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CAN THE DAB (*LIMANDA LIMANDA*) BE A PARATENIC HOST OF *ANGUILLICOLA CRASSUS* (NEMATODA; DRACUNCULOIDEA)? THE GULF OF GDAŃSK AND VISTULA LAGOON (POLAND) EXAMPLE

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ABSTRACT. *Anguillicola crassus* is an Asian nematode, dwelling in eel swim bladder and accidentally introduced to Europe. The eel becomes infected by consuming either crustaceans (intermediate hosts) or small fish (paratenic hosts), supporting stage 3 larvae. In 2002, 15 specimens of dab (*Limanda limanda*) caught in the Gulf of Gdańsk and 8 caught in the Vistula Lagoon were examined for the presence of *A. crassus* larvae. Two Gulf of Gdańsk specimens and one Vistula Lagoon fish were found to host 4 stage 3 larvae of *A. crassus*. This is the first world's record of *A. crassus* in the dab. It is suggested that, due to a large size of the infected fish, they cannot function as paratenic hosts in the *A. crassus* life cycle.

Key words: *Anguillicola crassus*, dab, Gulf of Gdańsk, *Limanda limanda*, Nematoda, paratenic host, Poland, Vistula Lagoon.

INTRODUCTION

The nematode *Anguillicola crassus* Kuwahara, Niimi et Itagaki, 1974 is a parasite of the European eel (*Anguilla anguilla*), Japanese eel (*Anguilla japonica*) (cf. Moravec and Taraschewski 1988), and the American eel (*Anguilla rostrata*) (cf. Barse et al. 2001, Moser et al. 2001). In the early 1980s, the parasite was introduced to Europe and very soon became a serious threat for the European eel in which it induces a pathological condition known as anguillicolosis that may even be fatal (Molnar et al. 1991, Baruš 1995). The life cycle of *A. crassus* involves intermediate hosts, primarily copepods (De Charleroy et al. 1990, Moravec 1994). Important in the life cycle are also the so-called paratenic hosts, mainly small fish (Székely 1994); experimental infections showed amphibians, insects (Megaloptera, Odonata), and molluscs to have a potential for acting as paratenic hosts as well (Moravec 1996, Moravec and Škoríková 1998).The eel (definitive host) becomes infected by ingesting invertebrates and mainly small fish supporting stage 3 larvae.

In the eel's swim bladder wall, the larvae grow to stage 4 and to pre-adults that mature in the swim bladder lumen.

The present work is a continuation of studies on paratenic hosts in the *A. crassus* life cycle in the Vistula Lagoon and Gulf of Gdańsk, commenced in the mid-1990s. It is worth mentioning that eel is one of the most commercially important fish species in the Gulf of Gdańsk and Vistula Lagoon where the extent of *A. crassus* infection ranges from 41.9% to 100% (Rolbiecki et al. 1996, 2000; Własow et al. 1998). For this reason, it seems important to elucidate the role of other fish (paratenic hosts) in the parasite's life cycle.

Among the 70 fish species occurring in the Baltic, the dab (*Limanda limanda*) is one of the rare and poorly known ones. The species belongs to the family Pleuronectidae; it is characteristically oval in shape and flattened on its right side; as a rule, it grows to be 20 cm long (the maximum length on record is 40 cm). This marine species inhabits North Atlantic, the North Sea, and the Baltic. In the Polish waters, it has been reported from the Gulf of Gdańsk, Pomeranian Bay, Szczecin and Vistula Lagoons, and even in River Odra. The dab feeds on crustaceans, annelids, molluscs, and small fish (Gąsowska 1962). The present study was aimed at defining the role of dab in the life cycle of *A. crassus*.

MATERIALS AND METHODS

In 2002, 15 dab individuals caught in the Gulf of Gdańsk (110-223 mm, 82-189g, 6 males, 9 females) and 8 obtained from the Vistula Lagoon (124-168 mm, 93-131g, 3 males, 5 females) were examined.

To look for parasites, temporary mounts were made of the stomach and intestine walls compressed between glass slides. The nematodes found were killed with hot 70% ethanol and cleared in lactophenol. Following identification, the parasites were placed in 70% ethanol. The measurements were taken with a OK12MO PZO optical measuring device.

RESULTS AND DISCUSSION

Two Gulf of Gdańsk and one Vistula Lagoon specimens of dab were found to carry 4 stage 3 larvae of *A. crassus* (Fig. 1). The parasites were revealed in the stomach wall (3 specimens, Gulf of Gdańsk) and in the intestinal wall (1 specimen, Vistula Lagoon). The fish infected (2 females and 2 males) measure 15.4-21 cm and weighed 157-189 g.

Dimensions of the nematodes found (length: 0.779-0.871 mm; width: 0.032-0.039 mm; pharynx length: 0.231-0.264 mm; distance between the nerv ring and the anterior end: 0.95-0.113 mm; tail length: 0.066-0.074 mm) were similar to those reported earlier by other authors (i.a., Petter et al. 1989, Blanc et al. 1992, Moravec et al. 1993).

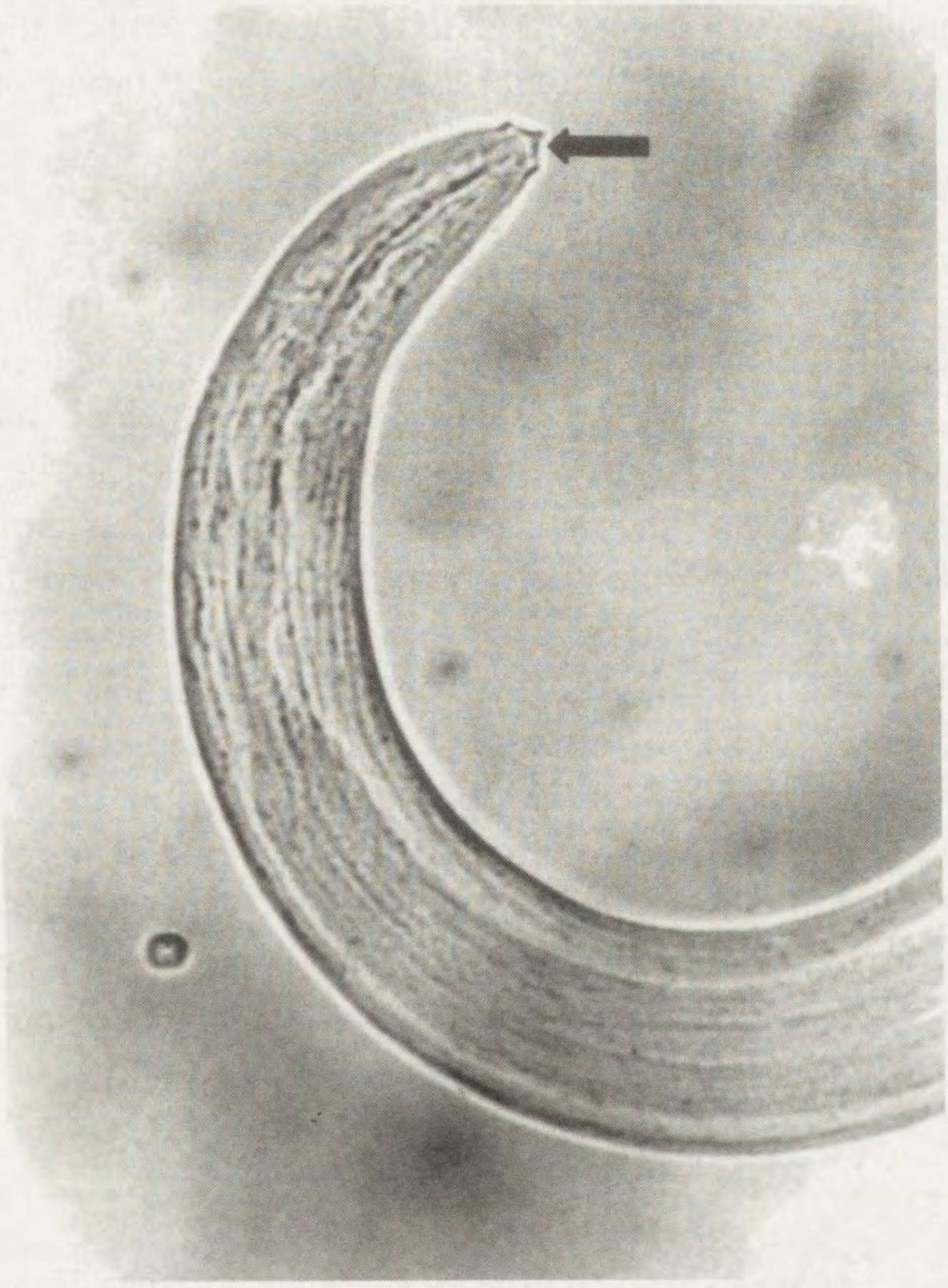

Fig. 1. *Anguillicola crassus*, third stage larvae, characteristic anterior end (arrow), lateral view

Although *A. crassus* is primarily a freshwater parasite, it occurs, as evidenced by the increasing body of data on its distribution and biology, occurs – albeit at a lower intensity – in brackish, and even marine, waters. This study shows the dab to be a new host for the larval *A. crassus*, the parasite being found again in a brackish water area. Earlier, the stage 3 larvae had been recorded, the fish of the families Cyprinidae, Centrarchidae, Percidae, Esocidae, Siluridae, Gobiidae, Osmeridae, Gasterosteidae, and Anguillidae from various freshwater European reservoirs (e.g. Thomas and Ollevier 1992; Székely 1994, 1995) and also in those caught from brackish areas, e.g., the Gobiidae and Syngnathidae (e.g. Reimer et al. 1994, Zander et al. 1999). In Poland, the parasites were known from the brackish Vistula Lagoon in ruffe, European perch, zander (Własow et al. 1997; Rolbiecki 2002, 2003a), carp bream, ziege (Rolbiecki 2002, 2003a), eel (Własow et al. 1997, Bystydzieńska et al. 2003), sticklebacks (Rolbiecki 2004), smelt (Rolbiecki 2003b, 2004), and round goby (Rolbiecki, unpublished data); in the Gulf of Gdańsk they had been found in sticklebacks, three spined stickleback (Rolbiecki 2003c, 2004), smelt (Rolbiecki

2004), and in eel (Bystydzieńska et al. 2003). Both the Polish and foreign studies identified the ruffe as the most frequent host of the stage 3 larvae (e.g., Thomas and Ollevier 1992; Székely 1994; Rolbiecki 2002, 2003a).

An interesting question is whether the dab infected can be a paratenic host for *A. crassus*. In the parasite's life cycle, paratenic hosts (various fish species) make it possible, *via* the trophic chain, to transfer the parasite from small, calorie-deficient food items such as invertebrates (intermediate hosts) to the eel (definitive hosts). Paratenic hosts are particularly important for the large eel which, on account of their size, feed primarily on fish. When assessing the role of fish in the parasite's cycle, important are food preferences of the definitive host as well as the size of its potential prey items (other fish infected dab found in this study were large (15.421 cm long and 9-12 cm wide). The large size of the dab in question rules them out as a potential eel food, and hence as *A. crassus* paratenic hosts. It has to be added that the eel food composition is known only in the eel occurring in the Vistula Lagoon, the dab being absent from the list of food items (Żelepień and Wilkońska 1995). Thus, the dab is a blind alley for *A. crassus*, the nematodes present will soon perish. However, it has to be borne in mind that the larval *A. crassus* can be transmitted to large fish predators other than eel. Even if the larvae will survive in the subsequent hosts (subsequent paratenic hosts), they, too, will become a blind alley for the parasite.

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