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VERSITA

New data on the occurrence of Acanthocephala in some fish in Admiralty Bay (South Shetland Islands)

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Abstract

New data on the infection with Acanthocephala of 33 fish caught in Admiralty Bay in November 2007 to January 2008 are given. These fish belong to 5 species: *Notothenia rossii* (22 immature specimens), *Lindbergichthys nudifrons* (n = 7), *Trematomus bernacchii* (n = 1), *T. newnesi* (n = 1) and *Harpagifer antarcticus* (n = 2). Three species of Echinorhynchida: *Aspersentis megarhynchus*, *Metacanthocephalus dalmori* and *M. johnstoni* and four species of Polymorphida: *Corynosoma arctocephali*, *C. bullosum*, *C. hamanni* and *C. pseudohamanni*, were found. Prevalence of N. *rossii* and *L. nudifrons* was 100%. The mean abundance of infection of *N. rossii* (125.09) was larger than that of *Notothenia coriiceps* (82.93). Data of infection of *N. rossii* in 2007 was almost identical with that in 1979 (mean abundance 118.66). The most abundant in this host were *A. megarhynchus*, *M. johnstoni*, *C. hamanni* and *C. pseudohamanni* (mean abundances 36.36, 29.77, 13.86 and 44.73, respectively). In total Echinorhynchida were more abundant than Polymorphida in 2007/08 (66.18 versus 58.91). Reverse situation was in 1979 (mean abundance 47.36 for Echinorhynchida and 71.3 for Polymorphida. Only 7 *L. nudifrons* were examined in 2007/08 and Echinorhynchida were more numerous in this host (mean abundance 26.71) than Polymorphida (10.29). Single specimens of other fish were infected with a few Acanthocephala belonging to species recorded in the same hosts with those found in 1978/79.

Keywords

Antarctica, Admiralty Bay, Acanthocephala, notothenioid fish, infection.

Introduction

The present paper contains new data about the occurrence of Acanthocephala in the shore bottom notothenioid fish with exception for infections in Admiralty Bay (Fig. 1) at South Shetland Islands (Antarctica) of *Chaenocephalus aceratus* (Lönnberg 1906) and *Notothenia coriiceps* Richardson, 1844 (see Laskowski and Zdzitowiecki 2010; Laskowski *et al.* 2012, Fig. 1). Extensive investigations, which were done previously the occurrence of Acanthocephala in Antarctic fish (final hosts of Echinorhynchida and paratenic hosts of Polymorphida) and in Amphipoda (intermediate hosts of representatives of both orders) were carried out in the same place (Zdzitowiecki 1986a, b; Zdzitowiecki and Rokosz 1986; Zdzitowiecki and Presler 2001; Laskowski *et al.* 2010). Data about the infection of fish in other places at South Shetland Islands were published by Zdzitowiecki (1990, 1991), Palm *et al. (*1998, 2007), Ruhl *et al.* (2003). In total, over 1000 specimens of fish were caught and examined using various methods in the Western Antarctica. The main object of investigations in Admiralty Bay (op. cit.) and Potter Cove (Palm *et al.* 1998) was *N. coriiceps*. The main purpose of investigation in 2007/08 was the examination of infection of this fish in Admiralty Bay in comparison with data from the same host species carried out 29 years earlier. The present paper contains results of examination of five species other than *N. coriiceps* (see Laskowski *et al.* 2012) and *C. aceratus* (see Laskowski and Zdzitowiecki 2010) caught in 2007/08 together with two species mentions. *Notothenia rossii* Richardson, 1844 (22 immature specimens), *Lindbergichthys nudifrons* (Lönnberg, 1905), n = 7, *Trematomus bernacchii* Boulenger, 1902, n = 1, *T. newnesi* Boulenger, 1902, n = 1 and *Harpagifer antarcticus* Nybelin, 1947, n = 2.

Materials and Methods

Recently examined fish were caught in shallow coastal waters of the Admiralty Bay in November and December 2007 and January 2008 using fishing rod and bottom nets at a depth

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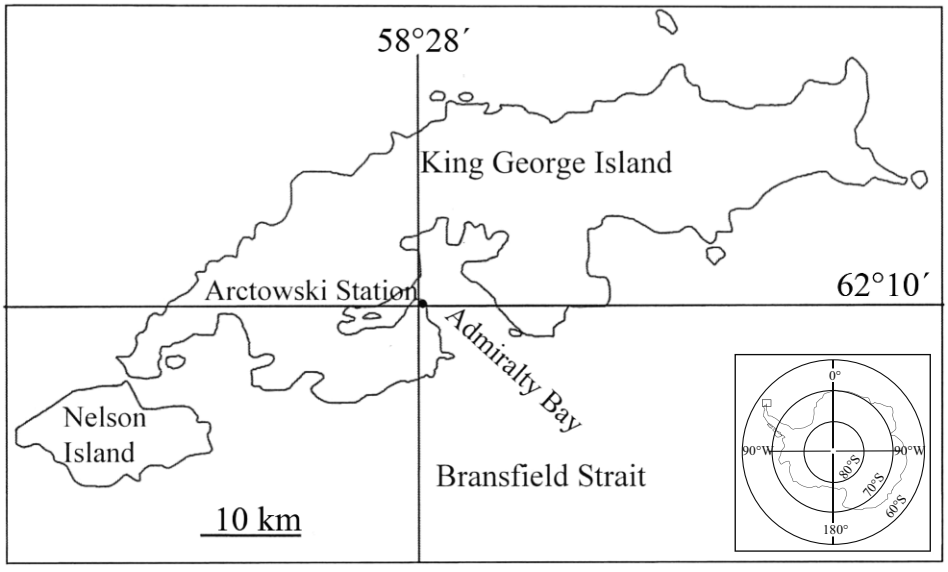

Fig. 1. King George Island with Admiralty Bay

lower than 100 m. Of 101 fish 33 specimens belonged to 5 species other than 2 species mentioned (see above). The fish were examined just after capture or held alive in a tank with marine water. Samples were checked using a stereomicroscope and collected. Cystacanths were liberated from cysts found in the body cavity using a water digestive solution (pepsin 1%, HCl 0.4%) in 38°C. Cystacanths occurring in the body cavity and acanthocephalans found in the lumen of intestine were relaxed in fresh water and fixed and stored in 70% ethanol. Most of specimens were determined without clearing using a stereomicroscope; doubtful specimens were dehydrated in graded ethanol, cleared in benzyl alcohol and determined using a light microscope. Determinations of all specimens were done according to the key and descriptions published by Zdzitowiecki (1991). Infections of various fish other than *N. coriiceps* examined during previous and present investigations were not compared using statistical methods, because there were not enough fish samples caught in 2007/08 (see Table I). Fish examined in 1978/79 were caught during the entire year whereas new investigations were restricted to 3 months.

Results

Investigations were carried out in November, December 2007 and January 2008. Three species of Echinorhynchida: *Aspersentis megarhynchus* (Linstow, 1892), *Metacanthocephalus dalmori* Zdzitowiecki, 1983 and *M. johnstoni* Zdzitowiecki, 1983 and four species of Polymorphida: *Corynosoma arctocephali* Zdzitowiecki, 1984, *C. bullosum* (Linstow, 1892), C. *hamanni* (Linstow, 1892) and *C. pseudohamanni* Zdzitowiecki, 1984 were found in hosts listed above. The prevalence of infection of *N. rossii* and *L. nudifrons* was 100%. The infection of *N. rossii* was a little larger than that of *N. coriiceps* in the same months and locality. Mean abundance of Acanthocephala in *N. rossii* in 2007/08 was 125.09 against 82.93 in *N. coriiceps*, and a little larger than the infection of *N. rossii* in 1979 (118.66). Numerous species of Acanthocephala in *N. rossii* were *A. megarhynchus*, *M. johnstoni*, *C. hamanni* and *C. pseudohamanni* (mean abundances 36.36, 29.77, 13.86 and 44.73 respectively). Summing up, Echinorhynchida were more numerous in *N. rossii* in 2007/08 than Polymorphida (1456 versus 1296 specimens). *Lindbergichthys nudifrons* was more strongly infected in 2007/08 (mean abundance 37.00) than in 1978/79 (5.84). Echinorhynchida (*M. dalmori* and *M. johnstoni*) were more numerous in this host than Polymorphida (*C. hamanni* and *C. pseudohamanni*) (mean abundance 26.71 versus 10.29). However, the difference is not statistically significant because of too low number of fish examined. Single specimens of *T. bernacchii* and *T. newnesi* and one of the two *H. antarcticus* were infected with two or three of five acanthocephalan species each: *A. megarhynchus*, *M. dalmori*, *M. johnstoni*, *C. hamanni* and *C. pseudohamanni* (Table I). All host/parasite relations found in 2007/08 were previously recorded during investigations in 1978/79. Eight abundant in the Admiralty Bay acanthocephalan species (five species listed above and *Corynosoma arctocephali*, *C. bullosum* and *C. shackletoni*) were present in a whole sample (101 specimens) of fish recently examined, as well as in fish examined in 1978/79.

Discussion

The most numerous species in 33 fish examined in 2007/08 were 22 immature *N. rossii.* Representatives of 2 orders of Acanthocephala (1456 specimens of 3 species of Echino-

Table I. Infection with Acanthocephala of some fish in Admiralty Bay in 2007/2008

Host	n	Parasite	Prevalence (%)	Intensity range	Mean abundance
Notothenia rossii	22	Acanthocephala	100	48–503	125.09
		Echinorhynchida	100	1–159	66.18
		Aspersentis megarhynchus	100	11–104	36.36
		Metacanthocephalus dalmori	5	1	0.05
		Metacanthocephalus johnstoni	100	1–130	29.77
		Polymorphida	100	1–344	58.91
		Corynosoma arctocephali	18	1–2	0.27
		Corynosoma bullosum	5	1	0.05
		Corynosoma hamanni	91	1–90	13.86
		Corynosoma pseudohamanni	100	2–253	44.73
Lindbergichthys nudifrons	7	Acanthocephala	100	15–83	37.00
		Echinorhynchida	100	14–68	26.71
		Metacanthocephalus dalmori	71	5–59	13.57
		Metacanthocephalus johnstoni	86	8–34	13.14
		Polymorphida	71	1–49	10.29
		Corynosoma hamanni	71	1–41	8.14
		Corynosoma pseudohamanni	57	1–8	2.14
Trematomus bernacchii	1	Acanthocephala		37	
		Metacanthocephalus dalmori		21	
		Corynosoma hamanni		2	
		Corynosoma pseudohamanni		14	
Trematomus newnesi	1	Acanthocephala		6	
		Aspersentis megarhynchus		1	
		Metacanthocephalus johnstoni		5	
Harpagifer antarcticus	2	Acanthocephala	1 of 2	3	
		Aspersentis megarhynchus	1 of 2	1	
		Corynosoma hamanni	1 of 2	2	

rhynchida and 1296 specimens of 4 species of Polymorphida) were found in 100% of *N. rossii.* Almost all other fish were infected with Acanthocephala of each order. Only one *Harpagifer antarcticus* was not infected (Table 1). The infection of *N. rossii* in the entire year 1978/79 was similar but a little lower (mean abundance 118.66) than that in the present investigations (125.09). However, two species of parasites: present in this host in 1978/79, *Corynosoma shackletoni* (Zdzitowiecki, 1978) and *Heterosentis heteracanthus* (Linstow, 1896) were absent in *N. rossii* in 2007/08. Other species: *Echinorhynchus petrotschenkoi* (Rodjuk, 1984) and *Metacanthocephalus campbelli* (Leiper et Atkinson, 1914) were present in Admiralty Bay, but absent in *N. rossii* (Zdzitowiecki 1991). The validity of *Echinorhynchus muraenolepisi* (Rodjuk, 1984) is doubtful.

The sample of N. *nudifrons* examined for acanthocephalans in 2007/08 was less numerous (7 fish) whereas 29 specimens were examined in entire 1978/79. In year 1978/79 six acanthocephalan species were found. However, two of them, *A. megarhynchus* and *C. bullosum*, were found to be rare in previous research and absent 2007/08. Nevertheless much more Acanthocephala were found in *L. nudifrons* in 2007/08 (the prevalence 100%, whereas 82.8% in 1979 and mean abundance 37.00 versus 5.84 respectively). Echinorhynchida (*M. dalmori* and *M. johnstoni*) were in 2007/08 more numerous than Polymorphida (*C. hamanni* and *C. pseudohamanni*), mean abundance 26.71 of the former and 10.29 of the latter (Table 1). However, results of two investigations are hardly comparable, because *N. nudifrons* were previously caught and examined in December 1978 to July 1879 (most of the study took part from January to June). However, present study was done only in December 2007 and January 2008. The number of fish examined in 2007/08 was to low for final conclusions. However, probably all species of Acanthocephala occurring in Admiralty Bay were recognized in 1878/79.

Any conclusions are impossible for three host species examined in 2007/08 in number of one or two specimens (Table 1). Each fish, with exception of one *H. antarcticus* free of Acanthocephala, was infected with acanthocephalans of 2–3 species abundant in them in earlier investigations (Zdzitowiecki 1986a, b; Zdzitowiecki and Rokosz 1986; Zdzitowiecki and Zadróżny 1999).

Two acanthocephalan species *Metacanthocephalus johnstoni* and *Corynosoma pseudohamanni*, are abundant in *N. coriiceps* in Admiralty Bay and Argentine Islands. Two more species, *Aspersentis megarhynchus* and *Corynosoma hamanni*, are present but less abundant off Argentine Islands (Zdzitowiecki and Laskowski 2004). All four parasites mentioned occur in big numbers in *N. rossii* in Admiralty Bay. They were found in various sub-coastal Amphipoda as intermediate hosts (Zdzitowiecki and Presler 2001; Laskowski *et al.* 2010). One species of amphipods living in deep water, *Waldeckia obesa* (Chevreux 1905) was found to be the intermediate host of *Corynosoma bullosum*. Other sub-coastal amphipods were found to be intermediate hosts of five species of Acanthocephala, namely *Aspersentis megarhynchus*, *Metacanthocephalus johnstoni* (only off Argentine Islands), *Corynosoma hamanni*, *C. pseudohamanni* and *C. bullosum* (Zdzitowiecki and Presler 2001; Laskowski *et al.* 2010). Amphipods were observed by present authors as the important component of the diet of the Antarctic sub-coastal bottom fish. These fish acquire parasites by feeding on infected amphipods. Large specimens of Nototheniidae, Bathydraconidae and Channichthyidae, including *N. coriiceps*, *N. rossii* and C. *aceratus* acquire polymorphid parasites mainly by feeding on smaller fish which are also infected with parasites (accumulation in paratenic hosts). C. *bullosum* is the only parasite found in amphipod *W. obesa* occurring mainly in a deep part of an Antarctic shelf (Zdzitowiecki and Presler 2001). It is the most numerous acanthocephalan found in fish living in the open sea shelf environment (Zdzitowiecki 1990, 1991, Palm *et al.* 2007). Intermediate hosts of *Metacanthocephalus dalmori* and six rare species occurring off South Shetland Islands are unknown.

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