

Review articles

New records of helminth species and their hosts in Poland

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ABSTRACT. Information on species of parasitic helminths native to Poland is provided by the *Pasożytnicze helminty Polski. Gatunki. Żywiciele. Białe Plamy* [1]. Until the middle of 2007, there were 1205 species of recorded helminths including 126 species of Monogenea, 338 of Trematoda (Digenea), 279 of Cestoda, 427 of Nematoda and 35 of Acanthocephala. They represented 32.9% of the species recorded in Europe (i.e., registered in the *Fauna Europaea* database). During the following three years up to the middle of 2010, 64 new species of Polish helminths were detected: 7 Monogenea, 15 Trematoda (Digenea), 21 Cestoda, 20 Nematoda and one Acanthocephala. Most hosts of the new helminth species were reported from birds (40 species), but also from fish (13 species) and mammals (10 species). Only one new species of helminth was detected in amphibians.

Key words: parasitic helminths, Trematoda, Monogenea, Digenea, Cestoda, Nematoda, Acanthocephala, Poland

During the second half of the 90's a new idea arose for establishing the inventory of the European fauna species (i.e., *Fauna Europaea*) comprising of all living European species. It was not a research project but rather a thematic network meant to be developed over 4 years (i.e., 2000–2004) [2]. Similarly, species living on other continents (i.e., North America – ITIS) and in seas and oceans (i.e., seas within and around Europe – European Register of Marine Species; and all seas and oceans – WoRMS – World Register of Marine Species) were recorded.

As a consequence of this undertaking species registers, so-called checklists including parasitic helminths, were published in many countries. The examples are: A). 2001, *Checklist of the Metazoan parasites of fishes of the Czech and Slovak Republics* [3]; B). 2006, *Checklist of the Trematodes (Digenea) of birds of the Czech and Slovak Republics* with 260 species, including 237 recorded in the Czech Republic and 128 in Slovakia [4]; and C). 2010, *Checklist of the Nematodes of birds of the Czech and Slovak Republics* [5] reporting 151 species, 135 in the Czech Republic and 84 in Slovakia. In Poland the information on the parasitic species of helminths was provided by the *Pasożytnicze helminty Polski. Gatunki. Żywiciele. Białe plamy* [1]. This book was based on the data published in parasite registers, keys for identification of particular helminth groups and source materials. According to data from this book, the list of parasites of native vertebrates assembled by the middle of 2007 accounted for 1205 species of helminths. Those were 126 species of Monogenea, 338 of Trematoda (Digenea), 279 of Cestoda, 427 of Nematoda and 35 of Acanthocephala. The number constituted 32.9% of all helminth species found in Europe (i.e., 3657 species reported in the *Fauna Europaea* database). Additionally, the lists of parasites of individual hosts were published, e.g., the three-spined stickleback *Gasterosteus aculeatus* (51 species) and the nine-spined stickleback *Pungitius pungitius* (16 species) [6], or records of groups of parasites in Polish fish, e.g., Monogenea, which included 127 species [7].

The growing interest in faunistic research resulted in registering 64 parasite species new to Poland in just three years (i.e., from mid-2007 to mid-2010). Among them were 7 species of Monogenea, 15 of Trematoda (Digenea), 21 of Cestoda, 20 of Nematoda and one of Acanthocephala (Table 1). Most frequently the hosts of the helminth species new to Poland were birds (40 species), and less often fish (13 species) and mammals (10 species), with only one species found in amphibians (Table 2).

Table 1. Number of helminth species in Poland

Helminths	Total	to 2007	2007–2010
Monogenea	133	126	7
Digenea	353	338	15
Cestoda	300	279	21
Nematoda	447	427	20
Acanthocephala	36	35	1
Total	1269	1205	64

Undertaking the large-scale research on parasitofauna of selected host groups contributed among other things to the detection of a few dozen species of helminths over a short time. For instance, because of parasitological studies on large population of wild ducks Anatidae at northwestern Poland performed by the team of Professor K. Kavetska from the Laboratory of Biology and Ecology of Parasites, West Pomeranian University of Technology in Szczecin, several new native helminths groups were detected [8–17]. Also, monographic papers on parasites of individual hosts describe some helminth species which are new to the Polish fauna. The example can be provided by Sobecka's work [18] on parasites of the Atlantic cod *Gadus morhua morhua* and *Gadus morhua callarias*, from which 28 species of helminths were identified, or the weather fish *Misgurnus fossilis* – with 37 species identified [19].

It should be emphasized that many species are mentioned in these texts by name only without their description, which prevents further use of such material by professionals. However, some species are only discussed during conference presentations without subsequent publication of the presented material [20]. Hopefully, the species presented by papers at the XXII Convention of Polish Parasitological Society in September 2010 will be published with full descriptions.

The occurrence of parasite species new to Poland may coincide with climatic changes, e.g., nematode *Cyathostoma* (*Cyathostoma microspiculum*) in cormorants in the northeastern part of the country [21], or is the result of indigenous invasions, such as *Dirofilaria repens* in dogs in the central Poland [22], demonstrated to be brought from countries with warmer climates [23]. Some of newly registered species of helminths were found in hosts of foreign origin – e.g., in raccoons *Procyon lotor* originating from North America – nematodes *Baylisascaris procyonis*, *Strongyloides procyonis* [24] and *Placoconus lotoris* [25]. The nematode *Oesophagostomum quadrispinulatum*, detected in pigs in the Wielkopolska region, was probably brought on by importing brood herds from western Europe [26]. Also monogenic trematode *Thaparocleidus caecus* was brought with panga *Pangasiandon hypophthalmus* [27] introduced from Asia. Another group constitutes parasites found in migratory birds – e.g., 6 species of tapeworms in Eurasian woodcock *Scolopax rusticola* [20] and the trematode *Collyricloides massanae* in common blackbird *Turdus merula* [28]. Also, some helminths originated from imported and raised exotic animals – e.g., nematode *Ascaridia platyceri* in budgerigars, African grey parrots and eastern rosella [29].

Species of helminths recorded in Poland for the first time are presented in Table 3.

So far there is no information on the species which supposed to be present in Poland because they were detected in the neighbouring countries at the east, west and south. The example may be *Calodium hepaticum* in mammals [46] or trichinella, *Trichinella pseudospiralis*, in mammals and birds [47].

The present report does not discuss several species of helminths, mainly nematodes, for which their presence in Poland requires confirmation.

Table 2. Number of helminth species found in hosts in Poland from mid-2007 to mid-2010

Helminths	Hosts				
	Total	Pisces	Amphibia	Aves	Mammalia
Monogenea	7	7	–	–	–
Digenea	15	1	–	14	–
Cestoda	21	1	–	19	1
Nematoda	20	3	1	7	9
Acanthocephala	1	1	–	–	–
Total	64	13	1	40	10

Table 3. List of helminth species recorded in Poland in the period 2007–2010

Helminth species	Host group	Host species	Author, year
Monogenea			
Gyrodactylus flesi (Malmberg,1957)	Pisces	*Platichthys flesus*	Chibani et al. 2005 [30]
Gyrodactylus latus Bychowsky, 1933	Pisces	*Cobitis elongatoides*	Popiołek et al. 2009 [31]
Gyrodactylus pomeraniae Kuusela et al., 2008	Pisces	*Rutilus rutilus*	Kuusela et al. 2008 [32]
Gyrodactylus teuchis Lautraite et al., 1999	Pisces	*Salmo trutta trutta, Salmo gaidneri*	Rokicka et al. 2007 [33]
Gyrodactylus unicupola (Glukhova, 1955)	Pisces	*Platichthys flesus*	Chibani et al. 2005 [30]
Sciadicleithrum variabilum (Mizelle et Kritsky, 1969)	Pisces	*Symphysodon aequifasciatus*	Sobecka et al. 2010 [34]
Thaparocleidus caecus (Mizelle et Kritsky, 1969)	Pisces	*Pangasiandon hypophthalmus*	Więcaszek et al. 2009 [27]
Digenea			
Aporocotyle simplex Odher, 1900	Pisces	*Limanda limanda*	Rolbiecki 2007 [35]
Collyricloides massanae Vaucher, 1969	Aves	*Turdus merula*	Okulewicz et al. 2010 [28]
Diplostomum phoxini (Faust, 1918)	Aves	Anatidae	Kavetska et al. 2008 [8]
Diplostomum pusillum (Dubois, 1928)	Aves	Anatidae	Kavetska et al. 2008 [8]
Echinochasmus euryporus (Looss, 1896)	Aves	*Buteo buteo*	Okulewicz et al. 2010 [28]
Echinoparyphium cinclum (Rudolphi, 1803)	Aves	Anatidae	Kavetska et al. 2008 [8]
Echinostoma acedemica Skrjabin, 1915	Aves	*Numenius arquata*	Okulewicz et al. 2010 [28]
Leyogonimus polyoon (Linstow, 1887)	Aves	*Gallinula chloropus Fulica atra*	Okulewicz et al. 2010 [28]
Lyperosomum alaudae (Strom et Sondak, 1935)	Aves	*Sylvia atricapilla Alauda arvenis*	Okulewicz et al. 2010 [28]
Notocotyloides petasatus (Deslongshamps, 1824)	Aves	*Calidris alpina*	Okulewicz et al. 2010 [28]
Patagifer parvispinosus Yamaguti, 1933	Aves	*Tachybaptus ruficollis*	Okulewicz et al. 2010 [28]
Petasiger grandivesicularis Ishii, 1935	Aves	*Tachybaptus ruficollis*	Okulewicz et al. 2010 [28]
Plagiorchis arcuatus Sthrom, 1924	Aves	*Corvus cornix*	Okulewicz et al. 2010 [28]
Strigea vanderbrokae Dubois, 1966	Aves	*Pernis apivorus*	Okulewicz et al. 2010 [28]
Tylodelphys immer Dubois, 1961	Aves	*Gavia stellata*	Okulewicz et al. 2010 [28]
Cestoda			
Aploparaksis demshini Bondarenko et Kontrimavichus, 2005	Aves	*Scolopax rusticola*	Salamatin et al. 2009 [20]
Aploparaksis kornyushini Bondarenko et Kontrimavichus, 2006	Aves	*Scolopax rusticola*	Salamatin et al. 2009 [20]
Aploparaksis pseudofilum (Clerc, 1902)	Aves	*Scolopax rusticola*	Salamatin et al. 2009 [20]
Aploparaksis scolopacis Yamaguti, 1935	Aves	*Scolopax rusticola*	Salamatin et al. 2009 [20]
Aploparaksis sinensis Tseng-Shen, 1933	Aves	*Scolopax rusticola*	Salamatin et al. 2009 [20]

Dicranotaenia mergi Yamaguti, 1940	Aves	Anatidae	Kavetska & Kornyushin 2008 [9]
Dicranotaenia synsacculata Macko, 1988	Aves	*Bucephala clangula*	Królaczyk et al. 2010 [14]
Fernandezia spinosissima (Linstow, 1894)	Aves	*Turdus merula*	Salamatin et al. 2010 [39]
Fuhrmanolepis scolopacinae (Lopez-Neyra, 1944)	Aves	*Scolopax rusticola*	Salamatin et al. 2009 [20]
Microsomacanthus baeri (Czapliński et Vaucher, 1977)	Aves	Anatidae	Kavetska et al. 2008 [13]
Microsomacanthus oidemiae Spassky et Jurpalova, 1964	Aves	Anatidae	Kavetska et al. 2008 [10]
Microsomacanthus pachycephala (Linstow, 1872)	Aves	Anatidae	Kavetska et al. 2008 [13]
Microsomacanthus tuvensis Spasskaya et Spassky, 1961	Aves	Anatidae	Królaczyk et al. 2009 [11]
Monopydium caenodex (Mettricket Beverley-Burton, 1962)	Aves	*Turdus merula*	Salamatin et al. 2007 [36]
Monotestilepis tadorne Gvozdev et al., 1971	Aves	Anatidae	Kavetska et al. 2008 [13]
Mosgovoyia ctenoides (Railliet, 1890)	Mammalia	*Lepus capensis*	Młocicki 2007 [37]
Nippotaenia mogurndae Yamaguti et Miyata, 1940	Pisces	*Perccottus glenii*	Mierzejewska et al. 2010 [38]
Retinometra pittalugai Lopez-Neyra, 1932	Aves	Anatidae	Królaczyk et al. 2008 [12]
Sobolevicanthus aculeostyleticus Birova et Macko, 1991	Aves	Anatidae	Kavetska et al. 2008 [13]
Sobolevitaenia verulami (Mettrick, 1958)	Aves	*Turdus merula*	Salamatin et al. 2010 [39]
Spasspasskya dubinini (Bauer, 1941)	Aves	*Turdus merula*	Salamatin et al. 2007 [36]
Nematoda			
Amidostomoides auriculatum (Lomakin, 1988)	Aves	Anatidae	Kavetska et al. 2007 [15]
Amidostomoides monodon (Linstow, 1882)	Aves	Anatidae	Kavetska et al. 2007 [15]
Amidostomoides petrowi (Shakhtanhtinskaya, 1956)	Aves	Anatidae	Kavetska et al. 2007 [15]
Aplectana praeputialis Skrjabin, 1916	Amphibia	*Rana arvalis*	Okulewicz 2010 [*]
Ascaridia platyceri Hartwich et Tschermer, 1979	Aves	Psittacinae	Balicka-Ramisz et al. 2007 [29]
Ascarophis arctica Poljansky, 1952	Pisces	*Gadus morhua*	Sobecka 2007 [18]
Ascarophis morrhuae (van Beneden, 1871)	Pisces	*Zoarces viviparus*	Łuczak & Dudko 2010 [40]
Baylisascaris procyonis (Stefański et Żarnowski, 1951)	Mammalia	*Procyon lotor*	Bartoszewicz et al. 2008 [24]
Capillaria gracilis (Bellingham, 1840)	Pisces	*Gadus morhua*	Sobecka 2007 [18]
Cyathostoma (*Cyathostoma*) *microspiculum* (Skrjabin, 1915)	Aves	*Phalacrocorax carbo*	Kanarek 2009 [21]
Dentostomella translucida Schulz et Krepkorgorskaya, 1932	Mammalia	*Rhombomys opimus*	Zaleśny et al. 2008 [41]
Dirofilaria repens (Leydy, 1856)	Mammalia	*Homo sapiens*	Cielecka et al. 2007 [23]
Echinuria hypognatha Wehr, 1937	Aves	Anatidae	Kavetska 2008 [16]
Metastrongylus asymmetricus (Node, 1973)	Mammalia	*Sus scrofa*	Nosal et al. 2009 [42]

Oesophagostomum quadrispinulatum (Marcone 1901)	Mammalia	*Sus scrofa dom.*	Nosal et al. 2007 [26]
Placoconus lotoris (Schwartz, 1925)	Mammalia	*Procyon lotor*	Popiołek et al. 2011 [25]
Streptocara formosensis (Sugimoto, 1930)	Aves	*Melanitta nigra M. deglani*	Królaczyk & Kavetska 2010 [17]
Strongyloides procyonis Little, 1966	Mammalia	*Procyon lotor*	Bartoszewicz et al. 2008 [24]
Trichuris arvicolae Feliu et al. 2000	Mammalia	*Microtus agrestis*	Hildebrand et al. 2007 [43]
Trichuris discolor (Linstow, 1906)	Mammalia	*Bos taurus*	Michalski & Procajło 2010 [44]
Acanthocephala			
Paratenuisetis ambiquus Van Cleave, 1921	Pisces	*Anguilla anguilla*	Morozińska-Gogol 2008 [45]

[*] paper in preparation

They were identified on the basis of their egg morphology, and the geographical range of the species is frequently limited to other continents.

I am aware that not all species of helminths newly found in Poland are presented here. However, some information was unfortunately not published in parasitological journals but in conference materials, and therefore was very difficult to access.

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Nowe gatunki helmintów i ich żywiciele w Polsce

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Dane o pasożytniczych helmintach Polski są zamieszczone w książce pt. „Pasożytnicze helminty Polski. Gatunki. Żywiciele. Białe plamy". Do połowy 2007 r. w Polsce znanych było 1205 gatunków helmintów, w tym 126 gatunków Monogenea, 338 Digenea, 279 Cestoda, 427 Nematoda i 35 Acanthocephala. Reprezentują one 32,9% wszystkich gatunków odnotowanych w Europie (baza *Fauna Europaea*). W ciągu trzech kolejnych lat, tj. do połowy 2010 r., stwierdzono występowanie 64 nowych dla Polski gatunków helmintów: 7 Monogenea, 15 Digenea, 21 Cestoda, 20 Nematoda i jednego Acanthocephala. Żywicielami dla nowych gatunków pasożytów są najczęściej ptaki (40), ryby (13) i ssaki (10). U płazów stwierdzono tylko jeden nowy gatunek helminta.

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