Acta Veterinaria Hungarica 41 (3–4), pp. 341–347 (1993)

Sphaerospora siluri n. sp. (*Myxosporea: Sphaerosporidae*) IN THE KIDNEY OF THE SHEATFISH (*Silurus glanis*)

K. MOLNÁR

Veterinary Medical Research Institute, Hungarian Academy of Sciences, H–1581 Budapest, P. O. Box 18, Hungary

(Received September 29, 1993)

Sphaerospora siluri sp. n. is a parasite of the sheatfish (*Silurus glanis*) cultured in Hungarian pond farms. Spores and pseudoplasmodia of the species inhabit the lumen of the renal tubules, attaching loosely to the tubular epithelium. Spores developing in monosporous pseudoplasmodia have an almost triangular shape.

Key words: European catfish or sheatfish, *Myxosporea*, new species, *Sphaerospora siluri*

More than 40 *Sphaerospora* species are known from freshwater and marine fishes. Most of them are found in the urinary system, primarily in cyprinid fishes. *Sphaerospora* infections have been found, however, also in fishes belonging to taxonomically different groups such as the salmonid *Salmo trutta* (Fischer-Scherl et al., 1986), the centrarchid *Lepomis gibbosus* (Li and Desser, 1985), the grouper *Epinephelus malabaricus* (Supamat-taya et al., 1991), the acipenserid *Acipenser ruthenus* (Baska, 1990), the percid *Gymnocephalus* spp. (Molnár, 1991) and the long nose skate *Raja rhina* (Arthur and Lom, 1985). Four species are known from the kidney of siluriform fishes. Among fish parasites of the Soviet Union Shulman (1984) recorded *S. dogieli* Schulman, 1962 from *Silurus soldatovi* and *S. schulmani* Allamuratov, 1966 from *Glyptosternum reticulatum*. From the American catfishes Lom et al. (1989) described *S. hankai* from *Ictalurus nebulosus* and Hedrick et al. (1990) described *S. ictaluri* from *I. punctatus*. Molnár and Baska (1992) suggested that the latter two species which infect phylogenetically closely related hosts might be synonyms.

Since the first extracellular developmental stages of sphaerospores were found by Csaba (1976), more data have become available on the development of *Sphaerospora* myxosporeans. Presporogonic developmental stages have been found in cyprinids (Kovács–Gayer et al., 1982; Körting,

1982; Csaba et al., 1984; Lom et al., 1983, 1985; Baska and Molnár, 1988) and in other fishes such as *Gasterosteus aculeatus, Ictalurus punctatus, Epinephelus malabaricus, Gymnocephalus schraetzer* and *Acipenser ruthenus* (Hedrick et al., 1988; Hedrick et al., 1990; Feist et al., 1991; Lom et al., 1991; Supamattaya et al., 1991; Molnár, 1991; Baska, 1990).

In the present paper, spores and presporogonic stages of a new *Sphaerospora* species are described from the kidney of the sheatfish (*Silurus glanis* L.), a cultured fish (known also as European catfish) that is well established in Hungarian pond farms and is being introduced to several Western European countries.

Materials and methods

From 1987 to 1993, 37 sheatfish (*Silurus glanis*) were collected from a fish farm close to the River Danube and from another farm close to the River Körös. The age of the fish varied from 3 months to 3 years. The fish were transfered live to the laboratory for later examination. They were killed by decapitation. Blood smears were prepared from each specimen, and pieces of the kidney, ureter and urinary bladder were examined fresh under a coverslip. The kidney was fixed for histological purposes if fresh examinations suggested the presence of spores or developmental stages. The kidney was fixed in Bouin's solution for 4 h, dehydrated in graded alcohols, embedded in paraffin, sectioned at 4 μm and stained with haematoxylin and eosin.

Results

Seven out of the 37 sheatfish examined proved to be infected by *Sphaerospora* stages. *Sphaerospora*-infected specimens were found both among month-old and three-year-old specimens, but infection was detected only in the spring and summer months. Four out of the 7 infected fish harboured spores in the renal tubules while the other 3 harboured only sporogonic developmental stages. Blood stages were found only in two specimens showing the heaviest infections. Description of the species based on 50 matured spores is as follows:

Sphaerospora siluri sp. n.
Host: *Silurus glanis* L.
Place of collection: Fish farms of Szarvas and Százhalombatta close to the River Körös and River Danube, respectively
Site of infection: Renal tubules of the kidney

The spores (Figs 1 and 2) and pseudoplasmodia occurred in the lumen of the convoluted tubules and, less often, inside the Bowman's capsule. The youngest pseudoplasmodia were composed of a primary cell and a secondary cell (sporoblast). All pseudoplasmodia were monosporous. The sporoblasts had 6 nuclei which together formed one spore. Pseudoplasmodia containing 6 cells of the sporoblast and one cell of the primary cell were amorphous, rounded or ellipsoidal. Rounded pseudoplasmodia measured 10–13 μm in diameter, while ellipsoidal ones were 15–17 × 11–12 μm.

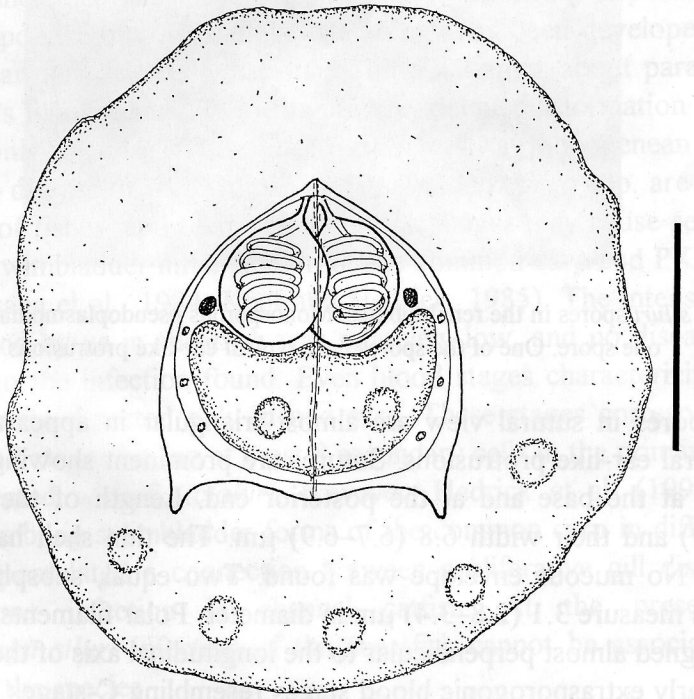

Fig. 1. Schematic illustration of a *Sphaerospora siluri* n. sp. spore within the pseudoplasmodium. Bar = 5 μm

Fig. 2. S. siluri spores in the renal tubules. Monosporous pseudoplasmodia harbour only one spore. One of the spores have typical ear-like protrusions. × 2,100

Spores in sutural view are almost triangular in appearance having two lateral ear-like protrusions. Sutures are prominent showing small protrusions at the base and at the posterior end. Length of the spores 6.8 (6.6–6.9) and their width 6.8 (6.7–6.9) μm. The thin shell has a smooth surface. No mucous envelope was found. Two equal, subspherical polar capsules measure 3.1 (2.8–3.4) μm in diameter. Polar filaments with 5 to 6 turns aligned almost perpendicular to the longitudinal axis of the capsule.

Early extrasporogonic blood stages resembling C-stages of the common carp were found only in two fish. Csaba (personal communication), however, frequently found these stages in *Sphaerospora*-infected sheatfishes.

In histological sections only moderate infections were found. Pseudoplasmodia of different developmental stages were found only in the anterior segments of the convoluted tubule where they attached loosely to the tubular epithelium. No pathological changes were observed.

Remarks: by having monosporous pseudoplasmodia, ear-like protrusions and prominent sutures on the spores this species resembles both *S. hankai* and *S. ictaluri*, but it differs from them by the larger size of spores and by having 5 to 6 coils in the polar capsule. Moreover, the hosts are phylogenetically distant from each other. The spores of *S. dogieli* and *S. schulmani* are about the same size but the shape of the spores is different.

Discussion

The sheatfish (European catfish) is an economically important fish in Hungarian pond farms. Its culture technology has been developed mostly by Hungarian fish culturists. Relatively little is known about parasitic diseases of this fish species. Up to the present, detailed information has been available only on *Ancylodiscoides vistulensis*, a monogenean parasite causing gill disease of fry (Molnár, 1980). *Sphaerospora* spp. are potential pathogens of fishes, and their presporogonic stages may cause severe diseases like swimbladder inflammation of the common carp and PKD of salmonids (Csaba et al., 1984; Kent and Hedrick, 1985). The intensity of infection found by us in sheatfish was relatively low, and no diseases were attributed to the infection found. Even blood stages characterizing heavy infections were detected only in one case. These stages corresponded to typical blood stages having at most 8 secondary cells in the primary cell. In catfish infected with *S. ictaluri*, however, Hedrick et al. (1990) found stages resembling swimbladder forms of the common carp in different organs, and postulated a connection between proliferative gill disease and *Sphaerospora* infection in channel catfish. At the present time *Sphaerospora siluri* infection of the sheatfish cannot be associated with diseases of the species.

Acknowledgement

The author is thankful to *Dr. Gy. Csaba* for information on blood stages found in sheatfish.

References

Arthur, J. R. and Lom, J. (1985): *Sphaerospora araii* n. sp (Myxosporea: Sphaerosporidae) from the kidney of a long nose skate (*Raja rhina*, Jordan and Gilbert) from the Pacific Ocean of Canada. Can. J. Zool. **63,** 2902–2906.

Baska, F. (1990): *Chloromyxum inexpectatum* n. sp. and *Sphaerospora colomani* n. sp. (*Myxozoa, Myxosporea*), parasites of the urinary system of the sterlet, *Acipenser ruthenus* L. Syst. Parasit. **16,** 185–193.

Baska, F. and Molnár, K. (1988): Observations on the blood stages of *Sphaerospora* spp. (Myxosporea) in cyprinid fishes. Dis. Aquat. Org. **5,** 23–28.

Csaba, G. (1976): An unidentifiable extracellular protozoan parasite from the blood of the carp. Parasitol. Hung. **9,** 21–24.

Csaba, G., Kovács–Gayer, É., Békési, L., Bucsek, M., Szakolczai, J. and Molnár, K. (1984): Studies into the possible protozoan aetiology of swimbladder inflammation in carp fry. J. Fish. Dis. **7,** 39–56.

Feist, W. S., Chilmonczyk, S. and Pike, A. W. (1991): Structure and development of *Sphaerospora elegans* Thélohan 1892 (*Myxozoa: Myxosporea*) in the sticklebacks *Gasterosteus aculeatus* L. and *Pungitius pungitius* L. (*Gasterosteidae*). Eur. J. Protistol. **27,** 269–277.

Fischer–Scherl, T., El–Matbouli, M. and Hoffman, R. (1986): A new *Sphaerospora* sp. in brown trout (*Salmo trutta m. fario*) in Germany. Bull. Eur. Ass. Fish Pathol. **86,** 16–19.

Hedrick, R. P., Kent, M. L., Toth, R. J. and Morrison, J. K. (1988): Fish infected with *Sphaerospora* spp. Thélohan (*Myxosporea*) from waters enzootic for proliferative kidney disease of salmonids. J. Protozool. **35,** 13–18.

Hedrick, R. P., McDowell, T. and Groff, J. M. (1990): *Sphaerospora ictaluri* n. sp. (*Myxosporea: Sphaerosporidae*) observed in the kidney of Channel catfish, *Ictalurus punctatus* Rafinisque. J. Protozool. **37,** 107–112.

Kent, M. L. and Hedrick, R. P. (1985): PKX, the causative agent of proliferative kidney disease (PKD) in Pacific salmonid fishes and its affinities with *Myxozoa.* J. Protozool. **32,** 254–260.

Kovács–Gayer, É., Csaba, G., Békési, L., Bucsek, M., Szakolczai, J. and Molnár, K. (1982): Studies on the protozoan etiology of swimbladder inflammation in common carp fry. Bull. Eur. Ass. Fish Pathol. **2,** 22–24.

Körting, W. (1982): Protozoan parasites associated with swimbladder inflammation (SBI) in young carp. Bull. Eur. Ass. Fish Pathol. **2,** 25–28.

Li, L. and Desser, S. S. (1985): The protozoan parasites of fish from Lake Sasajewun, Algonquin Park, Ontario. Can. J. Zool. **63,** 1446–1458.

Lom, J., Desser, S. S. and Dyková, I. (1989): Some little-known and new protozoan parasites of fish from Lake Sasajewun, Algonquin Park, Ontario. Can. J. Zool. **67,** 1372–1379.

Lom, J., Dyková, I. and Pavlasková, M. (1983): "Unidentified" mobile protozoans from the blood of carp and some unsolved problems of myxosporean life cycles. J. Protozool. **30,** 497–508.

Lom, J., Pavlasková, M. and Dyková, I. (1985): Notes on kidney infecting species of the genus *Sphaerospora* Thélohan (*Myxosporea*), including a new species *S. gobionis* sp. nov., and on myxosporean life cycle stages in the blood of some freshwater fish. J. Fish. Dis. **8,** 221–232.

Lom, J., Pike, A. W. and Feist, S. W. (1991): Myxosporean vegetative stages in the choroidal rete mirabile of *Gasterosteus aculeatus* infected with *Myxobilatus gasterostei* and *Sphaerospora elegans*. Dis. Aquat. Org. **11,** 67–72.

Molnár, K. (1980): A histological study on ancylodiscoidosis in the sheatfish (*Silurus glanis*). Helmintologia **17,** 117–126.

Molnár, K. (1991): *Sphaerospora danubialis* sp. n. (*Myxosporea: Sphaerosporidae*) from the kidney of freshwater percid fishes. Parasit. Hung. **24,** 53–58.

Molnár, K. and Baska, F. (1992): Sphaerospora infection of American catfishes (*Ictalurus punctatus* and *I. nebulosus*) in Europe. Acta Vet. Hung. **40,** 191–194.

Shulman, S. S. (1984): Key to the determination of parasites of freshwater fish of the fauna of the USSR, Vol. 1. Parasitic protozoa. Nauka Publ., Leningrad (in Russian).

Supamattaya, K., Fischer–Scherl, T., Hoffmann, R. W. and Boonyaratpalin, S. (1991): *Sphaerospora epinepheli* n. sp. (*Myxosporea: Sphaerosporidae*) observed in grouper (*Epinephelus malabaricus*). J. Protozool. **38,** 448–454.