The Spionidae (Polychaeta) act as invertebrate hosts for marine Myxozoa

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Abstract
Actinosporean stages including spherical pansporocysts and oval tetractinomyxon actinospores about 8 µm long were found in two unidentified spionid polychaetes in the northern Øresund, Denmark. The myxosporean stages in fish are unknown. Members of the Spionidae occur worldwide and at all depths and it is likely that they act as invertebrate hosts for several species of Myxozoa.

Marine actinospores have been recorded in both oligochaetes, polychaetes and in a sipunculid worm (see Køie 2000, 2002). Those found in polychaetes and in the sipunculid worm are of the tetractinomyxon type. Only two two-host life cycles with tetractinomyxon actinospores are known: Ceratomyxa shasta Noble, 1950 (Ceratomyxidae) uses the freshwater polychaete Manayunkia speciosa Leidy as invertebrate host (Bartholomew et al. 1997) and Ellipsomyxa gobii Køie, 2003 (tentatively placed in the Ceratomyxidae, see Køie, 2003) uses the marine polychaetes Nereis spp. as invertebrate hosts (Køie et al., 2004). Tetractinomyxon actinospores have until now been found in polychaetes belonging to the following families: Sabellidae, Nereidae, Spirorbidae and Serpulidae (Bartholomew et al., 1997; Køie, 2000; 2002; Køie et al., 2004).

The material used in this study was collected in the northern Øresund, Denmark, in December 2004 and January 2005. Benthic samples were taken with a dredge at depths of 12 and 18 m. Polychaetes were removed from sieved (mesh size 1.0 mm) bottom material under a binocular microscope. Fresh squash preparations of whole polychaetes or pieces of polychaetes were examined at high magnification.

All polychaetes in the present material were examined but only two specimens belonging to the family Spionidae were found infected with actinosporean developmental stages. Both infected worms were too damaged to be identified to genera but their affiliation to the Spionidae was evident. In all about 200 spionid specimens were examined. The less than 1 cm long threadlike spionids occurred in flexible tubes of fine sand grains. Two (about 1%) of the examined spionid worms were infected.

The infected spionid worm from 18 m harboured immature pansporocysts only (Figure 1), whereas that from 12 m contained both pansporocysts and apparently fully developed actinospores (Figures 2-4).

The actinosporean developmental stages were found outside the flattened polychaetes. It is

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unknown where they occur in an undamaged host, but they did not appear to live in the digestive tract. Each infected worm released only a few pansporocysts. The subspherical pansporoblasts in both spionid worms measured 11-14 µm in diameter. It was possible to count eight actinospores in a few of the examined pansporocysts.

The oval actinospores of the tetractinomyxon type measured 8-9 x 6-7 µm. Each actinospore is composed of eight cells, each with a nucleus. Only the nuclei of the binucleate sporoplasm were very large and distinct (Figures 2 and 4). One nucleus surrounds each of the three spherical polar capsules, which were 1.5 µm in diameter. The three nuclei of the shell valve cells were indistinct.

It is unknown whether the present material represents one or two species. Pansporocysts show little morphological variations. Most of the known pansporocysts contain eight actinospores and are more or less spherical, one has a constriction. Also the known tetractinomyxon actinospores show little morphological variation. They may be tetrahedal, conical, spherical or oval, all are without appendages. They measure about 10µm in diameter (Ikeda, 1912; Bartholomew et al., 1997; Køie, 2002; Køie et al., 2004). Neither the morphology of the pansporocysts nor the morphology of the actinospores makes these stages suitable for taxonomic diagnosis. The myxosporean stages, especially the myxospores, are more suitable for taxonomic diagnosis, even though, preferably, both the

**Figures 1 to 4.** Fresh squash preparations of actinosporean stages from spionid polychaetes, the northern Øresund, Denmark. 1 from 18 m, 2-4 from 12 m. 1. Pansporocysts with undeveloped actinospores. 2. Pansporocyst with undeveloped actinospores and an apparently fully developed actinospore. 3. A ruptured pansporocyst with undeveloped actinospores and two apparently fully developed actinospores. 4. An actinospore. A: undeveloped actinospore; NS: nucleus of sporoplasm; P: pansporocyst; PC: polar capsule; SC: shell valve cell. Interference contrast. All to same scale. Scale bar = 5 µm.
myxosporean and actinosporean developmental stages should be used for a confident taxonomic diagnosis. However, this is unrealistic, since the actinosporean developmental stages are known for only a few percent of the known freshwater myxozoan species, and for only one of the hundreds of known marine myxozoan species (see Køie et al., 2004). A new species of Myxozoa should not be described based solely on their actinosporean stages (see also the discussions by Kent & Lom (1999) and Lester et al. (1999)).

The Spionidae is a large family with members living both littorally and sublittorally to considerable depths. Members of the Spionidae are benthic deposit feeders, which use the two long tentacle-like palps for feeding, both free in the water or on the bottom. They occur among inhabitants on rocky shores or in bottom of shingle, sand and mud. They are free-living, tube living or burrowing in shells or limestone. Where the food is plentiful they may occur in enormous densities. Many are cosmopolitan. These ubiquitous worms are potential hosts for myxozoans at greater depths where suspension-feeding polychaetes, such as members of the Sabellidae, Spirorbidae and Serpulidae, are rare or absent.

References


