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Research Note

Parasites of *Dicentrarchus labrax, Anguilla anguilla,* and *Mugil cephalus* from a Pond in Corsica, France

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ABSTRACT: Three species of fish of great economic interest, *Dicentrarchus labrax* (Linnaeus) (N = 15), *Anguilla anguilla* (Linnaeus) (N = 20), and *Mugil cephalus* Linnaeus (N = 20), were collected during April and June 1997 from Biguglia Pond in Corsica, France, and examined for metazoan parasites. A total of 25 ectoparasite and endoparasite species were recovered, 13 of which were from *M. cephalus*, 5 from *A. anguilla*, and 7 from *D. labrax*. The copepod *Nipergasilus bora* is reported for the first time from Corsica.

KEY WORDS: Corsica, fish, *Anguilla anguilla, Dicentrarchus labrax, Mugil cephalus*, ectoparasites, endoparasites, *Nipergasilus bora*.

Biguglia Pond, a natural reserve–listed site, is the largest coastal pond in Corsica, France. It is a brackish environment in which fishery is a preponderant activity (Frisoni and Dutrieux, 1992), and the sea bass, *Dicentrarchus labrax* (Linnaeus), the European eel, *Anguilla anguilla* (Linnaeus), and the flathead grey mullet, *Mugil cephalus* Linnaeus, are of great economic interest. Two of these 3 fish, the sea bass and the flathead grey mullet, migrate to the open sea at the beginning of the egg-laying period, whereas the European eel stays many years in the pond and is more sensitive to the quality of the environment (Truslé, 1989). Consequently, the European eel can be considered a sedentary species.

To our knowledge, nothing has been published about the parasite fauna of these 3 hosts in Mediterranean ponds. The recent study of Sasal et al. (1997) focused on parasites of fish collected from the open sea.

Fifteen adult sea bass (mean standard length [SL], 29.6 cm ± 2.1 SD, range: 24.0–33.0 cm), 20 adult flathead grey mullet (mean SL, 34.7 cm ± 2.7 SD, range: 30.0–39.0 cm) and 20 adult European eels (mean SL, 53.8 cm ± 9.4 SD, range: 40.0–72.0 cm) were collected by netting from Biguglia Pond during April and June 1997. All fish were dissected the day they were captured. The digestive tract extending from the esophagus to the rectum was removed, along with gills, liver, and swimbladder. Each organ was examined separately under a dissecting microscope. Monogeneans and digeneans were fixed in Bouin's solution (Langeron, 1949), and the other metazoan parasites were fixed in 70% alcohol.

The terms "prevalence," "abundance," and "mean intensity" are used as defined by Bush et al. (1997).

Of the 55 fish, only 3 eels and 2 sea bass were free of parasites. Seven species of parasites were recorded from *D. labrax*: 2 copepods (*Lernanthropus kroyeri* Van Beneden, 1851 and *Caligus minimus* Otto, 1828), 2 monogeneans (*Diplectanum aequens* Wagener, 1857 and *Serranicotyle labracis* (Van Beneden and Hesse, 1863)), 2 digeneans (*Labratrema minimus* (Stossich, 1887) and *Timoniella praeteritum* (Looss, 1901)), and 1 unidentified larval nematode found encapsulated in the gut wall (Table 1). The prevalence and the mean intensity of the monogenean *D. aequens*, 80% (12 of 15) and 48.7, respectively, are the highest observed in this study. In the partly closed system, this monogenean may infest all hosts and reach very high intensity levels (Oliver, 1987). Sea bass is a voracious predator, and many species of Digenea have been reported from it. Yet only 2 digeneans were identified in our sample, 1 with a prevalence of 13% (2 of 15) and the other with a prevalence of 27% (4 of 15). The study of Sasal et al. (1997) has shown that sea bass are not infected with digeneans in open water. However, their study and our studies are not quite comparable, since we

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Table 1. Prevalences, abundances, and intensities of sea bass (N = 15), European eel (N = 20) and flathead grey mullet (N = 20) in Corsica, France.

Species		Accession No.	Location in host	Prevalence No.	Prevalence %	Abundance ± SD	Intensity Mean ± SD	Intensity Range
Dicentrarchus labrax (Linnaeus)								
Copepoda	*Lernanthropus kroyeri* (Van Beneden, 1851)	MNHN-Cp1495	G	3	20	3.3 ± 11.8	16.3 ± 25.7	1–46
	Caligus minimus (Otto, 1828)	MNHN-Cp1494	G	2	13	0.1 ± 0.35	1.0 ± 0	1
Monogenea	*Diplectanum aequens* (Wagener, 1857)	597MF	G	12	80	39.0 ± 57.1	48.7 ± 60.3	5–226
	Serranicotyle labracis (Van Beneden and Hesse, 1863)	600MF	G	1	7	1.1 ± 4.1	16.0 ± 0	16
Digenea	*Labratrema minimus* (Stossich, 1887)	603MF	I	2	13	1.0 ± 2.7	7.5 ± 2.2	6–9
	Timoniella praeteritum (Looss, 1901)	608MF	P	4	27	1.9 ± 5.2	7.2 ± 8.6	2–20
Nematoda	Unidentified nematode larvae	—	GW	2	13	—	90.5 ± 13.4	81–100
Anguilla anguilla (Linnaeus)								
Copepoda	*Ergasilus gibbus* (Nordmann, 1832)	—	G	7	35	6.2 ± 14.7	17.6 ± 21.3	1–48
Monogenea	*Pseudodactylogyrus anguillae* (Yin and Sproston, 1948)		G	3	15	1.6 ± 6.2	10.7 ± 15.0	1–28
Digenea	*Deropristis inflata* (Molin, 1858)	607MF	I	11	55	4.5 ± 5.6	8.2 ± 5.2	1–14
Cestoda	*Bothriocephalus claviceps* (Goeze, 1782)	598MF	I	4	20	0.25 ± 0.5	1.2 ± 0.5	1–2
Nematoda	*Anguillicola crassus* (Kuwahara, Niimi, and Itagaki, 1974)	599MF	SW	11	55	3.35 ± 4.8	6.1 ± 5.0	1–16
Mugil cephalus Linnaeus								
Isopoda	*Nerocila orbignyi* (Guerin-Méneville, 1829–1832)	MNHN-Is5101	S	1	5	0.1 ± 0.2	1.0 ± 0	1
Copepoda	*Pseudocaligus apodus* (Brian, 1928)	MNHN-Cp1491	G	2	10	0.2 ± 0.5	1.5 ± 0.7	1–2
	Ergasilus lizae (Kroyer, 1863)	MNHN-Cp1492	G	12	60	6.0 ± 11.3	9.9 ± 13.4	1–46
	Nipergasilus bora (Yamaguti, 1939)	MNHN-Cp1493	G	9	45	3.0 ± 5.2	6.7 ± 6.0	1–17
Monogenea	*Ligophorus mugilinus* (Hargis, 1955)	606MF	G	5	25	3.8 ± 9.3	15.0 ± 14.1	3–35
	Ligophorus chabaudi (Euzet and Suriano, 1977)	605MF	G	1	5	0.6 ± 2.7	12.0 ± 0	12
	Metamicrocotyla cephalus (Azim, 1939)	601MF	G	6	30	0.7 ± 1.2	2.2 ± 1.2	1–4
	Microcotyle mugilis (Vogt, 1878)	602MF	G	9	45	0.9 ± 1.1	1.8 ± 0.9	1–3
Myxozoa	Unidentified myxosporidia	—	G	1	5	—	—	—
Digenea	*Haplosplanchnus pachysomus* (Eysenharrdt, 1829)	595MF	I	8	40	2.9 ± 4.5	7.2 ± 8.8	1–26
	Haploporus sp.	604MF	I	9	45	26.4 ± 42.8	58.6 ± 47.1	5–150
Nematoda	Cucullanus sp.	596MF	I	1	5	0.1 ± 0.4	2.0 ± 0	2
Acanthocephala	*Neoechinorhynchus agilis* (Rudolphi, 1819)	594 MF	I	16	80	26.9 ± 49.4	33.6 ± 53.4	1–201

* All specimens were deposited at National Museum of Natural History (Paris, France).

† Location in host: G = gill, GW = gut wall, I = intestine, P = pylorus, S = skin, SW = swimbladder.

are dealing with fish from lagoons, which provide a special, partially closed milieu rich in intermediate hosts (Maillard, 1976).

Five parasite species were recorded from the European eel: 1 copepod (*Ergasilus gibbus* Nordmann, 1832), 1 monogenean (*Pseudodactylogyrus anguillae* (Yin and Sproston, 1948)), 1 digenean (*Deropristis inflata* (Molin, 1858)), 1 nematode (*Anguillicola crassus* Kuwahara, Niimi, and Itagaki, 1974), and 1 cestode (*Bothriocephalus claviceps* (Goeze, 1782)) (Table 1). *Pseudodactylogyrus anguillae* and *A. crassus,* with a prevalence of 15% (3 of 20) and 55% (11 of 20), respectively, are both allochthonous species that are only found in a freshwater or oligohaline (very low salt content) milieu (Dupont and Petter, 1988; Køie, 1991). Their initial host is the Japanese eel (Køie, 1991). Similarly, the development of the copepod *E. gibbus* is stimulated by a weak salinity of the environment (Raibaut and Altunel, 1976). The presence of *A. crassus* in Corsica is enigmatic, since no Japanese eel (and no European eel, to our knowledge) has ever been introduced to the island.

Parasite diversity of the flathead grey mullet is much higher than was observed for the 2 previous hosts, especially for the ectoparasites (Table 1). For the flathead grey mullet, 3 copepod species were identified (*Pseudocaligus apodus* Brian, 1928, *Ergasilus lizae* Kroyer, 1863, and *Nipergasilus bora* (Yamaguti, 1939)). For 1 of them, *N. bora,* Corsica is a new locality record for *M. cephalus. Ergasilus lizae,* however, reaches maximum infection rates in the oligohaline milieu (Ben Hassine, 1983). One isopod, *Nerocila orbignyi* (Guerin-Méneville, 1829–1832), was collected from the skin of only 1 individual host. Four monogeneans were recovered from the gills (*Ligophorus mugilinus* (Hargis, 1955), *Ligophorus chabaudi* Euzet and Suriano, 1977, *Metamicrocotyla cephalus* (Azim, 1939), and *Microcotyle mugilis* Vogt, 1878). One species, *L. chabaudi,* has been rarely found in the flathead grey mullet in the Mediterranean Sea (Euzet et al., 1993). Cysts of a myxosporidian parasite were also found on the gills of 1 fish. Among the endoparasites removed from the gut, 2 digeneans and an acanthocephalean, *Neoechinorhynchus agilis* (Rudolphi, 1819) were identified. *Neoechinorhynchus agilis* showed high prevalence and mean intensity.

With the exception of *P. anguillae* (see Køie 1988) and *N. orbignyi,* the latter of which is seldom reported found in *M. cephalus* (see Trilles 1968), the other ectoparasites observed are specialists found only on their preferred host (Euzet and Combes, 1969; Euzet and Suriano, 1977; Raibaut and Ben Hassine, 1977). The same is true for the endoparasites, except for *N. agilis,* which is not specific for *M. cephalus* (Petrochenko, 1971; Maillard, 1976).

Mean intensities observed for our samples may not really reflect the mean intensities found generally in this biotope, which is an enclosed environment favoring parasite circulation. The values of parasite diversity, species richness, and abundance seem to be low compared to similar biotopes around the Mediterranean Sea. For example, Ben Hassine (1983) found higher prevalence of copepods in brackish Tunisian ponds, and Maillard (1976) found higher species richness of digeneans in brackish ponds of Languedoc-Roussillon (France) than those encountered in Corsica. Similarly, although described as a sedentary species, the European eel from Corsica did not harbor many macroparasites compared to the results obtained by Køie (1988) in Denmark.

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