

SWIM BLADDER INFECTION OF FARMED ATLANTIC SALMON (*SALMO SALAR* L.) BY A FUNGUS: A CASE REPORT.

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Summary

This is a report of a seldom observed swim bladder fungal infection of farmed young Atlantic salmon with severe clinical symptoms of diseased fishes, but with low mortality relating to the total stock. The fungus, diagnosed in the wall of the swim bladder, possibly belongs to the species *Paecilomyces farinosus*, already described in 1989 as pathogen for salmon in Scotland and Norway or to the genus *Phoma*, also known as a swim bladder pathogen in salmonids.

Moribund young fish (size 5-6 cm) from a farmed stock in Northrhine-Westfalia, Germany, showed a swollen vent area. No bacterial or viral infections could be proved. The only observed symptom was a pathological alteration of the swim bladder (Fig.1). The confined lumen of the swim bladder was filled with a whitish mass, and the wall was extremely thickened. The microscopic and histological findings revealed a serious infestation of the swim bladder by septate fungal hyphae. The hyphae had penetrated the whole swim bladder wall destroying the tissue (Fig. 2-3). The fungus was not

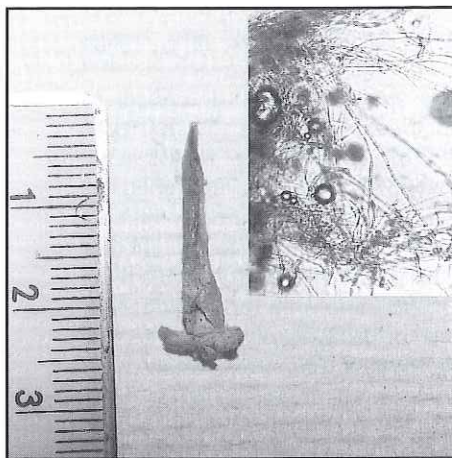


Fig. 1 A macroscopic demonstration of the swim bladder of a diseased young Atlantic salmon. Detail: Vital crushed preparation of the fungal hyphae.

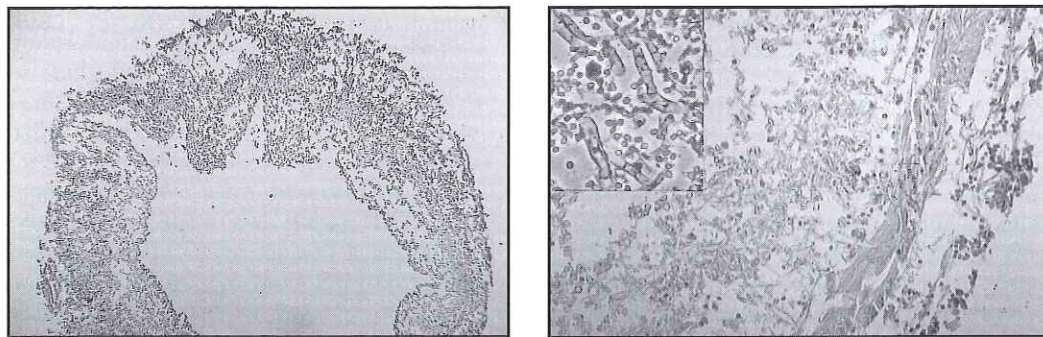


Fig. 2. An histological cross section of a swim bladder, which is infested with the mycosis. The swim bladder wall is extremely thickened. The mycosis has caused a great reduction of the lumen (x 31,2). **Fig. 3.** A high power view of the same swim bladder shown in Fig. 2. The fungal hyphae and conidia are present within the swim bladder wall. Because of the invasion and infiltration of the hyphae, the cellular structure of the swim bladder wall is nearly completely destroyed (x 200). Detail: Hyphae and conidia in phase-contrast image (x 312,5).

observed in other organs. Because our laboratory was not successful in cultivating this fungal isolate from the swim bladder of affected fish, the fungus remained at least undetermined. But the morphology of the hyphae and conidia, the clinical picture of the disease with a low mortality of the stock as mentioned in the publication of Bruno (1989), and the rareness of this funding make it probable that the fungus belongs to the species *Paecilomyces farinosus* (*Deuteromycetes/Paecilomyces*, related to *Penicillium*), a soil fungus and ubiquitous insect parasite with an unlimited host range (Domsch *et al.* 1980).

Paecilomyces farinosus was described as pathogen for *Salmo salar* for the first time by Bruno (1989) in Scotland. In the same year Langvad *et al.* mentioned the fungus as a fish pathogen with a low mortality in Norway. Lightner *et al.* (1988) found another species of the genus *Paecilomyces*, *P. marquandii* as responsible for a renal and peritoneal mycosis of tank-reared hybrid red tilapia (Genus *Oreochromis*) in North America. In contrast with *P. farinosus*, *P. marquandii* generally is not known to be pathogenic to insects or other animals (Domsch *et al.* 1980). *Phoma herbarum* is also known as an occasional salmonid pathogen. With this species the swim bladder seems to be the primary organ to be infected (Austin *et al.* 1989). *P. herbarum* is characterised by many pycnidia and sparse septate aerial mycelia. Typical chlamydospores are not developed. Conidia are globose to cylindrical,

single celled hyaline and usually with oil droplets. (Muller and Löffler., 1971, Domsch *et al.*, 1980, Austin and Austin, 1989).

All these characters were found within the fungus described in this case report.

Paecilomyces farinosus has conidiohores which bear several whorls of flask shaped phialides (Domsch *et al.*, 1980). Such structures were not observed in our case, so that the fungus which were found in the swim bladder wall of *Salmo salar* may more likely belong to *Phoma* sp. Than to the genus *Paecilomyces*.

These species of the fungal genera *Phoma* and *Poecilomyces* must be considered as imperfect parasites or facultative parasitic opportunists of fishes, respectively.

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