

Trilosporoides platessae gen. et sp. n. (Myxozoa: Multivalvulida) in the plaice *Pleuronectes platessa* (Teleostei: Pleuronectidae) from Denmark

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Abstract. A new myxosporean species, *Trilosporoides platessae* gen. et sp. n. (Multivalvulida), is described from the gallbladder of the plaice *Pleuronectes platessa* L. (Pleuronectidae) from Denmark. The myxospore of *T. platessae* is conical in side view, with a 24 µm long, pointed posterior projection. In apical view, the myxospore (diameter 9.4 µm) is round, trilobed and with three spherical polar capsules arranged peripherally, equidistant and opening peripherally through protruding tips. The polar capsules are of different sizes, one often larger than the others (diameter 3.3 µm vs. 2.5 µm). Apart from the long posterior projection, the myxospore of *T. platessae* differs from those of the three known species of *Trilospora* Noble, 1959 and from all genera within the order Multivalvulida Shulman, 1959 in the arrangement of the polar capsules. *Trilosporoides platessae* may temporarily be placed in the vicinity of the Trilosporidae.

Examination of myxozoans in marine fish in Denmark has revealed previously undescribed myxosporean species in various fish species. Even though the plaice *Pleuronectes platessa* L. (Pleuronectidae) had been much studied, both in the Øresund during the previous year and abroad, a new myxozoan species has been found in its gallbladder only recently. This species, which differs from all known multivalvulidan myxozoans in the arrangement of the polar capsules, is described as a new genus and a new species below.

MATERIALS AND METHODS

A total of 48 juvenile specimens of the plaice *Pleuronectes platessa* L. were caught with a beach seine net at a depth of about 1 m close to the North harbour of Helsingør, the Northern Øresund in May 2005. The salinity at this depth is usually between 12 and 20‰. The fish specimens were 1-group (from previous winter) and 10–15 cm long. The specimens were examined immediately upon capture. The body cavity of the fish was opened from the anal opening to the gills and the internal organs were examined using a dissection microscope. Fresh smears of urine, urinary bladder wall, various parts of the digestive tract, kidney, bile, gallbladder wall, liver, gills and musculature were compressed between the slide and coverslip. Smears of bile were air-dried, methanol-fixed, stained with Giemsa and embedded in DPX. Measurements (n = 10) in µm are based on fresh smears and are given as the mean with the range in parentheses.

RESULTS

A new myxosporean species with three polar capsules was found in a 12 cm long 1-group plaice. The gallbladder of the infected plaice was normally looking. The myxospores of the new species were revealed when

smears of fresh bile were examined at high magnification. No other myxosporean species was found in the gallbladder.

The new species was found in only one plaice *Pleuronectes platessa*, even though 40 specimens of 1-group of this species were examined in the summer of 2004 and 8 in the spring of 2005. The infected specimen was caught on the 12th May 2005. The prevalence for both years is 2.1%.

No plasmodia were found.

Trilosporoides gen. n.

Diagnosis. Myxospores conical in lateral view, circular in apical view. Three polar capsules peripherally, equidistant. Polar capsules open peripherally. One polar capsule may be larger than others. Spore radially symmetrical apart from different sizes of polar capsules. Sporoplasm conical and surrounded by thin shell-valves. Type and only species: *Trilosporoides platessae* sp. n.

E t y m o l o g y : The generic name relates to similarity of the new genus to *Trilospora* Noble, 1939.

Taxonomic affinities. *Trilosporoides platessae* may temporarily be placed in the vicinity of the Trilosporidae Shulman, 1959 in the order Multivalvulida Shulman, 1959.

Trilosporoides platessae sp. n.

Figs. 1–4

With characters of the genus. Myxospores 24.4 (22.0–26.0) µm long and 9.4 (8.0–11.0) µm in diameter. Three small incisions apically result in trefoil-like appearance in apical view. Sutures between three elongate shell-valves indistinct. Spherical polar capsules in each

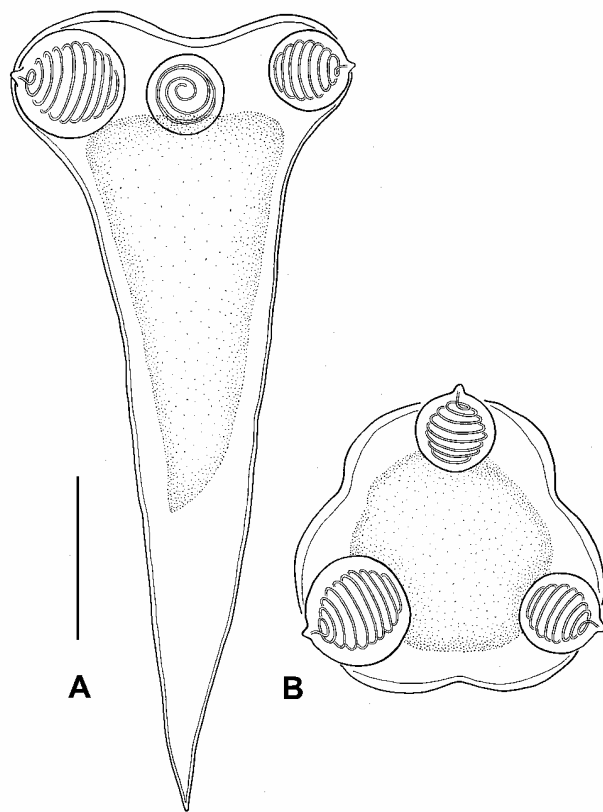


Fig. 1. *Trilosporoides platessae* gen. et sp. n., myxospore. **A** – lateral view; **B** – apical or polar view. Scale bar = 5 μ m.

trefoil rounded points. Polar capsules open peripherally through small tip which protrudes through trefoil rounded points. Most often one polar capsule is larger (diameter 3.3 μ m) than two remaining polar capsules (diameter 2.5 μ m), but all combinations were found between small and large polar capsules. Polar filament of large polar capsule 90 μ m long, extruded polar filaments of smaller polar capsules not observed. Ten to 12 filament turns in large polar capsules, less in small polar capsules. Half of conical sporoplasm protrudes into conical part of spore.

Type host: *Pleuronectes platessa* L. (plaice) (Teleostei, Heterosomata, Pleuronectidae).

Type locality and date: Northern Øresund off Helsingør, Denmark, 56°02'N, 12°37'E; 12 May 2005.

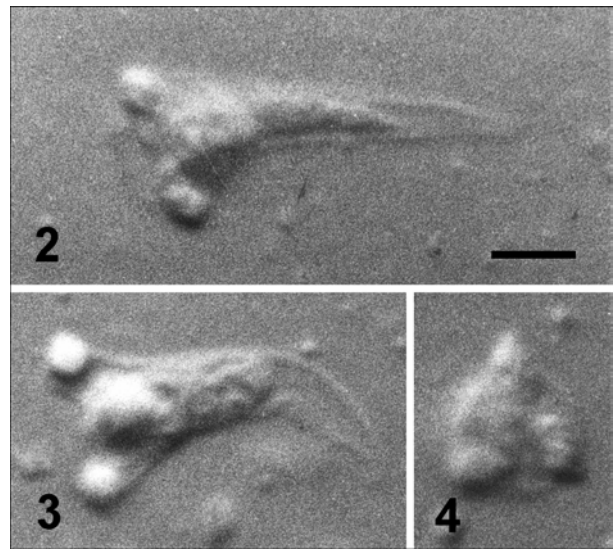
Site of infection: Gallbladder.

Prevalence: 2.1% (1 of 48 1-group plaice).

Type material: One slide with stained spores is deposited in the Institute of Parasitology, Academy of Sciences of the Czech Republic, České Budějovice (Cat. No. DPF-009) and one slide is deposited in the Zoological Museum, Copenhagen, Denmark (no Cat. No. assigned).

Etymology: The specific name *platessae* relates to the species name of the fish host.

Host reaction. The gallbladder was not examined histologically, but smears of infected and uninfected gallbladders were identical, indicating that the parasites have no or only a slight effect on the gallbladder.



Figs. 2–4. Live myxospores of *Trilosporoides platessae* gen. et sp. n. in the gallbladder of *Pleuronectes platessa*. Interference contrast. **Figs. 2, 3.** Lateral views. **Fig. 4.** Apical or polar view. Scale bar for Figs. 2–4 = 5 μ m.

DISCUSSION

Trilosporoides platessae and the three described species within the genus *Trilospora* Noble, 1939 differ from all other known myxozoans in having three polar capsules. One of the polar capsules of *T. platessae* is sometimes larger than the others, which is also a characteristic feature of the genus *Trilospora*. The members of the genus *Trilospora* (Table 1) have an unusual distribution in the seas; two were found in shallow water (rock pools and brackish water <1 m), and two were found in deep water in the North Atlantic. Three species were found in the gallbladder, one in muscle tissue. Molecular analysis may change the temporary placement of *Trilosporoides platessae* in the vicinity of the *Trilosporidae*.

Trilosporoides platessae differs from members of *Trilospora* in its shape, being long and conical, whereas those of *Trilospora* have round, three-lobed spores (Table 1). However, the greatest discrepancy between *T. platessae* and the species of *Trilospora* is the arrangement of the polar capsules. In *Trilospora* they are grouped together and open at the apex of the spore, whereas those in *T. platessae* open peripherally. *Trilosporoides platessae* hereby also differs from other members of the order Multivalvulida Shulman, 1959. The diagnosis of the Multivalvulida (see Lom and Dyková 1992), which among other genera includes *Kudoa* Meglitsch, 1947, should be emended to include all radially symmetrical spores with more than three valves meeting in three or more sutures (which may be inconspicuous). The number of polar capsules varies from 1 to 15 (Whipps et al. 2003); the polar capsules open at the apex or peripherally.

Table 1. Comparison between the three known species of *Trilospora* and *Trilosporoides platessae*. Sizes of myxospores in μm .

Species (locality)	Hosts (sites)	Plasmodia	Myxospores	Polar capsules	References
<i>T. californica</i> (Tide pools of Santa Barbara, California)	<i>Gibbonsia elegans</i> (Cooper), Clinidae; <i>Typhlogobius californiensis</i> Steindachner, Gobiidae (gallbladder)	Polymorphic, < 0.1 mm, pointed pseudopodia with amoeboid movement; mono- and disporic	L: 7.2 W: 16	Pyriform L: 3.0 W: 1.5	Noble 1939
<i>T. minuta</i> (North Atlantic)	<i>Coryphaenoides rupestris</i> Gunnerus, Macrouridae (gallbladder)	Cyst-like, 0.5–1.0 mm; polysporic	L: 4–5 (?) W: 5.6–6.3	Pyriform L: 2.5–2.8 W: 2.0–2.5 L: 3.2–3.5 W: 2.5–3.5	Kovaleva and Zubchenko 1984
<i>T. muscularis</i> (Dohrn Bank, North Atlantic)	<i>Molva dypterygia</i> (Pennant), Gadidae (muscle)	Not seen	L: 5.2–6.6 W: 6.7–9.8	Pyriform L: 3.2–4.8 W: 2.0–3.2	Priebe 1987
<i>T. platessae</i> (Northern Øresund, Denmark)	<i>Pleuronectes platessa</i> L., Pleuronectidae (gallbladder)	Not seen	L: 22–26 W: 8–11	Spherical Diam.: 2.5 Diam.: 3.3	Present study

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