

First occurrence of the eel parasite

Paraquimperia tenerrima in Lake Balaton

for citation and similar papers at core.ac.uk

brought to

provided by Repository of the

C. Székely

Veterinary Medical Research Institute, Hungarian Academy of Sciences, H-1143 Budapest, Hungária
krt. 21, Hungary.

Abstract

The parasite fauna of the eel has been studied regularly since the first imported eels were introduced to Lake Balaton in 1963. Over a long period of time no important parasitic infections were recorded. However, the importance of nematode infections has increased since 1991, when the pathogenic nematode *Anguillicola crassus* was first detected and intensive eel mortalities started to occur. This paper reports on the first occurrence of *Paraquimperia tenerrima*, a small nematode infecting the gut of the eel. *Paraquimperia tenerrima* is a common parasite in rivers of several European countries. Due to the small size and the low prevalence of the worm its pathogenic effect upon eels seems to be negligible in Lake Balaton.

Prior to the regular eel introductions, which started in 1963, only a small number of eels were found in Lake Balaton. However, repeated eel introductions continued up to 1991 that resulted in an extremely large eel population in the lake. Thus, data relating to the parasitofauna of eels in Lake Balaton can only be found post-1963. Molnár (1966) reported the common occurrence of the tapeworm *Bothriocephalus claviceps* in eels, in agreement with Matskási et al. (1971) who described the same in their work investigating the helminth infections of fish species living in Lake Balaton. Mészáros (1968) studied the nematode infections of Lake Balaton fish species, but the single eel specimen included in his sample proved to be negative. Murai (1971) detected four endoparasitic helminth species from the introduced eels: the trematode *Crowcrocoecum skrjabini*, the

nematode *Camallanus truncatus* and the cestodes *B. claviceps* and *Proteocephalus macrocephalus*, and she regarded the last two species as new for the Hungarian fauna. Of the eel parasites, the appearance and spread of the swimbladder nematode *Anguillicola crassus* has attracted the greatest attention. Following its first observation in Hungary (Csaba et al., 1991; Székely et al., 1991), *A. crassus* rapidly became the focus of interest, especially because of the massive eel mortality that occurred in the year 1991 (Molnár et al., 1991). Of the sources available in the Hungarian literature, the publication of Molnár & Székely (1995) contains the most extensive data about the parasites of Lake Balaton eels. In that paper, the authors described eleven parasites including two nematode species (*A. crassus* and *Daniconema anguillae*).

Since the extensive eel kill that occurred in 1991, complete parasitological examination or parasitological examinations limited to the swimbladder on large numbers of eels every year have been conducted by VMRI, and therefore there is a high probability that any newly appearing parasite species will be readily identified. Despite this, up to May 2005 the nematode *Paraquimperia tenerrima* (Linstow, 1878) was not encountered. In May 2005, however, this gut-parasitic nematode of small size was detected during routine parasitological dissections from two eel specimens originating from two sampling sites (Tihany & Keszthely, respectively) (Figures 1–2). The prevalence of infection was 1/3 in the Tihany sample and 1/20 in the sample collected in the Keszthely area (Székely, 2005). The appearance of this nematode in Lake Balaton was unexpected, as previously this species had only been detected in eel populations living in rivers (Chubb, 1975; Moravec, 1966, 1994; Nie & Kennedy, 1991). So far it has been recorded only in Europe (in Great Britain, Ireland, Germany, Denmark, the former Yugoslavia and Czechoslovakia, Spain and Portugal). The life cycle of the nematode was described by Moravec (1974), who studied the early developmental stages of the species under experimental conditions. Moravec (1994) has suggested that aquatic invertebrate species (tubificids, snails) play a role in the developmental cycle of *P. tenerrima*; however, his experiments aimed at confirming this were not successful. Finally the complete life cycle of *P. tenerrima* was elucidated by Shears & Kennedy (2005). Following their observations made in natural waters, they obtained experimental proof that the second-stage



Figure 1. Head end of the nematode *Paraquimperia tenerrima* from the gut of a Lake Balaton eel. Fresh preparation. Measure of length: 0.2 mm.



Figure 2. Vulva region of a female nematode. Measure of length: 0.2 mm.

larvae of the nematode can develop into third-stage larvae directly in the minnow (*Phoxinus phoxinus*), in which they can survive for 6 months. After feeding infected minnows to experimental eels, the above authors found fourth-stage larvae and young adult helminths in the gut of the eels. Although under conditions typical of the British Isles Shears & Kennedy (2005) identified the minnow as carrier host, in Lake Balaton this fish species can be found only in low numbers, or not at all, and thus in this lake probably the small-sized specimens of some other

carrier host species act as the source of infection for eels.

No data are available on the pathogenicity of this parasite.

The appearance of *P. tenerrima* in the eel population of Lake Balaton is unlikely to result in problems similar to those caused by *A. crassus*. It cannot be excluded either that this species had been present in Lake Balaton already earlier but escaped detection until now because of the seasonal appearance of the adult worms and the low prevalence of infection. It is also possible, however, that this parasite has appeared in the parasite fauna of Lake Balaton eels only recently, and that the prevalence of infection is now on the increase, which is suggested by the occurrence of the parasite at two sampling sites in the same period. This question may only be answered by the examination of further samples to be taken in the near future.

Acknowledgements

The authors thank the Hungarian Scientific Research Fund (OTKA), project No. T 45891 and the Fish Management Fund of the Ministry of Agriculture and Regional Development for financial support. Thanks are due to Dr. Frantisek Moravec (Institute of Parasitology, CSAV, Ceske Budejovice) for his help with the identification of the parasite.

References

Chubb JC (1975). A review of seasonal occurrence and maturation of adult helminths in freshwater fish in the British Isles. *Parasitology* **71**, iii-iv.

Csaba Gy, Láng M & Székely Cs (1991). Appearance of a new nematode, *Anguillicola crassus* in Hungary (in Hungarian, with English summary). *Halászat* **84**, 66–67.

Matskási I, Mészáros F & Murai É (1971). Results of helminthological investigations in Lake Balaton fishes (in Hungarian, with English summary). *Állattani Közlemények* **58** (1–4), 71–77.

Mészáros F (1968). Helminthological investigations of fish in Lake Balaton II. Parasitic nematodes from fish in the lake. *Annal Biol., Tihany* **35**, 141–144.

Murai É (1971). Tapeworms (Cestodes) parasitizing eels introduced into Lake Balaton. *Parasit. Hung.* **4**, 145–156.

Molnár K (1966). Parasitological aspects of eel introductions (in Hungarian). *Halászat* **59**, 24.

Molnár K, Székely Cs & Baska F (1991). Mass mortality of eel in Lake Balaton due to *Anguillicola crassus* infection. *Bulletin of the European Association of Fish Pathologists* **11**, 211–212.

Molnár K & Székely Cs (1995). Parasitological survey of some important fish species of Lake Balaton. *Parasit. Hung.* **28**, 63–82.

Moravec F (1966). The finding of the nematode *Paraquimperia tenerrima* (v. Linstov, 1878) from eels *Anguilla anguilla* (L.) in Czechoslovakia. *Folia Parasitologica* **13**, 182–186.

Moravec F (1974). Some remarks on the development of *Paraquimperia tenerrima* Linstov, 1878 (Nematoda: Quimperiidae). *Scripta Fac. Sci. Nat. UJEP Brun., Biol.* **5**, 4: 135–142.

Moravec F (1994). **Parasitic nematodes of freshwater fishes of Europe**. Academia, Prague, pp. 473.

Nie P & Kennedy CR (1991). Seasonal population-dynamics of *Paraquimperia tenerrima* (Linstow) (Nematoda) in the European eel *Anguilla anguilla* (Linnaeus) in 3 localities of Southwest England. *Journal of Fish Biology* **39**, 441–449.

Shears JA & Kennedy CR (2005). The life cycle of *Paraquimperia tenerrima*: a parasite of the European eel *Anguilla anguilla*. *Journal of Helminthology* **79**, 169–176.

Székely Cs (2005). Occurrence of the eel parasite *Paraquimperia tenerrima* in Lake Balaton, Hungary (in Hungarian, with English summary). *Halászat* **98**, 120–122.

Székely Cs, Láng M & Csaba Gy (1991). First occurrence of *Anguillicola crassus* in Hungary. *Bulletin of the European Association of Fish Pathologists* **11**, 162–163.