

NOTE

# First record of a myxozoan of the genus *Sphaeromyxa* Thélohan, 1892 (Myxozoa: Bivalvulida) from the tip of Africa

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## Abstract

Less than 40 species of the genus *Sphaeromyxa* Thélohan, 1892 are known from gall bladders of marine fishes throughout the world. The only species recorded in Africa is *S. balbianii* Thélohan, 1892 from the coast of Senegal. A second species from this genus has been recorded from the gall bladder of the intertidal fish *Pavoclinis graminis* (Gilchrist and Thompson, 1908) from the south coast of Africa.

Members of the genus *Sphaeromyxa* Thélohan, 1892 are unique amongst myxosporeans in having flat ribbon-like polar filaments that are folded several times back and fourth, as opposed to the tube-like, coiled filaments of other myxosporean genera (Lom, 2004). The genus *Sphaeromyxa* is further characterised by spores with two polar capsules lying in the opposite and truncate ends of the elongated, sometimes curved spores. The polar capsules open in the level of the sutural line, connecting both ends and bisecting the spore. The shell valves may be smooth or ridged and one binucleate sporoplasm is present. Large polysporous plasmodia live in the gall bladder of fish hosts and pansporoblast formation is generally observed (Lom & Dyková, 1992). Approximately 38 species of the genus *Sphaeromyxa* have been described from the gall bladders of marine fishes throughout the

world, the most recent being the description of *S. noblei* Lom, 2004 from the New South Wales coast in Australia. This genus also shows interesting cytological features and yet only three species have previously been studied ultrastructurally (Lom, 2004).

No species from this genus have ever been described from Africa, with only one record of the type species *S. balbianii* Thélohan, 1892 recorded from the gallbladder of *Abudefduf marginatus* and *Sardinella maderensis* along the Senegalese coast by Kpatcha et al. (1996). The paper presents the first record of a species from the genus *Sphaeromyxa* in the gall bladder of *Pavoclinis graminis* (Gilchrist and Thompson, 1908) from the south coast of Africa.

Seven *P. graminis* individuals were collected using small hand nets from intertidal rock

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pools from the De Hoop Nature Reserve along the south coast of South Africa in 2000. Captured fish were killed using high concentrations of the anaesthetic Benzocaine ( $2.5 \times 10^{-5}$  g/l) (ethyl-4-aminobenzoate), then measured and examined for the presence of myxosporean infections. Live spores were photographed on a layer of 0.5% non-nutrient Agar using an Axiophot microscope with differential interference contrast, and measured according to the guidelines provided by Lom and Arthur (1989). Minimum and maximum values of spore measurements are provided in micrometers ( $\mu\text{m}$ ), followed in parentheses by the arithmetic mean and standard deviation.

The gall bladder of one out of seven fishes caught and examined for myxosporeans was infected with a *Sphaeromyxa* sp.

#### Description of *Sphaeromyxa* sp.

(Figure 1 and 2)

Host: *Pavoclinus graminis* (Gilchrist and Thompson, 1908)

Locality: De Hoop Nature Reserve (34°28'S, 20°30'E), South Africa.

Site of infection: Gall bladder.

Total prevalence: 14 % (1/7).

#### Vegetative stages

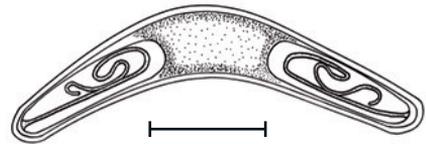
Coeozoic pansporoblasts were seen floating in the gall bladder of the host. The trophozoites were small, leaflike structures containing the developing spores ranging in size from 6 – 10  $\mu\text{m}$ .

#### Spores (based on 20 live spores)

Mature spores are transversely elongated, slightly arched and fusiform in valvular view with truncate or bluntly rounded ends,



**Figure 1.** Micrograph of live spore *Sphaeromyxa* Thélohan, 1892 sp. infecting the gall bladder of *Pavoclinus graminis* (Gilchrist & Thompson, 1908). Scale bar: 10  $\mu\text{m}$ .



**Figure 2.** Line drawing of live spore of *Sphaeromyxa* Thélohan, 1892 sp. infecting the gall bladder of *Pavoclinus graminis* (Gilchrist & Thompson, 1908). Scale bar: 10  $\mu\text{m}$ .

measuring 5 – 5.2 ( $5 \pm 0.08$ )  $\mu\text{m}$  long  $\times$  26.5 – 27.5 ( $26.8 \pm 0.5$ )  $\mu\text{m}$  wide. Shell valves are smooth and a narrow sutural ridge bisects the spores. Two large elongated-ovoid polar capsules are situated in opposite ends of the spore, measuring 7.0 – 9.0 ( $7.8 \pm 0.76$ )  $\mu\text{m}$  long  $\times$  2.0 – 3.0 ( $2.5 \pm 0.3$ )  $\mu\text{m}$  wide. Each polar capsule contains a short polar filament, not spirally wound, but folded two to three times. A single binucleate sporoplasm is situated between the two polar capsules without the presence of an iodophilous vacuole.

#### Remarks

This *Sphaeromyxa* sp. differs considerably from *S. balbiani* recorded by Kpatcha et al. (1996) in Senegal. The spores of *Sphaeromyxa* sp. are slightly arched compared to the more ellipsoidal spores of *S. balbiani* and furthermore, the spores of *Sphaeromyxa* sp. are much larger in overall morphology than

Species	Location	Spore length ( $\mu\text{m}$ )	Spore width ( $\mu\text{m}$ )	PC length ( $\mu\text{m}$ )	PC width ( $\mu\text{m}$ )	Coils
<i>Sphaeromyxa balbiani</i> Thélohan, 1892 <sup>1</sup>	Mediterranean Black Sea, Atlantic to British Isles	3.6 – 4.5 (4.23 $\pm$ 0.4)	13.5 – 14.6 (14.2 $\pm$ 0.4)	3.37 – 4.5 (4.17 $\pm$ 0.4)	2.25 – 2.7 (2.4 $\pm$ 0.4)	4
<i>Sphaeromyxa lateralis</i> Noble, 1941 <sup>2</sup>	Eastern Pacific	8.0	26.0	8.6	6.3	1.5
<i>Sphaeromyxa magna</i> Zhukov, 1964 <sup>2</sup>	Pacific	6.0	23	8.5	4.0	4
<i>Sphaeromyxa zabrazesi</i> Laveran and Mesnil, 1900 <sup>2</sup>	Mediterranean	4.0	25.0	9.0	3.0	4
<i>Sphaeromyxa</i> Thélohan, 1892 sp.*	South Africa	5.0 – 5.2 (5.0 $\pm$ 0.08)	26.5 – 27.5 (26.8 $\pm$ 0.5)	7.0 – 9.0 (7.8 $\pm$ 0.76)	2.0 – 3.0 (2.5 $\pm$ 0.3)	2 - 3

<sup>1</sup>Kpacha et al. (1996); <sup>2</sup>Lom and Dyková (1992); \*Present study

**Table 1.** Comparative spore measurements of marine species from the genus *Sphaeromyxa* Thélohan, 1892 including the species from the present study [Key: PC – polar capsules].

the spores of *S. balbiani* (Table 1). Compared to other species from this genus around the world, the *Sphaeromyxa* sp. collected from South Africa resembles just a few of the known species. *Sphaerospora zabrazesi* Laveran and Mesnil, 1900 was described from the gall bladder of syngnathid hosts (Lom & Dyková, 1992) in the Mediterranean. The spores of *Sphaeromyxa* sp. are slightly larger and more boomerang-shaped than the slightly arched spores of *S. zabrazesi*. Also, *Sphaeromyxa* sp. differs from *S. magna* Zhukov, 1964 described from the Pacific (Lom & Dyková, 1992) as the spores of *S. magna* have ridged surfaces and longer polar capsules than *Sphaeromyxa* sp. (Table 1). Finally, the spores of *S. lateralis* Noble, 1941, from the tidal-pool fish *Artedius fenestralis* has broadly ovoid, curved spores (Lom & Dyková, 1992) which differ from the elongated arched spores of *Sphaeromyxa* sp. In addition, the polar filaments of *S. lateralis* fold only one and a half times compared to the two to three folds of *Sphaeromyxa* sp. It may be concluded that *Sphaeromyxa* sp. does not conform to the description of any known *Sphaeromyxa* species. This is the second record of a myxosporean from the genus *Sphaeromyxa* from Africa, and the first record from the tip of the African continent.

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