



Fakulta rybnářství
a ochrany vod
Faculty of Fisheries
and Protection
of Waters

Jihočeská univerzita
v Českých Budějovicích
University of South Bohemia
in České Budějovice

Spring mortality of carp



Veronika Piačková

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Winter in ponds:

- Low temperature – low activity of fish
- Several months of starvation - energetic saturation from fat stores
- Proliferation of certain parasites
- Predator attacks





Chances on survival of winter depend on:

- Previous season (nutritional and healthy status of fish in the autumn)
- Conditions (ponds) for overwintering
- Course of temperature during the winter
- Other factors (parasites, predators, genetics...)





Early spring

- Very difficult period for fish in terms of health
- Development of natural food is just beginning
- Intake of presented food is still limited due to the low water temperature
- Immune system still doesn't work due to the low water temperature
- Any pathogen can apply in its full range



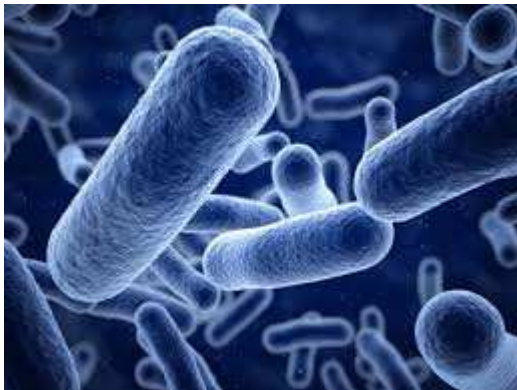


Possible causes of carp mortality in spring:



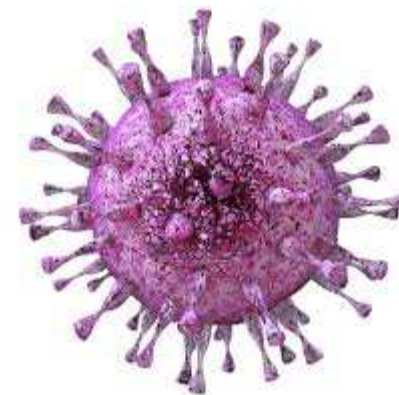
- Water quality

- Parasitic diseases



- Bacterial diseases

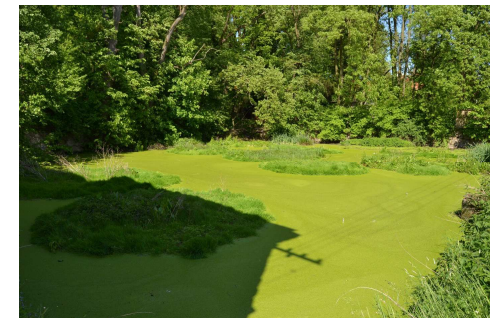
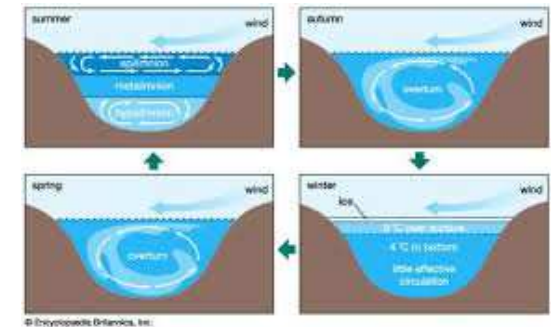
- Viral diseases





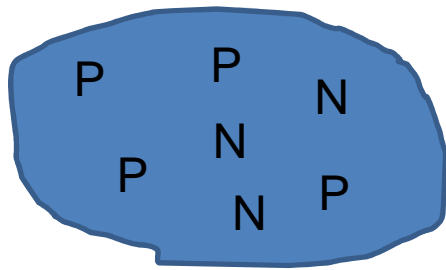
Water quality

- Increase of water temperature → increase of biological activity in pond ecosystem → related changes in physico-chemical properties of water.
- Spring circulation → mixing of the whole content of the reservoir (substances adsorbed on the bottom sediments or released gradually into the hypolimnion are present in whole water column).
- Changes of water quality due to the hydrobiological changes (development of phytoplankton and zooplankton, growth of water macrovegetation, fish introduction, etc.).
- Manuring without knowledge of water quality before application.

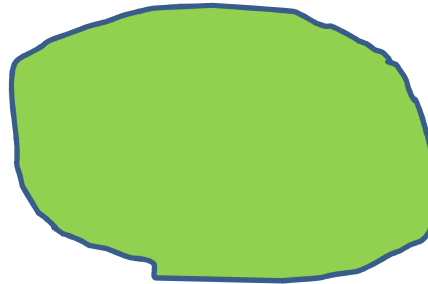




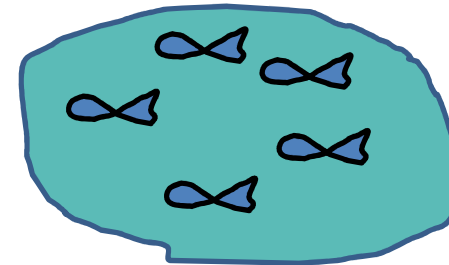
Eutrophic pond in spring



High concentration of
nutrients (P, N-NH₃)

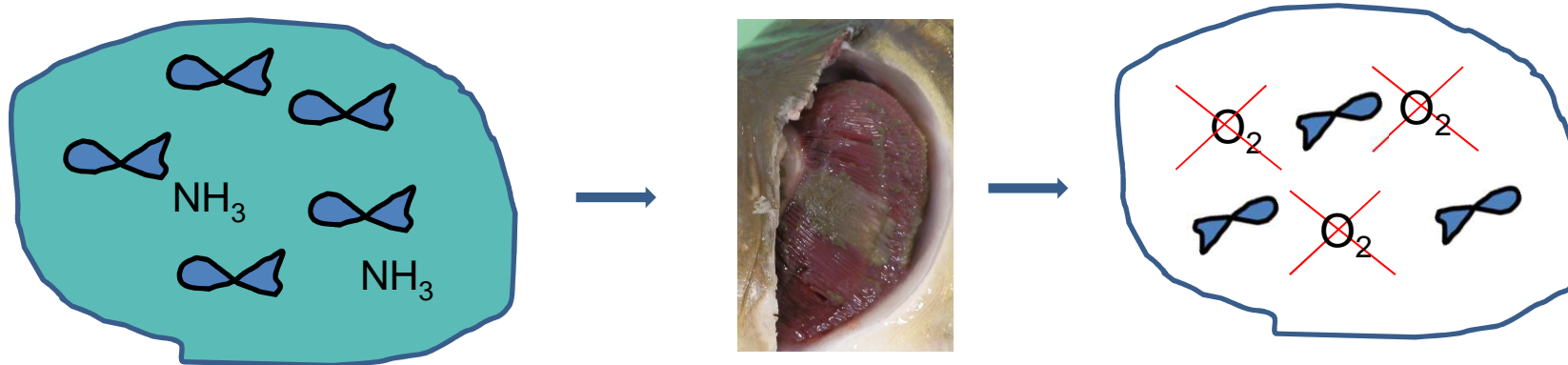


Development of phytoplankton
↑ photosynthesis
↑ pH



Introduction of fish

What will happen?



- Most of ammonia is present in NH_3 (toxic) form.
- Fish are unable to release $\text{NH}_3 \Rightarrow$ autointoxication, damage of the gills – toxic necrosis.
- Fish do not accept food (even natural) \Rightarrow overgrowth of zooplankton \Rightarrow reduction of phytoplankton \Rightarrow ↓ decrease of chlorophyll concentration \Rightarrow ↑ increase of transparency of water \Rightarrow ↓ decrease of oxygen concentration.



Contamination of surface water with pesticides

- Fish poisoning

Various clinical signs (darkening of the body, uncoordinated movement, excitation, accelerated breathing, convulsions, mortality)

- Decrease of natural food

Reduction of phytoplankton

Decomposition of death organisms

} Oxygen deficiency



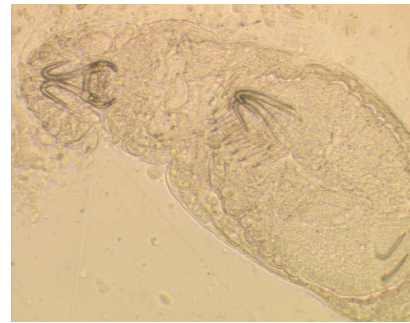
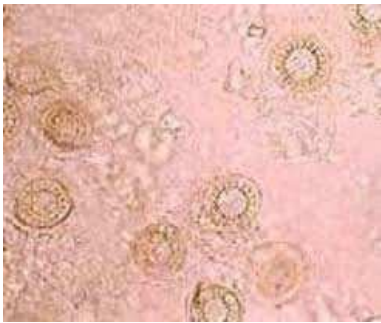


Parasitic diseases

Most of the parasitic disease breaks out during the period of intense warming of water - in May to June.

Due to the climatic fluctuations of recent years, their occurrence in the early spring period is not unique either.

Greatest damage is caused by species-specific ectoparasites:



Trichodina spp. *Chilodonella* spp. *Gyrodactylus* spp. *Dactylogyrus* spp.

One other possible cause of carp weakness or even death may be blood flagellins (*Trypanosoma* spp. and *Trypanoplasma* spp.).





Bacterial diseases

Carp Erythrodermatitis (*Aeromonas* spp.)

- inflammatory changes in the skin ranging from superficial lesions to deep muscle ulcers ("ulcer disease").



- Some types of motile aeromonads may cause **motile aeromonad infections** (MAI) in addition to skin changes.



Flavobacteriosis (*Flavobacterium* sp.)

- *Flavobacterium branchiophilum* has been repeatedly identified on the gills of CEV infected fish. This flavobacterium has been described as a bacterial gill disease (BGD).
- increased gill mucus, gill tissue necrosis, chronic gill anemia

Columnaris disease (*Flavobacterium columnare*)

- yellow to gray spots on fish skin





Viral diseases

Spring Viremia of Carp (SVC)

- generalized bleeding disease mainly of common carp
- occurrence described from the beginning of 20th century, big losses due to SVC in the 70s – 80s
- temperature range of 10-17 ° C
- apathy, gathering at the shore or at the inflow of water, loss of reflexes



- visible darkening of the body surface, gill anemia, exophthalm and enlargement of the body cavity
- bleeding on the body surface at the base of fins, on the abdominal part of the body or in the eye
- mortality rate of up to 70%
- edema of internal organs, liquid or adhesions in the body cavity
- bleedings in internal organs (gas blader)





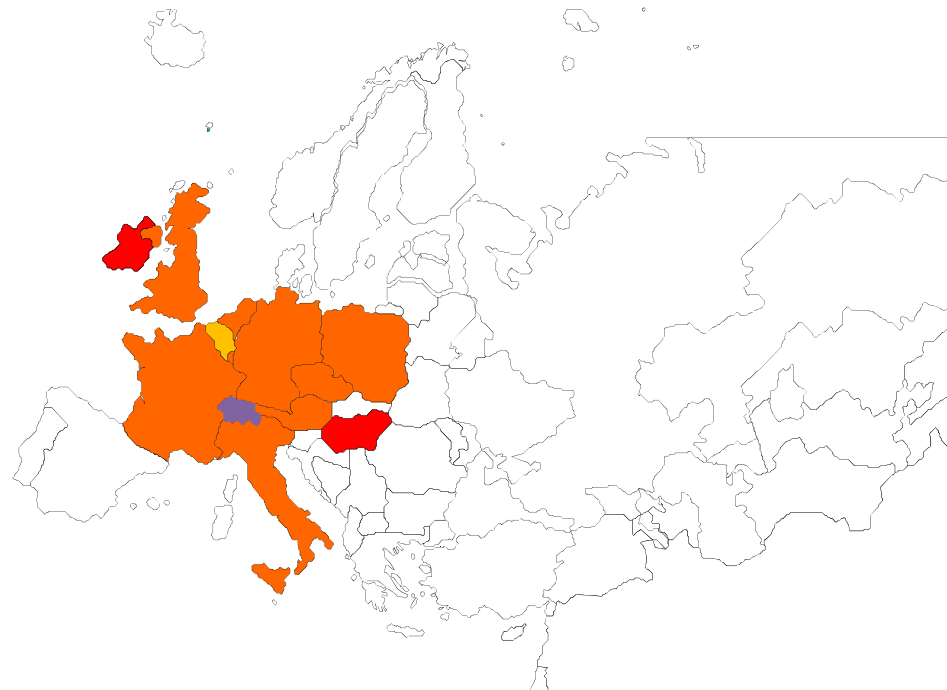
Carp Edema Virus Disease (Koi Sleepy Disease; KSD)

- common carp, koi
- lethargy, loss of reflexes, loss of balance, sleepy behaviour, asphyxia
- mucus separation, sunken eye (enophthalmia), occasional lesions on the body surface, edema of the gill epithelium, degradation of gill leaves and extensive gill necrosis
- water temperature below 17 °C
- mortality





- 70s – Koi Sleepy Disease in Japan
- 2011 – first detection of CEV in Europe (UK)
- 2013 - first confirmed case of CEVD in the Czech Republic
- CEV has been already detected in many other European countries:
- Croatia, Poland, Germany, Ireland, Austria, Netherlands, Belgium, France, Italy, Switzerland





- Two genogroups of the virus were identified:

CEV I

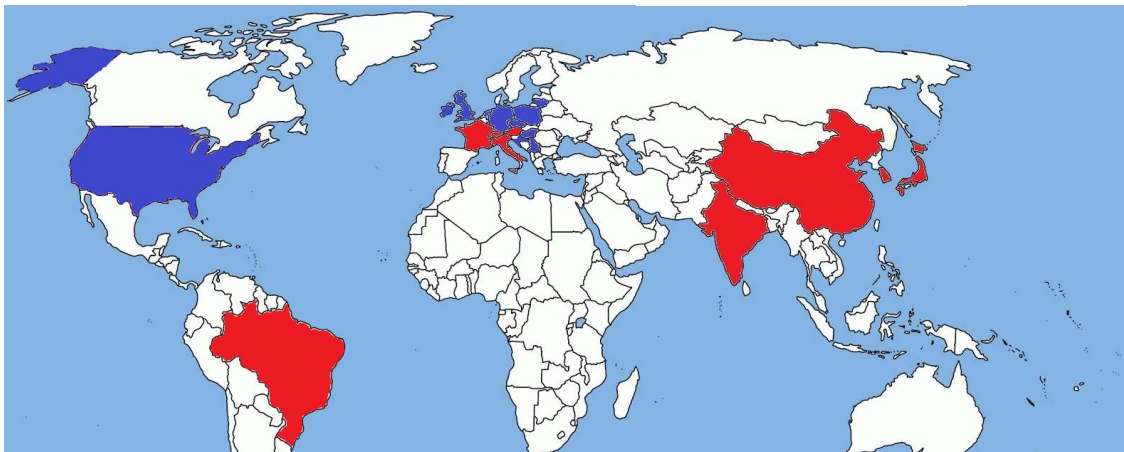


CEV II

CEV IIa



CEV IIb





- CEVD can occur also in Autumn





Koi Herpesvirus Disease (KHVD)

- typical temperature higher than 20 °C but some cases in lower temperature have been reported
- clinical signs and pathological changes similar to CEVD
- resolution by PCR





What can we do?

Water quality – check it regularly, don't manure unjustifiably, don't overload ponds with fish

Parasitic diseases – examine fish, keep parasitic infections under the control

Bacterial diseases – prevent excessive organic load of the water, keep the fish in a good condition

Viral diseases – use only healthy fish from trustworthy source for breeding, keep the fish in a good condition and

pray to st. Peter that all health disasters avoid our ponds!





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