

Review articles

The state of knowledge of the parasitic fauna of the pike *Esox lucius* Linnaeus, 1758 in Poland in the 50th anniversary of the publication of the *Catalogue of Parasitic Fauna of Poland. Part II. Parasites of Cyclostomes and Fish* by Jadwiga Grabda

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ABSTRACT. Parasites of pike *Esox lucius* from freshwater and brackish water in Poland are listed. This checklist summarized data published in *Catalogue of Parasitic Fauna of Poland. Part II. Parasites of Cyclostomes and Fish* by Jadwiga Grabda and later data from original studies. Parasites are listed alphabetically in higher taxa with their location in host and distribution in Polish waters with references. Parasites belonging to the higher taxa as Protista – 11 records, Myxosporea – 6, Digenea – 17, Monogenea – 2, Cestoda – 9, Nematoda – 7, Acanthocephala – 7, Hirudinida – 5, Mollusca – unidentified glochidia, Crustacea – 6, were found. The most frequently noted parasites have been *Azygia lucii*, *Diplostomum* spp., *Tylodelphys clavata*, *Tetraonchus monenteron*, *Trienophorus nodulosus*, *Raphidascaris acus* and *Ergasilus sieboldi*.

Keywords: parasites, pike, *Esox lucius*, Polish waters

Introduction

The pike (*Esox lucius*) as a large predatory fish does not belong to species of high abundance but with high economic (fishery and recreational fishery) and ecological importance. It is a freshwater species, live in different habitats, also in brackish shallow coastal water of the Baltic Sea. The pike tolerates salinity up to 10‰ [1].

Nowadays, abundance of this species clearly declining both in inland waters, as well as in coastal lakes and in the coastal zone of the Baltic Sea [1–4]. Baltic Sea populations of the pike spawn in shallow waters, or migrate to stream and wetlands. These pike populations have declined since the 1990's [1,4,5]. It is influenced by human activities as exploitation of the coasts e.g. the reduction of floodplain areas, which serve as spawning ground. In both, coastal waters as well as in inland water also important were overfishing, poaching, eutrophication, siltation and global climate changes which affect the trophic relationships in ecosystem and macrophyte growth, a spawning habitat.

The 50th anniversary of edition of the *Catalogue of Parasitic Fauna of Poland. Part II. Parasites of Cyclostomes and Fish* developed by Grabda [6], which collected data on parasites of various fish species in Poland, is approaching. The oldest publication about parasites of the pike listed in *Catalogue* was from 1792. Since the *Catalogue* has been published, several studies on the pike parasites were published. They contain mainly data from the northern Poland, from both, freshwater and brackish water habitats. Checklist of the pike parasites noted in different habitats in Poland is documented in this paper.

After publishing a catalog of fish parasites developed by Grabda [6] studies on the parasites of the pike in Polish waters were carried in Zegrzyński reservoir [7,8], Gulf of Gdańsk [9], Warniak [10, 11], Konin lakes (Ślesieńsko-Pątnowskie, Gosławskie, Licheńskie) and Gopło [12], Dgał Wielki [11], Dąbie [13], Miedwie [14], Kortowskie [15], and Łebsko [16].

Gill and eyes parasites were described from Oświn lake [17–19]. Single pike parasites have been

described also from Sunowo lake [20] and Narew River [21]. The species of leeches were found on the pike from Łyna River [22,23] and fish ponds near Legnica and Wołów [24].

List of parasites of the pike noted in Poland

The current list of pike parasites includes a total of 71 taxa, in this 62 named species and 9 parasites not identified to species level recorded in Polish water. These parasites belonging to the higher taxa as Protista – 11 records, including 8 species identified; Myxosporaea – 6, including 5 species; Digenea – 17, including 16 species; Monogenea – 2 species, Cestoda – 9, including 7 species; Nematoda – 7, including 5 species; Acanthocephala – 7 species; Hirudinida – 5 species; Mollusca – unidentified glochidia; Crustacea – 6 species, in this one species of Branchiura and 5 species of Copepoda.

Grabda [6] mentioned 47 taxa, in these 5 not identified to species level. After *Catalogue* edition in original papers [7–24] similarly were listed totally 49 taxa, in these 6 not identified to species level. Among them 23 new taxa, in this 18 identified to species level, in relation to the catalog have been identified. These are Protista – *Eimeria esoci*, *Ichthyophonus hoferi*, *Trichodina* sp., *Trypanoplasma* sp.; Digenea – *Diplostomum* spp., *Ichthyocotylurus platycephalus*, *Ichthyocotylurus variegatus*, *Nicolla skrjabini*, *Sphaerostomum globiporum*, *Tylodelphys podicipina*; Monogenea – *Dactylogyrus intermedius*; Cestoda – *Caryophyllaeus laticeps*, *Eubothrium* sp., *Proteocephalus percae*, *Valipora campylancristrota*; Nematoda – *Camallanus truncatus*, *Philometra obturans*, Nematoda gen. sp.; Crustacea – *Caligus lacustris*, *Tracheliastes polycolpus*; Hirudinida – *Piscicola borowieci*, *Piscicola burresoni* and *Piscicola brylinskae*. The catalog [6] lists 21 taxa that do not occur in later publication. The most important difference relates to the occurrence of the acanthocephalan and trematode. Seven species of the acanthocephalan are listed in *Catalogue* [6], while only two species as *Acanthocephalus lucii* and *A. anguillae* have been found in the last fifty years. On the contrary, the number of digenean species has increased (Table 1). The most frequently noted parasites throughout the period have been *Azygia lucii*, *Diplostomum* spp., *Tylodelphys clavata*, *Tetraonchus monenteron*, *Triaenophorus nodulosus*, *Raphidascaaris acus* and *Ergasilus sieboldi*.

Parasites are listed in higher taxa alphabetically with location in host and known distribution in Polish waters. If authors do not give the location in host, a typical location for this species of parasite will be given. Data from 1792 to 1970 comes from *Catalogue of Parasitic Fauna of Poland. Part II. Parasites of Cyclostomes and Fish* in this checklist are listed as Grabda [6]. A detailed references from this period can be found in *Catalogue*. Later data from 1969 (not included in catalog) to 2013 comes from original papers.

Detailed locations were subordinated to the Polish regions, according to the catalog [6]: Baltic Sea; Baltic Coast; Pomeranian Lake District; Mazurian Lake District; Wielkopolsko-Kujawska Lowland; Mazovian Lowland; Podlasie Lowland; Białowieża Forest; Lower Silesia; Trzebnickie Hills; Upper Silesia; Krakowsko-Wieluńska Upland; Małopolska Upland; Świętokrzyskie Mountains; Lubelska Upland; Roztocze Upland; Sandomierska Lowland; Western Sudetes Mountains; Eastern Sudetes Mountains; Western Beskids Mountains; Nowotarska Valley; Eastern Beskids Mountains; Bieszczady Mountains; Pieniny Mountains; Tatra Mountains.

PROTISTA

***Apiosoma* sp.**; syn. *Glossatella*; location: gills, mouth cavity; distribution: Baltic Coast – Družno Lake perhaps also Lubelska Upland – Lublin Province, but the author has doubts [see 6]; remarks: originally parasites in both cases were described as *Glossatella* sp. Lom [25] insist upon the recognition of the generic name *Apiosoma* Blanchard, 1883 as valid and *Glossatella* Rüttschli, 1889 as junior synonym. *Apiosoma* is now accepted as the valid name and *Glossatella* being a synonym [26].

***Capriniana piscium* (Bütschli, 1889)**; syn.: *Trichophrya piscium* Bütschli, 1889; location: gills; distribution: Mazurian Lake District – Arklity Lake [6]; remarks: species was described under the name *T. piscium*. Now, the valid name is *C. piscium* [27].

***Chilodonella piscicola* (Zacharias, 1894)**; syn.: *Chilodonella cyprini* (Moroff, 1902); location: gills; distribution: Baltic Coast – Družno Lake [6]; remarks: species was described under the name *Ch. cyprini*. *Ch. piscicola* is now accepted as the valid name and *Ch. cyprini* as synonym [28].

***Eimeria esoci* Schulman et Shtein, 1962**; location: intestine; distribution: Mazurian Lake

District – Sunowo Lake [20].

***Ichthyophonus hoferi* (Caullery & Mesnil, 1905)**; location: skin; distribution: Pomeranian Lake District – Miedwie Lake [14]; remarks: originally authors described this parasite as fungus. This a fungus-like protistan pathogen has a worldwide distribution. Previously, *I. hoferi* was classified into Fungi, but now it is classified as a Protista, a member of the class Mesomycetozoa [29,30].

***Trichodina domerguei* (Wallengren, 1897)**; location: gills; distribution: Baltic Coast – Vistula Lagoon, Drużno Lake, Mazurian Lake District – Tajty Lake [6].

***Trichodina pediculus* (Müller, 1786)**; location: gills; distribution: Lubelska Upland – surroundings of Lublin [6].

***Trichodina* sp.**; location: gills; distribution: Pomeranian Lake District – Miedwie Lake [14], Mazurian Lake District – Warniak Lake [10].

***Trichodinella epizootica* (Raabe, 1950)**; location: gills; distribution: Baltic Coast – Drużno Lake [6], Pomeranian Lake District – Miedwie Lake [14], Mazurian Lake District – Oświn Lake [17], Lubelska Upland – surroundings of Lublin [6].

***Trichodinella subtilis* Lom, 1959**; location: gills; distribution: Mazurian Lake District – Oświn Lake [17].

***Trypanoplasma* sp.**; location: blood, gills; distribution: Pomeranian Lake District – Miedwie Lake [14], Mazurian Lake District – Warniak Lake [10]; remarks: it is leech-transmitted parasite [31,32]. *Piscicola geometra* and *Hemiclepsis marginata* are reported to be vectors of this parasite [32].

MYXOSPOREA

***Henneguya lobosa* (Cohn, 1895)**; location: gills; distribution: Baltic Coast – Vistula Lagoon, Pomeranian Lake District – Wdzydze Lake [6], Mazurian Lake District – Oświn Lake [17], Wielkopolsko-Kujawska Lowland – Ślesińsko-Pątnowskie Lakes [12].

***Henneguya oviperda* (Cohn, 1895)**; location: ovaries; distribution: Pomeranian Lake District – Miedwie Lake [14], Mazurian Lake District – Tajty Lake [6].

***Henneguya psorospermica* Thélohan, 1892**; location: gills; distribution: Baltic Coast – Vistula Lagoon, Drużno Lake, Pomeranian Lake District – Wdzydze Lake [6], Miedwie Lake [14], Mazurian Lake District – Tajty Lake, Masuria without further

specification [6], Warniak Lake [10], Wielkopolsko-Kujawska Lowland – Ślesińsko-Pątnowskie Lakes, Gosławskie Lake, Gopło Lake [12], Mazovian Lowland – Zegrzyński Reservoir, Lubelska Upland – Lublin Province [6].

***Myxidium liberkuehni* Bütschli, 1882**; location: urinary bladder, ureters; distribution: Baltic Coast – Drużno Lake, Mazurian Lake District – Wigry Lake, Tajty Lake [6], Warniak Lake [10], Wielkopolsko-Kujawska Lowland – Ślesińsko-Pątnowskie Lakes, Gopło Lake [12], Lubelska Upland – Lublin Province [6].

***Myxobolus anurum* Cohn, 1895**; syn.: *Myxosoma anurus* (Cohn, 1895); location: gills; distribution: Pomeranian Lake District – Miedwie Lake [14], Mazurian Lake District – Giżycko [6], Wielkopolsko-Kujawska Lowland – Gopło Lake [12], Mazovian Lowland – Zegrzyński Reservoir [6]; remarks: except distribution in Miedwie Lake [14] species was described under the name *Myxosoma anurus* [6,12]. In 1984, Lom and Noble synonymised the genera *Myxobolus* and *Myxosoma* [33].

***Myxobolus* sp.**; location: gills; distribution: Mazurian Lake District – Tajty Lake [6].

DIGENEA

***Allocreadium isoporum* (Looss, 1894)**; location: intestine; distribution: Baltic Coast – Drużno Lake, Pomeranian Lake District – Trzebiocha stream [6], Mazovian Lowland – Zegrzyński Reservoir [8].

***Azygia lucii* (Müller, 1776)**; location: esophagus, stomach, intestine; distribution: Baltic Coast – Drużno Lake [6], Dąbie Lake [13], Łebsko Lake [16], Pomeranian Lake District – Wdzydze Lake, Trzebiocha stream [6], Miedwie Lake [14], Mazurian Lake District – Wigry Lake, Tajty Lake, North Mamry Lake, Goldapiwo Lake, surroundings of Giżycko [6], Kortowskie Lake [15], Dgał Wielki Lake [11], Wielkopolsko-Kujawska Lowland – Ślesińsko-Pątnowskie Lakes, Licheńskie Lake, Gopło Lake [12], Mazovian Lowland – Vistula River near Warsaw, surroundings of Warsaw [6], Zegrzyński Reservoir [6–8], Lubelska Upland – fish ponds in Parczew [6]; remarks: in Kortowskie Lake two adult specimens of *A. lucii* were found in branchial chamber [15].

***Bucephalus polymorphus* von Baer, 1827**; location: intestine; distribution: Baltic Sea – Gulf of Gdańsk [9], (Rokicki 1975), Baltic Coast – Drużno Lake, Pomeranian Lake District – Wdzydze Lake, Mazurian Lake District – Tajty Lake [6], Wielkopol-

sko-Kujawska Lowland – Ślesińsko-Pątnowskie Lakes, Licheńskie Lake, Gopło Lake [12], Mazovian Lowland – Vistula River near Warsaw, fish market in Warsaw [6], Zegrzyński Reservoir [8].

***Bunodera luciopercae* (Müller, 1776)**; location: intestine; distribution: Baltic Coast – Drużno Lake, Mazurian Lake District – Wigry Lake [6], Warniak Lake [10], Wielkopolsko-Kujawska Lowland – Gopło Lake [12], Mazovian Lowland – surroundings of Warsaw [6], Zegrzyński Reservoir [8].

***Diplostomum spathaceum* (Rudolphi, 1819)**; metacercaria; location: lens, vitreous humour of eye; distribution: Baltic Sea – Puck Bay, Baltic Coast – Drużno Lake, Pomeranian Lake District – Wdzydze Lake, Trzebiocha stream [6], Mazurian Lake District – Warniak Lake [10].

***Diplostomum* spp.**; metacercaria; location: lens, vitreous humour of eye; distribution: Baltic Coast – Dąbie Lake [13], Łebsko Lake [16], Pomeranian Lake District – Miedwie Lake [14], Mazurian Lake District – Oświn Lake [18], Kortowskie Lake [15], Dgał Wielki Lake, Warniak Lake [11], Wielkopolsko-Kujawska Lowland – Ślesińsko-Pątnowskie Lakes, Licheńskie Lake, Gosławskie Lake, Gopło Lake [12].

***Ichthyocotylurus platycephalus* (Creplin, 1825)**; metacercaria; location: heart, internal organs, mesenteries, swimbladder; distribution: Pomeranian Lake District – Miedwie Lake [14], Wielkopolsko-Kujawska Lowland – Ślesińsko-Pątnowskie Lakes, Licheńskie Lake, Gosławskie Lake, Gopło Lake [12].

***Ichthyocotylurus variegatus* (Creplin, 1825)**; syn.: *Cotylurus variegatus* (Creplin, 1825) metacercaria; location: mesenteries; distribution: Mazurian Lake District – Dgał Wielki Lake [11], Wielkopolsko-Kujawska Lowland – Gosławskie Lake, Gopło Lake [12]; remarks: in Dgał Wielki species was described under the name *C. variegatus* [11] but at present acceptable name is *I. variegatus* and *C. variegatus* is a synonym [34].

***Nicolla skrjabini* (Ivanitzky, 1928)**; syn.: *Crowcrocaecum skrjabini* (Ivanitzky, 1928); location: intestine; distribution: Mazovian Lowland – Zegrzyński Reservoir [8]; remarks: species was described under the name *C. skrjabini*, which is now a synonym of *N. skrjabini* [35].

***Paracoenogonimus ovatus* Katsurada, 1914**; metacercaria; location: encysted in musculature, connective tissue; distribution: Baltic Coast – Drużno Lake [6], Dąbie Lake [14], Mazurian Lake District – Tajty Lake, Łuknajno Lake, Gołdapiwo

Lake, North Mamry Lake, Mazovian Lowland – Vistula River near Płock (Konfederackie Łachy) [6].

***Phyllodistomum folium* (Olfers, 1816)**; location: ureters, urinary bladder; distribution: Baltic Coast – Drużno Lake, Mazurian Lake District – Wigry Lake, Gołdapiwo Lake, North Mamry Lake [6], Warniak Lake [10], Wielkopolsko-Kujawska Lowland – Licheńskie, Lake [12], Mazovian Lowland – Zegrzyński Reservoir [6,8], Lubelska Upland – various reservoirs [6].

***Posthodiplostomum brevicaudatum* (von Nordmann, 1832)**; metacercaria; location: retina and vitreous humour of eyes; distribution: Baltic Coast – Łebsko Lake [16], Mazurian Lake District – Łuknajno Lake [6], Warniak Lake [10,11], Wielkopolsko-Kujawska Lowland – Gopło Lake [12].

***Rhipidocotyle campanula* (Dujardin, 1845)**; syn.: *Rhipidocotyle illense* (Ziegler, 1883); adult and metacercaria; location: intestine, musculature, fins, gills, eyes, brain, subcutaneous tissue; distribution: Baltic Sea – Gulf of Gdańsk [9], Baltic Coast – Drużno Lake, Mazurian Lake District – Tajty Lake [6], Wielkopolsko-Kujawska Lowland – Ślesińsko-Pątnowskie Lakes, Licheńskie Lake, Gosławskie Lake, Gopło Lake [12], Mazovian Lowland – Zegrzyński Reservoir [7,8]; remarks: species was described under the name *R. illense* [6–9,12], currently a synonym of *R. campanula* [36].

***Sphaerostomum bramae* (Müller, 1776)**; location: intestine; distribution: Baltic Coast – Drużno Lake, Mazurian Lake District – Wigry Lake, Mazovian Lowland – without specifying [6]; remarks: this is a typical parasite of cyprinids, but also noted in accidental hosts as predatory fish species which acquire trematodes when preying on cyprinids [37].

***Sphaerostomum globiporum* (Rudolphi, 1802)**; location: intestine; distribution: Mazovian Lowland – Zegrzyński Reservoir [8].

***Tylodelphys clavata* (von Nordmann, 1832)**; metacercaria; location: vitreous humour of the eye; distribution: Baltic Coast – Drużno Lake [6], Łebsko Lake [16], Pomeranian Lake District – Wdzydze Lake, Mazurian Lake District – Wigry Lake, Tajty Lake, Gołdapiwo Lake, North Mamry Lake [6], Oświn Lake [18], Kortowskie Lake [15], Dgał Wielki Lake [11], Warniak Lake [10,11], Wielkopolsko-Kujawska Lowland – Ślesińsko-Pątnowskie Lakes, Licheńskie Lake, Gosławskie

Lake, Gopło Lake [12].

***Tylodelphys podicipina* Kozicka et Niewiadomska, 1960**; metacercaria; location: vitreous humour of the eye; distribution: Baltic Coast – Dąbie Lake [13], Łebsko Lake [16], Pomeranian Lake District – Miedwie Lake [14], Mazurian Lake District – Warniak Lake [10].

MONOGENEA

***Tetraonchus monenteron* (Wagener, 1857)**; location: gills; distribution: coastal zone of the Baltic Sea – coastal waters, Baltic Coast – Drużno Lake, Dead Vistula River [6], Dąbie Lake [13], Łebsko Lake [16], Pomeranian Lake District – Trzebiocha stream [6], Miedwie Lake [14], Mazurian Lake District – Wigry Lake, Tajty Lake [6], Oświn Lake [17,19], Kortowskie Lake [15], Dgał Wielki Lake [11], Warniak Lake [10,11], Wielkopolsko-Kujawska Lowland – Vistula River near Toruń [6], Ślesińsko-Pątnowskie Lakes, Licheńskie Lake, Gopło Lake [12], Mazovian Lowland – Vistula River near Warsaw, Vistula River near Wyszogród, Lubelska Upland – Minina River, Vistula River, Siemień Lake, fish pond in Sosnowica, Vistula River near Puławy, Western Beskids Mountains – Vistula River near Strumień [6].

***Dactylogyrus intermedius* Wegener, 1909**; location: gills; distribution: Mazurian Lake District – Oświn Lake [19]; remarks: this is a typical parasite of the cyprinids, especially *Carassius carassius* and *Cyprinus carpio* [34,38] and it can be assumed that pike infestation was accidental.

CESTODA

***Caryophyllaeus laticeps* (Pallas, 1781)**; location: intestine; distribution: Mazovian Lowland – Zegrzyński Reservoir [8]; remarks: this is a common parasite of the cyprinids [39]. It can be assumed that the occurrence of *C. laticeps* is accidental and tapeworm got into the gastrointestinal tract of predatory fish, such as pike with food like cyprinids.

***Diphyllobothrium latum* (Linnaeus, 1758)**; plerocercoid; location: body cavity, surface of internal organs; distribution: Baltic Sea – coastal water near Hel, Baltic Coast – Drużno Lake, Mazurian Lake District – Wigry Lake [6].

***Eubothrium* sp.**; plerocercoid; location: pyloric caeca and intestine; distribution: Mazurian Lake

District – Dgał Wielki Lake [11], Wielkopolsko-Kujawska Lowland – Licheńskie Lake [12].

***Proteocephalus esocis* (Schneider, 1905)**; location: intestine; distribution: Pomeranian Lake District – Wdzydze Lake [6]; remarks: according to Scholz and Hanzelova [40] and Scholz et al. [41], *P. esocis* is apparently invalid taxon, probably conspecific with *P. percae* or *P. longieollis*. The taxonomic status can be resolved only on a new material available for morphological and genetic studies [41].

***Proteocephalus percae* (Müller, 1780)**; location: intestine; distribution: Baltic Coast – Łebsko Lake [16], Wielkopolsko-Kujawska Lowland – Gopło Lake [12].

***Proteocephalus* sp.**; location: intestine; distribution: Mazurian Lake District – Wigry Lake, Tajty Lake [6].

***Proteocephalus* sp.**; plerocercoid; location: intestine; distribution: Baltic Sea – Puck Bay [6].

***Trienophorus crassus* Forel, 1868**; location: small intestine; distribution: Mazovian Lowland – fish market in Warsaw [6].

***Trienophorus nodulosus* (Pallas, 1781)**; adult and plerocercoid; location: intestine, encapsulated in liver; distribution: Baltic Sea – Puck Bay [6], Gulf of Gdańsk [9], Baltic Coast – Dąbie Lake [13], Łebsko Lake [16], Pomeranian Lake District – Wdzydze Lake [6], Miedwie Lake [14], Mazurian Lake District – Wigry Lake, Tajty Lake, Gołdapiwo Lake, Świętajty Lake, Arklity Lake, Stręgiel Lake, Pozezdrze Lake, Soltmany Lake, Masurian lakes without specifying [6], Kortowskie Lake [15], Dgał Wielki Lake [11], Warniak Lake [10,11], Wielkopolsko-Kujawska Lowland – Ślesińsko-Pątnowskie Lakes, Gopło Lake [12], Mazovian Lowland – surroundings of Warsaw, Vistula River near Warsaw [6], Zegrzyński Reservoir [6-8], Lubelska Upland – Vistula River, Siemień Lake [6].

***Valipora campylancristota* (Wedl, 1855)**; syn.: *Dilepis unilateralis* (Rudolphi, 1819); plerocercus; location: bile ducts, gall bladder, intestine; distribution: Mazurian Lake District – various reservoir [42], Dgał Wielki Lake [11], Vistula River without details [42]; remarks: species from Dgał Wielki was described as *D. unilateralis* [11], which is actually a synonym of *V. campylancristota* [43]. Larvae occur in many species of freshwater and brackish water fish, mainly cyprinid, first of all in region with high abundance of herons and cormorants in which they mature [42-44].

PARASITES	LAKES												Other distribution		
	<i>Catalogue of Parasitic Fauna</i> ...	After catalog: GULF OF GDANSK	MIEDWIE	DĄBIE	OŚWIN (only eye and gills)	KORTOWSKIE	ŁĘBSKO	DGAŁ WIELKI	WARNAK	ŚLESIŃSKO- PAŃNOWSKIE	GOSŁAWSKIE	LICHEŃSKIE		GOPŁO	ZEGRZYŃSKIE
CESTODA															
<i>Caryophyllaeus laticeps</i>		+													+
<i>Diphyllobothrium latum</i>	+														
<i>Eubothrium</i> sp.		+						+				+			
<i>Proteocephalus esocis</i>	+														
<i>Proteocephalus percae</i>		+					+						+		
<i>Proteocephalus</i> sp.	+														
<i>Triaenophorus crassus</i>	+														
<i>Triaenophorus nodulosus</i>	+	+	v	+	+	+	+	+	+	+			+	+	
<i>Valipora campylancristrota</i>		+													
NEMATODA															
<i>Anisakis mucronata</i>	+														
<i>Camallanus lacustris</i>	+	+						+	+	+	+		+	+	
<i>Camallanus truncatus</i>		+	+					+							
<i>Philometra obturans</i>		+						+							
<i>Raphidascaris acus</i>	+	+		+	+	+		+	+	+			+	+	
<i>Raphidascaris</i> sp.	+														
Nematoda gen. sp.		+		+											
ACANTHOCEPHALA															
<i>Acanthocephalus anguillae</i>	+	+													+
<i>Acanthocephalus lucii</i>	+	+		+				+	+						+
<i>Corynosoma strumosum</i>	+														
<i>Echinorhynchus cinctulus</i>	+	⁹													
<i>Echinorhynchus salmonis</i>	+														
<i>Echinorhynchus truttae</i>	+														
<i>Neoechinorhynchus rutili</i>	+														
CRUSTACEA															
<i>Argulus foliaceus</i>	+	+		+			+	+							
<i>Caligus lacustris</i>		+					+								
<i>Ergasilus briani</i>	+														
<i>Ergasilus sieboldi</i>	+	+		+	+	+	+	+	+	+		+	+		
<i>Lernaea csocina</i>	+														
<i>Tracheliaestes polycolpus</i>		+													+
HIRUDINIDA															
<i>Hemiclepsis marginata</i>	+														
<i>Piscicola borowieci</i>		+													+
<i>Piscicola burresoni</i>		+													+
<i>Piscicola geometra</i>	+	+					+								
<i>Piscicola brylinskae</i>		+													+
MOLLUSCA															
Unionidae gen. sp. (glochidium)	+	+		+			+	+		+					

originally described under the synonym: ¹– *Glossatella*; ²– *Trichophrya piscium*; ³– *Chilodonella cyprinid*; ⁴– *Myxosoma anurus*; ⁵– *Cotylurus variegatus*; ⁶– *Crowcrocaecum skrjabini*; ⁷– *Rhipidocotyle illense*; ⁸– *Dilepis unilateralis*; ⁹– *Echinorhynchus borealis*.

NEMATODA

Anisakis mucronata Prost, 1961; syn. *Ascaris mucronata* Schrank, 1790; location: intestine; distribution: Mazovian Lowland – Vistula River near Warsaw, Lubelska Upland – without specifying [6]; remarks: according to Grabda [6] it is doubtful designation and probably it is *Raphidascaaris acus*. Nowadays, *A. mucronata* is a synonym of *Raphidascaaris acus* (Bloch, 1779) [45].

Camallanus lacustris (Zoega, 1776); location: intestine; distribution: Baltic Coast – Drużno Lake [6], Łebsko Lake [16], Mazurian Lake District – Wigry Lake, Tajty Lake, Łuknajno Lake [6], Dgał Wielki Lake [11], Warniak Lake [10,11], Wielkopolsko-Kujawska Lowland – Ślesińsko-Pątnowskie Lakes, Licheńskie Lake, Gopło Lake [12], Mazovian Lowland – Vistula River near Warsaw [6], Zegrzyński Reservoir [6,7].

Camallanus truncatus (Rudolphi, 1814); location: intestine; distribution: Baltic Sea – Gulf of Gdańsk [9], Baltic Coast – Łebsko Lake [16].

Philometra obturans (Prenant, 1886); location: gill arteries, vitreous humour of the eye; distribution: Baltic Coast – Łebsko Lake [16]; remarks: it is a typical parasite of the pike [46,47]. Same fish species can act as paratenic hosts, mainly perch (*Perca fluviatilis* L.) and common rudd (*Scardinius erythrophthalmus* (L.)) and are a main source of pike infection [45–47]. Káll et al. [48] reported that pike infected with this nematode have a poorer condition and are less tolerant to environmental or physiological stress and more susceptible to mortality.

Raphidascaaris acus (Bloch, 1779); location: stomach, intestine; distribution: Baltic Coast – Drużno Lake [6], Dąbie Lake [13], Pomeranian Lake District – Koronowo Reservoir [6], Miedwie Lake [14], Mazurian Lake District – Wigry Lake, Tajty Lake, Krzywe Lake near Olsztyn, Łuknajno Lake [6], Kortowskie Lake [15], Dgał Wielki Lake [11], Warniak Lake [10], Wielkopolsko-Kujawska Lowland – Ślesińsko-Pątnowskie Lakes, Gopło Lake [12], Mazovian Lowland – Zegrzyński Reservoir [6–8].

Raphidascaaris sp.; location: encysted in the stomach wall; distribution: Baltic Sea – port in Hel [6].

Nematoda gen. sp.; location: eye; distribution: Pomeranian Lake District – Miedwie Lake [14]; remarks: authors noted that eye of one pike hosted very minute nematode [14]. Maybe this is a male *P.*

obturans, they have a minute body size and can be found also in eye of pike [see 47] (?).

ACANTHOCEPHALA

Acanthocephalus anguillae (Müller, 1780) Lühe, 1911; location: intestine; distribution: Mazovian Lowland – Vistula River near Warsaw [6], Zegrzyński Reservoir [7,8].

Acanthocephalus lucii (Müller, 1776) Lühe, 1911; location: intestine; distribution: Baltic Coast – Drużno Lake [6], Dąbie Lake [13], Łebsko Lake [16], Pomeranian Lake District – Wdzydze Lake, Trzebiocha stream, Vistula River near Bydgoszcz, Mazurian Lake District – Wigry Lake, Tajty Lake, Łuknajno Lake, Gaudy Lake, Radomno Lake [6], Warniak Lake [10], Mazovian Lowland – Zegrzyński Reservoir [6–8], Vistula River near Warsaw, Lubelska Upland – surroundings of Lublin, Upper Silesia – Goczałkowice Reservoir [6].

Corynosoma strumosum (Rudolphi, 1802) Lühe, 1904; cystacanthus; location: intestine; distribution: Baltic Coast – Drużno Lake [6]; remarks: many fish species serve as paratenic hosts [49]. Infection with this marine parasite was possible due to the connection of the Drużno Lake with the Baltic Sea [6], probably during the migration of the pike.

Echinorhynchus cinctulus Porta, 1905; syn.: *Echinorhynchus borealis* von Linstow, 1901; location: intestine; distribution: Baltic Coast – Łupawa River [6]; remarks: species was described as *E. borealis*, now the valid name is *E. cinctulus* [49].

Echinorhynchus salmonis Müller, 1784; location: intestine; distribution: Mazovian Lowland – Vistula River near Warsaw [6].

Echinorhynchus truttiae Schrank, 1788; location: intestine; distribution: Baltic Coast – Gnilna River a tributary of the Słupia River, Łupawa River [6].

Neoechinorhynchus rutili (Müller, 1780); location: intestine; distribution: Baltic Coast – Łupawa River, Mazurian Lake District – Tajty Lake [6].

CRUSTACEA

Argulus foliaceus (Linnaeus, 1758); location: skin, buccal cavity; distribution: Baltic Coast – Vistula Lagoon, Jamno Lake [6], Łebsko Lake [16], Pomeranian Lake District – Wdzydze Lake [6],

Miedwie Lake [14], Mazurian Lake District – Łuknajno Lake, Oświn Lake, Radomno Lake [6], Kortowskie Lake [15], Upper Silesia – Kozłowa Góra Reservoir [6].

***Caligus lacustris* Steenstrup & Lutken, 1861;** location: gills, fins; distribution: Mazurian Lake District – Kortowskie Lake [15].

***Ergasilus briani* Markevich, 1932;** location: gills; distribution: Upper Silesia – Kozłowa Góra Reservoir, Goczałkowice Reservoir [6].

***Ergasilus sieboldi* von Nordmann, 1832;** location: gills; distribution: Baltic Coast – Dąbie Lake [13], Łebsko Lake [16], Pomeranian Lake District – Miedwie Lake [14], Mazurian Lake District – Oświn Lake [17], Kortowskie Lake [15], Dgał Wielki Lake [11], Warniak Lake [10,11], Wielkopolsko-Kujawska Lowland – Ślesińsko-Pątnowskie Lakes, Licheńskie Lake, Gopło Lake [12], Upper Silesia – Kozłowa Góra Reservoir, Goczałkowice Reservoir, Krakowsko-Wieluńska Upland – reservoir on the Brynica River [6]. Moreover, Grabda [6] reports occurrence *E. sieboldi* in the whole of Poland, especially in Mazurian Lake District, Pomeranian Lake District, Wielkopolsko-Kujawska Lowland, Mazovian Lowland and Lower Silesia; remarks: pike is one of the most susceptible species for infection and mortality attributed to *E. sieboldi* is known [see 50].

***Lernaea esocina* (Burmeister, 1833);** location: gills operculum; distribution: Pomeranian Lake District – Brda River near Bydgoszcz, Mazovian Lowland – Vistula River near Warsaw, Podlasie Lowland – Narew River near Suraz [6].

***Tracheliaestes polycolpus* Nordmann, 1832;** location: fins, skin; distribution: Podlasie Lowland – Narew River [21].

HIRUDINIDA

***Hemicleipsis marginata* (Müller, 1774);** location: skin; distribution: nondescript [6].

***Piscicola borowieci* Bielecki, 1997;** location: fins and skin; distribution: Lower Silesia – fish ponds near Legnica and Wołów [24].

***Piscicola burresoni* n. sp.;** location: skin; distribution: Mazurian Lake District – Łyna River near Olsztyn [22].

***Piscicola geometra* (Linnaeus, 1761);** location: skin; distribution: Baltic Coast – Vistula Lagoon, Drużno Lake [6], Łebsko Lake [16], Pomeranian Lake District – fish ponds in Ostrówek, Wielkopolsko-Kujawska Lowland – Orla River,

Białowieża Forest – Narewka River [6].

***Piscicola brylinskae* Bielecki, 2001;** location: skin; distribution: Mazurian Lake District – Łyna River near Olsztyn [23].

MOLLUSCA

***Glochidium* indet.;** location: skin, fins, gills; distribution: Baltic Coast – Łebsko [16], Pomeranian Lake District – Trzebiocha stream [6], Miedwie Lake [14], Mazurian Lake District – Kortowskie Lake [15], Warniak Lake [11], Mazovian Lowland – Vistula River near Warsaw, Upper Silesia – Kozłowa Góra Reservoir [6].

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