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CERCARIAE (TREMATODA, DIGENEA) IN EUROPEAN FRESHWATER SNAILS – A CHECKLIST OF RECORDS FROM OVER ONE HUNDRED YEARS

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ABSTRACT: This review presents the results of studies on the freshwater snail-trematode associations, carried out in Europe since the beginning of the 20th century. The great number of synonyms of snail and trematode specific names has made the cooperation between malacologists and parasitologists difficult. Here we provide a survey of larval trematodes (cercariae) based on Central, North and Western European literature. Whenever possible, the valid species name is provided, accompanied by synonyms, or just provisional names are used making up the largest part of the list. Trematodes with a definitely unclear systematic status are indicated as species incertae sedis. These include mostly trematodes which were attributed obviously erroneous names with poor or no description of their morphology. Although the provisional names inflate the number of trematode species and there are still many identification problems, we believe that this is another step in assessing the trematode species composition in Europe which will help not only parasitologists but also malacologists and contribute to their closer cooperation.

KEY WORDS: snails, trematodes, Digenea, cercariae, synonyms, environmental research, Europe

INTRODUCTION

Freshwater snails play a crucial role in the life cycle of digenetic trematodes. They provide these parasites not only with resources for development and reproduction, but also constitute a means of transport by which trematodes can reach their next host (LOCKYER et al. 2004). This intimate association between snails and their parasites has a long evolutionary history. Most authors agree that trematodes were associated with molluscs before they adapted to other hosts (POJMAŃSKA & GRABDA-KAZUBSKA 1985, CRIBB et al. 2001). Most of the twenty thousand digenean species known today (POJMAŃSKA et al. 2007) use snails as obligatory first intermediate hosts. According to PONDER (1998) 66 digenean families are encountered within Gastropoda, while only nine are found in Bivalvia and one in Scaphopoda. There are also reports on the presence of digenetic trematodes in Annelida (MARTIN 1952).

More intensive studies on the trematode infection of freshwater snails have been conducted in Europe since the beginning of the 20th century (ŻBIKOWSKA & NOWAK 2009). However, many species revisions and introduction of new taxa caused serious difficulties when attempting to compare results of different authors. In this work we present information on snail-trematode studies, with an attempt to order these rich data for comparative purposes.

EUROPEAN SPECIES OF FRESHWATER SNAILS AND THEIR NATURAL INFECTION BY CERCARIAE

There is still much confusion concerning the systematic position and names of freshwater snails. The present-day classification of molluscs, like that of many other organisms, employs two different methodologies. Classic studies are morphology- and anatomy-based (CHERNOGORENKO-BIDULINA 1958, PIECHOCKI 1979, PONDER & LINDBERG 1997, JACKIEWICZ 2000), the alternative approach is genetic (BARGUES & MAS-COMA 1997, BARGUES et al. 2001, 2003, GLÖER & MEIER-BROOK 2003). The efficacy of the two methods has been recently compared by PFENNINGER et al. (2006). Both methods recognise parasites as very important factors inducing changes in the hosts' structure and function. Digenean invasions can, for example, affect the shell morphology (GORBUSHIN 1997, ŻBIKOWSKA & ŻBIKOWSKI 2005) or genetic features of the snail hosts (COMBES 1999) which may be an additional factor to consider when studying molluscan phylogeny.

The family Lymnaeidae has for years been the most intensively studied snail group in Europe. The main reason for this interest is the importance of lymnaeids in transmission of fascioliasis, and recently also cases of swimmers' itch. Planorbidae are the second snail group of high importance in parasitological studies; they include common pulmonate snail species adapted to different types of water bodies. For example, some members of this family – *Planorbis planorbis, Gyraulus rossmaessleri, Anisus leucostomus* – are extremely drought-resistant. This feature can play an important role in transmission of those parasites that can adapt to surviving inside their snail hosts during adverse periods. However, infected individuals are more often eliminated by parasites. Other families – pulmonate Physidae and prosobranch Bithyniidae, Viviparidae, Valvatidae, etc. – include (except Viviparidae) rather small-sized species, and studies on their parasite fauna need special research methods, even though some of these snails play an important part in transmission of human parasites (e.g. *Opisthorchis felineus*).

During the last hundred years various authors used different synonyms of species names, and different systems of mollusc classification. Nowadays, according to FALKNER et al. (2001), GLÖER & MEIER-BROOK (2003) and PIECHOCKI (2008), there are 18 lymnaeid species known in Europe, which are grouped into seven genera: *Omphiscola, Galba, Myxas, Radix, Stagnicola, Catascopia, Lymnaea.* Nine of these species are known as first intermediate hosts of Digenea. The list of parasites found in European species of Lymnaeidae is presented in Table 1.

Parasitological information on digenean cercariae in populations of different Planorbidae is relatively rich (Table 2). However, similarly to lymnaeids, the main difficulty in comparison of the records is the large number of snail synonyms. According to PIECHOCKI (2008), there are 45 species of the family Planorbidae in Europe, but many of them are introductions from other continents. The adaptation of both the immigrant host and the parasite or the establishment of a new snail-trematode association is often a long-term process (ŻBIKOWSKI & ŻBIKOWSKA 2009). For this reason probably only 13 species of European planorbids have been described as naturally infected first intermediate hosts of digenean larvae.

The remaining two freshwater pulmonate families have the smallest number of species in the European fauna: Acroloxidae – 4, and Physidae – 5. Only *Acroloxus lacustris, Physa fontinalis* and *Aplexa hypnorum* have been recognised as first intermediate hosts of Digenea in Europe (Table 5).

Freshwater pulmonates seem to be better hosts for trematode larvae compared to prosobranchs, because of their explorative behavior and great tolerance to water and oxygen deficit (MARSHALL & MCQUAID 1991). They are found on the bottom, near the surface as well as on macrophytes in the water bodies, and this makes them a more available target for invasive miracidia.

Many data concerning prosobranch snails as first intermediate hosts have accumulated during over one hundred years of European studies on snail hosts of Digenea. Bithyniidae are known to be the most strongly exploited by Digenea within prosobranchs. However, only two out of the ten bithyniid species living in Europe are used as first intermediate hosts, although the list of trematodes is quite long (Table 3). Interestingly, particularly one species – *Bithynia tentaculata* – has been subject to parasitological studies.

Some authors (GURALNICK et al. 2004) have emphasised the size of snail host as an important reason for being used by numerous parasite species. The family Viviparidae includes big and medium-sized snails. From among the five species found in Europe, the majority (four) have been found to carry cercariae of different Digenea, and the number of parasite species is relatively high (Table 4). Other prosobranch families: Hydrobiidae and Valvatidae, even though they include numerous taxa (Hydrobiidae – 650 species and subspecies, Valvatidae – 12 species living in Europe) have been poorly studied as key-hosts of digenean larvae (Table 4–5).

The above data show that much more attention has been paid to studies on larval trematodes of pulmonates than of prosobranch gastropods. Mainly the families Lymnaeidae and Planorbidae have been investigated which results from the easier availability

and high frequency of occurrence of these snails, especially the big-sized species: *Lymnaea stagnalis* and *Planorbarius corneus* (PIECHOCKI 1979, JACKIEWICZ 2000, LOY & HAAS 2001, FALTÝNKOVÁ et al. 2007, 2008). Moreover, these two snail families are mostly responsible for spreading of parasites which are important from the medical and veterinary point of view. The interest in other snail species has been inconsistent for a long time. Genera including small-sized species (*Anisus*, *Planorbis*, *Gyraulus*, *Physa*, *Aplexa* or *Potamopyrgus*) as well as those living in rivers, streams or water-meadows have been particularly neglected. Collecting a representative sample of such species is often an arduous work because of the snail's minute size and specific habitat requirements.

CONCLUSIONS

Trematodes (Digenea) have intriguing life strategies using animals from different vertebrate and invertebrate groups as hosts to complete their life cycles. Molluscs play a crucial role in the trematode life cycles, harbouring the proliferative stages (sporocysts, rediae) and stages responsible for further transmission (cercariae). Thus by examining molluscs (mainly gastropods) for their parasites we can easily obtain information on trematodes present in the studied ecosystems.

Many researchers dealing with cercariae gave new names to already described species, simply because of being unaware of the works of other authors (GALAKTIONOV & SKIRNISSON 2000). WIKGREN (1956), for example, described some cercariae as *Cercariae fennica* I-V, DUBOIS (1929, 1934) as *Cercariae helvetica* I-XXXIV and SZIDAT (1923, 1924) as *Cercaria* A–C. Furthermore, besides the many trematode synonyms that functioned in the parasitological literature during the last one hundred years, there are also many unidentified species still bearing provisional names (see Tables 1–5).

The investigations on the natural infestation of freshwater snails by larval stages of Digenea, conducted in Europe, has made it possible to compile information on the diversity of these parasites in the populations of their first intermediate hosts. However, the complications connected with the systematic position of trematodes and snails as well as frequent instances of repeatedly describing the same species, have caused difficulties when attempting to compare data of various authors. The main consequence of using many synonyms is an unclear view of the digenean biodiversity in the European populations of gastropods which in turn discourages interdisciplinary parasitological-malacological studies. Making an attempt to order the rich literature information, we intend to encourage experts in both disciplines to co-operate. Much new, valuable information on the host-parasite adaptation can be possibly gained and the results can be used to assess the evolutionary interrelationships between trematodes and their intermediate hosts.

Here we present a survey of larval trematodes (cercariae) based on the literature from Central, Northern and Western Europe, from the period of the last ca. 100 years. Whenever possible, the valid name is provided (first column in the tables), accompanied by its synonyms (second column) or just provisional names making up the largest part of the list. Trematodes with a definitely unclear systematic status are indicated as species incertae sedis. These include mostly trematodes which were attributed erroneous, names with poor or no description of their morphology.

Table 1. Cercariae found in Lymnaeidae from European countries

Valid names/Classification	Synonyms/Provisional names	Snail species*	Country** [References***]
Apatemon gracilis (Rudolphi, 1819)		LS, RPG, SP, RA	CR[1,2,3], PL[4], GB[5,6], IC[7], R[8], U[9], F[10]
	Apatemon sp. I (ZAJÍČEK & VALENTA 1964)	RPG	CR[3]
	Apatemon sp. II (ZAJÍČEK & VALENTA 1964)	RA	CR[3]
Apharyngostrigea cornu (Zeder, 1800)		SP	G[8]
Asymphylodora sp.		RA	U[9]
Asymphylodora tincae (Modeer, 1790)	*Asymphylodora* sp. 1 (NAŠINCOVÁ 1992)	SP, RA, RPG	CR[1,51]
Australapatemon burti (Miller, 1923)	*Apatemon burti* (Miller, 1923)	LS, RPG, SP	G[11], PL[12], CR[1]
Australapatemon minor (Yamaguti, 1933)	*Apatemon minor* (Yamaguti, 1933)	RPG, SP, LS	F[13,14],GB[15], CR[1], H, SU, D [8], G [8,47]
Strigea sp.	*Australapatemon* sp.	RPG	CR[1]
Azygia lucii (Müller, 1776)		SP	F[10]
Cotylurus cornutus (Rudolphi, 1819)	*Cercaria* A (SZIDAT 1924)	SP, LS	D[24], SU[26]
Hypoderaeum conoideum (Bloch, 1782)	*Cercaria affinis* Wesenberg-Lund, 1934	RA	U[9], D[24]
Opisthioglyphe ranae (Fröhlich, 1791)	*Cercaria armata* Siebold, 1837	LS	U[9], G[17]
	Cercaria auriculariae Zdun, 1961	RA, LS	U[9], PL[18]
Echinostoma bolschewense (Kotova, 1939)	*Cercaria bolschewensis* Kotova, 1939	LS	U[19]
	Cercaria borysthenica Bidulina, 1958	LS	U[9,20]
	Cercaria breconensis Probert, 1966	RPG	GB[6]
Diplostomum pseudospathaceum Niewiadomska, 1984	*Cercaria* C (SZIDAT 1923)	LS, RA	D[24]
Diplostomum sp.	*Cercaria chromatophora* Brown, 1931	LS, RPG, SP	F[10], CR[2,3], U[19], R[21], GB[25]
	Cercaria cinerea Bidulina, 1958	SP, LS	U[9,20]
	Cercaria coronata Filippi, 1855	LS, SP	U[9], G[17]
Cotylurus sp.	*Cercaria cotyluri-erratici* (ZAJÍČEK 1963)	LS	CR[2]
Sanguinicola inermis Plehn, 1905	*Cercaria cristata* La Valette, 1855	LS, SP, RA	PL[4], U[9], G[17], D[24]
	Cercaria curtimenbranosa Zdun, 1961	RPG	U[9]
	Cercaria deficipinnatum Khan, 1960	LS	GB[22]
	Cercaria dioculata Probert, 1966	RPG	GB[6]
Echinoparyphium aconiatum Dietz, 1909	*Cercaria echinata* Siebold, 1837	LS, RPG	CR[2], PL[18], U[9,20], G[17], D[24], GB[49]
?Echinoparyphium recurvatum (Linstow, 1873)	*Cercaria echinoparyphii* sp. I (ZAJÍČEK 1963)	LS	CR[2]
Echinoparyphium sp.	*Cercaria echinoparyphii* sp. II (ZAJÍČEK 1963)	RA, SP	CR[2]
	Cercaria echinostomi-parauli (ZAJÍČEK 1963)	LS	CR[2]

Table 1 continued

Valid names/Classification	Synonyms/Provisional names	Snail species*	Country** [References***]
	Cercaria equispinosa Brown, 1926	LS	GB[49]
	Cercaria essexensis Khan, 1960	LS	GB[22]
Isthmiophora/Paryphostomum	*Cercaria fallax* Pagenstecher, 1857	LS	G[17]
Plagiorchiidae	*Cercaria fennica* III (WIKGREN 1956)	LS, RPG, SP	F[10]
Diplostomidae	*Cercaria fennica* IV (WIKGREN 1956)	LS, RPG	F[10]
furcocercaria – species incertae sedis	*Cercaria fissicauda* La Valette, 1855	LS	G[17], GB[49]
	Cercaria florensis Probert, 1966	RPG	GB[6]
?*Australapatemon* sp.	*Cercaria furcata* Nitzsch, 1807	LS	G[17]
	Cercaria glabra Bidulina, 1958	LS	U[9,20]
	Cercaria granulosa Brown, 1926	RPG	GB[49]
	Cercaria helvetica II (DUBOIS 1929)	LL, SP	SU[26]
	Cercaria helvetica IV (DUBOIS 1929)	LS, LL, SP	CR[2], SU[26]
	Cercaria helvetica V (=VII) (DUBOIS 1929)	LS, SP	SU[26]
	Cercaria helvetica VI (DUBOIS 1929)	SP	CR[2]
	Cercaria helvetica IX (DUBOIS 1929)	RA	CR[2]
Diplostomum pseudospathaceum Niewiadomska, 1984	*Cercaria helvetica* XIII (DUBOIS 1929)	LS, SP	SU[26]
Diplostomum spathaceum (Rudolphi, 1819)	*Cercaria helvetica* XV (DUBOIS 1929)	LS, RPG, LL	PL[4], R[21], SU[26]
	Cercaria helvetica XVI (DUBOIS 1929)	LL	SU[26]
	Cercaria helvetica XX (DUBOIS 1929)	LS	SU[26]
	Cercaria helvetica XXI (DUBOIS 1929)	SP, LS	U[9], SU[26]
Echinoparyphium aconiatum Dietz, 1909	*Cercaria helvetica* XXII (DUBOIS 1929)	LS	SU[26], R[21]
	Cercaria helvetica XXIII (DUBOIS 1929)	LS	SU[26]
	Cercaria helvetica XXIV (DUBOIS 1929)	SP	SU[26]
	Cercaria helvetica XXV (DUBOIS 1929)	LL	SU[26]
	Cercaria helvetica XXVI (DUBOIS 1929)	LL	SU[26]
	Cercaria helvetica XXIX (DUBOIS 1929)	SP	PL[4], SU[26]
	Cercaria helvetica XXX (DUBOIS 1929)	LS, LL, SP	F[10], SU[26]
	Cercaria helvetica XXXI (DUBOIS 1929)	RPG, SP, LL	SU[26], D[24]
	Cercaria helvetica XXXII (DUBOIS 1929)	LS, SP	SU[26]
Cotylurus brevis Dubois et Rausch, 1950	*Cercaria helvetica* XXXIV (DUBOIS 1929)	LS	R[21], SU[26]
	Cercaria kentensis Khan, 1961	RPG	GB[29]

Table 1 continued

Valid names/Classification	Synonyms/Provisional names	Snail species*	Country** [References***]
	Cercaria laticauda Wesenberg-Lund, 1934	LS, SP	U[9], PL[4], D[24]
Moliniella anceps (Molin, 1859)	*Cercaria laticaudata* Riech, 1927	LS	R[21]
	Cercaria leptosoma Brown, 1926	RPG	GB[49]
Tylodelphys clavata (Nordmann, 1832)	*Cercaria letifera* Fuhrmann, 1916	RA, LL	SU[26], D[24]
	Cercaria limbifera Seifert, 1926	SP	GB[25]
Plagiorchiidae	*Cercaria limnaeae truncatulae* Linstow, 1884	GT	CR[28], U[9], G[17]
Plagiorchiidae	*Cercaria limnaeae ovatae* Linstow, 1884	RA, LS, RPG, SP	CR[28], U[9,20], G[17], D[24]
	Cercaria linearis Wesenberg-Lund, 1934	SP	F[10]
	Cercaria longeava Zdun, 1951	LS	U[20]
species incertae sedis	*Cercaria longiremis* Wesenberg-Lund, 1934	LS	PL[23]
	Cercaria macrosoma Brown, 1926	LS	GB[49]
	Cercaria microcaeca Probert, 1965	LS, RA, RPG	[GB [16, 31, 48]
	Cercaria micromorpha Brown, 1926	RPG	GB[49]
Notocotylidae	*Cercaria monostomi* Linstow, 1884	LS, RPG, SP	PL[18], G[17], GB[16], SU[26], D[24]
Trichobilharzia szidati (La Valette, 1855)	*Cercaria ocellata* La Valette, 1855	LS, SP, RPG, RA	CR[2], F[10], U[9,20],G[17], SU[26], D[24]
species incertae sedis	*Cercaria onusta* Zdun, 1951	LS	U[20], PL[18]
?*Paralepoderma* sp.	*Cercaria ornata* La Valette, 1855	LS	U[9]
	Cercaria paracauda Iles, 1959	RPG	GB[6,15]
	Cercaria pendulina Zdun, 1961	SP	U[9]
	Cercaria prima Sinitzin, 1905	SP	SU[26]
	Cercaria pseudocellata Szidat et Wigand, 1934	LS, RPG	GB[30]
species incertae sedis	*Cercaria pseudogracilis* Zdun, 1961	LS	PL[18,23]
	Cercaria pulicis Brown, 1929	RPG	GB[49]
	Cercaria secunda Sinitzin, 1905	LS	U[9], G[17]
?*Haematoloechus similis*	*Cercaria similis* Zdun, 1961	RPG	U[9]
?*Ichthyocotylurus* sp.	*Cercaria spinulosa* Ginetsinskaya, 1959	LS, RA, SP	CR[2,3], R[21], F[27]
	Cercaria spiralis Probert, 1966	RPG	GB[6]
	Cercaria stagnalis Zdun, 1961	LS	U[9]
	Cercaria stylosa Linstow, 1884	RA	U[9]
Plagiorchis sp.	*Cercaria tenuispina* Lühe, 1909	LS, SP	G[17]
	Cercaria tetraglandis Iles, 1959	RPG	GB[48]

Table 1 continued

Valid names/Classification	Synonyms/Provisional names	Snail species*	Country** [References***]
	Cercaria trifida Zdun, 1961	LS	U[9]
	Cercaria vacua Zdun, 1961	SP	U[9]
	Cercaria vulgaris Zdun, 1961	GT	U[9]
species incertae sedis	*Cercaria* 1 (PETERSEN 1931)	LS, RPG	PL[18], D[24]
	Cercaria 3 (PETERSEN 1931)	RPG	U[9]
	Cercarieum squamosum Fuhrmann, 1916	LL, LS	SU[26]
Codonocephalus urniger (Rudolphi, 1819)		SP, LS	PL, FR, R[8]
Cotylurus brevis Dubois et Rausch, 1950		LS	FR, SU [8], GB[8,50], F[27]
Cotylurus cornutus (Rudolphi, 1819)		RA, RPG, LS, RM, SP	CR[1,3,28], GB[5], IC[7], PL[4], F[10], U[9]
Cotylurus sp.	*Cotylurus erraticus* Rudolphi, 1809	LS	CR[2,3]
	Cotylurus sp.	LS, SP, GT, RA	CR[28], F[13,14], U[19]
	Cotylurus sp. I (GINETSINSKAYA 1959)	LS	U[19], R[21]
	Cotylurus sp. II (GINETSINSKAYA 1959)	SP, LS	CR[28], R[21]
Cyclocoelum microstomum (Creplin, 1829)		LS, RPG	CR[28], U[9]
Diplostomum baeri Dubois, 1937		RA, RPG	L[32]
Diplostomum commutatum (Diesing, 1850)		RPG	PL[32]
Diplostomum gobiorum Shigin, 1965		RPG	GB[5]
Diplostomum mergi Dubois, 1932		RA, RPG	R[8], L[32]
Diplostomum paracaudum (Iles, 1959)		RPG, RA, SP, LS, SC	L[32], R[8], CR[34], PL[33]
Diplostomum parviventosum Dubois, 1932		RA, RPG, SC, SP	PL[33], L[32], CR[1,34]
Diplostomum phoxini (Faust, 1918)		RPG	L[32], GB [48]
Diplostomum pseudospathaceum Niewiadomska, 1984		LS, RA, RPG, SP	FR,GB[8], CR[1,34], F[13,14,27], PL[12], L[32], G[11, 47]
Diplostomum sp.		RPG	IC[7]
Diplostomum spathaceum (Rudolphi, 1819)		LS, RPG, RA	CR[2,28], GB[5,48], F[35], L[32]
Echinoparyphium aconiatum Dietz, 1909		LS, RA, RPG, SC, SP	[CR [1,2,28, 34], PL[12,18,23], F[13,14], G [11, 47], U[9,19], SU[26]
Echinoparyphium recurvatum (Linstow, 1873)		LS, RA, RPG, RM, SP	CR [1,2,28,34], PL [4,45], L[45], G[11], F[14], GB[16, 48], IC[7], U[19], R[21]

Table 1 continued

Valid names/Classification	Synonyms/Provisional names	Snail species*	Country** [References***]
	Echinoparyphium sp. (ZAJÍČEK 1963)	LS	CR[34]
Echinostoma revolutum (Fröhlich, 1802)		LS, SP, RPG, SC	CR[1,2,28, 34], PL[4,12], G[11,47], F[10,13,14], U[9,19], R[21]
Fasciola gigantica Cobbold, 1856		RPG(?)	U[9]
Fasciola hepatica (Linnaeus, 1758)		GT	U[9], PL[41], FR[42], D[24]
Fascioloides magna (Bassi, 1875)		RPG	CR[36]
	Furcocercaria I (WESENBERG-LUND 1934)	RPG	F[10]
Haplometra cylindracea (Zeder, 1800)		RPG, GT, LS	GB[5], G[11], U[9], D[24]
	Hemistomum spathaceum (Rudolphi, 1819)	LS	U[9]
Hypoderaeum conoideum (Bloch, 1782)		LS, SP, RA, RPG	CR[1,28], [PL[12, 44], F[10,13,14], G[11,47], GB[5], IC[7], U[9], R[21], SU[26], D[24] SP[43]
Hypoderaeum sp.		RPG	CR[1]
Isthmiophora melis (Schrank, 1788)		LS	G[47]
Leptophallus nigrovenosus (Bellingham,1844)		RPG	CR[1]
Moliniella anceps (Molin, 1859)		LS, RA, SP, SC, ST, RPG	CR[1,2,28, 34], PL[12], G[11]
Neoglyphe sobolevi Shaldybin, 1953		LS, SC, SP	CR[1,37], PL[12]
Notocotylus attenuatus (Rudolphi, 1809)		LS, RA, RPG, SP	G[11], CR[1,2,28, 34], PL[12], F[13,14], GB[5], IC[7], U[9], R[21]
Notocotylus ralli Baylis, 1936		SP	G[38]
Notocotylus seineti Fuhrmann, 1919		LS, RPG	PL[18,23], GB[16], U[9]
Notocotylus sp.		LS, RPG, SP	F[10]
Omphalometra flexuosa (Rudolphi, 1809)		SP	CR[1]
Opisthioglyphe ranae (Fröhlich, 1791)		LS,RA,RPG, SP, SC	CR[1,2,28, 34], PL[12], G[11], U[19], R[21]
Palaeorchis sp.		RPG	CR[28]
Paryphostomum radiatum (Dujardin, 1845)		RA	G[11], CR[46]
?*Isthmiophora melis*/?*Paryphostomum* sp.	*Paryphostomum* sp. 2 (NAŠINCOVÁ 1992)	LS, SP	CR[1]
Plagiorchis elegans (Rudolphi, 1802)		LS, RPG	PL[12] CR[34], F[13,14], G[11]
Plagiorchis maculosus (Rudolphi, 1819)		LS, RA	CR[1,34], PL[12]
Plagiorchis neomidis Brendow, 1970		RPG, RM	G[11], CR[1]

Table 1 continued

Valid names/Classification	Synonyms/Provisional names	Snail species*	Country** [References***]
Plagiorchis sp.		LS, SP, RA, RPG	G[11], CR[1]
Sanguinicola inermis Plehn, 1905		RPG, RA, LS, SP	CR[1,2], PL[12,39], U[19] GB[48]
Sanguinicola intermedia Ejsmont, 1926		LS, RA	PL[39], U[19]
Sanguinicola sp.		RA	CR[28]
	Sanguinicola sp. III (CHERNOGORENKO 1977)	SP	U[19]
Sphaerostoma sp.		RA	G[11]
Strigea tarda Mathias, 1925		LS, SP	F[10]
Trichobilharzia franki Műller et Kimmig, 1994		RA	CR[34], PL[12]
Trichobilharzia szidati (Odening, 1966)		RA, LS, RPG, RM	CR[1,2,3,28,34,40], F[13,14], R[21], PL[4,12,18,23], G[11,47], FR,SU,D[8]
Tylodelphys clavata (Nordmann, 1832)	*Tylodelphys coniferum* (Mehlis, 1846)	RA, LS, RPG	CR[1,3,28,34], PL[4,8,12],G[11], U[19]
Plagiorchiidae	*Xiphidiocercaria* sp. I (GINETSINSKAYA 1959)	LS	U[19], R[21]
Plagiorchiidae	*Xiphidiocercaria* sp. II (GINETSINSKAYA 1959)	LS	CR[28], R[21]
Plagiorchiidae	*Xiphidiocercaria* sp. III (GINETSINSKAYA 1959)	RA, LS, SP	CR[28], U[19], R[21]
Plagiorchiidae	*Xiphidiocercaria* sp. IV (GINETSINSKAYA 1959)	LS, RA	U[19], R[21]
Plagiorchiidae	*Xiphidiocercaria* sp. V (GINETSINSKAYA 1959)	LS, SP	U[19], R[21]
Plagiorchiidae	*Xiphidiocercaria* sp. VI (GINETSINSKAYA 1959)	LS	R[21]
Plagiorchiidae	*Xiphidiocercaria* sp. VII (GINETSINSKAYA 1959)	RPG	R[21]

* RA – *Radix auricularia*; RPG – *Radix peregra* group[1]; RM – *R. ampla*; LS – *Lymnaea stagnalis*; LL – *Lymnaea limosa*; SC – *Stagnicola corvus*; SP – *S. palustris*; ST – *S. turricula*; – GT – *Galba truncatula*.
[1] – *Radix peregra* group – according to present nomenclature *Radix peregra peregra* and *Radix peregra ovata* are recognized as *Radix balthica* and *Radix labiata*

** CR – Czech Republic; D – Denmark; F – Finland; FR – France; G – Germany; GB – Great Britain; , IC – Iceland; L – Lithuania; PL – Poland; R – Russia, SU – Suisse, U – Ukraine.

*** [1] – NAŠINCOVÁ (1992); [2] – ZAJÍČEK (1963); [3] – ZAJÍČEK &VALENTA (1964); [4] – WIŚNIEWSKI (1958); [5] – WILLIAMS (1966); [6] – PROBERT (1966a); [7] – BLAIR (1973); [8] – COMBES (1980); [9] – ZDUN (1961); [10] – WIKGREN (1956); [11] – FALTÝNKOVÁ & HAAS (2006); [12] – ŻBIKOWSKA (2007); [13] – NIEWIADOMSKA et al. (1997); [14] – VÄYRYNEN et al. (2000); [15] – ILES (1959); [16] – PROBERT (1966b); [17] – LÜHE (1909); [18] – BERTMAN & WOJCIECHOWSKA (1974); [19] – CHERNOGORENKO (1977); [20] – CHERNOGORENKO-BIDULINA (1958); [21] – GINETSINSKAYA (1959); [22] – KHAN (1960a); [23] – BERTMAN (1980); [24] – WESENBERG-LUND (1934); [25] – BROWN (1931); [26] – DUBOIS (1929); [27] – FALTÝNKOVÁ et al. (2007); [28] – ŽDÁRSKÁ (1963); [29] – KHAN (1961a); [30] – KHAN (1961b); [31] – PROBERT (1965a); [32] – NIEWIADOMSKA & KISELIENE (1994); [33] – NIEWIADOMSKA (1987); [34] – FALTÝNKOVÁ (2005); [35] – KARVONEN et al. (2006); [36] – FALTÝNKOVÁ et al. (2006); [37] – NAŠINCOVÁ et al. (1989); [38] – ODENING (1966); [39] – BOBIATYŃSKA-KSOK (1964); [40] – KOLÁŘOVÁ et al. (1992); [41] – CHOWANIEC & DRÓŻDŻ (1958); [42] – DREYFUSS et al. (2005); [43] – MUNOZ-ANTOLI et al. (2000); [44] – GRABDA-KAZUBSKA & KISELIENE (1990); [45] – GRABDA-KAZUBSKA & KISELIENE (1989); [46] – NAŠINCOVÁ et al. (1993); [47] – LOY & HAAS (2001); [48] – MORLEY & LEWIS (2007); [49] – BROWN (1926); [50] – NASIR (1960); [51] – NAŠINCOVÁ & SCHOLZ (1994).

Table 2. Cercariae found in Planorbiidae in European countries

Valid name	Synonyms/Provisional names	Snail species*	Country** [References***]
Alaria alata (Goeze, 1782)		AV, PM, PS, PP, GA	PL, R, G[1]
Apatemon gracilis (Rudolphi, 1819)		AS, SN, AV, BC, AL, PP	CR[2], PL[3], R[4]
Apharyngostrigea cornu (Zeder, 1800)		BC, AV, AL, SN	R, G[1]
Asymphylodora sp.		AV, PP, BC, GA, SN	CR[2,5], U[8], R[4]
Asymphylodora tincae (Modeer, 1790)		PP, AV, BC, GA, SN	CR[31]
Australapatemon burti (Miller, 1923)		AL., AV, BC, GA	CR[5], F[29]
Australapatemon minor Yamaguti, 1933		PP, PK, AV, AL, BC, SN	R, G, SU, H[1], CR[5]
Bilharziella polonica (Kowalewski, 1895)		PP, PC, AV, BC	CR[2,5,11], PL[3,9,10,13,24], GB[19,25], R[4], U[6], D[16], F[29]
Catatrophis sp.		AV, SN	CR[5,11]
Catatropis verrucosa (Fröhlich, 1789)		SN, GA	G[14]
species incertae sedis	*Cercaria cellularia* Zdun, 1961	GL, P	U[6], PL[9]
Cathaemasia hians (Rudolphi, 1809)	*Cercaria choanophila* U. Szidat, 1936	PSP, ASP	U[6]
	Cercaria clara Zdun, 1961	PP	U[6]
	Cercaria complexiglandulosa Khan, 1962	AS	GB[27]
	Cercaria contorti Ginetsinskaya, 1959	BC	R[4]
Diplodiscus subclavatus (Pallas, 1760)	*Cercaria diplocotylea* Pagenstecher, 1857	PP, PU	U[6,7], D[16]
	Cercaria echinomorpha Brown, 1931	PK	GB[21]
	Cercaria edgwarensis Khan, 1961	PP	GB[25]
Notocotylus ephemera (Nitzsch, 1807)	*Cercaria ephemera* Nitzsch, 1807	PP, PC, AV, BC	PL[3,10], U[6,7], G[15], D[16]
	Cercaria frederiksborgensis Wesenberg-Lund, 1934	PC	U[6], D[16]
	Cercaria glauca Bidulina, 1958	PC	U[6,7]
	Cercaria gracilis La Valette, 1855	PP	PL[9], G[15], U[8], D[16]
	Cercaria hamptonensis Khan, 1960	PP	GB[26]
	Cercaria helvetica V (=VII) (DUBOIS 1929)	PM	SU[17]
	Cercaria helvetica VI (DUBOIS 1929)	PK, PM	SU[17,18]
	Cercaria helvetica XXIV (DUBOIS 1929)	PC	PL[3]
	Cercaria helvetica XXXI(DUBOIS 1929)	PM, PK	SU[17,18]
	Cercaria ignota Zdun, 1961	PSP	U[6]
	Cercaria kenilworthensis Khan, 1961	PP	GB[25]

Table 2 continued

Valid name	Synonyms/Provisional names	Snail species*	Country** [References***]
	Cercaria lacustris Bidulina, 1958	PP	PL[9], U[6,7]
	Cercaria linearis Wesenberg-Lund, 1934	PC	PL[10], U[6,7], D[16]
	Cercaria londonensis Khan, 1960	PC	GB[26]
species incertae sedis	*Cercaria longiremis* Wesenberg-Lund, 1934	PP	PL[9]
	Cercaria markewitschi Bidulina, 1958	PP	U[6,7]
	Cercaria media Bidulina, 1958	PP	U[6,7]
	Cercaria mirabilis Braun, 1891	AF	U[6]
	Cercaria monostomi Linstow, 1896	PC, PP, PK	PL[9], SU[17]
	Cercaria notabilis Niewiadomska, 1966	PP	PL[20]
	Cercaria onusta Zdun, 1961	PP	U[6]
	Cercaria ornata La Valette, 1855	PC	U[6], G[15]
	Cercaria oscillatoria Brown, 1931	PK	GB[21]
	Cercaria pendulina Zdun, 1961	PK	U[6]
	Cercaria pigmentata Sonsino, 1982	PP	U[6,7]
Haematoloechus asper (Looss, 1899)	*Cercaria pilosa* Zdun, 1959	PC	U[6,7], PL[10]
	Cercaria planorbida Iles, 1959	PP	GB[19]
Asymphylodora sp.	*Cercaria planorbis carinati* Filippi, 1854	AV, BC, PC	U[6], G[15]
	Cercaria planorbis cornei Skworzow, 1924	PC	U[6,7]
	Cercaria prima Sinitzin, 1905	GL, PC, AV, GA	U[6], G[15], D[16]
species incertae sedis	*Cercaria pseudogracilis* Zdun, 1959	PP, PC	U[6], PL[9,10]
	Cercaria pseudolinearis Khan, 1962	PC	GB[27]
	Cercaria pseudoornata Lühe, 1909	PC	U[6], G[15]
	Cercaria pugio Linstow, 1884	PC	CR[2], U[7]
	Cercaria pulchra Zdun, 1961	PP	U[6]
species incertae sedis	*Cercaria pusilla* Looss, 1896	PC	PL[9]
	Cercaria pygocytophora Brown, 1931	PK	GB[21]
	Cercaria radiata Zdun, 1961	PP	U[6]
	Cercaria spinifera La Valette, 1855	PC	PL[10], U[6], G[15], D[16]
	Cercaria spinosa Bidulina, 1958	PC	U[6,7]
Azygia lucii (Müller, 1776)	*Cercaria splendens* Szidat, 1932	AV, PU	F[23], H[22], U[6]

Table 2 continued

Valid name	Synonyms/Provisional names	Snail species*	Country** [References***]
species incertae sedis	*Cercaria stylosa* Linstow, 1884	AL, AV	CR[2], G[15]
	Cercaria tetraglandis Iles, 1959	PC	GB[19]
	Cercaria thamesensis Khan, 1960	PP	GB[26]
	Cercaria vilanoviensis Zdun, 1959	PC	PL[10], U[6]
	Cercaria zduni Bidulina, 1958	PP	U[6,7]
species incertae sedis	*Cercaria* 1 (PETERSEN 1931)	PC	PL[9]
	Cercarieum squamosum Fuhrmann, 1916	PK	SU[17]
Cotylurus brevis Dubois et Rausch, 1950		PC, PP, SN	FR, R[1]
Cotylurus cornutus (Rudolphi, 1808)		PC, AV	CR[2], PL[10], U[6]
Cotylurus sp.		PC, AV	CR[2], U[8]
	Cotylurus sp. 2 (NAŠINCOVÁ 1992)	PC	CR[5]
	Cotylurus sp. I (CHERNOGORENKO 1977)	PC	U[8]
	Cotylurus sp. III (CHERNOGORENKO 1977)	PC	U[8]
Cyclocoelum microstomum (Creplin, 1829)		PC	CR[2]
Dendritobilharzia pulverulenta (Braun, 1901)		AV, PP	PL[1]
Diplodiscus subclavatus (Pallas, 1760)		PP, AV, BC, AL., GA	CR[2,5,11], PL[3], R[4], U[8]
Diplostomum micradenum (Cort et Brackett, 1938)		PP	R[1,4]
species incertae sedis	*Echinoparyphium aconiatum* Dietz, 1909	PP, PC, AV	PL[9], CR[2]
Echinoparyphium pseudorecurvatum Kiseliene et Grabda-Kazubska, 1990	*Echinoparyphium recurvatum* (Linstow, 1873)	PP	G[12]
	Echinoparyphium recurvatum (Linstow, 1873)	AL, AS, PU, PP	CR[2,5], PL[3,13], U[6], D[16]
	Echinostoma revolutum (Fröhlich, 1802)	PC, AV, BC	CR[2]
Echinostoma sp.		GA, BC	CR[5]
Echinostoma spiniferum (La Valette, 1855)	*Cercaria spinifera* La Valette, 1855,	PC, PP, BC, GA	CR[5,11], PL[10,13]
?Gigantobilharzia sp.	*Trichobilharzia ocellata* (La Valette, 1855)	PP, GA, AL, AV, GA	R[1], CR[5]
Gigantobilharzia sp.		AV	G[12]
Gigantobilharzia mazuriana Khalifa, 1974		AV	PL[1]
Gigantobilharzia suebica Dönges, 1964		AL	G[1]
Haematoloechus asper Looss, 1899		PC	CR[5,11], PL[13]

Table 2 continued

Valid name	Synonyms/Provisional names	Snail species*	Country** [References***]
Haematoloechus sp.		PP, PC, AL, AV, BC, GA, SN, AS	CR[2,5,11],U[8], R[4]
Haematoloechus similis (Looss, 1899)	*Skrjabinoeces similis* (Looss, 1899)	PP	CR[5]
Haematoloechus variegatus (Rudolphi, 1819)		PP, AV	G[12]
Halipegus ovocaudatus (Vulpian, 1858)		PP	PL[9]
species incertae sedis	*Hypoderaeum conoideum* (Bloch, 1782)	PP, PC, AV, GA	PL[9], CR[2]
species incertae sedis	*Moliniella anceps* (Molin, 1859)	PC, AV	CR[2]
Neodiplostomum attenuatum (Linstow, 1906)		AV, GA	G[1]
Neodiplostomum spathoides Dubois, 1937		PP	G[1]
Neoglyphe locellus (Kossack, 1910)		PC	CR[5,11], PL[13]
Notocotylus ephemera (Nitzsch, 1807)		PC	CR[5,11], PL[13], G[14]
Notocotylus noyeri Joyeux, 1922		AV, BC, AL	G[14]
Notocotylus ralli Baylis, 1936		PK	G[14]
Notocotylus regis Harwood, 1939		PP	G[14]
Notocotylus sp.		PC, GA, PP	PL[9], CR[2], U[6], R[4]
	Notocotylus sp. I (CHERNOGORENKO 1977)	PP	U[8]
Notocotylus thienemanni L. et U. Szidat 1933		PC	U[8]
Omphalometra flexuosa (Rudolphi, 1809)		PP, BC	CR[5]
?Paralepoderma sp.	*Opisthioglyphe ranae* (Fröhlich, 1791)	AV	CR[2]
Palaeorchis sp.		PP, AV	CR[2]
Parafasciolopsis fasciolaemorpha Ejsmont, 1932		PC	U[6]
Paralepoderma progenetica Büttner, 1951		PP	U[6]
Paralepoderma sp.		GA, SN, BC	CR[5]
Paramphistomum cervi (Zeder, 1970)		PP	U[8]
Parastrigea robusta Szidat, 1928		SN, PP, AV, AL., BC, GA	CR[5,11], PL[13]
Paryphostomum radiatum (Dujardin,1845)	*Paryphostomum* sp. 1 (NAŠINCOVÁ 1992)	GA, SN	CR[28]
Patagifer bilobus (Rudolphi, 1819)		PP	U[6]
Petasiger grandivesicularis Ishii, 1935		PP	B[30]
?Petasiger pungens (Linstow, 1894)	*Petasiger* sp.	PP	B[30]

Table 2 continued

Valid name	Synonyms/Provisional names	Snail species*	Country** [References***]
Posthodiplostomum brevicaudatum (Nordmann, 1832)		PP, PK	PL[3], R, G[1]
Posthodiplostomum cuticola (Nordmann, 1832)		PP, PK	CR[5,11], R, G[1], U[8]
Quinqueserialis quinqueserialis (Barker et Laughlin, 1911)		SN, AV, AL, GA	G[12], CR[5]
Rubenstrema exasperatum (Rudolphi, 1819)		PC	CR[5,11], PL[13]
Rubenstrema opisthovitellinum Soltys, 1954		PC	CR[5,11], PL[13]
Stichorchis subtriquetrus (Rudolphi, 1814)		AV	U[6]
Strigea falconis falconis Szidat, 1928		PP	G[1]
Tracheophylus sisowi Skrjabin, 1923		PP	U[6]
Tylodelphys conifera (Mehlis, 1846)		AV, BC	R[4]
Tylodelphys excavata (Rudolphi, 1803)		PC	CR[5,11], G[1], PL[3,10,13],U[6]
	Xiphidiocercaria sp. VI (CHERNOGORENKO 1977)	PC	U[8]

* PSP – *Planorbis* sp.; PP – *P. planorbis*; PK – *P. carinatus;* PM – *P. marginatus;* PS – *P. septemgyratus;* PU – *P. umbilicatus*; PC – *Planorbarius corneus*; SN – *Segmentina nitida*; ASP – *Anisus* sp.; AL – *A. leucostomus;* AS – *A. spirorbis;* AV – *A. vortex;* BC – *Bathyomphalus contortus*; *GA – Gyraulus albus,* AF – *Ancylus fluviatilis.*

** B – Bulgaria; CZ – Czech Republic; D – Denmark; F – Finland; G – Germany; GB – Great Britain; H – Holland; IC – Iceland; PL – Poland, P – Portugal; R – Russia; S – Spain; SU – Suisse.

***[1] – COMBES (1980); [2] – ŽDÁRSKÁ (1963); [3] – WIŚNIEWSKI (1958); [4] – GINETSINSKAYA (1959); [5] – NAŠINCOVÁ (1992); [6] – ZDUN (1961); [7] – CHERNOGORENKO-BIDULINA (1958); [8] – CHERNOGORENKO (1977); [9] – BERTMAN & WOJCIECHOWSKA (1974); [10] – ZDUN (1959); [11] – FALTÝNKOVÁ (2005); [12] – FALTÝNKOVÁ & HAAS (2006); [13] – ŻBIKOWSKA (2007); [14] – ODENING (1966); [15] – LÜHE (1909); [16] – WESENBERG-LUND (1934); [17] – DUBOIS (1929); [18] – DUBOIS (1934); [19] – ILES (1959); [20] – NIEWIADOMSKA (1966); [21] – BROWN (1931); [22] – BROEK (1957); [23] – WIKGREN (1956); [24] – KHALIFA (1972); [25] – KHAN (1961b); [26] – KHAN (1960a); [27] – KHAN (1962a); [28] – NAŠINCOVÁ et al. (1993); [29] – FALTÝNKOVÁ et al. (2007); [30] – KOSTADINOVA (1997); [31] – NAŠINCOVÁ & SCHOLZ (1994).

Table 3. Cercariae found in Bithyniidae from European countries

Valid name	Synonyms/Provisional names	Snail species*	Country** [References***]
Australapatemon sp.	*Apatemon gracilis* (Rudolphi, 1819)	BT	PL[1]
Asymphylodora sp.		BT	CR[2]
	Asymphylodora sp. 2 (NAŠINCOVÁ 1992)	BT	CR[3]
Catatropis verrucosa (Fröhlich 1789)		BT, BL	U[4], R[5], A, B[24]
	Cercaria acris Skworcow, 1924	BT	U[6]
	Cercaria albinea Khan, 1960	BT	GB[9,11]
	Cercaria ariformis Khan, 1962	BT	GB[10]
species incertae sedis	*Cercaria armata* Siebold, 1837	BT	G[8]
	Cercaria bithyniae Khan, 1962	BT	GB[11]
	Cercaria C (SZIDAT 1924)	BT	GB[11]
	Cercaria cordiformis Wesenberg-Lund, 1934	BT	F[7], U[4], D[12]
Sanguinicola sp.	*Cercaria cristata* La Valette, 1855	BT	PL[1], G[8]
	Cercaria curta Zdun, 1955	BT	U[6]
	Cercaria cystogenata Probert, 1965	BT	GB[14]
	Cercaria densacutis Khan, 1960	BT	GB[9]
	Cercaria dyjannae Keulen, 1981	BT	CR[3]
	Cercaria echinatoides Filippi, 1854	BT	U[6]
	Cercaria fennica I (WIKGREN 1956)	BT	F[7]
	Cercaria fennica II (WIKGREN 1956)	BT	F[7]
	Cercaria fennica V (WIKGREN 1956)	BT	F[7]
	Cercaria fulvopunctata Ercolani, 1882	BT	G[8]
	Cercaria grandis Wesenberg-Lund, 1934	BT	U[4], D[12]
	Cercaria helvetica I (DUBOIS 1929)	BT	SU[13]
	Cercaria helvetica VIII (DUBOIS 1929)	BT	SU[13]
	Cercaria helvetica IX (DUBOIS 1929)	BT	CR[3], U[4], F[7], SU[13], D[12]
	Cercaria helvetica X (DUBOIS 1929)	BT	PL[1], SU[13]
	Cercaria helvetica XI (DUBOIS 1929)	BT	GB[15], CR[3], SU[13]
	Cercaria helvetica XII (DUBOIS 1929)	BT	CR[3], SU[13]
	Cercaria helvetica XVII (DUBOIS 1929)	BT	F[7], PL[1], SU[13]
	Cercaria helvetica XVIII (DUBOIS 1929)	BT	SU[13]

Table 3 continued

Valid name	Synonyms/Provisional names	Snail species*	Country** [References***]
	Cercaria helvetica XIX (DUBOIS 1929)	BT	U[4], SU[13], D[12]
	Cercaria helvetica XXVIII (DUBOIS 1929)	BT	SU[13]
	Cercaria hirsuticauda Probert, 1966	BT	GB[16]
Notocotylus imbricatus (Looss, 1896)	*Cercaria imbricata* Looss, 1896	BT	PL[1], G[8], D[12]
	Cercaria lahtinensis Probert, 1965	BT	GB[15]
	Cercaria llangorsensis Probert, 1965	BT	GB[14]
	Cercaria lophocerca Filippi, 1857	BT, BL	GB[9,14,17], U[4,6], G[8], SU[13], D[12]
	Cercaria lorata Zdun, 1961	BT	U[4]
	Cercaria micrura Filippi, 1857	BT	PL[1], U[4], D[12]
	Cercaria minuta Probert, 1965	BT	GB[15]
	Cercaria nodosa Zdun, 1961	BT	U[4]
	Cercaria nodulosa Linstow, 1873	BT, BL	U[4,6], G[8], D[12]
	Cercaria obscura Wesenberg-Lund, 1934	BT	U[4], D[12]
	Cercaria oviformis Bidulina, 1958	BL	U[4,6]
Palaeorchis sp.	*Cercaria paludinae impurae* (Filippi, 1854)	BT	U[4,6], D[12]
	Cercaria papillosa Filippi, 1858	BT	PL[1], U[4], G[8], D[12]
	Cercaria papillosoma Khan, 1962	BT	GB[10]
	Cercaria parva Ercolani, 1881	BT	G[8]
	Cercaria parvus Khan, 1961	BT	GB[11]
	Cercaria pusilla Looss, 1896	BT	U[4,6,19], D[12]
	Cercaria spatulata Probert, 1966	BT	GB[16]
	Cercaria subulo Pagenstecher, 1857	BT	U[4]
	Cercaria tarda Khan, 1961	BT	GB[11]
	Cercaria triglandularis Probert, 1965	BT	GB[15]
	Cercaria tuberculata Filippi, 1857	BT	G[8], D[12]
	Cercaria unistoma Llewelyn, 1957	BT	GB[17]
	Cercaria vesiculosa Diesing, 1850	BT	U[4], D[12]
	Cercaria virgula Filippi, 1857	BT	Pl [1], G[8], D[12]
	Cercaria vivacis Iles, 1959	BT	GB[22]
	Cercaria vivax Sonsino, 1892	BT, BL	U[4,6], D[12]
	Cercaria 4 (PETERSEN 1931)	BT	U[4], D[12]

Table 3 continued

Valid name	Synonyms/Provisional names	Snail species*	Country** [References***]
	Cercarieum bithyneae Khan, 1962	BT	GB[11,23]
	Cercarieum helveticum I (DUBOIS 1929)	BT	SU[13]
	Cercarieum internale Khan, 1962	BT	GB[11]
Asymphylodora tincae (Modeer, 1790)	*Cercarieum* of *Asymphylodora tincae* (WIKGREN 1956)	BT	F[7]
species incertae sedis	*Cotylurus cornutus* (Rudolphi, 1808)	BT	F[7]
Cyathocotyle bithyniae Sudarikov, 1974		BT	CR[3]
Cyathocotyle bushiensis Khan, 1962		BT	GB[10], CR[3]
Cyathocotyle gravieri Mathias, 1935		BT	FR[18]
Cyathocotyle opaca (Wiśniewski, 1934)		BT	CR, R[18]
Cyathocotyle sp.		BT	PL[1]
Diplostomum petromyzi-fluviatilis Diesing, 1850		BT	GB[18]
Echinochasmus sp.		BT	CR[3]
	Gymnocephalous cercaria A (LÜHE 1909)	BT	F[7]
	Gymnocephalous cercaria B (LÜHE 1909)	BT	F[7]
	Gymnocephalous cercaria C (LÜHE 1909)	BT	F[7]
Holostephanus cobitidis Opravilova, 1968		BT	CR[18]
Holostephanus curonensis (Szidat, 1933)		BT	G[18]
Holostephanus dubinini Vojtkova, 1968		BT	CR[18]
Holostephanus luehei Szidat, 1936		BT	GB[23]
Holostephanus volgensis Sudarikov, 1962		BT	G[20], CR[18], R[21]
	Lecithodendriidae gen. sp. 1 (FALTÝNKOVÁ & HAAS 2006)	BT	G [20]
	Lecithodendriidae gen. sp. 2 (FALTÝNKOVÁ & HAAS 2006)	BT	G [20]
	Lecithodendriidae gen. sp. 3 (FALTÝNKOVÁ & HAAS 2006)	BT	G [20]
	Lecithodendriidae gen. sp. 4 (FALTÝNKOVÁ & HAAS 2006)	BT	G [20]
	Lecithodendriidae gen. sp. 5 (FALTÝNKOVÁ & HAAS 2006)	BT	G [20]
Metorchis intermedius Heinemann, 1937		BT	R[21], CR[3]
Metorchis sp.		BT	F[7]
Metorchis xanthosomus (Creplin, 1846)		BT	G[20]
Notocotylus imbricatus (Looss, 1893)		BT	R[21], CR[3]
	Notocotylus sp. I (CHERNOGORENKO 1977)	BT	U[19]
Notocotylus triserialis Diesing, 1839		BT	GB[11]

Table 3 continued

Valid name	Synonyms/Provisional names	Snail species*	Country** [References***]
Opisthorchis felineus (Rivolta, 1884)		BL	U[4]
Palaeorchis sp.		BT, BL	CR[2], R[5,21], U[19]
Parasymphylodora sp.		BT	U[19]
Pleurogenoides medians (Olsson, 1876)		BT	CR[2], U[4], R[5,21]
Prostogonimus ovatus Rudolphi, 1803		BT	GB[23]
Psilotrema simillimum (Mühling, 1898)		BT	CR[3]
Psilotrema spiculigerum (Mühling, 1898)		BT	CR[3], U[4], GB[23]
Psilotrema tuberculata Filippi, 1857		BT	R[21]
	Sanguinicola sp. II (CHERNOGORENKO 1977)	BT	U[19]
Sphaeridiotrema globulus (Rudolphi, 1819)		BT	G[20], R[21], GB[14,23], CR[3]
Sphaerostoma bramae (Müller, 1776)		BT, BL	F[7], U[19], R[5]
Sphaerostoma sp.		BT	CR[3]
	Xiphidiocercaria sp. 1 (NAŠINCOVÁ 1992)	BT	CR[3]
	Xiphidiocercaria sp. 2 (NAŠINCOVÁ 1992)	BT	CR[3]
	Xiphidiocercaria sp. 3 (NAŠINCOVÁ 1992)	BT	CR[3]
	Xiphidiocercaria sp. 4 (NAŠINCOVÁ 1992)	BT	CR[3]
	Xiphidiocercaria sp. 6 (NAŠINCOVÁ 1992)	BT	CR[3]
	Xiphidiocercaria sp. VII (CHERNOGORENKO 1977)	BT, BL	U[19]

*BT – *Bithynia tentaculata*; BL – *B. leachi*.

** A – Austria, B – Bulgaria, CZ – Czech Republic, GB – Great Britain; PL – Poland, G – Germany, R – Russia, U – Ukraine, F – Finland, FR – France, D – Denmark.

*** [1] – WIŚNIEWSKI (1958); [2] – ŽDÁRSKÁ (1963); [3] – NAŠINCOVÁ (1992); [4] – ZDUN (1961); [5] – GINETSINSKAYA (1959); [6] – CHERNOGORENKO-BIDULINA (1958); [7] – WIKGREN (1956); [8] – LÜHE (1909); [9] – KHAN (1960b); [10] – KHAN (1962b); [11] – MORLEY et al. (2004); [12] – WESENBERG-LUND (1934); [13] – DUBOIS (1929); [14] – PROBERT (1965b); [15] – PROBERT (1965a); [16] – PROBERT (1966a); [17] – PROBERT (1966b); [18] – COMBES (1980); [19] – CHERNOGORENKO (1977); [20] – FALTÝNKOVÁ & HAAS (2006); [21] – ATAEV et al. (2002); [22] – ILES (1959); [23] – MORLEY & LEWIS (2007), [24] – KANEV (1994).

Table 4. Cercariae found in Valvatidae and Viviparidae from European countries

Valid name/Classification	Synonyms/Provisional names	Snails species*	Country** [References***]
Asymphylodora sp.		VP	U[1]
Australapatemon sp.		VM	F[15]
	Cercaria abyssalis Ginetsinskaya, 1959	VP	R[10]
Echinostomatidae	*Cercaria abyssicola* Wesenberg-Lund, 1934	VP	U[3], D[12]
	Cercaria adiposa Lutta, 1934	VV	U[3,4]
	Cercaria aquatica Bidulina, 1958	VP	U[3,4]
Echinostoma bolschewense (Kotova, 1939)	*Cercaria bolschewensis* Kotova, 1939	VV	U[1,4]
	Cercaria cellulosa Looss, 1896	VV	U[3], D[12]
Sanguinicola sp.	*Cercaria cristata* La Valette, 1855	VP	U[4], G[6]
	Cercaria cristocorpa Khan, 1961	VP	GB[14]
	Cercaria gibba Wesenberg-Lund, 1934	VP	U[3], D[12]
	Cercaria longiremis Wesenberg-Lund, 1934	VP	U[3], D[12]
	Cercaria lophocerca Filippi, 1857	VP	U[1]
	Cercaria magna Pagenstecher, 1857	VV	G[6]
	Cercaria membranosa Zdun, 1961	VC	U[3]
	Cercaria microcotyla Filippi, 1854	VV, VF	G[6]
	Cercaria mona Bidulina, 1958	VV	U[3,4]
	Cercaria monostomi Linstow, 1896	VV	U[4], PL[5]
	Cercaria mutila Zdun, 1961	VV	U[3]
	Cercaria pseudogracilis Zdun, 1959	VV	PL[5]
	Cercaria pugnax La Valette, 1855	VC,VV	PL[2], U[1,3], G[6]
	Cercaria pusilla Looss, 1896	VV,VA	CR[11], PL[5], U[4]
	Cercaria subulo Pagenstecher, 1857	VV	G[6]
	Cercaria transversalis Zdun, 1961	VP	U[3]
	Cercaria trivolvis Cort, 1914	VV	U[3]
?*Ichthyocotylurus* sp.	*Cercaria valvatae* Ginetsinskaya, 1959	VP	R[10]
	Cercaria vesiculosa Diesing, 1850	VC,VV	PL[2], G[6]
	Cercaria virgula Filippi, 1857	VP	PL[9]
	Cercaria vivax Sonsino, 1892	VV	U[1,4]
	Cercaria viviparae Zdun, 1961	VV	U[3]

Table 4 continued

Valid name/Classification	Synonyms/Provisional names	Snails species*	Country** [References***]
	Cercaria viviparae secunda Bidulina, 1958	VV	U[3,4]
	Cercaria 1 (PETERSEN 1931)	VV	PL[5], U[4], D[12]
	Cotylurus variegatus (Creplin, 1825)	VP	G[13]
species incertae sedis	*Echinoparyphium aconiatum* Dietz, 1909	VV , VA	CR[11], PL[5]
Echinoparyphium mordwilkoi Skrjabin, 1915		VP	L[16]
Echinostoma bolschewense (Kotova, 1939)		VC	CR[7]
Ichthyocotylurus platycephalus (Creplin, 1825)		VP	L[16]
Ichthyocotylurus variegatus (Creplin, 1825)		VM	F[15]
Linstowiella viviparae (Linstow, 1877)		VC, VV	CR[7,8], G,PL[13], U[3,13]
Neoacanthoparyphium echinatoides (Filippi, 1854)		VC, VV	PL[2], CR[7]
species incertae sedis	*Opisthioglyphe ranae* (Fröhlich, 1791)	VV	CR[11]
Paracoenogonimus ovatus Katsurada, 1914		VC, VV	PL[2], G,R[13]
Sanguinicola sp.	*Sanguinicola inermis* Plehn, 1905	VP, VM, VL	PL[9], F[15], L[16], R[10]

* VC – *Viviparus contectus*; VV – *V. viviparus*; VA – *V. acerosus*; VF – *V. fasciatus*; VP – *Valvata piscinalis*; VL – *V. pulchella*; VM – *V. macrostoma*

** CR – Czech Republic; G – Germany; GB – Great Britain; L – Lithuania; PL – Poland; U – Ukraine.

*** [1] – CHERNOGORENKO (1977); [2] – JEŻEWSKI (2004); [3] – ZDUN (1961); [4] – CHERNOGORENKO-BIDULINA (1958); [5] – BERTMAN & WOJCIECHOWSKA (1974); [6] – LÜHE (1909); [7] – NAŠINCOVÁ (1992); [8] – NAŠINCOVÁ (1991); [9] – WIŚNIEWSKI (1958); [10] – GINETSINSKAYA (1959); [11] – ŽDÁRSKÁ (1963); [12] – WESENBERG-LUND (1934); [13] – COMBES (1980); [14] – KHAN (1961a); [15] – FALTÝNKOVÁ et al. (2007); [16] – GRABDA-KAZUBSKA & KISELIENE (1991).

Table 5. Cercariae found in other snails families from European countries

Valid name/Classification	Synonyms/Provisional names	Snails species*	Country** [References***]
	Allocreadiidae gen. sp. (FALTÝNKOVÁ & LITERÁK 2002)	BA	CR, PL, SK[13]
Apatemon gracilis (Rudolphi, 1819)		PF, AL	PL[5]
Apophallus mühlingi (Jägerskiöld, 1899)		LN	U[3]
Apophallus donicus (Skrjabin et Lindtrop, 1919)	*Rossicotrema donicum* (Skrjabin et Lindtrop, 1919)	LN	B[4]
Asymphylodora tincae (Modeer, 1790)		PF, AL	CR[16]
Australapatemon burti (Miller, 1923)		AL	CR[7]
Australapatemon minor Yamaguti, 1933		AL	G[9]
	Cercaria alia Zdun, 1961	FA, FE	U[1]
Sanguinicola sp.	*Cercaria cristata* La Valette, 1855	FA, FE, TF, LN	U[1,2]
	Cercaria curta Zdun, 1961	FA, FE	U[1,2]
	Cercaria furcillata Zdun, 1961	PF	U[1]
	Cercaria fuscicaudata Zdun, 1961	FA, FE	U[1,2]
	Cercaria gerula Zdun, 1961	LN	U[1]
	Cercaria illa Zdun, 1961	LN	U[1]
	Cercaria lophocerca Filippi, 1857	FA, FE, LN	U[1,2]
	Cercaria micrura Filippi, 1857	TF, LN	U[2]
	Cercaria monostomi Linstow, 1896	FA, FE, TF, LN	U[1,2]
	Cercaria myzura Pagenstecher, 1857	TF, LN	U[1,2]
	Cercaria nodulosa Linstow, 1873	FE, LN	U[2]
	Cercaria nuda Zdun, 1961	LN	U[1]
	Cercaria octava Zdun, 1951	LN	U[2]
	Cercaria oviformis Bidulina, 1958	FA, LN	U[2]
	Cercaria prima Sinitzin, 1905	AH	G[10], SU[11]
	Cercaria pulsans Zdun, 1961	FA	U[1,2]
	Cercaria saga Zdun, 1961	LN	U[1]
	Cercaria stepha Zdun, 1961	LN	U[1]
	Cercaria styriensis Zdun, 1961	PF	U[1]
	Cercaria subulo Pagenstecher, 1857	FA, FE	U[1]
	Cercaria 1 (PETERSEN 1931)	PF	CR[6], D[12]
	Cotylurus cornutus (Rudolphi, 1808)	PF	CR[6]
Crowcrocoecum skrjabini (Iwanitzky, 1928)		LN	U[3]
species incertae sedis	*Echinoparyphium aconiatum* Dietz, 1909	PF	CR[6]
species incertae sedis	*Echinoparyphium recurvatum* (Linstow, 1873)	PF	CR[6,7]

Table 5 continued

Valid name/Classification	Synonyms/Provisional names	Snails species*	Country** [References***]
species incertae sedis	*Echinostoma revolutum* (Fröhlich, 1802)	PF	CR[6]
Echinostoma sp.		PF, AL	CR[7]
	Furcocercaria sp. III (CHERNOGORENKO 1977)	LN	U[3]
species incertae sedis	*Hypoderaeum conoideum* (Bloch, 1782)	PF	CR[6]
	Lecithodendriidae gen. sp. 1 (FALTÝNKOVÁ & LITERÁK 2002)	BA	CR, PL, SK[13]
	Lecithodendriidae gen. sp. 2 (FALTÝNKOVÁ & LITERÁK 2002)	BA	CR, PL, SK[13]
	Lecithodendriidae gen. sp. 3 (FALTÝNKOVÁ & LITERÁK 2002)	BA	CR, PL, SK[13]
	Lecithodendriidae gen. sp. 4 (FALTÝNKOVÁ & LITERÁK 2002)	BA	CR, PL, SK[13]
	Lecithodendriidae gen. sp. 5 (FALTÝNKOVÁ & LITERÁK 2002)	BA	CR, PL, SK[13]
	Microphallidae gen. sp. (FALTÝNKOVÁ & LITERÁK 2002)	BA	CR, PL, SK[13]
	Nanophyetidae gen. sp. (FALTÝNKOVÁ & LITERÁK 2002)	BA	CR, PL, SK[13]
	Notocotylus sp. I (CHERNOGORENKO 1977)	LN	U[3]
Notocotylus ephemera (Nitzsch, 1807)		PF	G[8], PL[5]
Notocotylus pacifer (Noble, 1933)		PF	G[8]
Notocotylus sp.		PF	CR[7]
species incertae sedis	*Opisthioglyphe ranae* (Fröhlich, 1791)	PF	CR[6]
	Opisthorchioidea gen. sp. (FALTÝNKOVÁ & LITERÁK 2002)	BA	CR, PL, SK[13]
Palaeorchis sp.		PF, LN	CR[6], B[4], U[3]
Pleurogenoides sp.		LN	U[3]
Posthodiplostomum brevicaudatum (Nordmann, 1832)		PF	PL[5]
Sanguinicola sp.		PA	FR[14], PL[15]
	Sanguinicola sp. I (CHERNOGORENKO 1977)	LN	U[3]
Sphaerostoma bramae (Müller, 1776)		LN	B[4], U[3]
	Troglotrematidae gen. sp. (FALTÝNKOVÁ & LITERÁK 2002)	BA	CR, PL, SK[13]
	Xiphidiocercaria sp. I (CHERNOGORENKO 1977)	LN	U[3]

* Melanopsidae: FA – *Fagotia acicularis*, FE – *F. esperi*; Neritidae: TF – *Theodoxus fluviatilis*; Physidae: PF – *Physa fontinalis*; AH – *Aplexa hypnorum*; Acroloxidae: AL – *Acroloxus lacustris*; Hydrobiidae: BA – *Bythinella austriaca*; LN – *Lithoglyphus naticoides*, PA – *Potamopyrgus antipodarum*.

** B – Belarus; CR – Czech Republic; FR – France; G – Germany; IC – Iceland; N – Norway; PL – Poland; SK – Slovakia; U – Ukraine.

*** [1] – ZDUN (1961); [2] – CHERNOGORENKO-BIDULINA (1958); [3] – CHERNOGORENKO (1977); [4] – MASTITSKY (2007) [5] – WIŚNIEWSKI (1958); [6] – ŽDÁRSKÁ (1963); [7] – NAŠINCOVÁ (1992); [8] – ODENING (1966); [9] – COMBES (1980); [10] – LÜHE (1909); [11] – DUBOIS (1929); [12] – WESENBERG-LUND (1934); [13] FALTÝNKOVÁ & LITERÁK (2002); [14] – GÉRARD et al. (2003); [15] – ŻBIKOWSKI & ŻBIKOWSKA (2009); [16] – NAŠINCOVÁ & SCHOLZ (1994).

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