

Short communication: An overview of the trematodes fauna of pool frog *Pelophylax lessonae* (Camerano, 1882) in the Volga Basin, Russia: 1. Adult stages

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Abstract. Chikhlyayev IV, Ruchin AB, Fayzulin AI. 2018. Short communication: An overview of the trematodes fauna of pool frog *Pelophylax lessonae* (Camerano, 1882) in the Volga Basin, Russia: 1. Adult stages. *Nusantara Bioscience* 10: 256-262. The paper presents data on fauna of trematodes of a pool frog *Pelophylax lessonae* (Camerano, 1882) from 13 regions of the Volga basin (Russia). It consolidates data from different authors over the past 80 years, supplemented by our own research results. There are authentically known findings of 19 trematodes species at an adult stage of development. Three species of trematodes make the basis of helminth fauna: *Pneumonoeces variegatus*, *Opisthioglyphe ranae* and *Diplodiscus subclavatus*. By all species of helminths the following data are provided: taxonomic position, localization, area of detection, biology, definitive hosts, geographic distribution and the degree host-specificity.

Keywords: Adult stages, *Pelophylax lessonae*, pool frog, trematodes, Volga basin

INTRODUCTION

The pool frog *Pelophylax lessonae* (Camerano, 1882) (Amphibia: Anura) is a common in Europe from Southern France in the west to Tatarstan and Bashkortostan (Russia) in the east (Borkin et al. 1987; Hotz et al. 2008; Hofman et al. 2012; Dedukh et al. 2015; Fayzulin et al. 2018; Zeisset, Hoogesteger 2018). It inhabits deciduous and mixed forests, where it prefers shallow, overgrown standing reservoirs: lakes, ponds, oxbow lakes, swamps; it rarely occurs in shallow waters of rivers and streams, in floodplains and islands. The pool frog penetrates into the forest-steppe and steppe zones passing thickets of riverine shrubs and afforested floodplains of rivers. It is common in anthropogenic landscapes, where it inhabits temporary and drying out reservoirs: ruts, roadside pits, ditches, and quarries with water. Pool frogs are carnivorous animals, eating mainly different classes of terrestrial and aquatic invertebrates (insects, spiders, centipedes, crustaceans, gastropods, oligochaetes); rarely - vertebrates (fish fry, tadpoles and amphibian yearlings) animals (Kuzmin 2012). A wide range of food, intra- and inter-species cannibalism affect the pool frog infected by various species of the trematodes at the adult stage of development (marita). The trematodes are known to develop with an obligate change of hosts and therefore can serve as bioindicators of the trophic relationships of amphibians in the biocoenosis.

This paper continues a series of publications devoted to the modern characterization of the helminth fauna of amphibians in the Volga basin (Ruchin et al. 2009, 2016; Reshetnikov et al. 2013; Chikhlyayev, Ruchin 2014;

Chikhlyayev et al. 2016b, 2018). This study aimed to present a review on fauna of adult stages of trematodes of a pool frog from Volga basin based on our researches and literature.

MATERIALS AND METHODS

In the period from 1936 to 2016, many authors had examined 1,460 specimens of pool frog from 13 regions of the Volga basin, Russia Federation among which are: Kaluga, Moscow, Ivanovo, Kostroma, Nizhny Novgorod, Tambov, Ulyanovsk and Samara regions, the Republics of Mordovia, Chuvashia, Mari El, Tatarstan and Bashkortostan. For species determination of trematodes, we used reports of K.M. Ryzhikov et al. (1980). At distribution on taxons adhered to the modern data on a systematics of trematodes (Keys to the Trematoda, 2002, 2008) and given the website "Fauna Europaea" (<http://www.fauna-eu.org>).

RESULTS AND DISCUSSION

In total in the pool frog on the territory of Volga basin there are registered 19 species of trematodes at an adult stage of development, belonging to 13 genera, 7 families and 3 orders (Table 1). Of these, 11 species are broadly specific, polyhostal parasites of anurans and 8 are specific, oligohostal for Ranidae family. Among all trematodes, 15 species use frogs as obligatory definitive (final) hosts.

Other 4 species (*G. vitelliloba*, *H. cylindracea*, *D. rastellus*, *O. ranae*) combine different stages of development in one individual or individuals of different ages, and use amphibians as amphyxenic, and the latter two species, also as post-cyclic hosts.

The annotated list of pool frog trematodes species with an indication of their systematic position, localization, areas of detection, biology, degree of parasites host-specificity and geographic distribution is given below. Also, the list of their definitive hosts in Russia is indicated, corrected according to literary analysis (Ryzhikov et al. 1980; Kostyunin 2010; Chikhlyayev et al. 2012a, b; Kirillov et al. 2012, 2018; Kuzmin 2012). The sign “?” marked the single finds of helminths at final hosts demanding confirmation.

Class: Trematoda Rudolphi, 1808

Order: Hemiurida Skrjabin et Guschanskaja, 1956

Family: Derogenidae Nicoll, 1910

Halipegus ovocaudatus (Vulpian, 1859)

Localization: oral cavity.

Areas of detection: Moscow, Nizhny Novgorod and Samara regions, the Republic of Tatarstan.

Biology: Widely specific parasite of anurans. Tetraxenic life cycle. Intermediate host - gastropod mollusks genus *Planorbis*; first additional hosts - cyclops genus *Macrocyclus*; second additional hosts - dragonflies of different genera (Kechemir 1976).

Definitive hosts: *Pelophylax ridibundus* (Pallas, 1771), *Pelophylax lessonae* (Camerano, 1882), *Rana arvalis* Nilsson, 1842, *Rana temporaria* Linnaeus, 1758, *Bombina bombina* (Linnaeus, 1761), *Triturus cristatus* (Laurenti, 1768) (rarely) (Vojtkova, Roca 1994; Chikhlyayev et al. 2012a, b; Kuzmin 2012).

Distribution: Europe.

Order: Paramphistomida Skrjabin et Schulz, 1937

Family: Diplodiscidae Cohn, 1904

Diplodiscus subclavatus (Pallas, 1760)

Localization: rectum, small intestine.

Areas of detection: Moscow, Ivanovo, Nizhny Novgorod, Tambov and Samara regions, the Republics of Mordovia, Chuvashia, Mari El, Tatarstan and Bashkortostan.

Biology: Widely specific parasite of amphibians. Dixenic life cycle. Intermediate hosts - gastropods genus *Planorbis*; less often - genera *Anisus*, *Viviparus* and *Segmentina*. Additional hosts are absent (Skryabin 1949).

Definitive hosts: *P. ridibundus*, *P. lessonae*, *Pelophylax esculentus* (Linnaeus, 1758), *Pelophylax nigromaculatus* (Hallowell, 1861), *R. arvalis*, *R. temporaria*, *Rana macrocnemis* Boulenger, 1885, *Rana amurensis* Boulenger, 1886, *Rana dybowskii* Guenther, 1876, *B. bombina*, *Pelobates fuscus* (Laurenti, 1768), *Hyla arborea* (Linnaeus, 1758), *Hyla orientalis* Bedriaga, 1890, *Bufo bufo* (Linnaeus, 1758), *Bufotes viridis* (Laurenti, 1768), *Lissotriton vulgaris* (Linnaeus, 1758), *T. cristatus*

(Vojtkova, Roca 1994; Chikhlyayev et al. 2012a, b; Kuzmin 2012).

Distribution: cosmopolite.

Order: Plagiorchiida La Rue, 1957

Family: Gorgoderidae Looss, 1899

Gorgodera cygnoides (Zeder, 1800)

Localization: bladder.

Areas of detection: Ivanovo and Nizhny Novgorod regions, the Republics of Mordovia, Tatarstan and Bashkortostan.

Biology: Widely specific parasite of anurans. Trixenic life cycle. Intermediate hosts - bivalve molluscs of genera *Cyclas*, *Pisidium* and *Sphaerium*; additional hosts - dragonfly of different species, cyclops genus *Mesocyclops* (Pigulevsky 1952).

Definitive hosts: *P. ridibundus*, *P. lessonae*, *R. arvalis*, *R. temporaria*, *R. macrocnemis*, *B. bombina*, *P. fuscus*, *Bufo calamita* Laurenti, 1768, *B. viridis*, *H. arborea*, *H. orientalis* (Vojtkova, Roca 1994; Chikhlyayev et al. 2012a, b; Kuzmin 2012).

Distribution: Palearctic.

Gorgodera loossi Sinitzin, 1905

Localization: bladder.

Area of detection: Republic of Bashkortostan.

Biology: Specific parasite of water frogs. Trixenic life cycle. Intermediate hosts - bivalve mollusks genus *Sphaerium*; additional hosts - dragonflies of genera *Agrion* and *Epiteca* (Pigulevsky 1952).

Definitive hosts: *P. ridibundus*, *P. lessonae* and *R. temporaria* (?) (Vojtkova, Roca 1994; Chikhlyayev et al. 2012a, b; Kuzmin 2012).

Distribution: Europe.

Gorgodera microovata Fuhrmann, 1924

Localization: bladder.

Areas of detection: Nizhny Novgorod region, the Republics of Mordovia and Tatarstan.

Biology: Specific parasite of frogs. The life cycle has not been studied.

Definitive hosts: *P. ridibundus*, *P. lessonae*, *P. esculentus*, *R. arvalis*, *R. temporaria*, *Rana asiatica* Bedriaga, 1898 (Vojtkova, Roca 1994; Chikhlyayev et al. 2012a, b; Kuzmin 2012).

Distribution: Europe.

Gorgodera pagenstecheri Sinitzin, 1905

Localization: bladder.

Areas of detection: Nizhny Novgorod and Samara regions, the Republics of Mari El and Tatarstan.

Biology: Specific parasite of frogs. Trixenic life cycle. Intermediate hosts - bivalve mollusks genera *Sphaerium* and *Pisidium*; additional hosts - dragonfly of different species, caddisflies genus *Limnophilus* (Pigulevsky 1952).

Definitive hosts: *P. ridibundus*, *P. lessonae*, *R. arvalis*, *R. temporaria*, *R. macrocnemis* (Vojtkova, Roca 1994; Chikhlyayev et al. 2012a, b; Kuzmin 2012).

Distribution: Palearctic.

Gorgodera varsoviensis Sinitzin, 1905

Localization: bladder.

Areas of detection: Moscow, Kostroma, Nizhny Novgorod and Samara regions, the Republic of Tatarstan.

Biology: Specific parasite of frogs. Trixenic life cycle. Intermediate host - bivalve mollusks genus *Sphaerium*; additional hosts - dragonfly of different species, caddisflies genus *Limnophilus* (Pigulevsky 1952).

Definitive hosts: *P. ridibundus*, *P. lessonae*, *P. esculentus*, *R. arvalis*, *R. temporaria* (Vojtkova, Roca 1994; Chikhlyayev et al. 2012a, b; Kuzmin 2012).

Distribution: Europe.

Gorgoderina vitelliloba (Olsson, 1876)

Localization: bladder.

Areas of detection: Nizhny Novgorod and Samara regions.

Biology: Widely specific parasite of anurans. Trixenic life cycle. Intermediate hosts - bivalve mollusks genera *Sphaerium*, *Pisidium* and *Musculium*; additional hosts - the tadpoles, alderflies genus *Sialis* (Pigulevsky 1953).

Definitive hosts: *P. ridibundus*, *P. lessonae*, *P. esculentus*, *R. arvalis*, *R. temporaria*, *R. macrocnemis*, *B. bombina* (Vojtkova, Roca 1994; Chikhlyayev et al. 2012a, b; Kuzmin 2012).

Distribution: Palearctic.

Family: Plagiorchiidae Luhe, 1901

Haplometra cylindracea (Zeder, 1800)

Localization: lungs.

Areas of detection: Moscow, Ivanovo, Kostroma and Nizhny Novgorod regions.

Biology: Specific parasite of frogs. Trixenic life cycle. Intermediate hosts - gastropod mollusks genus *Lymnaea*; additional hosts - tadpoles (Grabda-Kazubskaya 1970; Dobrovolsky, Raikhel 1973).

Definitive hosts: *P. ridibundus*, *P. lessonae*, *R. arvalis*, *R. temporaria*, *R. macrocnemis*, *R. amurensis*, *B. bombina* (?), *B. viridis* (Vojtkova, Roca 1994; Chikhlyayev et al. 2012a, b; Kuzmin 2012).

Distribution: Palearctic.

Family: Telorchiidae Looss, 1899

Dolichosaccus rastellus (Olsson, 1876)

Localization: small intestine.

Area of detection: Kostroma region.

Biology: Specific parasite of frogs. Trixenic life cycle. Intermediate hosts - gastropod mollusks genus *Lymnaea*; additional hosts - tadpoles of frogs (Grabda-Kazubskaya 1969; Kalabekov 1976).

Definitive hosts: *P. ridibundus* (?), *P. lessonae* (?), *R. arvalis*, *R. temporaria*, *R. macrocnemis*, *R. asiatica*, *R. amurensis*, *R. dybowskii* (Vojtkova, Roca 1994; Chikhlyayev et al. 2012a, b; Kuzmin 2012).

Distribution: Palearctic.

Opisthioglyphe ranae (Frohlich, 1791)

Localization: small intestine.

Areas of detection: Kaluga, Moscow, Ivanovo, Kostroma, Nizhny Novgorod, Tambov and Samara regions, the Republics of Mordovia, Chuvashia and Tatarstan.

Biology: Widely specific parasite of amphibians. Trixenic life cycle. Intermediate hosts - gastropod mollusks genus *Lymnaea*; additional hosts - gastropods family Lymnaeidae and juvenile of amphibians (Dobrovolsky 1965a; Grabda-Kazubskaya 1969).

Definitive hosts: *P. ridibundus*, *P. lessonae*, *P. esculentus*, *R. arvalis*, *R. temporaria*, *R. macrocnemis*, *R. amurensis*, *B. bombina*, *P. fuscus*, *H. arborea*, *H. orientalis*, *B. bufo*, *B. viridis*, *T. cristatus*, *L. vulgaris*, *Lissotriton montandoni* (Boulenger, 1880), *Salamandrella keyserlingii* Dybowski, 1870 (Vojtkova, Roca 1994; Chikhlyayev et al. 2012a, b; Kuzmin 2012).

Distribution: Palearctic.

Family: Haematoloechidae Freitas et Lent, 1939

Pneumonoeces variegatus (Rudolphi, 1819)

Syn.: *Haematoloechus variegatus* (Rudolphi, 1819)

Localization: lungs.

Areas of detection: Kaluga, Moscow, Ivanovo, Kostroma, Nizhny Novgorod, Tambov and Samara regions, the Republics of Mordovia, Chuvashia, Mari El, Tatarstan and Bashkortostan.

Biology: Widely specific parasite of anurans. Trixenic life cycle. Intermediate hosts - gastropod mollusks of different species; additional hosts - dipterans genera *Anopheles* and *Culex* (Skryabin, Antipin 1962).

Definitive hosts: *P. ridibundus*, *P. lessonae*, *P. esculentus*, *R. arvalis*, *R. temporaria*, *R. asiatica*, *R. amurensis*, *B. bombina*, *P. fuscus* (rarely), *B. bufo*, *B. viridis* (rarely) (Vojtkova, Roca 1994; Chikhlyayev et al. 2012a, b; Kuzmin 2012).

Distribution: Palearctic.

Pneumonoeces asper (Looss, 1899)

Syn.: *Haematoloechus asper* Looss, 1899

Localization: lungs.

Areas of detection: Moscow, Ivanovo, Kostroma, Nizhny Novgorod, Ulyanovsk and Samara regions, the Republics of Chuvashia and Tatarstan.

Biology: Specific parasite of frogs. Trixenic life cycle. Intermediate host - gastropod mollusks genus *Planorbis*; additional hosts - dragonflies genera *Calopteryx*, *Agrion* and *Lestes* (Dobrovolsky 1965b).

Definitive hosts: *P. ridibundus*, *P. lessonae*, *P. esculentus*, *R. arvalis*, *R. temporaria*, *B. bombina* (Vojtkova, Roca 1994; Chikhlyayev et al. 2012a, b; Kuzmin 2012).

Distribution: Europe.

Skrjabinoeces similis (Looss, 1899)

Syn.: *Skrjabinoeces volgensis* Sudarikov, 1950

Localization: lungs.

Areas of detection: Kaluga, Moscow, Ivanovo, Kostroma, Nizhny Novgorod and Samara regions, the Republics of Mordovia, Tatarstan and Bashkortostan.

Biology: Specific parasite of frogs. Trixenic life cycle. Intermediate hosts - gastropod mollusks genera *Planorbis*, *Anisus* and *Coretus*; additional hosts - dragonfly of different species (Grabda 1960).

Definitive hosts: *P. ridibundus*, *P. lessonae*, *P. esculentus*, *R. arvalis*, *R. temporaria* (Vojtkova, Roca 1994; Chikhlyayev et al. 2012a, b; Kuzmin 2012).

Distribution: Palearctic.

Skrjabinoeces breviansa Sudarikov, 1950

Localization: lungs.

Areas of detection: Nizhny Novgorod, Ulyanovsk and Samara regions.

Biology: Specific parasite of frogs. The life cycle has not been studied.

Definitive hosts: *P. ridibundus*, *P. lessonae* (Vojtkova, Roca 1994; Chikhlyayev et al. 2012a, b; Kuzmin 2012).

Distribution: Europe.

Family: Pleurogenidae Looss, 1899

Pleurogenes claviger (Rudolphi, 1819)

Localization: small intestine.

Areas of detection: Moscow, Ivanovo, Kostroma, Nizhny Novgorod, Tambov and Samara regions, the Republics of Mordovia and Tatarstan.

Biology: Widely specific parasite of amphibians. Trixenic life cycle. Intermediate hosts - gastropod mollusks genus *Bithynia*; additional hosts - dragonflies, caddisflies, beetles, mayflies, alderflies, as well isopod and amphipod crustaceans genera *Asellus*, *Gammarus* and *Pontogammarus* (Khotenovsky 1970; Grabda-Kazubskaya 1971).

Definitive hosts: *P. ridibundus*, *P. lessonae*, *P. esculentus*, *R. arvalis*, *R. temporaria*, *R. macrocnemis*, *B. bombina*, *P. fuscus*, *H. arborea*, *H. orientalis*, *B. bufo*, *B. viridis*, *L. vulgaris*, *T. cristatus*, *L. montandoni* (Vojtkova, Roca 1994; Chikhlyayev et al. 2012a, b; Kuzmin 2012).

Distribution: cosmopolite.

Brandesia turgida (Brandes, 1888)

Localization: pouch-like herniations (diverticules) in the wall of the duodenum.

Areas of detection: Nizhny Novgorod and Samara regions, the Republics of Mordovia, Chuvashia and Tatarstan.

Biology: Specific parasite of frogs. The life cycle has not been studied.

Definitive hosts: *P. ridibundus*, *P. lessonae*, *R. arvalis* (rarely), *R. temporaria* (rarely) (Vojtkova, Roca 1994; Chikhlyayev et al. 2012a, b; Kuzmin 2012).

Distribution: Palearctic.

Pleurogenoides medians (Olsson, 1876)

Localization: small intestine.

Areas of detection: Kaluga, Moscow, Kostroma, Nizhny Novgorod and Samara regions, the Republics of Mordovia, Chuvashia, Tatarstan and Bashkortostan.

Biology: Widely specific parasite of anurans. Trixenic life cycle. Intermediate hosts - gastropod mollusks genera

Bithynia, *Lymnaea* and *Planorbarius*; additional hosts - aquatic arthropods: dragonflies, caddisflies, mayflies, beetles, alderflies, dipterans of different species, amphipods and isopods crustaceans genus *Asellus* (Khotenovsky 1970).

Definitive hosts: *P. ridibundus*, *P. lessonae*, *P. esculentus*, *R. arvalis*, *R. temporaria*, *R. amurensis*, *B. bombina*, *P. fuscus*, *H. arborea*, *H. orientalis*, *B. bufo*, *B. viridis*, *L. vulgaris*, *T. cristatus* (Vojtkova, Roca 1994; Chikhlyayev et al. 2012a, b; Kuzmin 2012).

Distribution: Palearctic.

Prosotocus confusus (Looss, 1894)

Localization: stomach, small intestine.

Areas of detection: Moscow, Ivanovo, Kostroma, Nizhny Novgorod, Tambov and Samara regions, the Republics of Mordovia, Chuvashia and Tatarstan.

Biology: Widely specific parasite of anurans. Trixenic life cycle. Intermediate hosts - gastropod mollusks genera *Bithynia* and *Codiella*; additional hosts - aquatic arthropods: dragonflies, beetles, caddisflies, mayflies, alderflies of different species and amphipods genus *Gammarus* (Shevchenko, Vergun 1961; Khotenovsky 1970).

Definitive hosts: *P. ridibundus*, *P. lessonae*, *P. esculentus*, *R. arvalis*, *R. temporaria*, *B. bombina*, *P. fuscus*, *B. bufo*, *B. viridis* (Vojtkova, Roca 1994; Chikhlyayev et al. 2012a, b; Kuzmin 2012).

Distribution: Palearctic.

The largest species diversity of trematodes was recorded in pool frogs in Nizhny Novgorod (17 species) and Samara (14) regions, the Republic of Tatarstan (14); less diverse species composition registered in Moscow (11), Kostroma (10) and Ivanovo (9) regions, the Republics of Mordovia (10); the minimum - in the Republic of Chuvashia (7) and Bashkortostan (6), Tambov (5) and Kaluga (4) regions, the Republic of Mari El (3) and Ulyanovsk (2) region (Table 1). These distinctions have biotopical character, that is, depend on a variety of conditions of dwelling in different a biotope with the individual complex abiotic (type and character of reservoir) and biotic (composition of flora, invertebrates and vertebrates) factors. Also, they can be bound to the geographic location, level of anthropogenic influence and a difference in volumes of frogs samplings.

The trematodes composition of the pool frog strongly differs in the Volga basin. Of the recorded 19 species any is not noted in all regions. Other species the trematode of *P. variegatus* found in 12 regions of 13 examined meets more often. Two more species (*D. subclavatus*, *O. ranae*) were detected at 10 regions, and 5 species (*P. asper*, *S. similis*, *P. claviger*, *P. medians*, *P. confusus*) at 8-9 regions. Other species in the habitat range of this host were less common, and their findings were of a sporadic nature. The rest of the trematodes, in particular, *G. loossi*, *G. vitelliloba* and *D. rastellus*, were found locally and they were observed in 1-2 regions (Table 1).

The development of the trematodes species registered at the marita stage in the pool frog in the biocoenosis of the

Volga basin proceeds on 6 types and 2 subtypes from 3 groups of life cycles. The greatest part circulates on complex - trixenic (15 species); a smaller one - on dixenic (1) and tetra-xenic (1) - cycles. The development cycles of two trematodes species (*S. breviansa*, *B. turgida*) are unknown. Species with known life cycles develop with involvement of gastropods (11 species) and bivalve (6) mollusks as intermediate hosts; insects (12), crustaceans (4) and young (tadpoles and yearlings) amphibians (4) - in the role of additional hosts.

The helminth fauna of amphibians depends on their way of life, the nature of a biotope, stay duration in water

and food spectrum. The pool frog helminths composition in the Volga basin for 50% is presented by adult stages of trematodes. Another 50% are necessary on nematodes, monogeneans and larval stages of trematodes. The reason for this is the semi-aquatic life style and consumption of aquatic invertebrates - additional hosts of trematodes. Invermination indices with many of them are usually relatively low, due to the narrow biotopic specialization of the amphibians inhabiting forest reservoirs. In these conditions, separate species (*P. variegatus*, *O. ranae*, *D. subclavatus*), can often occur and be ordinary (background) parasites of the pool frog.

Table 1. Adult stages of trematodes of a pool frog *Pelophylax lessonae* in the Volga basin regions

Trematodes species	KL	MS	IV	KS	NN	TM	UL	SM	MR	CH	ME	TT	BS
Class Trematoda Rudolphi, 1808													
Order Hemiurida Skrjabin et Guschanskaja, 1956													
Family Derogenidae Nicoll, 1910													
<i>Halipegus ovocaudatus</i>		+			+			+				+	
Order Paramphistomida Skrjabin et Schulz, 1937													
Family Diplodiscidae Cohn, 1904													
<i>Diplodiscus subclavatus</i>		+	+		+	+		+	+	+	+	+	+
Order Plagiorchiida La Rue, 1957													
Family Gorgoderidae Looss, 1899													
<i>Gorgodera cygnoides</i>			+		+				+			+	+
<i>Gorgodera loossi</i>													+
<i>Gorgodera microovata</i>					+				+			+	
<i>Gorgodera pagenstecheri</i>					+			+			+	+	
<i>Gorgodera varsoviensis</i>		+		+	+			+				+	
<i>Gorgoderina vitelliloba</i>					+			+					
Family Plagiorchiidae Luhe, 1901													
<i>Haplometra cylindracea</i>		+	+	+	+								
Family Telorchidae Looss, 1899													
<i>Dolichosaccus rastellus</i>				+									
<i>Opisthioglyphe ranae</i>	+	+	+	+	+	+		+	+	+		+	
Family Haematoloecidae Freitas et Lent, 1939													
<i>Pneumonoeces variegatus</i>	+	+	+	+	+	+		+	+	+	+	+	+
<i>Pneumonoeces asper</i>		+	+	+	+		+	+		+		+	
<i>Skrjabinoeces similis</i>	+	+	+	+	+			+	+			+	+
<i>Skrjabinoeces breviansa</i>					+		+	+					
Family Pleurogenidae Looss, 1899													
<i>Brandesia turgida</i>					+			+	+	+		+	
<i>Pleurogenes claviger</i>		+	+	+	+	+		+	+			+	
<i>Pleurogenoides medians</i>	+	+		+	+			+	+	+		+	+
<i>Prosotocus confusus</i>		+	+	+	+	+		+	+	+		+	
Species in total	4	11	9	10	17	5	2	14	10	7	3	14	6
Examined, specimens	22	121	132	134	418	40	17	203	53	38	8	257	17

Note: KL: Kaluga region (Chikhlyayev et al. 2016a); MS: Moscow region (Kotova 1936); IV: Ivanovo region (Kirillova 2002; Kirillova, Egorov 2002); KS: Kostroma region (Radchenko, Budalova 1980); NN: Nizhny Novgorod region (Sudarikov 1950, 1951; Borisova 1988; Nosova 1983, 1985, 1990, 1993; our data); TM: Tambov region (Rezvantseva, Chikhlyayev 2005; Kolodina et al. 2016); UL: Ulyanovsk region (Indiryakova et al. 2008); SM: Samara region (Evlanov et al. 2001, 2002; Chikhlyayev 2004, 2009, 2017; Fayzulin et al. 2013; Kirillov et al., 2018; our data); MR: Republic of Mordovia (Chikhlyayev et al. 2015; Ruchin et al. 2016; our data); CH: Republic of Chuvashia (Chikhlyayev, Fayzulin 2015; our data); ME: Republic of Mari El (our data); TT: Republic of Tatarstan (Smirnova 1968, 1970; Smirnova, Sizova 1978; Smirnova et al. 1987; Shaldybin 1974, 1977; our data); BS: Republic of Bashkortostan (Ayupov et al. 1974; Bayanov 1992; Yumagulova 2000)

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