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THE PARASITE FAUNA OF THE GOBIID FISH (ACTINOPTERYGII, GOBIIDAE) IN THE SUKHYI LYMAN, BLACK SEA

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The Parasite Fauna of the Gobiid Fish (Actinopterygii, Gobiidae) in the Sykhyi Lyman, Black Sea. Krasnovyd V., Kvach Yu., Drobiniak O. — The parasite fauna of gobiid fish of the Sukhyi Lyman, Black Sea, is described. Seventeen species of parasites are registered in the gobiids in the water body. The marine tubenose goby *Proterorhinus marmoratus* has the richest parasite fauna (12 species), the grass goby *Zosterisessor ophiocephalus* has the fewest number of parasite species (5 species). The microsporidian *Loma* sp. and ciliate *Trichodina domerguei* are recorded for the first time for gobiids in the north-western Black Sea. The core of the parasite fauna is formed by metacercariae *Cryptocotyle* spp. The core, secondary, satellite, and rare species in the parasite community of each host are described. Not only marine and brackish water parasites, but also limnetic species, namely metacercariae *D. spathaceum*, were registered in the Sukhyi Lyman that differentiates it from the many of localities in the north-western Black Sea.

Key words: Gobiids, Black Sea, parasites, parasite fauna.

Паразитофауна бычковых рыб (Actinopterygii: Gobiidae) Сухого лимана, Чёрное море. Красновид В., Квач Ю., Дробиняк А. — Описана паразитофауна бычковых рыб Сухого лимана Чёрного моря. У бычковых рыб акватории найдено 17 видов паразитов; самая богатая паразитофауна (12 видов) отмечена у морского трубконосого бычка, *Proterorhinus marmoratus*, меньше всего паразитов (5 видов) — у бычка-травяника, *Zosterisessor ophiocephalus.* Впервые для северо-западной части Чёрного моря представлены данные по заражённости бычков микроспоридиями *Loma* sp. и инфузориями *Trichodina domerguei*. Ядро паразитофауны составляют метацеркарии *Cryptocotyle* spp. Описаны основные, второстепенные, сопутствующие и редкие виды в сообществе паразитов каждого из хозяев. В отличие от других водоемов северо-западной части Чёрного моря, в Сухом лимане отмечены как морские и солоноватоводные паразиты, так и пресноводные (метацеркарии *Diplostomum spathaceum*).

Ключевые слова: бычки, Чёрное море, паразиты, паразитофауна.

Introduction

The representatives of the Gobiidae family are among the most widespread fish species in the littoral ecosystems of the north-western Black Sea and the coastal lagoons and estuaries (lymans) of the south-western Ukraine. Five of 27 species of this family, which inhabits the Black Sea, have commercial importance (Smirnov, 1986). Last years, in water bodies such as the Budaki Lagoon and Tuzly group of lagoons, the volume of gobies fisheries reached 10 tones per year, inferior in terms of only sand-smelt (Starushenko, Bushuyev, 2001). In many of water bodies the gobiids are also the item of amateur fishing.

The parasites are one of the important components of water ecosystems. Gobies appear to be definitive, intermediate, also paratenic hosts of parasites, which adult stages infest commercial fish, birds and mammals (including human). Thanks to their ecological plasticity, small sizes, settling and multiplicity, the gobiids are convenient object to study the processes of colonization by parasites (Zander, Kesting, 1998).

The Sukhyi Lyman has unique hydrochemical conditions, being the estuary of two rivers, Akkarzhanka and Dalnyk (Starushenko, Bushuyev, 2001). The north-western part is artificially separated by dam from the other part of the estuary and its hydrochemical regime is formed under the freshwater flow of the Dalnyk River and used for aquaculture. The central and south-eastern parts of the estuary are under the influence of the Port of

Illichivsk, almost lost the fishery importance because of intensive antropogenic pressing. The hydrochemical regime of the Sukhyi Lyman is under the strong influence of the neighbored sites of the sea, therefore has typical for the north-western Black Sea salinity (the study was not covered the desalinated north-western part of the estuary).

There are a lot of published data concerning the parasites of gobiids of the Gulf of Odessa, lagoons and estuaries of the north-western Black Sea (inter alia Kvach, 2002 a, b, 2004, 2005, 2007). The data about the parasite infestation of the marine tubenose goby *Proterorhinus marmoratus* (Pallas, 1814) from the Sukhyi Lyman is presented in Y. Kvach and M. C. Oğuz (2009). Also, the acanthocephalan, *Acanthocephaloides irregularis* Amin et al., 2011, was described from the gobies from this water body (Amin et al., 2011). But any complex data about the parasites of fish of the Sukhyi Lyman are absent.

The aim of the present study is to describe the parasite fauna of gobiids (Actinopterygii, Gobiidae) of the Sukhyi Lyman, to identify the most common and numerous parasite species, also to describe the factors, which impact on nature of the parasite fauna of the particular hosts.

Material and methods

To study the maximum number of possible fish species, the sampling was done on three different localities with different types of biotope: 1. Near the village of Tairove (46°22'12"N 30°38'34"E), sandy bottom; 2. Near the village of Malodolynske (46°21'05"N 30°38'31"E), muddy bottom with seaweeds; 3. Near the village of Burlacha Balka (46°19'58"N 30°39'41"E), rocky bottom. The fish were caught in different seasons of 2008–2010 using the trawl (10 m length, 5 mm cell diameter), also by a deep-net (1 × 0.5 m, 5 mm cell diameter), at the depth ~0.5–1 m, then transported alive to the laboratory, where placed to an aerated aquarium and dissected during two days. In total, 156 specimens of gobies belonging to 8 species were dissected (table 1). The standard length, SL, was measured before the section. The systematic of fish hosts is given according to M. E. Neilson, C. A. Stepien (2009).

The parasitological indices presented in A. O. Bush et al. (1997) were used to analyze the parasitization: Prevalence (P); mean intensity (MI), which supplied by intensity range (IR), which is minimum and maximum number of parasite per a host; and abundance (A).

The standard deviation, sd, was calculated for average numbers.

In the case of intensive infestation of fish with metacercariae (the number of parasite individuals per a host was several hundreds to several thousands) the approximated number of parasite individuals of particular species per a host individual was calculated. The approximated intensity and abundance is presented respectively. Only prevalence was calculated for the microparasites (microsporidians and ciliates), but intensity is presented as order of magnitude.

The importance of parasites was judged by an altered core/satellite species concept according to their abundance (Zander et al., 2000). The scores were divided into the following categories:

> 2.0 core species;
0.6–2.0 secondary species;
0.2–0.6 satellite species;
< 0.2 rare species.

Table 1. Species composition, number, sizes, and total infestation of studied fish
Таблица 1. Видовой состав, количество, размеры и общая зараженность изученных рыб

Fish species	Number of fish studied	Number of fish studied per season (spring / summer / autumn)	SL±sd	Number of infected fishes / P
Caucasian draft goby *Knipowitschia caucasica*	23	15 / 3 / 5	2.6±0.4	20 / 87.0
Monkey goby *Neogobius fluviatilis*	23	4 / 14 / 5	7.9±1.6	22 / 95.7
Round goby *Neogobius melanostomus*	19	7 / 9 / 3	6.3±1.4	15 / 78.9
Marbled goby *Pomatoschistus marmoratus*	20	11 / 4 / 5	3.3±1.6	18 / 90.0
Pinchuk's goby *Ponticola cephalargoides*	7	1 / 0 / 6	6.7±1.7	7 / 100.0
Mushroom goby *Ponticola eurycephalus*	21	0 / 16 / 5	7.4±1.2	16 / 76.2
Marine tubenose goby *Proterorhinus marmoratus*	36	4 / 31 / 1	5.0 ±0.8	35 / 97.2
Grass goby *Zosterisessor ophiocephalus*	7	0 / 1 / 6	11.4±1.9	7 / 100.0
Total	156	42 / 78 / 36		140 / 89.7

Note. SL — standard length (cm), sd — standard deviation, P — prevalence (%).

Results

The majority of caught fish species in the studied water body were *Knipowitschia caucasica* (Berg, 1916), *Neogobius fluviatilis* (Pallas, 1814), *Neogobius melanostomus* (Pallas, 1814), *Pomatoschistus marmoratus* (Risso, 1810), *Ponticola eurycephalus* (Kessler, 1874), and *P. marmoratus*. Meanwhile *Ponticola cephalargoides* (Pinchuk, 1976), and *Zosterisessor ophiocephalus* (Pallas, 1814) were rare in catches (table 1). The samplings in the winter season showed no result.

In total, twenty parasite species occurred in the studied fish species: one microsporidian, one ciliate, two monogenean, and one cestode, nine trematodes, four of nematodes, and two acanthocephalans (table 2).

The tubenose goby has the richest parasite fauna, numbering 14 species. Also abundant parasite fauna comprising 11 species was found in Caucasian draft goby, monkey and mushroom gobies. The minimal number of parasite species occurred in the grass goby (six species).

The microsporidian *Loma* (found in monkey and round gobies) are registered for the north-western Black Sea for the first time.

The trematode metacercariae *Cryptocotyle concavum* (Creplin, 1825) and the acanthocephalan *A. irregularis* were registered in all studied fish species. The monogenean *Gyrodactylus* sp. occurred only in the marbled goby, the trematode metacercariae *Diplostomum spathaceum* (Rudolphi, 1819) were only in the monkey goby, but the third-stage larvae of the nematode *Agamospirura* sp. (Moravec, Ergens, 1971) only in the Caucasian draft goby.

The trematodes *Aphalloides coelomicola* Dollfus et al., 1957 and *Paratimonia gobii* Prévôt et Bartoli, 1967 were registered only in annual gobies, such as the Caucasian draft goby and the marbled goby.

The monogenean *Gyrodactylus proterorini* Ergens, 1967 (found in *P. eurycephalus* and *P. marmoratus*), the cestode *Proteocephalus gobiorum* Dogiel et Bychowsky, 1939 (found in *P. eurycephalus* and *Z. ophiocephalus*), and the trematode *Magnibursatus skjabini* Vlasenko, 1931 (found in *P. cephalargoides*, *P. eurycephalus*, *P. marmoratus*, and *Z. ophiocephalus*) are specific parasites of gobiid fish. Additionally, the specific parasite of Ponto-Caspian gobiids, the trematode *Asymphylodora pontica* Tschernyschenko, 1949, was registered in the Ponto-Caspian gobies, such as the monkey goby, the round goby, Pinchuk's goby, and the tubenose goby. Also the cases of parasitization of this trematode in the Mediterranean immigrants, the Caucasian draft goby, the marbled goby, and the grass goby were noted.

The metacercariae of heterophyids, such as *Cryptocotyle* spp., play the role of core species in the parasite fauna of all gobiids, except the grass goby (table 3). *A. pontica* presented as core in the parasite fauna for the Ponto-Caspian gobiid fishes, for other fishes it was satellite or rare species. The life cycle of *Dichelyne minutus* (Rudolphi, 1819) is integrated with Polychaetes (Køie, 2001), which often included to the diet composition of gobiid fishes (Kvach, Zamorov, 2001). Other trematodes, *A. coelomicola* and *P. gobii*, were core species in the parasite fauna of annual gobies (Caucasian draft goby and marbled goby). The trematode metacercariae *Pygydiopsis genata* Looss, 1907 and *Timoniella imbutiforme* (Molin, 1859) play the role of core, secondary, satellite or rare parasite depending on the host species. *Telosentis exiguus* (von Linstow, 1901), which was rare for mostly all species, except the Pinchuk's goby. The acanthocephalan *A. irregularis* was core in the Pinchuk's goby, mushroom goby, tubenose goby, and the grass goby, but rare in the monkey goby. The nematode larvae *Cosmocephalus obvelatus* (Creplin, 1825) were rare in the marbled goby. Monogeneans *Gyrodactylus* sp. and *G. proterorhini*, also the nematode larvae *Agamospirura* sp. and *Contracaecum rudolphii* Hartwich, 1964 were found as rare species only.

Table 2. The parasite fauna of different gobiid species in the Sukhyi Lyman
Таблица 2. Паразитофауна различных видов бычков в Сухом лимане

Parasite species		*Knipowitschia caucasica*	*Neogobius fluviatilis*	*Neogobius melanostomus*	*Pomatoschistus marmoratus*	*Ponticola cephalargoides*	*Ponticola eurycephalus*	*Proterorhinus marmoratus*	*Zosterisessor ophiocephalus*
MICROSPOREA									
Loma sp.	P, %		4.3	15.8				16.7	
	IR		Hundreds	Hundreds				Teens-hundreds	
CILIOPHORA									
Trichodina domerguei	P, %					1 from 7		2.8	
	IR					Hundreds		Hundreds	
MONOGENEA									
Gyrodactylus proterorhini	P, %						9.5	2.8	
	IR						1−2	1	
	MI±sd						1.5±0.7	1.0	
	A						0.1	0.03	
Gyrodactylus sp.	P, %				5.0				
	IR				1				
	MI±sd				1.0				
	A				0.1				
CESTODA									
Proteocephalus gobiorum	P, %						4.8		1 from 7
	IR						2		2
	MI±sd						2.0		2.0
	A						0.1		0.3
TREMATODA									
Aphalloides coelomicola	P, %	47.8			15.0				
	IR	1−84			16−36				
	MI±sd	18.3±24.4			26.0±10.0				
	A	8.7			3.9				
Asymphilodora pontica	P, %	8.7	56.5	47.4	10.0	1 from 7		22.2	1 from 7
	IR	3−5	1−94	1−57	1	8		1−3	1
	MI±sd	4.0±1.4	20.1±26.4	25.1±22.0	1.0±0.0	8		1.5±0.8	1.0
	A	0.3	11.3	11.9	0.1	1.1		0.3	0.1
Cryptocotyle concavum met	P, %	39.1	66.7	47.4	35.0	1 of 7	23.8	75.0	1 of 7
	IR	3-~200	6-~500	1-~500	9-~150	28	1-~500	2-~100	4
	MI±sd	~122	~248	~178	~77	28	~211	~36	4.0
	A	> 47.7	> 173	> 84.3	> 27	4.0	> 50	> 27	0.6
Cryptocotyle lingua met	P, %	21.7	65.2	26.3		2 of 7	23.8	50.0	
	IR	25-~150	7-~500	10-~500		1−25	1-~500	2-~100	
	MI±sd	~100	~267	~307		13.0±17.0	~211	~43.8	
	A	>22	>174	>80.8		3.7	>50	21.9	
Diplostomum spathaceum met	P, %		4.3						
	IR		53						
	MI±sd		53.0						
	A		2.3						
Magnibursatus skrjabini	P, %					1 of 7	14.3	58.3	3 of 7
	IR					2	1−10	1−50	4−16
	MI±sd					2.0±0.0	4.3±4.9	8.7±12.5	11.7±6.7
	A					0.6	0.6	5.1	5.0
Paratimonia gobii	P, %	82.6			65.0				
	IR	1−90			1−50				
	MI±sd	30.0±24.8			27.0±20.4				
	A	24.8			17.6				

Table 2.
Таблица 2.

Parasite species		*Knipowitschia caucasica*	*Neogobius fluviatilis*	*Neogobius melanostomus*	*Pomatoschistus marmoratus*	*Ponticola cephalargoides*	*Ponticola eurycephalus*	*Proterorhinus marmoratus*	*Zosterisessor ophiocephalus*
Paratimonia gobii	P, %	82.6			65.0				
	IR	1–90			1–50				
	MI±sd	30.0±24.8			27.0±20.4				
	A	24.8			17.6				
Pygidiopsis genata met	P, %	4.3	73.9	5.3	20.0		4.8	8.0	
	IR	8	2-~2000	2	31–46		15	4–6	
	MI±sd	8.0	~578	2.0	37.8±7.9		15.0	5.3±1.2	
	A	0.3	> 427	0.1	7.6		0.7	0.4	
Timoniella imbutiforme met	P, %	8.7	13.0	42.1	15.0	1 of 7	4.8	16.7	
	IR	5-~150	2–36	1–100	30–36	3	2	1–10	
	MI±sd	~77.5	13.7±19.3	14.4±36.6	33.0±3.0	3.0	2.0	4.8±4.4	
	A	6.7	1.8	6.1	5.0	0.4	0.1	0.8	
NEMATODA									
Agamospirura sp. L3	P, %	4.3							
	IR	1							
	MI±sd	1.0							
	A	0.04							
Contracaecum rudolphii L3	P, %		4.3					2.8	
	IR		1					1	
	MI±sd		1.0					1.0	
	A		0.04					0.03	
Cosmocephalus obvelatus L3	P, %					2 from 7	4.8	2.8	
	IR					1–3	7	1	
	MI±sd					2.0±1.4	7.0	1.0	
	A					0.6	0.3	0.03	
Dichelyne minutus	P, %	13.0	4.3	21.1	10.0	2 of 7	38.1	25.0	
	IR	1–35	1	2–11	2–3	1–3	1–3	1–5	
	MI±sd	18.0±17.0	1.0	7.0±3.9	2.5±0.7	2.0±1.4	1.6±0.9	2.0±1.3	
	A	2.3	0.04	1.5	0.3	0.6	0.6	0.5	
ACANTHOCEPHALA									
Acanthocephaloides irregularis	P, %	13.0	13.0	21.1	10.0	5 of 7	61.9	75.0	7 of 7
	IR	2–3	1–2	1–7	1	1–50	1–19	1–19	15–67
	MI±sd	2.7±0.6	1.7±0.6	3.0±2.8	1.0±0.0	17.8±21.5	5.2±5.4	4.1±3.7	44.3±18.9
	A	0.3	0.2	0.6	0.1	12.7	3.2	3.1	44.3
Telosentis exiguus	P, %	8.7	8.7				33.3	5.6	1 of 7
	IR	1–2	1–2				1–19	1–2	2
	MI±sd	1.5±0.7	1.5±0.7				4.3±6.6	1.5±0.7	2.0
	A	0.1	0.1				1.4	0.1	0.3
Total	11	11	8	9	9	11	14	6	

Note. See Material and methods section for abbreviations.

Discussion

Currently, the Sukhyi Lyman is connected with the Black Sea and de-facto is marine bay with the salinity depended on the salinity of neighbored part of the sea (Starushenko, Bushuyev, 2001). It is less depended on inflows of the rivers Dalnyk and Akkarzhanka. One of the factors, which have influence on distribution of parasites, is their adaptation to the salinity, which is optimal for their host, if the parasite is a specialist (Zander, 1998).

The occurred parasites where grouped to several categories according their relation to salinity: limnetic, brackishwater, marine, and euryhaline.

Table 3. Core / secondary / satellite / rare species in the parasite fauna of the fish hosts studied
Таблица 3. Основные / второстепенные / сопутствующие / редкие виды в паразитофауне исследованных рыб-хозяев

Fish host	Core species	Secondary species	Satellite species	Rare species
Knipowitschia caucasica	*Aphalloides coelomicola* *Cryptocotyle* spp. met *Paratimonia gobii* *Timoniella imbutiforme* met *Dichelyne minutus*		*Asymphylodora pontica* *Pygydiopsis genata* met *Acanthocephaloides irregularis*	*Agamospirura* sp. L3 *Telosentis exiguus*
Neogobius fluviatilis	*Asymphylodora pontica* *Cryptocotyle* spp. met *Diplostomum spathaceum* met *Pygydiopsis genata* met	*Timoniella imbutiforme* met	*Acanthocephaloides irregularis*	*Dichelyne minutus* *Contracaecum rudolphii* L3 *Telosentis exiguus*
Neogobius melanostomus	*Asymphylodora pontica* *Cryptocotyle* spp. met *Timoniella imbutiforme* met	*Acanthocephaloides irregularis Dichelyne minutus*		*Pygydiopsis genata* met
Pomatoschistus marmoratus	*Aphalloides coelomicola* *Cryptocotyle* spp. met *Paratimonia gobii* *Pygydiopsis genata* met *Timoniella imbutiforme* met		*Dichelyne minutus*	*Gyrodactylus* sp. *Asymphylodora pontica* *Timoniella imbutiforme* met *Acanthocephaloides irregularis*
Ponticola cephalargoides	*Cryptocotyle* spp. met *Acanthocephaloides irregularis*	*Asymphylodora pontica* *Magnibursatus skrjabini* *Cosmocephalus obvelatus* L3 *Dichelyne minutus*	*Timoniella imbutiforme* met	
Ponticola eurycephalus	*Cryptocotyle* spp. met *Acanthocephaloides irregularis*	*Magnibursatus skrjabini* *Pygydiopsis genata* met *Dichelyne minutus* *Telosentis exiguus*	*Cosmocephalus obvelatus* L3	*Gyrodactylus proterorhini* *Proteocephalus gobiorum* *Timoniella imbutiforme* met
Proterorhinus marmoratus	*Cryptocotyle* spp. met *Magnibursatus skrjabini* *Acanthocephaloides irregularis*	*Timoniella imbutiforme* met	*Asymphylodora pontica* *Pygydiopsis genata* met *Dichelyne minutus*	*Gyrodactylus proterorhini* *Contracaecum rudolphii* L3 *Cosmocephalus obvelatus* L3 *Telosentis exiguus*
Zosterisessor ophiocephalus	*Acanthocephaloides irregularis* *Magnibursatus skrjabini*	*Cryptocotyle* spp. met	*Proteocephalus gobiorum Telosentis exiguus*	*Asymphylodora pontica*

Note. Met — metacercariae, L3 — third-stage larvae.

The limnetic parasites were presented by a single species, metacercariae of Holarctic trematode *D. spathaceum*. Marita of this generalist parasite infests many species of fish-eating birds, while metacercariae localize in eye lens of many of limnetic fish species (Bray et al., 2008). Metacercariae were found in the monkey goby, caught near the village of Tairove. The parthenogenetic stages of this trematode develop in the limnetic pond-snails *Lymnaea* spp. The reed-grown northern part of the estuary is a place where the Dalnyk River inflows. The pond-snail *Lymnaea* sp. was registered in the reed-growns of this locality (Mikhail Son, PC).

The group of brackishwater species consists of Ponto-Caspian parasites such as monogenean *G. proterorhini*, cestode *P. gobiorum*, and trematode *A. pontica*. All species listed are specific parasites of gobiids, mostly of Ponto-Caspian group. Also, several Mediterranean immigrants are related to brackishwater species: *A. coelomicola* and *P. genata*. The trematode *A. coelomicola* is a specific parasite of annual gobies, such as *Pomathoschistus* spp.

and *Knipowitschia* spp. This group also consists of Holarctic trematode *C. concavum* and Boreal-Atlantic nematode *D. minutus*.

Marine parasites are presented by Mediterranean species, such as trematodes *P. gobii* and *T. imbutiforme*, acanthocephalans *A. irregularis* and *T. exiguus*, also Holarctic trematode *C. lingua*.

The group of euryhaline parasites consists of larvae of nematodes *Agamospirura* sp., *C. obvelatus*, and *C. rudolphii*. Those generalist parasites could be found in fresh water bodies (Moravec, 1994), and also in sea waters (Korniychuk et al., 2008). Their definitive hosts are fish-eating birds (Moravec, 1994).

The composition of the parasite fauna depends on many factors. A type of diet is one of them. The parasitization with the trematodes is more abundant for malacophagous fishes, such as the monkey goby and the round goby. In the case of carcinophagous fishes, such as fouling inhabitants, *P. cephalargoides* and *P. eurycephalus*, besides the trematodes the high abundance was in acanthocephalans, which have amphipods (for *T. exiguus*) and isopodes (for *Acanthocephaloides* sp.) as first intermediate hosts (Belofastova, Grintsov, 2003; Belofastova, Mordvinova, 2006).

The most specific parasite fauna is proper for the marbled goby and Caucasian draft goby. These two species have very similar parasite fauna; they both belong to the group of annual fish with similar ecology (Miller, 1986). The short life cycle of the annual gobies causes the presence of specific parasites (trematodes *A. coelomicola* and *P. gobii*), which form the core of parasite fauna of these host species (table 2). Such specificity is the result of the co-evolution of life-cycles of parasites and their hosts (Kvach, 2010). As the several specific monogeneans are typical for the annual gobies of *Pomatoschistus* genus (Huyse et al., 2003), *Gyrodactylus* sp. found in the marbled goby is possible to be also a specific parasite of annual gobies.

The biotope conditions affect the parasite fauna of the fish significantly. The tubenose goby and the grass goby are inhabitants of macrophyts, therefore they have similar parasite fauna. But in contrast to the grass goby, the tubenose goby inhabits not only macrophyts, but also fouling of rocks and piers. Therefore its parasite fauna consists of more parasite species.

The parasite fauna of gobiids in the Sukhyi Lyman not significantly differs from the other localities in the north-western Black Sea. The metacercariae of *Cryptocotyle* genus makes the core of the gobiids parasite fauna, also the acanthocephalan *A. irregularis* in carcinofagous gobies. The similar situation is mentioned in the Hryhorivsky Estuary (Kvach, 2002 a), that is an artificially opened water body, same as Sukhyi Lyman, in the Gulf of Odessa, a naturally opened water body (Kvach, 2007), also in a closed water body, such as the Tyligul Estuary and Budaki Lagoon (Kvach, 2002 b, 2004). But, in the difference from the mentioned water bodies, the limnetic species, metacercariae *D. spathaceum*, was registered in the Sukhyi Lyman.

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