

Saprolegniasis – Cotton Wool Disease

I. Causative Agent and Disease

The disease saprolegniasis is caused by freshwater fungi usually in the genus *Saprolegnia*. These fungi are classified in the family Saprolegniaceae, otherwise known as water molds. Saprolegniasis often is used indiscriminately to describe any cotton-like growth of fungus adherent to skin or gills which may include any one of several genera of molds. The fungi are found worldwide in freshwater, although some species may occur in brackish water less than 2.8 parts per thousand salinity. Most species are saprophytes naturally present in the environment (water, sediment) and are considered opportunistic pathogens and secondary invaders requiring prior injury of external tissues from mechanical abrasion or other primary pathogens. Some species of *Saprolegnia* (*parasitica*) can produce a systemic mycosis and are considered primary pathogens.

II. Host Species

All freshwater fish species and incubating eggs are susceptible to saprolegniasis.

III. Clinical Signs

Externally, the fungus appears as focal white to brownish cotton-like patches on the surface of the skin and/or gills. Early lesions consist of pale foci with peripheral areas of erythema and a central zone of lifted scales which frequently becomes ulcerated, exposing underlying musculature. Systemic infections are characterized by mycelial masses in the gut and surrounding viscera causing peritonitis with extensive hemorrhage, necrosis and adhesions. In smaller juvenile fish external signs of bloating caused by gut obstruction may progress to perforation of the abdominal wall.

IV. Transmission

External fungal infections are transmitted through ambient water by infectious biflagellated zoospores released from hyphal sporangia. Systemic infections in cultured fish occur by ingestion of uneaten food that has been colonized by fungal hyphae. Factors of environmental stress play an important role in the etiology of the external disease. Outbreaks occur primarily after minor injury from handling or during crowded conditions when environmental quality is suboptimal. Adult salmon migrating to spawning areas have weakened immune systems and often have external infections of *Saprolegnia*. Also, cold water temperatures predispose fish to fungal disease because development of zoospores and sexual stages are favored while host tissue repair and the inflammatory response are slowed by the lower host metabolism.

V. Diagnosis

Diagnosis is based on typical gross clinical signs where the skin, gills and other surfaces of an infected fish or eggs become covered with white, cottony tufts of fungal hyphae. Wet mounts of fungal mycelium from lesions show large, branching, non-septate hyphae. Terminal ends of older hyphae form club-shaped sporangia containing biflagellated zoospores. The fungus can be isolated on cornmeal or potato agar.

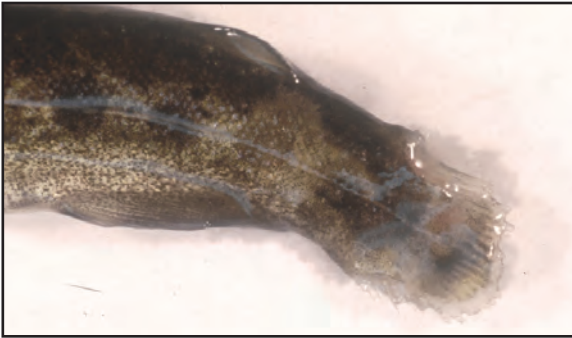
VI. Prognosis for Host

When external infections are extensive and/or involve the gills death of the host is likely from fluid imbalance and peripheral circulatory failure (shock). In the hatchery environment external fungus infections can be treated success-

fully with formalin drips. There is no treatment for systemic mycoses that are rapidly fatal.

VII. Human Health Significance

There are no human health concerns associated with *Saprolegnia*.



Tail rot due to infestation with *Saprolegnia* fungus



Typical skin lesion due to *Saprolegnia* fungus



Hyphae and sporangia of *Saprolegnia* fungus, phase contrast microscopy