Air bladder inflammation of the carp. (Aerocystitis)

by F. Otto

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From the Bavarian National Institute of Fishery, Starnberg.

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Definition.  

Air bladder inflammation, an endemic or epidemic infectious disease causing high mortality, is presently claiming with Infectious Dropsy of Carp (IDC) and gill necrosis (Branchiomycetes demigrans s. sanguinis) the heaviest economic losses in intensive German pond farming.

Distribution.

First, single cases were recorded. In recent years the epidemic character of this disease was recognized due to great losses in the pond farms of Eastern European countries such as Czechoslovakia, Poland, Hungary, the Soviet Union and the German Democratic Republic. In the Federal Republic considerable losses were observed during the two last finishing periods in the pond cultivations of the Upper Palatinate and the Aischgrund.

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**Environmental Health and Fisheries Service**

**Environment**

**Fisheries Service**

**Halifax, N.S.**
Check-tests of innumerable ponds in the spring of 1971 verified the frequent appearance of this contagious disease in this region.

Air bladder inflammation attacks predominantly carp in intensive fish farming. Symptoms of the disease were observed in \( k_v, k_1, k_2 \), carp of marketable size and spawning carp. Mainly, however, one- and two-summer carp are taken ill.

**Diagnosis.**

**External disease symptoms.**

The initial signs of the disease or the early stage are not recognizable externally. Only in the advanced stage does the carp exhibit a behaviour that, however, hardly differs from other pathological symptoms, such as swarm-formation on the water surface, reduced escape reflex, dark discoloration of the epidermis, possible exophthalmos, abdominal distension and a protruding, inflamed vent.

Uncoordinated swimming is regarded as a pathognomonically specific symptom of advanced air bladder inflammation. The animals swim upside down and paddle with the tail fin since adaptation to the specific gravity has been lost.

In the terminal stage the fish refuse feeding.
Fig. 1 Three-summer carp (1150g) with pronounced abdominal distension.

Fig. 2 Normal position of an air bladder without inflammation.
**Morbid anatomy.**

The air bladder of a healthy carp is glass-clear, dry, slightly vascularized, not enlarged and transparent.

Developing aerocystitis is first indicated by an increased vascularization proceeding in cranial direction from the constriction between the cranial camera aerea anterior and the caudal camera aerea posterior, or the capillaries already present are dilated.

Finally, hemorrhagic diapedesis develops which in the initial stage appears only microscopically, in the progressed stage macroscopically in the form of petechial hemorrhages, later as ecchymoses.

The dilated vessels lead to the development of an exudate with subsequent cloudiness of the air bladder.

In advanced aerocystitis fibrinous deposits develop. Adhesions of the air bladder wall to the coarse, opaque, white exterior covering of the air bladder are additional pathological changes.

The advanced exudative and proliferative reactions lead finally to a serous exudate into the air bladder, or to the development of air-containing pseudomembranes generally directed caudally. In the final stage the air bladder is completely collapsed. If aerocystitis is already fading away, the petechiae are discoloured dark, in the chronic form a complete deformity or a partial regeneration of the air bladder is found.
In addition to the changes in the air bladder the fish may show the patho-anatomical changes of acute or chronic infectious dropsy.

Changes in the air bladder are, however, regarded as the exclusive specific signs for the diagnosis of aerocystitis.

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Abb. 3
Ausschnitbild einer Schwimmblase mit vermehrter Vaskularisierung, Gefäßdilatation und kleinsten nur mikroskopisch erkennbaren Petechien

Fig. 3. Section of an air bladder with increased vascularization, vascular dilatation and minimal, only microscopically recognizable petechiae.
Fig. 4. The early stage of aerocystitis with macroscopically discernible petechiae.

Fig. 5. Air bladder of a two-summer carp with increased vascularization and hemorrhages on the camera area anterior.
Fig. 6. Picture of dissected carp of Fig. 1.

Fig. 7. Pronounced increase in the size of the air bladder with increased vascularization, petechiae, ecchymoses and fibrinous deposits.
Fig. 8. Dissected air bladder filled with serous fluid. The fibrinous deposits were removed.

Fig. 9. 165 ml of serous fluid from the air bladder in Fig. 8, of the 1150g carp of Fig. 1.
Epidemiology.

Accounts concerning the period of incubation are differing. In my opinion, an accurately defined duration, however, cannot be stated. The outbreak of air bladder inflammation coincides with the beginning of the warm season. The first seasonal appearance in the Aischgrund during 1971 was observed as early as the beginning of April. During May and June the epizootic culminated universally.

Etiology.

Aerocystitis appears to be primarily of viral origin (Mattheis and Kulow, 1969; Schäperclaus, 1969; Fijan, 1970).

Only a secondary bacterial infection produces the true disease symptoms.

Morbidity or Mortality. p.338.

In pond cultivation of the Upper Palatinate, Upper Franconia and the Aischgrund a very high percentage of loss, and in part total loss, was ascertained in the spring of 1971 in some fish ponds and cultivated ponds. Once air bladder inflammation is established in certain waters, trial catches show that all stages of the disease occur simultaneously, side by side.
Influence of environmental factors.

Deviations of environmental factors from the norm, i.e. stress situations such as changes of temperature, oxygen and pH-values, chemistry of nutriment and water or overcrowding may be contributing causes.

Prophylaxis.

Prophylactic measures of pond hygiene, prevention of any measures detrimental to resistance, as well as increased attention to care are unalterable preconditions for rearing a healthy stock.

Any mass transport or ownership change of fish and any extensive depletion of the fish population should be controlled by an expert in an antecedent examination of the state of health of the stock in question.

Release of the stock for trade should be permitted only after scrupulous examination and dissection of individual specimens.

When transferring sick stock, the animals should be treated with medicinal baths or injections, stock in the surface pond should be treated with medicated feed. In a mixed population from different stocks of various age groups a predisposition may already exist.

Therapy.

Good results were obtained in $K_0$, $K_v$, and $K_l$ with chloramphenicol baths of five days' duration combined with oxygenation, ammonia and temperature controls, and complete withdrawal of feed.
In the experiment one-summer carp in two batches of 800 with an average weight of 25 g were bathed in 0.64 cbm of water of 9°C at a chloramphenicol concentration of 80 mg/l.

The dosage is always in direct relation to the total weight of the fish.

K₂ and K₃ were successfully treated by i. p. injections of antibiotics or chemotherapeutic agents.

In total, more than 100,000 K₂ were injected experimentally in the spring of 1971. At a dosage of a chloramphenicol suspension at 10 mg/100g, combined with an application of 100 gamma of a vitamin-B₁₂-cyanocomplex the mortality in the first seven days was reduced to zero. The chloramphenicol/vitamin-B₁₂ suspension was diluted with distilled water and in the above mentioned concentration of the active material injected i. p. in not more than 1 ml. amounts in K₂ and in 0.5 ml amounts in K₁.

After the seven days the effect of the antibiotics had ceased resulting in recurrent, but considerably reduced mortality, which was always below 5% and mostly below 1%.

In comparison, the untreated control groups showed in part over 90% mortality. With that it became evident that the dosage of 4 mg/100g, generally recommended in the bibliography of fishery biology, is not sufficiently effective.
Fish pretreated with antibiotics are in principle not protected against a new infection; prophylactic injections, for instance at the transfer from wintering ponds, are accordingly of doubtful value.

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Bibliography.

Literatur:


Address of the author:

Dr. F. Otto.
Klinik für Geburtshilfe und Gynäkologie der Haustiere.
Winterthurer Str. 260.
CH - 8057 Zürich/ Schweiz.