

EXPERIMENTAL EVIDENCE THAT PROTOZOANS CAUSING SWIM-BLADDER INFLAMMATION IN COMMON CARP (*Cyprinus carpio* L.) ARE STAGES OF *Sphaerospora renicola*

By K. MOLNÁR

In a previous paper Molnár (1980) reported a high correlation between *Sphaerospora angulata* infection of the carp kidney and the occurrence of swim-bladder inflammation (SBI) and advanced the theory that protozoan stages (SBP) found in the swim-bladder wall by Kovács-Gayer (personal communication) may have a role in producing renal sphaerosporosis. This hypothesis has been substantiated by Kovács-Gayer *et al.* (1982) and Körting (1982). On the basis of detailed parasitological, histological and electron microscopic examinations, Csaba *et al.* (1984) proved the aetiological relationship between renal sphaerosporosis and SBI. However, the relationship between the organism causing SBI, Csaba's "C" blood protozoan, and renal sphaerosporosis has not been elucidated experimentally. Dykova and Lom (1982) have described the parasite which frequently occurs in the kidney of the common carp and which was formerly regarded as *Sphaerospora angulata* Fujita, 1912, as a new species, *Sphaerospora renicola*. Therefore, in the following this name is used to designate this parasite.

Similarly, in the following, Csaba's "C" blood protozoan will be referred to as UBO (Unidentified Blood Organism), a designation proposed by Lom and Dyková (1983).

The present paper reports morphological and epidemiological observations which support the identity of SBP as *S. renicola*.

Two types of experiments were conducted on common carp fry raised in a parasite-free environment.

In the first type of experiment, swim-bladder homogenates from carp affected with SBI were injected into experimental fish. On post-inoculation (PI) days 7 or 8, developmental stages, and 1-2 days later also spores of *S. renicola* appeared in the kidneys of 2 of 3 fish inoculated in the 1st experiment; in 3 of 3 fish in the 2nd, and in 12 of 14 fish in the 3rd experiment. Infection lasted about one month. The control fish always remained free from infection. No sphaerosporosis developed in the 12 and 5 fish inoculated in the 4th and 5th experiment, respectively, with swim-bladder homogenate derived from a late phase of SBI, when the swim-bladder was already free from SBP.

The other type of experiment was aimed at elucidating the role of UBOs (Unidentified Blood Organisms). In this experiment, blood from fish heavily infected by UBO was injected into the abdominal cavity of 10 common carp fry. UBOs appeared in the blood of experimental fish on day 14 PI and were present up to day 30 PI which was the last sampling time. However, no

Sphaerospora-infection developed in the kidneys of the fish.

The results of the present experiments agree with observations reported by Kovács-Gayer *et al.* (1982), Körting (1982) and Csaba *et al.* (1984), and furnish conclusive evidence that Myxozoa stages developing in the swim-bladder wall of the common carp are identical with presporogenic stages of *S. renicola* in the lumen of renal tubules. In all cases when SBP were demonstrable in impression smears, injection of the swim-bladder homogenate into the abdominal cavity of infection-free fish resulted in the development of sphaero-spores.

The identification of UBOs as a stage of sphaerosporosis could not be proved in these experiments, although their Myxozoa-, presumably *Sphaerospora*-, nature is considered probable, in agreement with the opinion of Lom and Dyková (1983).

Summary

Experimental evidence indicates that the protozoa causing swim-bladder inflammation (SBI) of the Common carp (*Cyprinus carpio*) are identical with presporogenic stages of *Sphaerospora renicola*

Author's address:

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

Dyková and Lom, 1982, which occur in the renal tubules. Homogenates prepared from the thickened and inflamed swim-bladder of naturally infected carp, and which contained the parasites described by Kovács-Gayer *et al.* (1982), produced renal sphaerosporosis when injected into the abdominal cavity of parasite-free fish.

References

- Csaba, G., Kovács-Gayer, É., Békési, L., Bucsek, M., Szokolczi, J. and Molnár, K. (1984). Studies into the possible protozoan aetiology of swim-bladder inflammation in the carp fry. *J. Fish Dis.* 7, 39—56.
- Dykova, J. and Lom, J. (1982). *Sphaerospora renicola* n. sp., a Myxosporean from carp kidney, and its pathogenicity. *Z. Parasitenk.* 68, 259—268.
- Kovács-Gayer, É., Csaba, G., Békési, L., Bucsek, M., Szokolczi, J. and Molnár, K. (1982). Studies on the protozoan aetiology of swim-bladder inflammation in common carp fry. *Bull. European Association Fish Pathol.* 2, 22—24.
- Körting, W. (1982). Protozoan parasites associated with swim-bladder inflammation (SBI) in young carp. *Bull. European Association Fish Pathol.* 2, 25—28.
- Lom, J. and Dykova, J. (1983). "Unidentified" mobile Protozoans from the blood of carp and some unsolved problems of Myxosporean life cycles. *J. Protozool.* 30, 497—508.
- Molnár, K. (1980). "Sphaerosporosis", a new kidney disease of the common carp. In: Ahne, W. (ed) *Fish Diseases*. Springer Verlag, Berlin-Heidelberg-New York, p. 157—164.

89/B 17