



***Anguillicola crassus* (Nematoda, Dracunculoidea); first documented record of this swimbladder parasite of eels in Ireland**

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In summer 1998 European eels infected with the swimbladder nematode *Anguillicola crassus* were detected in the Erne catchment, Ireland, probably introduced recently through the commercial eel trade.

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Anguillicola crassus (Kuwahara *et al.*, 1974) is a parasitic blood-sucking nematode indigenous to East Asia, where it is widespread amongst its native host the Japanese eel *Anguilla japonica* Temminck & Schlegel. Found in the swimbladder, the parasite causes little or no pathological damage to its native eel host (Nagasawa *et al.*, 1994). Thought to have been introduced accidentally into Europe with Japanese eel from Asia in the early 1980s (Koops & Hartmann, 1989; Køie, 1991), *A. crassus* was transmitted to populations of the European eel *Anguilla anguilla* (L.) which were highly susceptible to the parasite and suffered various forms of pathogenic effects (Egusa, 1979; Peters & Hartmann, 1986; Boon *et al.*, 1990; Køie, 1991; Molnar *et al.*, 1991). First recorded in Germany in 1982 (Taraschewski *et al.*, 1987), the parasite spread rapidly throughout Europe, aided by the international trade in live eels (Sinderman, 1993) reaching the British Isles in 1987 (Kennedy & Fitch, 1990).

Adult male *A. crassus* may reach a length of 23 mm and females 36 mm (Taraschewski *et al.*, 1987). Eggs are laid in the swimbladder and along with L2 larvae (larvae from newly hatched eggs) pass through the pneumatic duct into the digestive tract of the eel and are expelled with the faeces. Released eggs and L2 larvae are consumed by many invertebrates including cyclopoid copepods, cladocerans and other crustaceans (de Charleroy *et al.*, 1990). L3 larvae develop in the intermediate hosts, which are eaten by eels. The last larval stage, L4, bores through the intestinal wall of the eel to the swimbladder where it completes the final moult into an adult (Peters & Hartmann, 1986; Haenen *et al.*, 1989; de Charleroy *et al.*, 1990).

Anguillicolosis in adult European eels can induce thickening or rupture of the swimbladder wall, resulting in emaciation, increased vulnerability to bacterial infections, and significant mortalities in eel farms and lakes (Egusa, 1979; Køie, 1991; Molnar *et al.*, 1991). Eels may become infected as early as the glass eel stage (Kennedy & Fitch, 1990) and elvers may suffer acute inflammatory reactions including fibrosis and formation of fibrotic conglomerates in the swimbladder and gut, constriction of the intestine through build up of scar tissue and in severe cases rupture of the swimbladder (Banning & Haenen, 1989). Such pathological damage may prevent successful spawning migration of silver eels.

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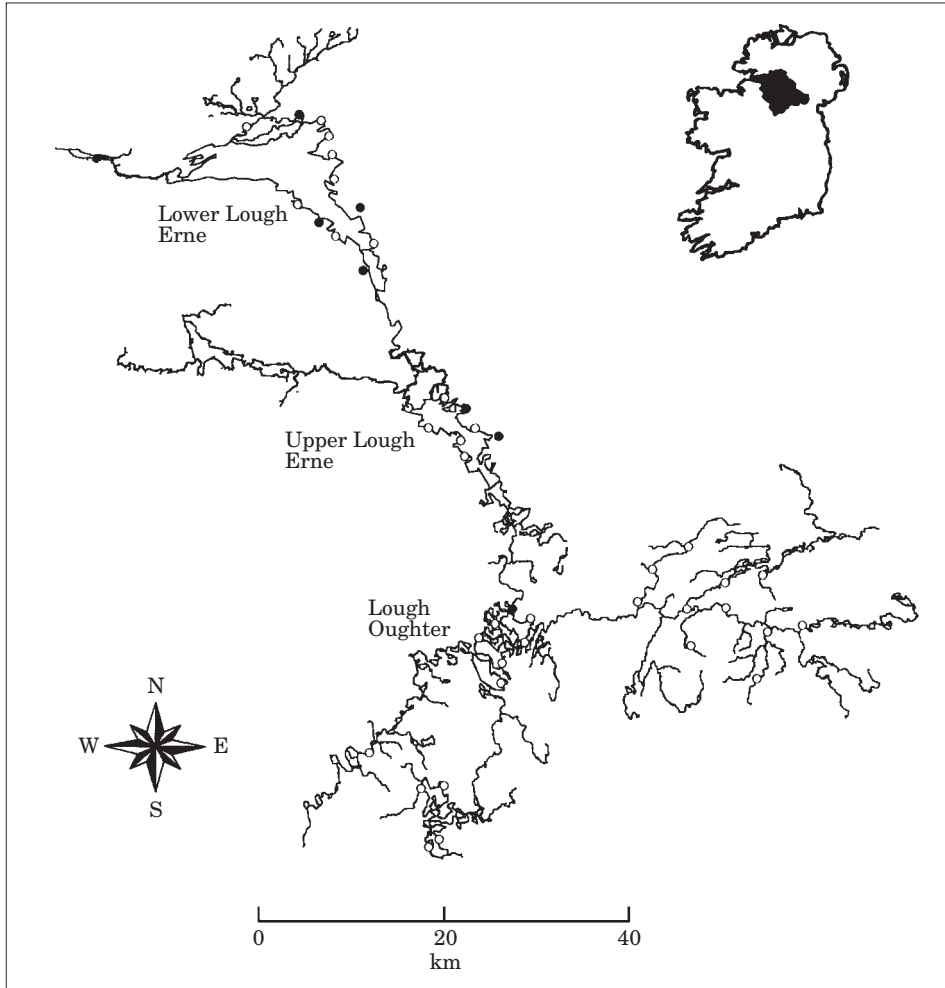


FIG. 1. The distribution of *Anguillicola crassus* in the Erne catchment, Ireland in 1998. Each circle represents one sampling site: ●, present; ○, absent.

Surveys of the parasitofauna of Irish freshwater fish (Conneely & McCarthy, 1984, 1986; Kennedy & Fitch, 1990; Holland & Kennedy, 1997) indicated Ireland was one of the few European countries not affected by *A. crassus*, probably because it was a net exporter of eels to Europe (McCarthy *et al.*, 1996).

During July to September 1998, an intensive fyke-net survey of the Erne catchment in north-western Ireland yielded eels containing adult worms and L4 larvae in their swimbladders (Fig. 1) identified as *A. crassus* following Kuwahara *et al.* (1974) and Moravec & Taraschewski (1988) and verified by the British Museum of Natural History, London. Although *A. crassus* had been seen in eels from the River Barrow in south-eastern Ireland (McCarthy, pers. comm.) this is the first documented report of this parasite in Ireland.

Infected eels were recorded in three out of six lakes in the Erne catchment (Table I). Prevalence was highest in southern Lower Lough Erne (26%). Lower prevalence was recorded elsewhere in Lower Lough Erne, Upper Lough Erne and Lough Oughter. No infected eels were recorded from Lough Gowna or the Annalee and Dromore systems in the upper catchment. Among infected eels worm intensity ranged from one to 22 worms

TABLE I. The distribution of *Anguillicola crassus* infections in the Erne catchment

	Lough Erne			Lough Oughter	D&A*	Lough Gowna
	North-eastern Lower	Southern Lower	Upper			
Number of eels examined	63	63	55	54	67	23
Number (%) of eels infected	2 (3.2)	14 (22.2)	5 (9.1)	3 (5.6)	0	0
Number (range) of <i>A. crassus</i> recorded	5 (1-4)	79 (1-22)	12 (1-4)	7 (1-5)	0	0
Mean intensity \pm s.d.	2.5 \pm 2.1	5.6 \pm 5.1	2.4 \pm 1.1	2.3 \pm 2.3	0	0

*D&A, Dromore and Annalee systems.

per eel (mean 5.6 in southern Lower Lough Erne and lower elsewhere). Silver eels, netted at the outlet of Lower Lough Erne, were infected also.

In new waters, typically *A. crassus* spreads rapidly and may reach 100% prevalence within one year (Kennedy & Fitch, 1990). The concentration of *A. crassus* infections within Lower Lough Erne and its absence from the southern section of the Erne catchment may indicate a relatively recent introduction into southern Lower Lough Erne. In the absence of any documented introductions of eels to the Erne, the most likely infective route was via the commercial eel trade, which was implicated in the introduction of *A. crassus* to Britain (Kennedy & Fitch, 1990). Detailed studies of the distribution, spread and epidemiology of *A. crassus* within the Erne catchment are in progress.

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