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PARASITIC FAUNA OF BURBOT, *LOTA LOTA* (L.)
IN THE LAKE DĄBIE

PARAZYTOFAUNA MIĘTUSA – *LOTA LOTA* (L.) Z JEZIORA DĄBIE

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The fish individuals examined were found to contain 22 parasitic species belonging to six higher taxa. The location on host and the extent of invasion are given. Five of the species found proved new for the fauna of Poland; 8 species have not been so far found in burbot in Poland. One of the species has not been recorded in the literature as a burbot parasite.

INTRODUCTION

Most literature data on the burbot parasitic fauna are based on a small number of fish examined. Šulman and Černyševa (1969) examined 15 individuals from the Lake Seliger (USSR) and found 28 parasitic species, the number being dominated by protozoans, trematodes, and nematodes. Kulakovskaya and Koval (1973) listed 14 species in the Danube basin, while Mitenev (1971, 1983) described the *Myxosporidia* of the host in question from the Kola Peninsula.

In the Polish literature, Ejsymont (1970) treated the burbot parasites most comprehensively. He examined 51 fish individuals caught in the river Biebrza, and found 15 parasitic species of various higher taxa. Five of them were considered typical of the host species, while 9 turned out to be new among the burbot parasites in Poland.

A relatively large number of fish individuals (70) was examined by Skóra (1965) in the Goczałkowice reservoir. His paper concerned mainly the burbot biology, the parasitic fauna being treated in a general way only. Of the parasites found in burbot from that region, it is interesting to note numerous *Trichodina* sp. on the gills, *Diplostomum spathaceum* and *Tylodelphys clavata* in the eyes, and numerous acanthocephalans in the intestine. Kozicka and Niewiadomska (1960) who studied biology and taxonomy of the *Tylodelphys trematodes* in the Lake Mamry, found them in burbot, too. Grabda (1961), when working on the brook Trzebiocha fish health, found three burbot to have a mixed parasitic fauna. Grabda et al. (1961) examined 8 individuals from the Lake Wdzydze and found them to contain *Diplostomum spathaceum*, *Camallanus lacustris*, and *Acanthocephalus lucii*. Remarks on parasites of the host discussed are given also by Kozicka (1959) working on the Lake Drużno and by Dąbrowska (1970) in the Vistula near Warsaw.

So far, the health state of burbot in the north-western part of Poland has not been studied; the present paper is therefore aimed at examining the parasitic fauna of this fish species in the Lake Dąbie.

MATERIALS AND METHODS

The materials were collected in spring and autumn 1981 and 1984. The fish individuals were caught from the Lake Dąbie, in the vicinity of Szczecin, the lake having a direct connection with the terminal (mouth) part of the River Odra. A total of 33 individuals whose weight and total length ranged within 300–1400 g and 38–54 cm, respectively, were examined.

Parasitologic dissections were made on fresh materials. In each fish the skin, fins, gills, eyes, body cavity, intestine, and internal organs (heart, liver, gall bladder, kidney, spleen, swimming bladder, and urinary bladder) as well as muscles were examined. The parasites found were fixed using 75% ethyl alcohol for cestodes and trematodes and 10% formalin – physiological fluid solution for nematodes and acanthocephalans. The parasites in permanent mounts were stained with alum carmine (trematodes, acanthocephalans) or in borax carmine (cestodes). Nematodes and some acanthocephalans were identified in temporary, glycerine mounts. Smears were made to examine protozoans; they were then May-Grünwald and Giemsa stained (Pappenheim's technique) and AgNO_3 covered; some protozoans were identified in fresh materials.

RESULTS AND DISCUSSION

The Lake Dąbie burbot parasitic fauna was found to contain a total of 22 species belonging to the *Protozoa* (6 species), *Cestoda* (2), *Trematoda* (6), *Nematoda* (3), *Acanthocephala* (3), *Mollusca* (1), and *Crustacea* (1). The infestation in the fish species examined was usually not very strong.

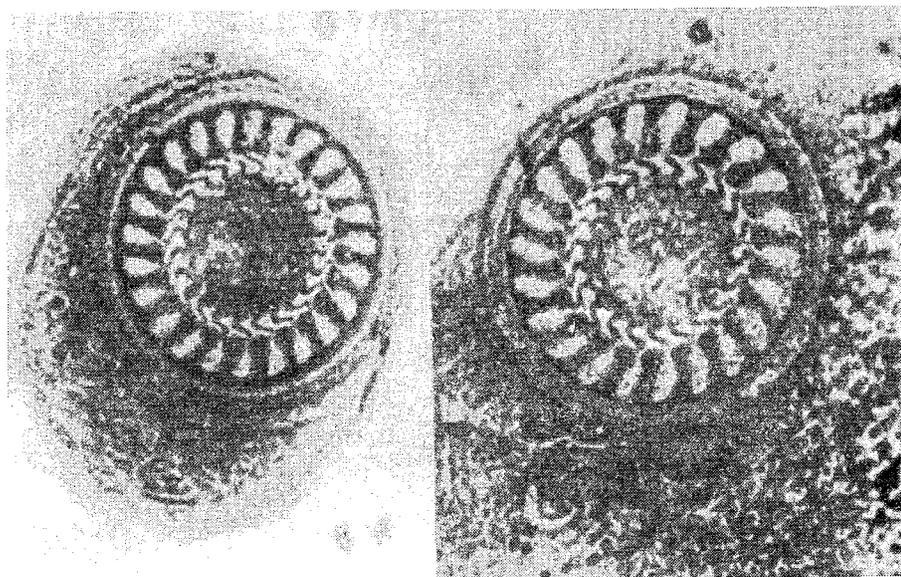


Fig. 1. *Trichodinella lotae* from gills (AgNO₃ coated mount)

Among the protozoans, the most common species was *Trichodinella lotae* (Fig. 1) parasitising the gills (62.5%). The protozoans were most numerous in spring; some fishes showed a mass infestation. So far, the literature most often reports on *T. epizootica* (Raabe, 1950) in burbot (Grabda, 1961; Sulman and Černyševa, 1969). On the other hand, Šulman (1984) mentions only *T. lotae* as occurring in burbot while *T. epizootica* would be a parasite of many other fish species.

Relatively frequent protozoans in the water body studied were *Sphaerospora cristata* (Figs. 2A and 3) and *Chloromyxum mucronatum* (Fig. 2B) found in the urinary bladder

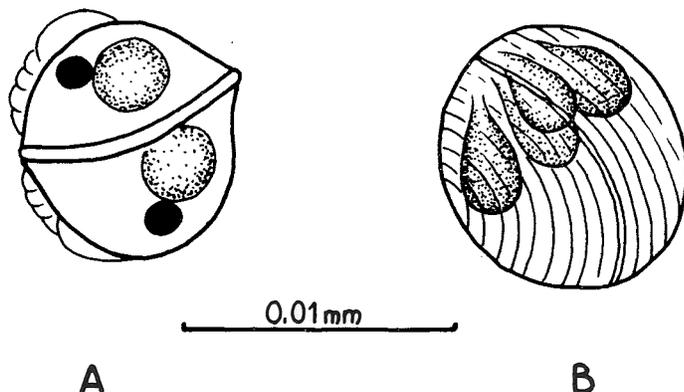


Fig. 2. Spores from urinary bladder: A. *Sphaerospora cristata*, B. *Chloromyxum mucronatum*



Fig. 3. *Sphaerospora cristata* from urinary bladder

(Table 1). A similar degree of these protozoans' invasion in burbot was observed by Šulman and Černyševa (1969) in the Lake Seliger and by Mitenev (1983) in the Lake Umbozero (Kola Peninsula). Much rarer were *Myxobolus lotae* (Fig. 4) and flagellates *Hexamita* sp. (6.25%). *M. lotae* was reported from the burbot gills by Mitenev (1971); in

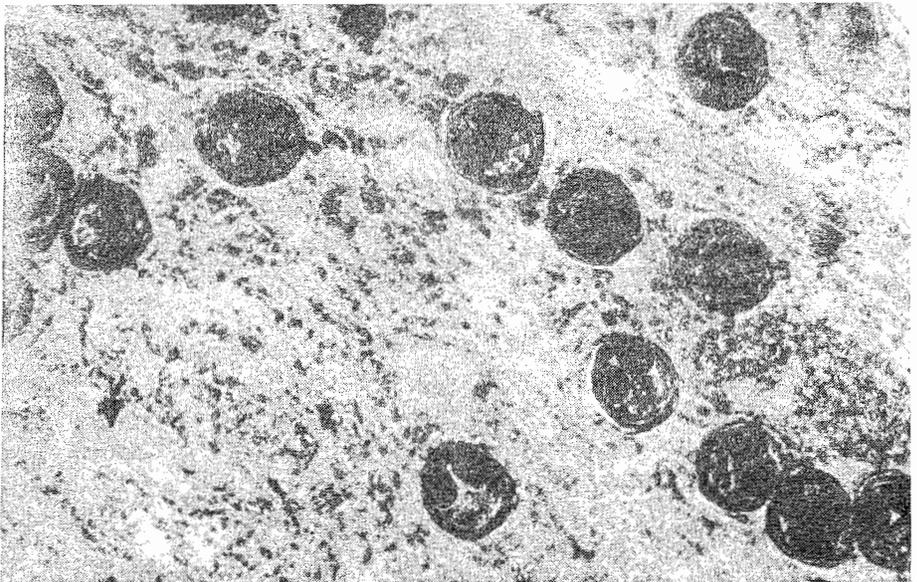


Fig. 4. *Myxobolus lotae* from gills (AgNO₃ coated mount)

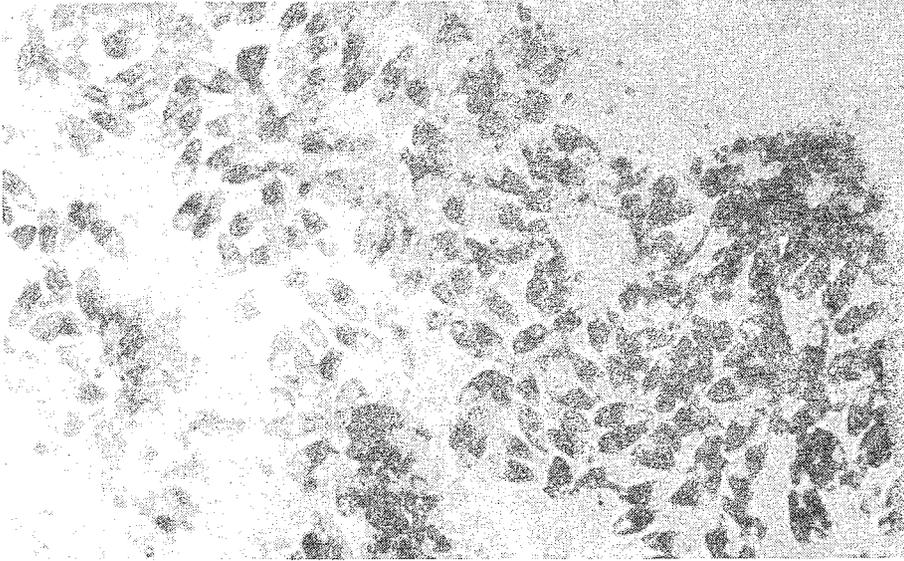


Fig. 5. *Glugea fennica* spores from cysts found on skin

1981, that author recorded these protozoans much more often than *M. muelleri* Bütschli, 1882 in most Kola Peninsula water bodies. According to Šulman (1984), burbot is invaded by *Hexamita truttae* (Schmidt, 1920). Our *Hexamita* mounts are not suitable for species identification. Apart from the parasites listed above, one fish was found to contain cysts of *Glugea fennica* (Fig. 5, Table 1). To date, burbot has been most often reported as a host for *G. anomala* (Moniez, 1887) (Grabda, 1961; Šulman and Černyševa, 1969). On the other hand, Šulman (1984) states that the species occurs exclusively in the genus *Gasterosteus*.

Cestodes were represented by two species only. One of them, *Eubothrium rugosum*, was common (57.57%) in the burbot intestine. The species was found in this host also in lakes Družno (Kozicka, 1959) and Seliger (Šulman and Černyševa, 1969). The other species, *Triaenophorus nodulosus*, was less common; it occurred in two forms: as plerocercoids in the liver and as the mature form in the intestine. This parasite was recorded in burbot by Šulman and Černyševa (1969) and in Poland by Ejsymont (1970).

The Trematoda, similarly to protozoans, had numerous representatives in the materials studied. Most common were metacercariae, those of *Diplostomum* sp. being found in 57.5% of the fish examined. These species were frequently reported in burbot from various water bodies of Poland (Grabda, 1961; Grabda et al., 1961; Skóra, 1965; Ejsymont, 1970). A high invasion (73%) was observed by Šulman and Černyševa (1969) in the Lake Seliger. Another species of the eye metacercariae, *Tylodelphys clavata*, was less common in the Lake Dąbie (Table 1). In Poland these metacercariae were found in burbot by Kozicka and Niewiadomska (1960) and Skóra (1965). Apart from the two species mentioned, the intestine was found to house metacercariae of *Cotylurus*

Table 1

Burbot, *Lota lota* (L.) parasites in Lake Dąbie

Parasitic species	No. of fish examined	Location	Invasion incidence	Invasion intensity	Mean invasion intensity	Mean invasion intensity in population
<i>Hexamita</i> sp.	16	gall bladder	6.25	numerous	+	+
<i>Glugea fennica</i> Lom et Weiser, 1969	33	skin	3.03	ca 50 cysts	+	+
<i>Sphaerospora cristata</i> Schulman, 1962	16	urinary bladder	37.50	from single to very numerous	+	+
<i>Chloromyxum mucronatum</i> Gurley, 1893	16	urinary bladder	25.00	from single to very numerous	+	+
<i>Myxobolus lotae</i> Mitenev, 1971	16	gills	6.25	single	+	+
<i>Trichodinella lotae</i> (Chan, 1961)	16	gills	62.50	from single to very numerous	+	+
<i>Trienophorus nodulosus</i> (Pallas, 1781)						
larva	33	liver	15.15	1	1	0.15
adult	33	intestine	3.03	1	1	0.03
<i>Eubothrium rugosum</i> (Batsch, 1786)	33	intestine	57.57	1-18	6.95	4.00
<i>Bucephalus polymorphus</i> (Baer, 1827)	33	stomach intestine	15.15	2-53	22.40	3.39
<i>Nicolla skrjabini</i> (Ivanitzky, 1928)	33	intestine stomach	12.12	3-10	6.50	0.78
<i>Diplostomum</i> sp. (l.)	33	lens hyaline body	57.57	3-65	14.05	8.09
<i>Tylodelphys clavata</i> (Nordmann, 1832) (l.)	33	hyaline body	21.21	2-50	14.71	3.12
<i>Cotylurus platycephalus</i> (Creplin, 1825) (l.)	33	stomach	3.03	4	4.00	0.12
<i>Cotylurus variegatus</i> (Creplin, 1825) (l.)	33	stomach intestine	9.09	2-10	5.00	0.45
<i>Camallanus lacustris</i> (Zoega, 1776)	33	intestine	12.12	1-3	1.50	0.18
<i>Camallanus truncatus</i> (Rudolphi, 1814)	33	intestine	9.09	1	1.00	0.09
<i>Eustrongylides</i> sp. (l.)	33	on intestine	3.03	1	1.00	0.03
<i>Neoechinorhynchus rutili</i> (Müller, 1780)	33	intestine	6.06	1-7	4.00	0.24
<i>Acanthocephalus lucii</i> (Müller, 1776)	33	stomach intestine	51.51	1-24	7.06	3.64
<i>Echinorhynchus gadi</i> Zoega in Müller, 1776	33	intestine	3.03	2	2.00	0.06
<i>Unio</i> sp. (l.)	33	gills	24.24	from single to very numerous	+	+
<i>Ergasilus sieboldi</i> Nordmann, 1832	33	gills	18.18	1-10	3.17	0.58

platycephalus and *C. variegatus* (Table 1). They had found their way to the intestine with food. Their usual location is the body cavity of numerous freshwater fish (Mattheis and Odening, 1980). Odening and Bockhardt (1971) described the *C. variegatus* development cycle. Also Swennen et al. (1979) dealt with the biology of *Cotylurus* trematodes. Metacercariae of *C. platycephalus* and *C. variegatus* found in the stomach and intestine are accidental parasites of burbot.

The remaining trematodes, *Bucephalus polymorphus** and *Nicolla skrjabini* occurred in the intestine as the adult forms. They belong to relatively rare parasites of burbot in the Lake Dąbie (Table 1). Ejsymont (1970) found *B. polymorphus* in burbot of the river Biebrza, while Kulakovskaja and Koval (1973) reported *N. skrjabini* from the Danube basin.

Nematodes were relatively rare in the fish examined (Table 1). The presence of *Camallanus truncatus* in burbot is mentioned by Šulman and Černyševa (1969). In the Lake Seliger they observed a four times higher invasion incidence and the invasion intensity of up to 104 individuals in a fish. *C. lacustris* was being recorded in burbot much more frequently (Grabda et al., 1961; Šulman and Černyševa, 1969; Dąbrowska, 1970; Ejsymont, 1970; Kulakovskaja and Koval, 1973). Nematodes *Eustrongylides sp.* were the rarest burbot parasites: a single encysted larva was found attached to the intestine wall.

The burbot intestines were found to harbour three acanthocephalan species, of which *Acanthocephalus lucii* only can be regarded as common (51.51%). A stronger infestation (75%) was recorded in burbot by Grabda et al. (1961), while Šulman and Černyševa (1969) report data similar to those from the Lake Dąbie. Moreover, *A. lucii* was being found in numerous water bodies (Grabda, 1961; Skóra, 1965; Dąbrowska, 1970; Ejsymont, 1970; Kulakovskaja and Koval, 1973). Much rarer was *Neoechinorhynchus rutili* (Table 1). In Poland, Ejsymont (1970) noted its presence in burbot, the invasion incidence and intensity being higher than observed in this study. *Echinorhynchus gadi* was very rare, two females being found in one of the burbot individuals examined.

Of the *Mollusca*, larval stages of *Unio sp.* (Fig. 6 A, B) occurred on the burbot gills. The larvae were recorded in 24% of the fish examined. The parasites were also recorded in burbot by Šulman and Černyševa (1969). Somewhat rarer were the crustaceans *Ergasilus sieboldi* (Table 1) found on the gills. Šulman and Černyševa (1969) recorded these parasites' invasion in burbot to be of a higher incidence and intensity (up to 281 specimens in a fish).

* The trematode *Bucephalus polymorphus* was identified with the aid of the paper by Kozicka (1959); however, Baturó (1977) postulates the change of the trematode's name by the International Commission for Zoological Nomenclature.

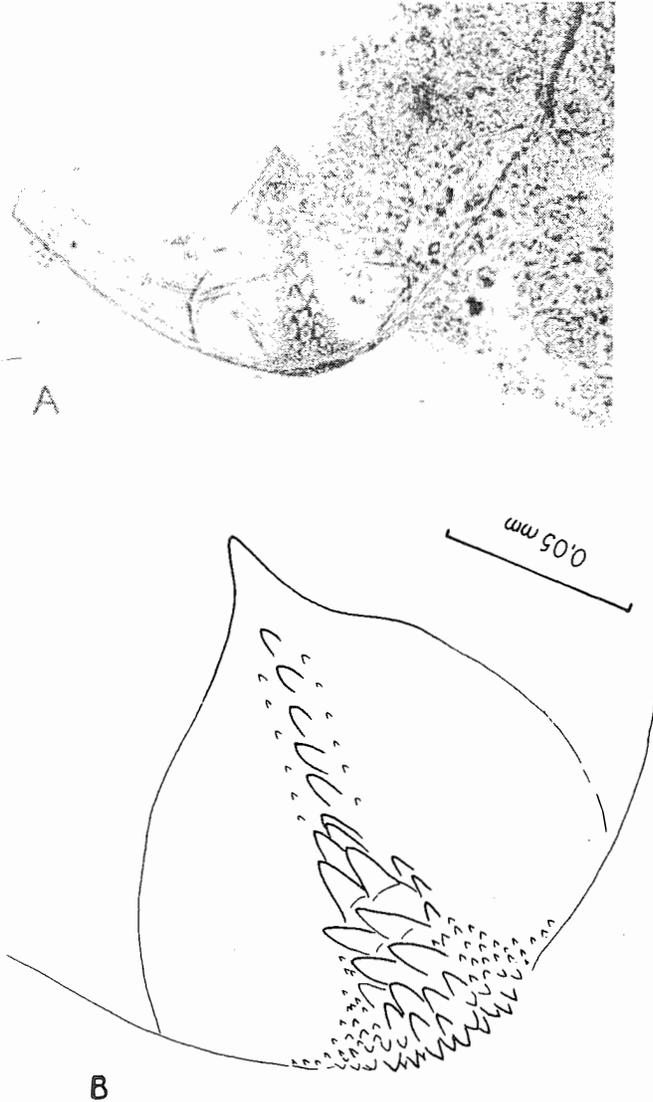


Fig. 6. *Unio* sp. larva: shell margin : A. photographed, B. drawn

SUMMING-UP

1. The burbot individuals examined were found to contain 22 parasitic species belonging to 6 higher taxa. The invasion was not strong.
2. The most common parasites were: *Trichodinella lotae* on the gills, *Diplostomum* sp. in the eyes, and *Eubothrium rugosum* and *Acanthocephalus lucii* in the intestine.

3. The protozoans *Glugea fennica*, *Sphaerospora cristata*, *Chloromyxum mucronatum*, *Myxobolus lotae*, and *Trichodinella lotae* are new for the fauna of Poland.
4. The following parasites were found for the first time in burbot in Poland: *Hexamita* sp., *Nicolla skrjabini*, *Cotylurus platycephalus*, *C. variegatus*, *Camallanus truncatus*, *Eustrongylides* sp., *Echinorhynchus gadi*, and *Ergasilus sieboldi*. Metacercariae of *C. platycephalus* and *C. variegatus* occurring in the intestine are, however, accidental parasites of burbot as their natural location is the body cavity. On the other hand, the *Eustrongylides* sp. larvae have not been recorded in burbot before.

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PARAZYTOFAUNA MIĘTUSA – LOTA LOTA (L.) Z JEZIORA DĄBIE

STRESZCZENIE

W latach 1981 i 1984 przeprowadzono szczegółowe badania parazytologiczne 33 osobników miętusa. Materiał pochodził z jeziora Dąbie łączącego się z ujściowym odcinkiem Odry. Odławiany był w okresach wiosennych i jesiennych. Łącznie stwierdzono 22 gatunki pasożytów należących do *Protozoa* (6 gatunków), *Cestoda* (2), *Trematoda* (6), *Nematoda* (3), *Acanthocephala* (3), *Mollusca* (1) i *Crustacea* (1).

Do najczęstszych pasożytów można zaliczyć: *Trichodinella lotae* występujące na skrzelach, *Diplostomum sp.* w oczach, *Eubothrium rugosum* i *Acanthocephalus lucii* w jelicie. Ekstensywność zarażenia tymi gatunkami wynosiła 51,5 – 62,5%. Dość często stwierdzano: *Sphaerospora cristata* i *Chloromyxum mucronatum* w pęcherzu moczowym, *Tyloodelphys clavata* w ciałku szklistym oraz *Unio sp.* na skrzelach. Obserwowano je u 21,2–37,5% badanych ryb (tabl. 1). Pozostałe pasożyty znajdowano rzadziej lub sporadycznie.

Pierwotniaki *Glugea fennica*, *Sphaerospora cristata*, *Chloromyxum mucronatum*, *Myxobolus lotae* i *Trichodinella lotae* są nowe dla fauny Polski. Pasożyty *Hexamita sp.*, *Nicolla skrjabini*, *Cotylurus platycephalus*, *C. variegatus*, *Camallanus truncatus*, *Eustrongylides sp.*, *Echinorhynchus gadi* i *Ergasilus sieboldi* stwierdzono po raz pierwszy u miętusa w Polsce. Metacerkarie *C. platycephalus* i *C. variegatus* występujące w przewodzie pokarmowym są jednak przypadkowymi pasożytami tej ryby, ponieważ właściwym miejscem ich bytowania jest jama ciała. Natomiast larwy *Eustrongylides sp.* nie były dotychczas notowane w literaturze u tego żywiciela.

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ПАРАЗИТОФАУНА НАЛИМА – ЛОТА ЛОТА (L.) ОЗЕРА ДОМБЕ

Р е з ю м е

В 1981 и 1984 гг. проводились детальные паразитологические исследования 33 особей налима. Ма-

териал вылавливали из озера Домбе, соединяющегося с отрезком устья р.Одра. Отлов проводили весной и осенью. Всего обнаружено 22 вида паразитов, принадлежащих: Protozoa (6 видов), Cestoda (2), Trematoda (6), Nematoda (3), Acanthocephala (3), Mollusca (1), Crustacea (1).

К часто встречающимся паразитам можно отнести *Trichodinella lotae*, обнаруженных на жабрах, *Diplostomum* sp. в глазах, *Eubothrium rugosum* и *Acanthocephalus lucii* в кишках. Экстенсивность заражения этими видами составляла 51,5 - 62,5%. Довольно часто обнаруживали *Sphaerospora cristata* и *Chloromyxum mucronatum* в мочевом пузыре, *Tylodelphys clavata* в стекловидном теле, а также *Unio* sp. на жабрах. Обнаружено их у 21,2 - 37,5% исследуемых рыб (Табл.1). Остальные паразиты наблюдались реже или спорадично.

Простейшие *Glugea fennica*, *Sphaerospora cristata*, *Chloromyxum mucronatum*, *Myxobolus lotae*, *Trichodinella lotae* - новые для польской фауны. Паразиты *Hexamita* sp., *Nicolla skrjabini*, *Cotylurus platycephalus*, *C.variegatus*, *Camallanus truncatus*, *Eustrongylides* sp., *Echinorhynchus gadi*, *Ergasilus sieboldi* обнаружены первый раз у налима в Польше. *Metacercaria* C., *platycephalus*, *C. variegatus* обнаруженные в пищеводе являются случайными паразитами этой рыбы, так как обычным местом их пребывания считается полость тела. Тогда как личинки *Eustrongylides* sp. до

сих пор не были отмечены в литературе у этого хо-
зяина.

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