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NEW SPECIES OF MYXOSPOREA FROM GENUS *KUDO*A (MYXOSPOREA, MULTIVALVULIDA) FOUND IN MUSCLES OF SOME FISHES OF THE SEA OF JAPAN

N. L. Aseeva

*Pacific Fisheries Research Center (TINRO),
Shevchenko Alley, 4, Vladivostok, 690950 Russia
E-mail: shvetsova@tinro.ru*

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New Species of Myxosporea from Genus *Kudoa* (Myxosporea, Multivalvulida) Found in Muscles of Some Fishes the Sea of Japan. Aseeva N. L. — Two new species of myxosporeans are described from muscles of greenlings (*Kudoa azoni*) and perch (*Kudoa sebastea*) caught in the Peter the Great Bay (Sea of Japan).

Key words: fish parasites, myxosporeans.

Новые виды микоспоридий рода *Kudoa* (Myxosporea, Multivalvulida), обнаруженные в мускулатуре некоторых видов рыб Японского моря. Асеева Н. Л. — Приведено описание двух новых видов микоспоридий рода *Kudoa* из скелетной мускулатуры южного одноперого и восьмилнейного терпуга (*Kudoa azoni*) и малого окуня (*Kudoa sebastea*), выловленных в заливе Петра Великого (Японское море).

Ключевые слова: паразиты рыб, микоспоридии.

Introduction

Two species of myxosporeans of the genus *Kudoa* were found during parasitological studies of greenlings and perches of the Sea of Japan. These species infect skeleton muscles of the arabesque greenling *Pleurogrammus azonus* Jordan et Metz, 1913, masked greenling *Hexagrammos octogrammus* Pallas, 1810, and petit perch *Sebastes minor* Barukov, 1972. Young fish have the parasites between muscle fibres; adult fish surround them with cysts formed by the connective tissue of the host. After detailed investigation they were found to belong to new species. Syntypes are deposited in the Laboratory of Parasitology of Pacific Fisheries Research Center (TINRO).

Material and methods

The studies were carried out in 1996–1998, mainly in the spring–summer periods. Fish samples were collected at the depth 15–60 m near the coast of Primorye Region (north-western the Sea of Japan). Fresh samples were transported to the Laboratory of Parasitology in Vladivostok for special testing of infection by myxosporidia parasites. 90 specimens of 3 species were investigated: 74 specimens of the arabesque greenling, 6 specimens of the masked greenling, and 6 specimens of the petit perch. Cysts of parasites were found visually in muscles of 3 specimens of the arabesque greenling and 2 specimens of the petit perch. Two young specimens of the masked greenling were exposed to histological analysis, and spores of the parasites were found in skeleton muscles.

Extracted myxosporean parasites were studied in smears fixed in glycerin-gelatin liquid by Donets-Schulman method (Donets, Schulman, 1973). Further processing was carried out using oil immersion phase contrast microscopy (Biolam M-211) with measurement of length and width of 30 spores of each species. Figures were drawn using RA-4 drawing device.

Family KUDOIDAE Meglitsch, 1947

Kudoa azoni Aseeva, sp. n. (fig. 1)

Material. Hosts and frequency: *Pleurogrammus azonus* (in 3 out of 74 specimens), *Hexagrammos octogrammus* (in 2 out of 6). Habitat: Skeleton muscles. The Sea of Japan, Amur Bay, depth 15 m, 20.03.1996 (Aseeva); the Sea of Japan, Ussuri Bay, depth 28 m, 26.04.1998 (Aseeva). Depository: TINRO, Vladivostok, Coll. N 567, 568.

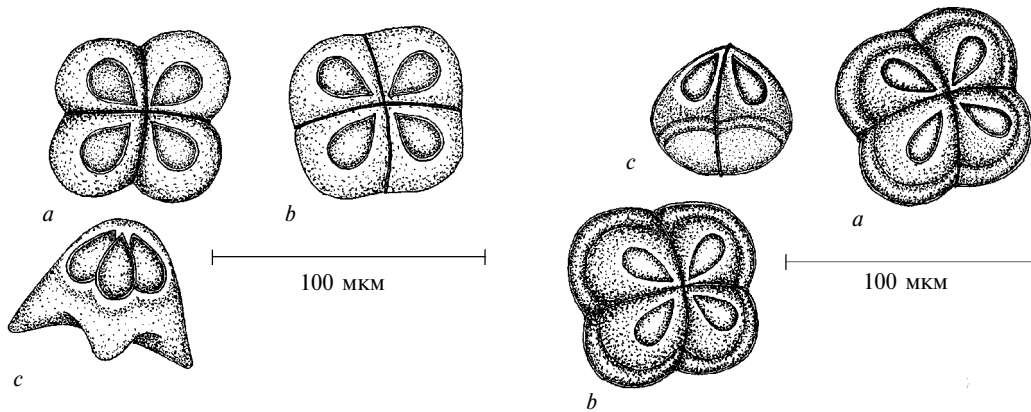


Fig. 1. Spores of *Kudoa azoni*: *a-b* — anterior view; *c* — lateral view.

Рис. 1. Споры *Kudoa azoni*: *a-b* — вид спереди; *c* — вид сбоку.

Fig. 1. Spores of *Kudoa azoni*: *a-b* — anterior view; *c* — lateral view.

Рис. 1. Споры *Kudoa azoni*: *a-b* — вид спереди; *c* — вид сбоку.

Description. Vegetative forms are numerous plasmodia containing 6–10 spores. Large groups of plasmodia are surrounded with cysts formed by connective tissue of host. Cysts spindle-shaped, white-gray colored, size 2.5–5.0 × 0.5–1.2 mm. Young fish with mature spores within muscles between fibres, especially in skeleton muscles. Spores quadrangular, but rounded under pressure. Anterior-posterior projection almost quadrant, with rounded angles. Valves thin and able to crumple lightly (ends of some spores looking as pointed at lateral view). Polar capsules pear-shaped and have equal lengths. Valvegenic nuclei are located in the tips of valves. Dimensions of spores (mkm): length 5.0–6.0, width 6.2–7.2, thickness 5.2–6.0. Dimensions of polar capsules: length 2.0–2.2, diameter 1.0–1.5.

Differences. The species is the most similar to *Kudoa alliari* Kovaljova, Shulman et Yakovlev, 1981 (Kovaljova et al., 1981) from deep-water fishes of the Atlantic Ocean, differing by smaller dimensions of spores, very thin and more rounded valves. It differs from *Kudoa nova* Najdenova, 1975 (Najdenova et al., 1975) by smaller sizes of spores and polar capsules, and very thin valves.

Etymology. The species is named after the species name of the most usual host, *Pleurogrammus azonus*.

***Kudoa sebastea* Aseeva, sp. n. (fig. 2)**

Material. Host: *Sebastes minor* (in 2 out of 6 specimens). Habitat: skeleton muscles. the Sea of Japan, Alexeev Bay, depth 20 m, 12.05.1998 (Aseeva). Depository: TINRO, Vladivostok, Coll. N 765, 766.

Description. Vegetative forms small, whitened plasmodia with 1–8 spores surrounded with capsule formed by connective tissue of host. Capsules with size 2.0–5.0 × 1.0–2.5 mm located in thin fibres of muscles. Spores with round shape under pressure, but their anterior-posterior projection is almost quadrant, with rounded angles, and lateral projection not round as well because of small swelling of anterior pole and slightly planned posterior pole. Valves with band thickening along perimeter easily visible at lateral view closer to posterior pole. Polar capsules small, of equal size. Polar filament twisted around longitudinal axis of capsule with one coil. Valvegenic nuclei located in tips of valves. Dimensions of spores (mkm): length 5.4–5.6, width 7.3–8.2, thickness 5.0–5.5. Dimensions of polar capsules: length 2.0–2.2 mkm, diameter 0.8–1.0 mkm.

Differences. The new species differs from all known species of the family *Kudoidae* by the presence of bolster thickening of its valves. Spores structure of *K. sebastea* is the most similar to *Kudoa musculoliquifacies* Matsumoto, 1954 and *K. amamensis* Egusa et Nakajima, 1980 found in fishes of the Sea of Japan (Matsumoto, 1954; Egusa, Nakajima, 1980), and *K. alliaria* Schulman et Kovaljova, 1981 (Kovaljova et al., 1981). However, the new species differs from *K. musculoliquifacies* by its more rounded spores, from *K. amamensis* — by more stretched polar capsules and larger length and width of spores, from *K. alliaria* — by smaller length and thickness of spores. Besides, *K. sebastea* does not cause tissue histolysis around their cysts.

Etymology. The species is named after the genus name of the host, *Sebastes minor*.

Applied importance

Newfound myxosporeans belong to the genus *Kudoa* that does a great harm to fisheries causing the dangerous decease as kudoosis. Histolysis of muscle tissue caused by *K. azoni* was observed at specimens of young greenlings, especially after the death of the fish. The process of histolysis could be delayed by low temperature, but liquefying of muscles renews after refreezing. The histolysis stops with thermal processing. The mechanism of the fish tissue histolysis is still vague.

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