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Metchnikovella dogieli sp. n. (Microsporidia: Metchnikovellida), a parasite of archigregarines *Selenidium* sp. from polychaetes *Pygospio elegans*

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Summary

Cysts and free spores of a metchnikovellid microsporidium were found in several specimens of an archigregarine *Selenidium* sp. isolated from polychaetes *Pygospio elegans*. Samples were collected at the littoral area of the Kandalaksha Bay of the White Sea in the year 2016. We examined this material with high-quality light optics in stained and live preparations. The structure of cysts and the host range suggest that this species belongs to the genus *Metchnikovella* Caullery et Mesnil, 1897. The length of the cysts varied from 9.5 to 34 μm (av. 23.8 μm); the width of the cysts was 4.8–9.2 μm (av. 8.2 μm). The number of cyst-bound spores varied from 7 to 18. Cyst-bound spores were oval or ovoid and arranged in two or three rows. The length of the spores was 2.2–3.0 μm (av. 2.6 μm); the width was 1.4–2.9 μm (av. 1.7 μm). Free spores were similar to cyst-bound ones in shape and size. We summarized available data on the species of the genus *Metchnikovella*. The analysis of these data proved that the shape and size of the examined cysts and the host range of this parasite differ from those of any known species. We named the observed organism *Metchnikovella dogieli* n. sp.

Key words: Annelida, Apicomplexa, gregarines, hyperparasitism, Metchnikovellidae, microsporidia, White Sea

Introduction

Microsporidia (phylum Microsporidia Balbiani, 1982) are eukaryotic, unicellular spore-forming parasites invading animals and some protists (Weiss and Becnel, 2014). They belong to the recently recognised holomycotan clade ARM, taxonomically designated as the superphylum Opisthosporidia (Karpov et al., 2014).

The primary distinctive feature of microsporidia

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is the spores, possessing a highly elaborated extrusion apparatus. It consists of a long, thread-like, coiled polar filament, a polar sac, an anchoring disk, a polaroplast, and a posterior vacuole (see Issi and Voronin, 2007). One group of microsporidia, the family Metchnikovellidae Caullery et Mesnil, 1914, stands apart. Representatives of this group lack the anchoring disk, polaroplast and coiled polar filament in their spores, instead they have got a structure called "manubrium", which is believed to be a primitive form of the polar filament of higher microsporidia (Vivier, 1975). All known metchnikovellids are hyperparasities of gregarines inhabiting the gut of polychaetes and some other invertebrates (Vivier, 1975; Schrével and Desportes, 2013; Larsson, 2014). Based on unusual spore morphology and unusual life cycle without merogonial proliferation, metchnikovellids have been regarded as a monotypic taxon (Class Rudimicrosporea with a single family Metchnikovellidae) (Sprague, 1977). Basal position of metch-nikovellids in relation to other taxa of microsporidia was suggested by SSU rDNA-inferred phylogeny (Simdianov et al., 2009; Nassonova et al., 2015) and confirmed by phylogenomic analyses (Mikhailov et al., 2016; Nassonova et al., 2016).

It is very hard to find and study metchnikovellids, because of their hyperparasitic life style, small size and occasional occurrence in the environment. Up to now, less than 30 species of these organisms are described, many of them are known only from old descriptions and illustrations. Only eight species have been investigated by electron microscopy (Vivier and Schrével, 1973; Hildebrand, 1974; Desportes and Théodoridès, 1979; Ormières et al,. 1981; Larsson, 2000; Larsson and Køie, 2006; Sokolova et al., 2013, 2014). Any new observation on metchnikovellids expands our yet very limited knowledge on the diversity and distribution of these organisms. Here, we describe a new species of metchnikovellid microsporidia, *Metchnikovella dogieli* n.sp., inhabiting the archigregarine *Selenidium* sp., parasitising the polychaete *Pygospio elegans*.

Material and methods

About a hundred of polychaetes *Pygospio elegans* (Annelida: Spionidae) were collected at one site (about 9 m^2) of the sand-silt littoral zone in the vicinity of the White Sea Biological Station of M.V. Lomonosov Moscow State University (Velikaja Salma, Kandalaksha Bay, White Sea, 66°33.200' N, 33°6.283' E) in August 2016. Prior to dissection, all animals were stored in small containers (about 50 worms per 250 ml container) at +10 °C with periodically changed seawater. The dissection of polychaetes and isolation of gregarines were performed at the field station using MBS-10 stereomicroscopes (LOMO, Russia) with the help of thin needles and hand-drawn glass pipettes. Presumably infected gregarines were isolated on microscopic slides, fixed for 1 min with 1% acetic acid with 1–2 drops of 1% methyl green according to Fowell (1936) and immediately examined using Leica DM 2000 microscope equipped with DFC 420 digital camera (Leica, Germany). The resulting images of 23 infected gregarines were used to analyse the number of parasite cysts per host cell and the number of spores and their arrangement in a cyst.

Several polychaetes were transported to the laboratory at the Department of Invertebrate Zoology, Saint Petersburg State University. Worms were dissected in a similar manner using Leica M125C dissection microscope. Among them two specimens were found to contain infected gregarines. Both infected and non-infected gregarines were placed on the object slides and investigated using Leica DM 2500 microscope equipped with DIC optics and Plan-Apo objective lenses and photographed using DFC 295 digital camera (Leica, Germany). Two alive gregarines infected with parasite were examined. The measurements of cysts and spores were conducted using the obtained micrographs of the alive gregarines. Some micrographs were processed using the soft-ware Helicon Focus (free version 3.20.2, Helicon Soft) in order to obtain image merged from 2-3 pictures made at the different focus depth. The resulting images were used in Fig. 1, G–I.

Results

Almost all examined polychaetes (98 percent) were infected with archigregarines of the genus *Selenidium* Giard, 1884. Gregarines inhabited the host gut. They were attached to the intestine epithelium or freely resided in the gut lumen. The number of parasites per host varied from 1 to 75 (average (av.) 20, mode 2, standard deviation (SD)=16.4, n=40). Gregarines were aseptate, vermiform (about 150 μm in length), slightly flattened, with narrowed ends (Fig. 1, A). On the cell surface, they had longitudinal

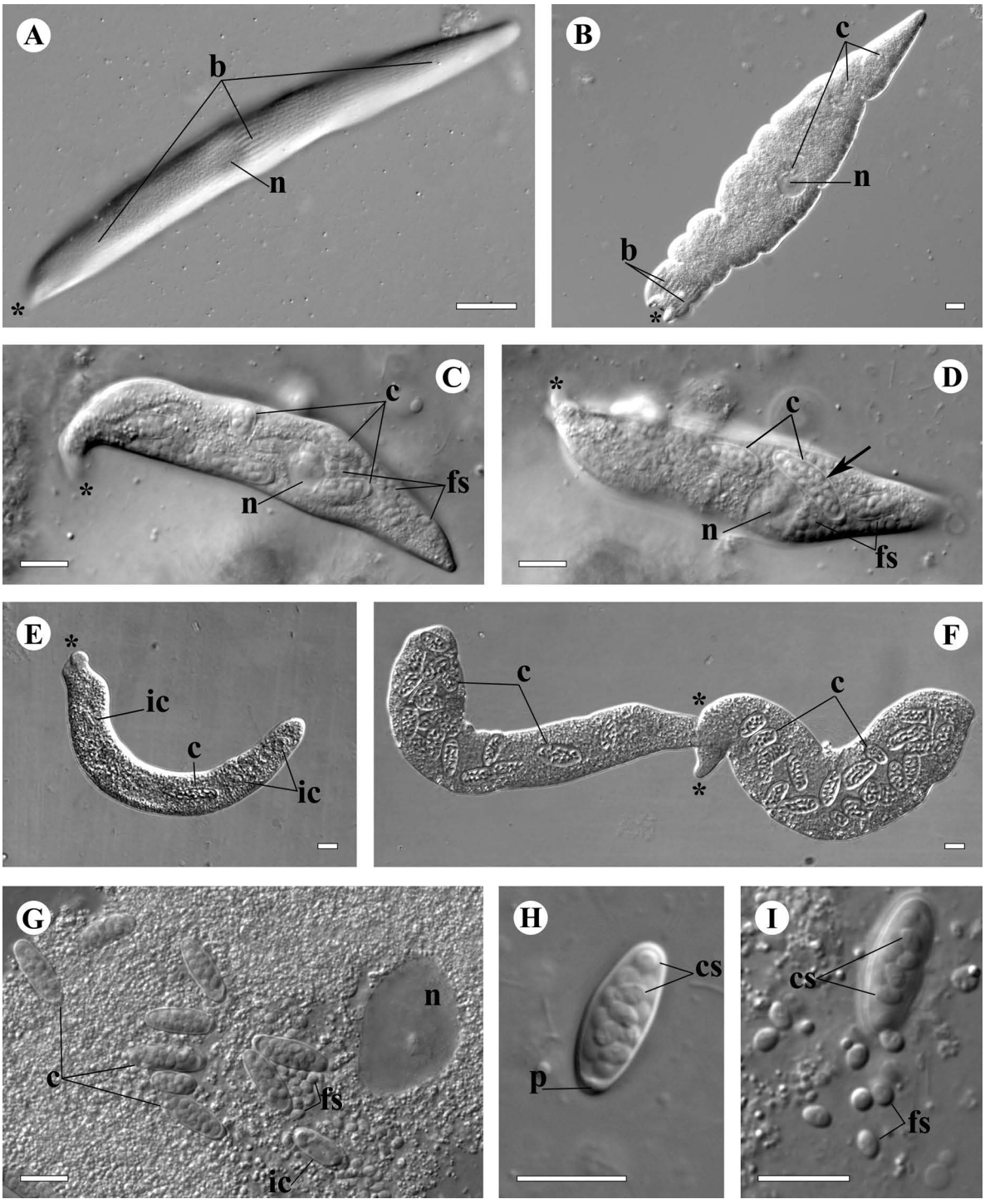

Fig. 1. The archigregarine *Selenidium* sp. infected with the microsporidium *Metchnikovella dogieli*. A – Non-infected gregarine slightly pressed with the coverslip, live cell; B-D – infected gregarines, live cells; the cyst labeled by *arrow* in D contains 18 spores (only 16 spores are in focus in the present image); E-F – infected gregarines, fixed and stained cells; note the single (E) and multiple cysts (F) as well as presumably immature cysts (E) in the cytoplasm of gregarines; G-I – cysts and free spores released from the crashed host cell. *Abbreviations*: b - bulges on the gregarine surface, c - cysts, cs - cyst-bound spores, fs - free spores, ic - immature cyst(s), n - nucleus of the gregarine, p - polar plug. *Asterisks* indicate the anterior end of gregarines. Figures G-I are images merged from several pictures taken at different focus depth. Scale bars: A – 20 μm, B-I – 10 μm.

bulges typical for archigregarines. Gregarines had a well-visible large nucleus located in the widest part of the cell (Fig. 1, A) and demonstrated very active bending motility of the cell.

Among the examined live gregarines, some specimens were deformed (Fig. 1, B–D). They were wider and shorter than the usual cells. Their surface was irregular, with longitudinal bulges only at their anterior end. The nucleus appeared to be also deformed (Fig. 1, B–D vs Fig. 1, A). These deformed gregarines demonstrated restricted motility (Supplementary Video). When these gregarines were slightly pressed with the coverslip, it was possible to observe cysts and free spores of metchnikovellids inside the cells (Fig.1, C–D). Cysts were also found in the stained preparations (Fig. 1, E–F). No other developmental stages rather than cysts and spores were found.

Cysts (Fig. 1, G–H) were dispersed chaotically throughout the gregarine cytoplasm. The number of cysts per gregarine varied from 1 to 24 (av. 12.4, mode 15, SD=6.5, n=25). Cysts were oval, with rounded ends. Some cysts were slightly bent (Fig. 1, D). At one end, they had a thickening, resembling a polar plug observed in other metchnikovellids (Larsson, 2014). The length of the cysts varied from 9.5 to 34 μm (av. 23.8, mode 26.5, SD=5.3, n=29). The width of the cysts was 4.8–9.2 μm (av. 8.2, mode 8.1, SD=1.1, n=29). The observed number of cyst-bound spores varied from 7 to 18 (av. 11.6, mode 12, SD=1.6, n=81). Cyst-bound spores were oval or ovoid and arranged in two or three rows (Fig. 1, F). The length of the spores was 2.2–3.0 μm (av.2.6, SD=0.2, n=30), the width was 1.4–2.9 μm (av.1.7, SD=0.3, n=30). In several stained specimens, irregularly shaped, thin-walled cysts were observed together with the usual ones. The content of these cysts was poorly colored (Fig. 1, E). One similar cyst with intact walls and a polar plug at one end, but without recognisable spores inside was also found in a live gregarine (Fig. 1, G). These cysts with underdeveloped content were, probably, immature.

Besides cysts, the cytoplasm of infected gregarines contained numerous free spores located between the cysts (Fig. 1, C, D). Crashing of one live gregarine during manipulations with samples caused the release of cysts and free spores from the host cytoplasm (Fig. 1, G–I). This allowed us to observe and compare cyst-bound spores with free spores directly (Fig. 1, I). Free spores were of the same morphology as cyst-bound spores: oval or ovoid, sometimes with a small bulge on one side. Their dimensions were very close to that of the cyst-bound spores: 2.2–3.3 μm (av. 2.9, SD=0.3, n=23) in length and 1.3–3.7 μm (av. 2.0, SD=0.4, n=23) in width (Fig. 1, G–I).

Discussion

The family Metchnikovellidae Caullery et Mesnil, 1914 comprises three genera: *Metchnikovella* Caullery et Mesnil, 1897, *Amphiamblys* Caullery et Mesnil, 1914 and *Amphiacantha* Caullery et Mesnil, 1914. These genera are distinguished by the morphological characters of the cysts (summarized in Vivier, 1975; Schrével and Desportes, 2013; Larsson, 2014; Sokolova et al., 2014). The species of the genus *Metchnikovella* produce oval, cylindrical or fusiform cysts with rounded thick ends, so-called polar plugs or plugging structures (Sokolova et al., 2014). The length of these cysts never exceeds ten times the width. In the most of described species, the length of cysts is under 20 μm, the number of cyst-bound spores varies from 8 to 16, rarely more. In some species the number of spores per cyst indicated as a constant value, in other – as a variable one. The most of *Metchnikovella* species parasitise gregarines of the genera *Lecudina, Selenidium* and *Polyrhabdina*, inhabiting the gut of various polychaetes (Table 1). Three species were described from other hosts. Up to now, 18 species of *Metchnikovella* were described. Larsson (2014) transferred seven species from the genus *Metchnikovella* to the genus *Caulleryetta* Dogiel, 1922 based on the oval shape of cysts and the presence of polar plug at one end only. However, this genus was doubted earlier (Vivier, 1975) because many old descriptions of metchnikovellids are sketchy and do not contain characters required to assign them to either of these genera.

Species belonging to the genus *Amphiamblys* have cylindrical cysts without polar plugs at the ends. The length of cysts is 35–100 μm, depending on the species; it exceeds ten times the width. The number of spores in each cyst was determined as 32 in *A. capitellides* (Caullery and Mesnil, 1914) or 20 - 30 in *A. caullery* (Mackinnon and Ray, 1931). In many descriptions of *Amphiamblys* species, this parameter was not indicated. The representatives of this genus inhabit gregarines of the genera *Ancora, Bhatiella, Lecudina* from polychaetes and echiurids. According to Larsson (2014), the genus comprises eight species.

The genus *Amphiacantha* is defined as having fusiform cysts with numerous spores inside. The

Table 1. Diagnostic characters of the species from the genus *Metchnikovella* parasitising in the gregarines from polychaetes[1].

***Metchnikovella* species**	**Host species**	**Super-host species**	**Presporogonial stages**	**Free spores**	**Cysts**	**Type locality**	**References**
M. brasili [2]	*Polyrhabdina brasili*	*Spio martinensis*	One-nucleated cells in a group (?)	No data	Ovoid, 10 x 5 µm, about 12 spores	Anse Saint-Martin, English Channel, East Atlantic	Caullery and Mesnil, 1919
M. claparedei [3]	*Lecudina* sp. (?)	*Phyllodoce* sp. (?)	No data	No data	Elongated, incurved, with a thicker part in the middle	Hebrides, East Atlantic	Claparède, 1861; Caullery and Mesnil, 1914, 1919; Vivier, 1975
M. hovassei [2]	*Lecudina pellucida*	*Perinereis cultrifera*	One-nucleated cells, multinucleated plasmodia	Slightly flattened spinning-top, 1.75 x 1.25 µm	Oval, 10 x 4 µm, one plug, about 10 spores (roundish to oval, x1.5 µm) in two rows	Étang de Thau, Mediterranean Sea	Vivier, 1965, 1975; Vivier and Schrével, 1973
M. incurvata	*Polyrhabdina pygospionis*	*Pygospio elegans* (former *P. seticornis)*	Chains of one- and multinucleated cells	Oval or ovoid, 3.7 × 1.8 µm	Elongated, slightly bent, 22–27 x 4.0–5.0 µm, two plugs, up to 16 spores (oval or ovoid, 3.6 x 1.8 µm)	Anse Saint-Martin, English Channel, East Atlantic	Caullery and Mesnil, 1914, 1919; Sokolova et al., 2013
M. legeri	*Sycia inopinata*	*Cirriformia* (former *Audouinia*) *tentaculata* [4]	No data	No data	Fusiform, slightly bent, 20-30 x 5.5-7 µm, two plugs, 32 spores in 2-3 or more rows	Belle-Île-en-Mer, East Atlantic	Léger, 1892; Caullery and Mesnil, 1914, 1919
M. mesnili [2]	*Selenidium* sp.	*Travisia forbesii*	No data	Roundish	Roundish with a short, thin neck, one plug, 8-12 spores	Strait Ekaterininskaya Gavan', Kola Bay, Barents Sea	Dogiel, 1922; Vivier, 1975
M. minima	*Selenidium cirratuli* (*Ditrypanocystis cirratuli*?)	*Cirriformia*[4] (former *Audouinia*) sp. (*C. tentaculata*?)	No data	No data	Cylindrical, thick wall, 8.7 x 4.3 µm, about 20 spores in 3 rows	Belle-Île-en-Mer, East Atlantic	Léger, 1892; Caullery and Mesnil, 1914, 1919; Vivier, 1975
M. nereidis	*Lecudina* sp. (*L. pellucida* ?)	*Platynereis dumerilii*	No data	No data	Fusiform, 10-12 x 4 µm, two plugs, 8 spores in two rows	Cap de la Hague, English Channel, East Atlantic	Caullery and Mesnil, 1914, 1919; Vivier, 1975
M. oviformis [2]	*Polyrhabdina pygospionis*	*Pygospio elegans* (former *P. seticornis)*	No data	No data	Ovoid, 14 x 6.5 µm, no plugs, 8 spores	Anse Saint-Martin, English Channel, East Atlantic	Caullery and Mesnil, 1914, 1919; Sokolova et al., 2013
M. polydorae	*Selenidium* sp. *(S. cruzi ?)*	*Polydora* sp.	No data	No data	10-14 x 3 µm, one plug (?), 12-16 spores	Helgoland, North Sea	Reichenow, 1932; Vivier, 1975
M. schereschevskaiae (former *Microsporidyopsis nereidis*) [2]	*Lecudina* sp.	*Nereis falsa* [4] (former *N. parallelogramma*)	No data	No data	Oblong, with one longitudinal suture (?) and one plug, 8-10 x 3.5-4 µm, 8-12 (round or oval, x1.6 µm) spores in 2-3 rows	Trieste, Mediterranean Sea	Schereschevsky, 1924; Stubblefield, 1955; Vivier, 1975
M. selenidii	*Selenidium sp.*	*Ophelia limacina*	Filamentous plasmodia with great number of nuclei arranged in 1-2 rows	<= 2 µm, ellipsoid	Cylindrical, bent, with rounded ends, one plug (?), 16 x 5-8 µm, 14-20 spores in two rows	Kola Bay, Barents Sea	Awerinzew, 1908; Caullery and Mesnil, 1919; Rotari et al, 2015

Table 1. Continuation.

M. spionis, type species	*Polyrhabdina brasili*	*Spio martinensis*	No data	Roundish (?)	Elongated with swollen middle part, two long and thick plugs, 20-40 x 4 µm, about 16 spores (x 2.5 µm) in two rows	Baie d'Écalgrain, English Channel, East Atlantic	Caullery and Mesnil, 1897, 1919
M. spiralis	*Polyrhabdina* sp. (*P. pygospionis* ?)	*Pygospio elegans*	One-, two- and four-nucleated cells	Roundish or oval, slightly angular at the top of the polar cap, 2.0-3.2 x 1.3-1.9 µm (fixed)	Oval, 10.0-13.5 x 3.5-5.3 µm (live), spiral cord, no plugs, 8 spores (barrel-shaped, 3.3-4.4 x 2.3-2.8 µm (live))	Levin reach, Chupa Inlet, Kandalaksha Bay, White Sea	Sokolova et al., 2014
M. wohlfarthi [2]	*Lecudina tuzetae*	*Nereis diversicolor*	Multinucleated plasmodia	Ovoid, 1.7-3.0 x 0.9-1.9 µm	Bottle-shaped, short and bulky, with round and conical ends, one plug (?) at round end, 10 × 5 µm, 8-12 spores in 2-3 rows	Petit Fort Philippe, English Channel, East Atlantic	Hildebrand and Vivier, 1971; Hildebrand, 1974; Vivier, 1975
Metchnikovella dogieli sp. n.	*Selenidium* sp.	*Pygospio elegans*	No data	Oval or ovoid, sometimes with a small bulge on one side, 2.2-3.3 x 1.3-3.7 µm	Oval, sometimes slightly bent, 9.5-34 x 4.8-9.2 µm, with one plug, 7-18 (often 12-14) spores (2.2-3.0 x 1.4-2.9 µm)	Velikaja Salma, Kandalaksha Bay, White Sea	Present study

Abbreviations: "?" – data need to be clarified; species examined by electron microscopy are in bold; "plug(s)" – polar plug(s).

[1] In addition to 16 metchnikovellian species described from the polychaete hosts (including the species described in the present study) there are three species isolated from other hosts: *M. hessei* from *Monocystis mitis* in the terrestrial oligochaete *Fridericia polychaete* – Hesse, 1909; Mesnil, 1915; *M. berliozi* [2] from *Lecudina franciana (Selenidium franciana*?) in the sipunculid *Phascolion (Phascolion) strombus strombus* [4] – Arvy, 1952; *M. martojai* from *Gregarina cousinea* in the orthopteran insect *Gryllus assimilis* – Corbel, 1967 (the latter species is considered to be uncertain due to many questions to its description) (cited after Vivier, 1975; Larsson, 2014; Schrével and Desportes, 2013).

[2] In the last revision of metchnikovellids by Larsson (2014) these species were attributed to the genus *Caulleryetta* Dogiel 1922. The genus was not justified in the revision of the family by Vivier (1975) and in the further works of other authors (Schrével and Desportes, 2013).

[3] Larsson (2014) attributed this species to the genus *Amphiamblys* because of the questionable description of the species by Caullery and Mesnil (1914, 1919).

[4] The validation of the scientific names was conducted in the World Register of Marine Species (WoRMS Editorial Board, 2016).

cysts lack polar plugs and terminate as threadlike extensions. The length of cysts is up to 100 μm. Metchnikovellids of this genus parasitise gregarines of the genus *Lecudina* from polychaetes *Lumbriconereis* spp. The genus comprises three species (Vivier, 1975; Larson, 2014).

The cysts of the metchnikovellid, reported in the present study, are oval. They contain up to 18 spores and have thickenings, resembling polar plugs, at one end. Cyst-bound spores are similar in size and shape to free spores. The cyst morphology and host range of this species are typical for the genus *Metchnikovella* (Hildebrand and Vivier, 1971; Vivier and Schrével, 1973; Sokolova et al., 2013, 2014), while microsporidia belonging to the genera *Amphiamblys* and *Amphiacantha* produce free spores that differ from the cyst-bound ones in size and/or shape (Desportes and Théodoridès, 1979; Larsson and Køie, 2006). Thus, the studied microsporidium can be identified as a member of the genus *Metchnikovella* (Table 1).

There are several descriptions of metchnikovellids inhabiting gregarines from the polychaetes of the family Spionidae: *Metchnikovella oviformis, M. incurvata* and *M. spiralis* from *Pygospio elegans* (Sokolova et al., 2013, 2014), *M. spionis* and *M. brasili* from *Spio martinensis* (Caullery and Mesnil, 1914, 1919), *M. polydorae* from *Polydora* sp. (Vivier, 1975). Except *M. polydorae* all these microsporidia invade eugregarines of the genus *Polyrhabdina*. Only one species, *M. polydorae*, was found in the archigregarine *Selenidium* sp. (Vivier, 1975). However, the cysts of this species are twice smaller than that of the studied microsporidium (Table 1). Microsporidia *Metchnikovella mesnili, M. minima* and *M. selenidii* inhabit archigregarines from polychaetes of different families: Travisiidae, Cirratulidae and Opheliidae. The cysts of these parasites are either twice smaller or of different shape (Table 1). Therefore, the examined in this study metchnikovellid microsporidium shows unique combination of individual characters used for the species identification within the genus *Metchnikovella*: the super-host range, the host range, the size and shape of the cysts (Table 1). This result suggests that the examined organism represents a new species of the genus *Metchnikovella*, which we called *M. dogieli* in honor of the famous zoologist, Prof. Valentin A. Dogiel.

In the studied species, we observed mature and, probably, immature cysts, and free spores, but no presporogonial stages. Lacking of information on presporogonial phase of development is a common place for metchnikovellids. It could be a result of inappropriate fixation/staining methods, which reveal only thick-walled stages (cysts, spores) of the parasite life cycle, or it may indicate that presporogonial phase is too rapid to be detected.

The observed variations in the size of cysts and in the number of spores within a cyst (which were also mentioned in the descriptions of some *Metchnikovella* species (Table 1)) could reflect an intra-population (probably, intra-clonal) variability of parasites. Sometimes, such cyst variations were observed in one and the same gregarine (Fig. 1, D, G–I). We also cannot discount that variations in the cyst dimension and spore number could also be an artifact of observations (this especially concerns descriptions published in the older literature). These artifacts could originate from arranging and handling the preparations of infected gregarines for light microscopy that may cause violation of cysts on the slide, overlapping of individual spores or shifts of spore arrangement inside the cysts.

Interestingly, the present species of metchnikovellids was found for the first time at the White Sea despite intensive, long-term studies of microsporidian parasites in gregarines from the polychaete *Pygospio elegans* collected at different sampling sites (Rotari, 1988; Rotari and Paskerova, 2007; Sokolova et al., 2013, 2014; Rotari et al., 2015). This parasite was found in a dense population of polychaetes intensively infected with archigregarines. We never observed that heavily infected host populations before. In general, the level of infection with microsporidia is extremely low in the polychaete populations (Sokolova et al., 2013, 2014; Rotari et al., 2015). We suppose that the extensiveness of infection with microsporidia may sharply raise in some polychaete populations heavily parasitised by gregarines. We also cannot exclude the emergence of this parasite in the White Sea as a result of its spreading from other localities as it was suggested for *M. incurvata* (Sokolova et al., 2014; Rotari et al., 2015). Long-term studies and molecular ecological approaches are essential to reveal the diversity of these relatively rare and unusual organisms.

Taxonomic summary

Phylum Microsporidia Balbiani, 1982
Class Rudimicrosporea Sprague, 1977
Order Metchnikovellida Vivier, 1975
Family Metchnikovellidae Caullery and Mesnil, 1914

Genus *Metchnikovella* Caullery and Mesnil, 1897, emend. Caullery and Mesnil, 1914
Metchnikovella dogieli n. sp. Paskerova, Frolova, Kováčiková, Panfilkina, Mesentsev, Smirnov et Nassonova

Diagnosis. Free spores oval or ovoid, with a small bulge on one side. The length of the spores is 2.2–3.3 μm (here and further average ± standard deviation: 2.9 ± 0.3 μm), the width is 1.3–3.7 μm (2.0 ± 0.4 μm). Cysts are oval, sometimes slightly bent, with rounded ends and a polar plug at one end. The length of the cysts is 9.5–34 μm (23.8 ± 5.3 μm), the width is 4.8–9.2 μm (8.2 ± 1.1 μm). The number of cyst-bound spores varies from 7 to 18 (average 12). Cyst-bound spores are of the same shape and arranged in two or three rows inside the cyst. The length of the cyst-bound spores is 2.2–3.0 μm (2.6 ± 0.2 μm), the width is 1.4–2.9 μm (1.7 ± 0.3 μm).
Differential diagnosis. The species differs from the congeners and other metchnikovellids by the combination of characters: the size and shape of the cysts, the number of spores per cyst, the super-host and host range.
Type locality. In the environ of the White Sea Biological station of Lomonosov Moscow State University, Velikaja Salma, Kandalaksha Bay, White Sea, 66°33.200' N, 33°6.283' E. Littoral zone.
Type habitat. Marine.
Type host and super-host. Archigregarines *Selenidium* sp. (Apicomplexa: Selenidiidae) from polychaetes *Pygospio elegans* (Annelida: Spionidae).
Location in host. Gregarine cytoplasm.
Type material. Images of two live gregarines are in the image collection of the Department of Invertebrate Zoology, St Petersburg State University under the following numbers: *Metchnikovella dogieli*_LeicaDM2500_DFC295_x100_001 - *Metchnikovella dogieli*_LeicaDM2500_DFC295_x100_234.
Holotype. Fig. 1, H.
Paratypes. Fig. 1, C, D, G, I.
Etymology. This species was named in honor of the famous zoologist, Prof. Valentin A. Dogiel (1882–1955) for his contributions to the studies of parasitic and free-living protists.

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