllbothriid plerocercoid	0	0	3	14	46	0	ca. 100	81
Acanthocephala								
<i>Corynosoma pseudohamanni</i>	0	0	0	1	72	0	0	0
Nematoda								
<i>Ascarophis nototheniae</i>	0	1	0	0	6	0	0	0
<i>Contracaecum</i> spp.	3	0	47	278	285	727	47	0

^a – Data published by Zdzitowiecki *et al.* (1993, 1999), Wojciechowska *et al.* (1994) and Rocka (1999); ^b – data published by Wojciechowska 1993b; Rocka (2003).

and reported the occurrence of larvae of a third nematode species, *P. decipiens*, occurring with the prevalence of 74.4% and the intensity range 1–25 (mean 4.4). The same species was earlier reported from *C. mawsoni* (Johnston and Mawson 1945). Data on the occurrence of other helminths in the same host and locality concern one digenean species, *E. oatesi* (Prudhoe and Bray 1973), one adult nematode, *A. nototheniae* (Johnston and Mawson 1945) and one cestode larval form, bilocular cercoid (Prudhoe 1969). Numerical data are lacking. The result of the earlier examination of one host specimen in the Ross Sea is included in Table 1.

None of the helminths listed here are specific for bathydraconids; all commonly occur in a many other fish species.

Acknowledgements. — The authors are grateful to Mrs. Janina Wiśniewska for the technical assistance during the laboratory investigations and to Rodney A. Bray and Wojciech Piasecki for constructive referees' comments.

References

- JOHNSTON T.H. and MAWSON P.M. 1945. Parasitic nematodes. Reports B.A.N.Z. *Antarctic Research Expedition, Series B* 8: 73–160.
- KLÖSER H., PLÖTZ J., PALM H., BARTSCH A. and HUBOLD G. 1992. Adjustment of anisakid nematode life cycles to the high Antarctic food web as shown by *Contracaecum radiatum* and *C. osculatum* in the Weddell Sea. *Antarctic Science* 4: 171–178.
- PALM H., ANDERSEN K., KLÖSER H. and PLÖTZ J. 1994. Occurrence of *Pseudoterranova decipiens* (Nematoda) in fish from the southeastern Weddell Sea (Antarctic). *Polar Biology* 14: 539–544.
- PRUDHOE S. 1969. Cestodes from fish, birds and whales. Reports B.A.N.Z. *Antarctic Research Expedition, Series B* 8: 171–193.
- PRUDHOE S. and BRAY R.A. 1973. Digenetic trematodes from fishes. Reports B.A.N.Z. *Antarctic Research Expedition, Series B* 8: 195–225.
- ROCKA A. 1999. Biometrical variability and occurrence of *Ascarophis nototheniae* (Nematoda, Cystidicolidae), a parasitic nematode of Antarctic and subantarctic fishes. *Acta Parasitologica* 44: 188–192.
- ROCKA A. 2003. Cestodes of the Antarctic fishes. *Polish Polar Research* 24: 261–276.
- WOJCIECHOWSKA A. 1993a. The tetraphyllidean and tetrabothriid cercoids from Antarctic bony fishes. I. Morphology. Identification with adult forms. *Acta Parasitologica* 38: 15–22.
- WOJCIECHOWSKA A. 1993b. The tetraphyllidean and tetrabothriid cercoids from Antarctic bony fishes. II. Occurrence of cercoids in various fish species. *Acta Parasitologica* 38: 113–118.
- WOJCIECHOWSKA A., ZDZITOWIECKI K., PISANO E. and VACCHI M. 1994. The tetraphyllidean cercoids from bony fishes occurring in the Ross Sea (Antarctic). *Acta Parasitologica* 39: 13–15.
- ZDZITOWIECKI K. 1991. Antarctic Acanthocephala. In: J.W. Wägele and J. Sieg (eds) *Synopses of the Antarctic benthos*, 3. Koenigstein, Koeltz Scientific Books: 1–116.
- ZDZITOWIECKI K. 1997. Antarctic Digenea, parasites of fishes. In: J.W. Wägele and J. Sieg (eds) *Synopses of the Antarctic benthos*, 8. Koenigstein, Koeltz Scientific Books: 1–156.
- ZDZITOWIECKI K., PISANO E. and VACCHI M. 1993. Antarctic representatives of the genus *Neolebouria* Gibson, 1976 (Digenea, Opecoelidae), with a description of one new species. *Acta Parasitologica* 38: 11–14.
- ZDZITOWIECKI K., PALLADINO S. and VACCHI M. 1999. Preliminary results on Digenea found in fishes in the coastal waters of Terra Nova Bay Antarctica. *Parassitologia* 41: 575–578.

Received 29 October 2004

Accepted 28 January 2005