

Thelohanellus hovorkai - IN DIFFERENT CATEGORIES OF CARP*

NIKOLINA NOVAKOV, MIROSLAV ĆIRKOVIĆ, DRAGANA LJUBOJEVIĆ,
BOJAN ADŽIĆ, STEVAN MALETIN, OLIVERA BJELIĆ ČABRILO¹

SUMMARY: Thelohanellus hovorkai was designated as "hemorrhages thelohanellus" because of severe haemorrhages on the body surface of the affected common carp. The diagnosis of this disease is related to the detection of spores, whose size varies, according to researches, in fish from open water and carp fish raised in aquaculture. The disease is manifested by disturbances in the central nervous system, anemia and absence of progress in fingerlings, where numerous spores are diagnosed in the tissues of fish. The investigations were conducted in the northern Serbia in 15 fish ponds during the period 2007-2009. The methods that have been used were clinical observations, light microscopy and classical pathohistology with H&E stain. The presence of Thelohanellus hovorkai was detected in common carp fingerlings older than 90 days and female carp fish. Effective therapeutic measures are not known but the general preventive measures related to the preparation of facilities for the cultivation of carp fingerlings give favorable results.

Key words: telohanelosis, common carp, *Thelohanellus hovorkai*, spores.

INTRODUCTION

Telohanelosis is a disease of cyprinids, which are clinically observed in the fins and scales (*Thelohanellus nikolskii*) and all other tissues and especially in the central nervous system (*Thelohanellus hovorkai*) (Molnár, 2002a). The biology and histopathology of *Thelohanellus hovorkai* was described by Ćirković (1986) and Ćirković et al. (1997). Its pathology was described by Yokoyama et al. (1998) who found severe

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¹Nikolina Novakov, Mr, teaching assistant, Miroslav Ćirković, PhD, professor, Dragana Ljubojević, DVM, research associate, Stevan Maletin PhD, professor, Faculty of Agriculture, Novi Sad, Serbia. Bojan Adžić, Mr, assistant, Veterinary diagnostic laboratory, Podgorica, Montenegro. Olivera Bjelić Čubrilo, PhD, associate professor, Faculty of Sciences, Novi Sad.

Corresponding author: Nikolina Novakov, Faculty of Agriculture, 21000 Novi Sad, Serbia; E-mail: milosevicnina@gmail.com; Phone: +381 63 8767-653.

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haemorrhages on the body surface of the affected common carp and marked the disease as “haemorrhages thelohanellosis”. The diagnosis of this disease is related to the detection of spores, whose size varies, according to research descriptions, in fish from open water and carp fish raised in aquaculture (Molnár et al., 2006). Application of molecular techniques can help in diagnosis and can determine whether the parasite corresponds to this species or another species or subspecies (Anderson et al., 2000). In GenBank, there is a short DNA sequence (710 bp) of *T. hovorkai* (AJ133419) collected from the common carp *Cyprinus carpio* in Japan (Anderson et al., 2000). The disease is manifested by disturbances in the central nervous system, anemia and absence of progress in fingerlings, where numerous spores are diagnosed *in the tissues of fish*. (Molnár, 2002b; Ćirković et al., 2010). Apart from the investigations made by Yokoyama et al. (1999) efficient therapeutic measures are not known, but general preventive measures related to the preparation of facilities for the cultivation of carp fingerlings give favorable results (Ćirković et al., 2010).

The subject of the investigation was myxosporidia detection in carps. In this paper, thelohanellosis of one-year old common carp fingerlings and female carp fish caused by *Thelohanellus hovorkai* is described.

MATERIAL AND METHODS

The investigations were conducted in the northern Serbia (Vojvodina province) in 15 fish ponds during the period 2007-2010. All investigated fish ponds provide water from channel network, the rivers Tisa, Tamiš, and Danube, and wells. The methods that have been used were clinical observations, light microscopy and classical pathohistology with H&E stain.

RESULTS AND DISCUSSION

The presence of *Thelohanellus hovorkai* was detected in common carp fingerlings older than 90 days and female carp fish. The infection intensity and number of *T. hovorkai* carriers differed among ponds. It has been noted that the most serious infections and the majority of infected fingerlings were from ponds where they reared with older fish, ponds with natural spawning, and ponds which served for older carp winter storage. This infection of the common carp occurs in the Serbian and Hungarian fish farms every year (Molanár, 2002a; Molanár, 2002b; Ćirković et al., 2010). Microscopic observation of compressed samples of brain tissue reveals small or large groups of spores (Fig. 1 and 2).



Figure 1. Spores of *T. hovorkai* in brain
Slika 1. Spore T. hovorkai u mozgu

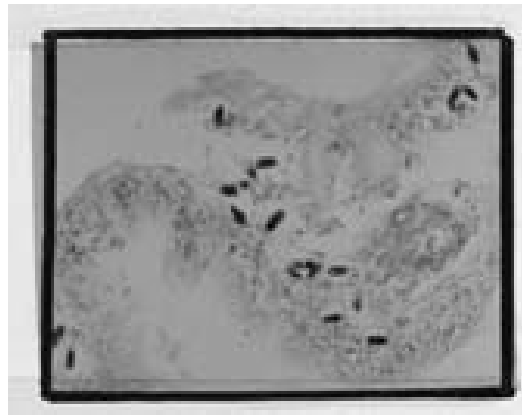


Figure 2. *T. hovorkai* spores
Slika 2. Spore T. hovorkai

According to our investigations, spores show next values: spore length 20-21 μm , spore width 14 μm , polar capsule length 12.5-14 μm polar capsule width 11.5-12.5 μm , spore length with mucal layer 22.5-25 μm , spore width with mucal layer 14.5-17.5 μm . Spores were rounded by mucoid layer (Fig. 3).

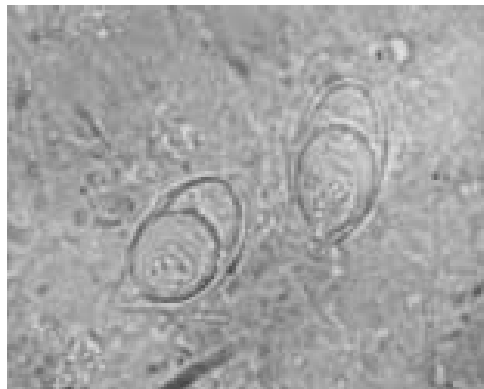


Figure 3. Fresh spores of *T. Hovorkai*
Slika 3. Sveže spore T. Hovorkai

The spores of *T. hovorkai* were present in gills, skin, musculues, liver, spleen, kidneys, intestines, bile and swim bladder, spinal cord and brain where were present the highest number of spores (Fig. 4). The results of Lianage et al. (2003a) reveal that the gill is primarily the portal of entry of *T. hovorkai* in fish immersed in waterborne actinospore suspension. Also, their successful transmission of *T. hovorkai* using the intubation method strongly suggests that the gut is another and important site of entry for this species, although actinospore penetration through the gut tissue had not been explored. It is probable that actinospores can utilize multiple sites of entry in the fish host. Yokoyama et al. (2006) were observed that *Thelohanellus hovorki actino spores exhibited a slow response of sporoplasm release to common carp mucus as well as penetration into the gills of common carp.*

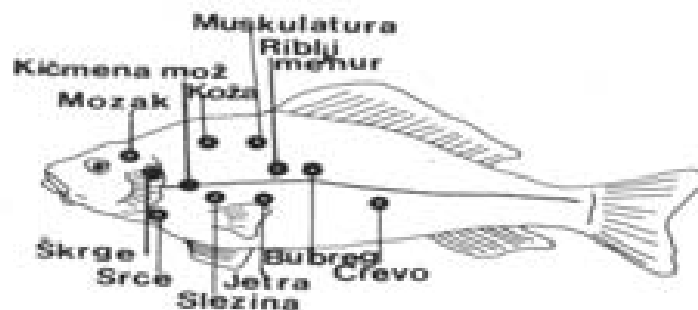


Figure 4. Organs where spores of *T. hovorkai* were detected
 Slika 4. Organi u kojima su detektovane spore *T. hovorkai*

The disease was manifested with disturbances in central nervous system, anemia, and absence of fingerlings progression especially when higher number of spores is diagnosticated. Lianage et al. (2003b) concluded that the developmental cycle of *T. hovorkai* was completed within 3–5 months at 20–25°C, and that the ingestion of large numbers of actinospores orally, possibly by feeding on infected oligochaetes, resulted in a disease condition in carp. The life cycle of *Thelohanellus hovorkai* (Myxozoa), the causative agent of haemorrhagic thelohanellosis of carp *Cyprinus carpio*, involves the alternate oligochaete host *Branchiura sowerbyi*, which plays the role of vector in the parasite's transmission (Ćirković, 1987; Liyanage et al., 2003a). Myxosporean and actinosporean stages of *Thelohanellus hovorkai* develop in common carp and water oligochaete, respectively (Ćirković and Jovanović, 1987; Antychowicz et al., 2005). Furthermore, Liyanage, Yokoyama and Wakabayashi (2003b) revealed that a high prevalence of actinosporean infection (max. 92%) in high population densities of *B. sowerbyi* was another aetiological factor responsible for the disease outbreak. Diseases in fish populations is a dynamic phenomenon that depends on complex interactions among the host, pathogen and the environment (Hedrick, 1998). Alternatively, the biological control of oligochaete abundance using benthoseating fishes is now under trial (Yokoyama et al. 2002). The best preventive measure is still accurate preparation of pond.

CONCLUSION

Natural spawning of fish is not convenient for more intensive common carp production. It is recommended to rear carp fingerlings of the same age group. During the winter, fish ponds bottom soil should be dried up and frozen.

After 3-5 years of exploitation, the surface layer of the soil from ponds should be removed. During pond preparation it is recommended to use rotary ploughs. For fish pond disinfection, burnt lime (1000 kg/ha) or hydrated lime (2000 kg/ha) should be applied.

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Thelohanellus hovorkai – KOD RAZLIČITIH KATEGORIJA ŠARANA

NIKOLINA NOVAKOV, MIROSLAV ČIRKOVIĆ, DRAGANA LJUBOJEVIĆ,
BOJAN ADŽIĆ, STEVAN MALETIN, OLIVERA BJELIĆ ČABRILO

Izvod

Thelohanellus hovorkai je opisana i kao “hemoragična telohaneloza” zbog čestih nalaza hemoragičnih lezija na površini tela zaraženih šarana. Dijagnostika ovog oboljenja vezana je za detekciju spora čija se veličina razlikuje u opisima istraživača kod riba iz otvorenih voda i šaranskih riba gajenih u akvakulturi. Oboljenje se manifestuje poremećajima u centralnom nervnom sistemu, malokrvnosti i slabijem napredovanju mladunaca a naročito kada se dijagnostikuje veći broj spora u tkivima riba. Istraživanja su sprovedena u Vojvodini na 15 ribnjaka u razdoblju 2007-2010. Metode koje su korištene su klinička posmatranja, svetlosna mikroskopija i klasična patohistologija sa H & E bojenjem. Prisustvo ovog parazita zabeleženo je kod mladunaca šarana starijih od 90 dana i kod matica šarana. Specifične terapijske mere nisu poznate, ali opšte preventivne mere vezane za pripremu objekata za gajenje mladunaca šarana daju povoljne rezultate.

Ključne reči: telohaneloza, šaran, *Thelohanellus hovorkai*, spore.

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