

Henneguya paranaensis sp. n. (Myxozoa, Myxobolidae), a parasite of the teleost fish *Prochilodus lineatus* (Characiformes, Prochilodontidae) from the Paraná River, Brazil

J.C. Eiras¹, G.C. Pavanelli² and R.M. Takemoto²

¹Departamento de Zoologia e Antropologia, and CIIMAR, Faculdade de Ciências, Universidade do Porto, 4099-002 Porto, Portugal; ²Universidade Estadual de Maringá, Departamento de Biologia, NUPELIA, Av. Colombo 5790, 87020-900 Maringá, PR, Brasil.

Abstract

Henneguya paranaensis sp. n. is described from the gills of the teleost fish *Prochilodus lineatus* from the Paraná River, Brazil. The spore wall is thin and smooth, with symmetric valves; the total length of the spore is 60.4 (56 – 63) μm ; the spore body, ellipsoidal in frontal and biconvex in lateral views, is 16.1 (14 – 17) μm in length by 6.5 (6 – 7) μm in width, and 5 μm thick; the polar capsules are unequal in size in most of the spores: the larger are 8.4 (8 – 9) μm long and 2 μm wide, and the smaller are 6.7 (6 – 7) μm long by 2 μm wide, both having a polar filament forming 10 – 12 coils perpendicularly to the axis of the polar capsule; a small proportion of the spores have polar capsules of the same size; the caudal projections measure 43.1 (41 – 46) μm in length.

Introduction

Henneguya spp. are common Myxozoa parasitizing fish and are the second largest group within the Myxozoa (Eiras, 2002). They have a worldwide distribution and infect both freshwater and marine fish. A few number of species are considered highly pathogenic kill the hosts. For the Neotropical region only 25 valid species are known, and all of them were described in Brazilian hosts (see Eiras, 2002; Eiras et al., 2004; Gióia & Cordeiro, 1996; Vita et al., 2003; Azevedo & Matos, 2002, 2003; Barassa et al., 2003a,b; Casal et al., 2003). This number is surprisingly low when compared with the high number of fish species in Brazilian rivers – about 8,000 species,

representing nearly 24% of all fish species (Cellere et al., 2002).

In this paper we report a new *Henneguya* species, *H. paranaensis* sp. n. infecting the Curimatá, *Prochilodus lineatus* Valenciennes, 1836 (Characiformes, Prochilodontidae) from the Paraná River. This fish species is highly important as a food resource and its farming potential is now being evaluated.

Materials and methods

One specimen of *P. lineatus* Valenciennes, 1836 (Characiformes, Prochilodontidae) (total length: 29.3 cm) was net-fished from the Paraná River, at Porto Rico, Paraná State,

Brazil, and transported to the laboratory. The specimen was dissected and all the organs were thoroughly inspected under a compound microscope for the presence of parasites. Measurements were made from fresh spores (30 specimens), and spores were observed under Nomarski differential interference-contrast.

Results

The parasites formed whitish, oval or rounded plasmodia measuring about 0.1 mm in diameter, in the gills secondary lamellae. The plasmodia occurred in the interlamellar position and were located mostly on the anterior third part of the lamellae.

Description of the spores:

Mature fresh spores (Figure 1 and 2) had a thin and smooth spore wall, with symmetric valves; the total length of the spores was 60.4 (56 – 63) μm ; the spore body was ellipsoidal in frontal view and biconvex in lateral view, measured 16.1 (14 – 17) μm in length by 6.5 (6 – 7) μm in width, and was 5 μm thick; the polar capsules were prominent, elongated, with rounded posterior extremity and tapering anteriorly; they surpassed the half-length of the spore body and were unequal in size in most of the spores: the larger were 8.4



Figure 1. *Henneguya paranaensis* sp. n. Bar = 10 μm .



Figure 2. Schematic drawing of *Henneguya paranaensis* sp. n. Bar = 10 μm .

(8 – 9) μm long and 2 μm wide, and the smaller were 6.7 (6 – 7) μm long by 2 μm wide, both having a polar filament forming 10 – 12 coils perpendicularly to the axis of the polar capsule; a small proportion of the spores had polar capsules of the same size; the tail bifurcates immediately after the end of the spore and measured 43.1 (41 – 46) μm in length.

The syntypes are deposited at the Section of Animal Pathology, Department of Zoology and Anthropology from the Faculty of Sciences of Porto, Portugal.

Discussion

Comparing our specimens with the *Henneguya* spp. described so far from Brazilian fishes it can be seen that they are different from the others. The main difference concerns the length of the tail, which is much shorter in the majority of the species. Only *H. amazonica* (Rocha et al., 1992) and *H. piaractus* (Martins & Souza, 1997) have a similar tail length (41.7 – 52.1 μm and 39.7 – 43.6 μm , respectively). However, the spore body of *H. amazonica* is smaller (13.9 μm), their polar capsules are much smaller (3.3 μm long by 1.5 μm wide), and the polar filament forms 6 coils as opposed to 10 – 12 in our specimens. *Henneguya piaractus* has a smaller spore body (12.7 μm long by 3.6 μm wide), the polar capsules are smaller (6.7 μm long by 1.2 μm wide), and the polar filament forms 8 – 9 coils. The present material was also compared with a total of 146 forms included in the synopsis of the *Henneguya* species organised by Eiras (2002).

The most similar species are *H. ghaffari* (Ali, 1999) parasitizing *Lates niloticus*, *H. kayarensis*

(Kpatcha et al., 1997) from *Galeoides decadactylus*, and *H. notopteriae* (Qadri, 1965) described from *Notopterus notopterus*.

Henneguya ghaffari differ from our material by a smaller spore body (11.8 – 14.0 μm in length) and shorter and wider polar capsules (4.8 – 5.9 μm x 2.8 – 3.9 μm), smaller number of coils of the polar filament (4 – 5) and broader range of the tail length (36.3 – 53.0 μm). *Henneguya kayarensis* has a tail length similar to our specimens (45 – 47.2 μm), but differs in the spore body dimensions (7 – 9 by 6 – 7 μm), and smaller polar capsules (4 – 4.5 μm by 2.2 – 2.5 μm). Besides, *Galeoides decadactylus* is a marine host. *Henneguya notopteriae* differs by a smaller spore body (11.5 – 13.0 μm by 4.5 – 5.0 μm) and different polar capsules (3.5 – 5.5 μm by 1 – 1.5 μm), in spite of similar values for the length of the tail (40.2 – 42.0 μm).

A comparison with other *Henneguya* spp. described after the publication of the synopsis of the *Henneguya* species (Eiras, 2002) showed that none of the forms are identical to the present parasites.

Therefore, the parasite described herein is considered a new species, and we propose the name *Henneguya paranaensis* after the river Paraná.

References

- Ali MA (1999). *Henneguya ghaffari* sp. n. (Myxozoa: Myxosporidia) infecting the Nile perch *Lates niloticus* (Teleostei: Centropomidae). *Diseases of Aquatic Organisms* **28**, 225-230.
- Azevedo C & Matos E (2002). Fine structure of the myxosporidian *Henneguya curimata* n. sp., parasite of the Amazonian fish, *Curimata inornata* (Teleostei, Curimatidae). *Journal of Eukaryotic Microbiology* **49**, 197-200.

Azevedo C & Matos E (2003). Fine structure of *Henneguya pilosa* sp. n. (Myxozoa: Myxosporea), parasite of *Serrasalmus altuvei* (Characidae), in Brazil. *Folia Parasitologica* **50**, 37-42.

Barassa B, Cordeiro NS & Arana S (2003a). A new species of *Henneguya*, a gill parasite of *Astyanax altiparanae* (Pisces: Characidae) from Brazil, with comments on histopathology and seasonality. *Memorias do Instituto Oswaldo Cruz* **98**, 761-765.

Barassa B, Adriano EA, Arana S & Cordeiro NS (2003b). *Henneguya curvata* sp. n. (Myxosporea: Myxobolidae) parasitizing the gills of *Serrasalmus spilopleura* (Characidae: Serrasalmidae), a South American freshwater fish. *Folia Parasitologica* **50**, 151-153.

Casal G, Matos E & Azevedo C (2003). Light and electron microscopic study of the myxosporean *Henneguya friderici* n. sp. from the Amazonian teleostean fish, *Leporinus friderici*. *Parasitology* **126**, 313-319.

Cellere EF, Cordeiro N & Adriano ES (2002). *Myxobolus absonus* sp. n. (Myxozoa: Myxosporea) parasitizing *Pimelodus maculatus* (Siluriformes: Pimelodidae), a South American freshwater fish. *Memorias do Instituto Oswaldo Cruz* **97**, 79-80.

Eiras JC (2002). Synopsis of the species of the genus *Henneguya* Thélohan, 1892 (Myxozoa: Myxosporea: Myxobolidae). *Systematic Parasitology* **52**, 43-54.

Eiras JC, Malta JC, Varela A & Pavanelli GC (2004). *Henneguya schizodon* n. sp. (Myxozoa, Myxobolidae), a parasite of the Amazonian teleost fish *Schizodon fasciatus* (Characiformes, Anostomidae). *Parasite* **11**, 169-173.

Gióia, I. & Cordeiro, N.S. (1996) Brazilians myxosporidians' check-list (Myxozoa). *Acta Protozool.* **35**, 137-149.

Kpatcha TK, Diebakate C, Fall M. & Toguebaye BS (1997). Nouvelles espèces d'*Henneguya* Thélohan, 1895 (Myxozoa, Myxosporea) parasites des poissons marins du Sénégal: Étude en microscopie photonique et électronique. *Ann. Scien. Naturel. Zoologie, 13e Série* **18**, 81-91.

Martins ML & Souza VN (1997). *Henneguya piaractus* n. sp. (Myxozoa: Myxobolidae), a gill parasite of *Piaractus mesopotamicus* Holmberg, 1887 (Osteichthyes: Characidae), in Brazil. *Revista Brasileira de Biologia* **57**, 239-245.

Qadri SS (1965). Study on a new myxosporidian parasite from the freshwater fish, *Notopterus notopterus*. *Zool. Anz.* **175**, 222-228.

Rocha E, Matos E & Azevedo C (1992). *Henneguya amazonica* n. sp. (Myxozoa, Myxobolidae), parasitizing the gills of *Crenicichla lepidota* Heckel, 1840 (Teleostei, Cichlidae) from Amazon river. *Eur. J. Protistol.* **28**, 273-278.

Vita P, Corral L, Matos E & Azevedo C (2003). Ultrastructural aspects of the myxosporean *Henneguya astyanax* n. sp. (Myxozoa: Myxobolidae), a parasite of the Amazonian teleost *Astyanax keithi* (Characidae). *Diseases of Aquatic Organisms* **53**, 55-60.