

SZENT ISTVÁN UNIVERSITY
Faculty of Veterinary Science

**MAIN RESULTS OF RESEARCHES
BASED ON FISH HEALTH DIAGNOSTICS IN HUNGARY
(1975–2003)**

PhD Thesis

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**Central Veterinary Institute
2004**

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INTRODUCTION AND OBJECTIVES

In Hungary the pathological studies of fish diseases were started by the activity of István Rátz professor of the Faculty of Pathology of Veterinary High School in 1897, although significant studies by László Betegh relating mycobacterium in fish were published in 1910. In Europe most of the knowledge in fish pathology concentrated only on trout diseases, though the scientific activity of Schäperclaus and that of Fijan included carp disease too.

Regular diagnostic studies in fish pathology were started in 1957 in the Department of Fish and Bee Diseases established by László Buza at the Central Veterinary Institute. The diagnostic work operating within the Department – following and understanding the basic needs and characteristics of the country – concentrated first of all on the species of common carp. In this thesis I give account of my personal activity and my scientific achievements in this field.

Materials and methods

For examination purposes we regularly used the fish samples arriving to the Department for normal routine control, or the samples collected during our official visits in fish farms. We performed our examinations on fishes with parasitological, bacteriological, pathological, and in need ultra structural as well as virological methods. Here I must point out the special significance of the Giemsa-staining in fish pathological researches.

I. Protozoological examinations

1. In 1975 it came to my attention that while Giemsa-staining was a successful method in warm-blooded animal examinations it was only seldom and ad hoc used in fish disease diagnostics.

As Giemsa-staining served with good results in examining diseases – both of protozoological and of bacteriological origin – and because these results could further orientate the researcher, I decided to use it among the methods of my regular everyday work. I started to use Giemsa-staining in regular examinations of blood smears and impression smears of organs of fish.

The routine application of Giemsa-staining brought an unexpected result: I came across a so far unknown protozoon in the blood of common carp. I find an explication for the unexpectedness of this discovery in the fact that during the classical period of protozoological researches fish was rare subject of examining as the most important diseases of humans and warm-blooded animals (malaria,

sleeping sickness, leishmaniosis, babesiosis etc.). Intensive research using this field started only in the second half of the 20th century, and by then the methods of Giemsa-staining and the monotone microscopic examinations seemed to be obsolete as methods in regular fish diagnostic work. This also explains the fact that the developed form of the protozoon /1, 2/ discovered by me and later referred to as „Csaba body”, „Csaba parasite” or „C protozoon” was recognised in carps and other cyprinid species in the surrounding countries by many scientists. After my discovery scientists discovered it even in others fish species infected by *Sphaerospora* in distant continents too.

The parasite found in the blood of carp inspired me to analyse the Giemsa-stained impression smears gained from the different organs of sick carp. These further researches executed in co-operation with fellow scientists resulted in discovering that swim bladder inflammation earlier diagnosed by Western scientists as to be of viral infection eventually is caused by *Sphaerospora renicola* Myxozoa /3/. My thesis gives detailed account on cause-effect study of the carp's swim bladder inflammation.

2. The application of Giemsa-staining assisted also to prove that *Mitraspora cyprini* found in the urine tube of carps is a synonym of *Hoferellus cyprini* /4/. Additionally the Giemsa-staining opened the way to discover *Dermocystidium* sp. that causes granulomatosis of common carp /5/.
3. The so-called winter skin disease have caused considerable economic losses for more than 25 years in wintering ponds, but not in lakes. In the ice covered wintering ponds only carps get sick. Their skin first becomes opal-like, and then the sick opaque glass shape epidermal layer sloughed off, the skin thus becoming rough to the touch, and carps with sunken eyes die off due to consequent skin inflammation. The supposed cause of this disease is a 5–8 µm large colourless, refractive, pear like organism, which had root like appendages (rhizoid) on their narrowed end. The taxonomic position of this organism is uncertain.

II. Bacteriological investigations.

1. Among the bacterial diseases the discovery of the septicaemia caused by *Pseudomonas fluorescens* in silver carp /6/, was also the consequence of using Giemsa-staining.
2. The method of staining contributed to the successful and rapid demonstration of red mouth disease /7/ in trout.
3. We demonstrated the role of atypical *Aeromonas salmonicida* causing erythrodermatitis in carps also by artificial infection /8/ and we executed further observations regarding the histopathological character of the disease. /9/
4. By studying tubercular cases in local ornamental fishes we could isolate *Mycobacterium marinum*, *M. aquae*, *M. terrae*, *M. fortuitum*, *M. parafortuitum*, and *M. smegmatis* bacteria. /10, 11/

III. Helminthological studies.

We found the nematode *Anguillicola crassus* in 1990 in the Lake Balaton. Relying on the results of our researches we pointed out that infected eels could die if posed to increased stress /12/. Large-scale death occurred in 1991. Our researches executed

during the 1991 eel death proved that *A. crassus* played a special role in the occurrence of death cases /13/. We simultaneously proved that chemical pollution played no part in the death of eels in these cases. We also gave an exclusive report on the pathological and histopathological deformations caused by eels /14/.

In my thesis I put special emphasis on my study series presenting the differences and similarities of different development forms of the pathogens in swim bladder inflammation (presenting them in the blood, in the walls of the swim bladder and in the kidney), as well as on reporting my results in detail concerning the carp's winter skin disease and erythrodermatitis of carp. The pathological results are illustrated by own macro and micro photos.

The results of our research activity – following the basic demand and nature of the routine diagnostic activity – were ready to be applied in practice right after publication.

Practical examples:

a) Suggestions for medical treatment regarding of bacterial antibiotic resistance
– For preventing of secondary bacterial contamination in case of chronic swimbladder inflammation of carp fry.
– For combating of atypical *Aeromonas salmonicida* isolated from ulcers of carp erythrodermatitis.

b) Suggestions for saving values
– At diagnosis of *Pseudomonas* septicaemia in silver and bighead carp the remaining stock of these carps in good health is to be recommended (because of the traditional medical food treatment can't be applied for these species)
– At detecting pathogens of winter skin disease of carp – in order to avoid further losses – a sale course according to the state of health of wintering carp stocks can be fixed.

c) After detecting the *anguillicolosis* in the Lake Balaton we suggested stock decrease and simultaneous value saving by electric fishery as well as ceasing of further introduction of eels.

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