

Gyrodactylosis of Atlantic salmon (*Gyrodactylus salaris*)



AETIOLOGY

CLASSIFICATION OF THE CAUSATIVE AGENT

Flatworm (Platyhelminthes) in the class Monogenea, family Gyrodactylidae, genus *Gyrodactylus*. Obligate fish parasites that give birth to offspring, there are no eggs, resting stages, specialised transmission stages or intermediate hosts.

RESISTANCE TO PHYSICAL AND CHEMICAL ACTION

Temperature: Survives all temperatures between 0°C and 25°C. Tolerance to temperatures above 25°C is unknown. Not resistant to freezing.

Drought: Not drought resistant. Must be surrounded by water for survival.

pH: Dies after a few days at pH=5. More sensitive to low pH (5.1<pH<6.4) in association with aluminium than the host Atlantic salmon.

Salinity: Lives mainly in fresh water, but reproduces normally at salinity up to 5–6‰. Survival at higher salinities is temperature dependent. For example at 1.4°C, *G. salaris* may survive for 240 hours, 78 hours and 42 hours at 10%, 15% and 20% salinity, respectively, while at 12°C it may survive for 72 hours, 24 hours and 12 hours at the same three salinities, respectively.

Chemicals: Sensitive to changes in chemical composition in water. Sensitive to most chemicals used for bath treatment of farmed salmon parr and its eggs, e.g. formaldehyde and compounds containing chlorine and iodine.

Survival: Detached from host: temperature dependant, e.g. about 24 hours at 19°C, 54 hours at 13°C, 96 hours at 7°C and 132 hours at 3°C.

- Commonly found on farmed rainbow trout, but usually without causing disease.

EPIDEMIOLOGY

- When the parasite is introduced to a new river, up to 98% of the native Atlantic salmon parr population dies within a few years. The existence of the salmon population is threatened in many of these rivers (mortality of salmon parr in original endemic rivers is unknown).
- Recent experiments indicate that parasite induced host mortality is dependent on water quality (chemistry).
- Up to 100% mortality in farmed Atlantic salmon parr (if not chemically treated).

HOSTS

- Atlantic salmon (*Salmo salar*).
- Other salmonids (in declining order of susceptibility): Rainbow trout (*Oncorhynchus mykiss*), Arctic char (*Salvelinus alpinus*), North American brook trout (*S. fontinalis*), grayling (*Thymallus thymallus*), North American lake trout (*S. namaycush*), brown trout (*Salmo trutta*).

TRANSMISSION

- Direct contact between infected and uninfected host.
- Contact between uninfected host and detached parasites on the substrate.
- Contact between uninfected host and parasites in the water column.

SOURCES OF THE PARASITE

- Infected fish.
- Wet equipment, such as fishing tackle, net and waders, that has been used in an infected river or farm.

OCCURRENCE

Gyrodactylus salaris has been found on wild and farmed Atlantic salmon and farmed rainbow trout in several European countries, but not in the British Isles. On wild fish, the presence of the parasite is restricted to rivers and lakes where Atlantic salmon occur. The only exception has been on rainbow trout that have recently escaped from an infected farm.

Recently, *G. salaris* was observed on non-anadromous Arctic char without causing disease. The lake has no Atlantic salmon or other salmonids known as good *G. salaris* carriers.

For detailed information on occurrence, see recent issues of *World Animal Health* and the OIE Web site.

DIAGNOSIS

The period from establishment of infection to disease outbreak is dependent on water temperature and number of parasites (dose). It may be as short as 1 week, but may take as long as several months

CLINICAL DIAGNOSIS

- Usually there are no clinical signs in fish with a few tens of parasite specimens.
- Flashing is common among moderate to heavily infected farmed fish as they scratch their skin on the bottom or wall of a tank or dam.
- Heavily infected fish may become greyish as a result of increased mucification, at a later stage the dorsal and pectoral fins may become whitish as a result of increased thickness (mainly hypertrophy) of epidermis.
- Secondary fungal infections (*Saprolegnia* spp.) are commonly observed in fish suffering from gyrodactylosis.
- Heavily infected fish may have reduced activity and stay in low current areas.

LESIONS

- Heavily infected fish may have eroded fins, especially dorsal, tail and pectoral fin, due to parasite feeding.

DIFFERENTIAL DIAGNOSIS

- Clinical observations such as changed behaviour and increased mucification are similar to those observed for other ectoparasitic infections.

LABORATORY DIAGNOSIS

Procedures

Identification of the agent

- *Gyrodactylus* specimens should be prepared individually in a drop of ammonium-picrate glycerine between a slide and a cover-slip for microscopic examination.
- Morphology and morphometry of marginal hooks, anchors (hamuli) and bars in the attachment organ.
- DNA probes for ITS, IGS and CO1.

Serological tests

- No serological tests available.

Samples

Identification of the agent

- When monitoring for the presence of *Gyrodactylus* specimens, fish should be examined individually under a binocular dissecting microscope with good illumination and in a box completely covered by water. Alternatively, only fins from the fish can be examined. However, then the number of examined fish should be increased as the specificity of the method is reduced. Fish should be killed just prior to examination, as living active parasites are most easily observed. Examination of fish conserved in at least 70% ethanol is a good alternative as the dead parasites become whitish and thus are quite easily observed. However, conserved *Gyrodactylus* specimens are difficult to prepare for morphological identification and tissue should be softened or removed in proteinase K in the process.

Serological tests

- No serological tests available.

PREVENTION AND CONTROL

- *Gyrodactylus salaris* has mainly been spread with transports of live salmon and rainbow trout. At least 30 fish from a production unit (e.g. a tank) should be examined under a dissecting microscope prior to a transport.
- Several chemicals in bath treatments are effective against the parasite such as aluminium sulphate for many days and sea water for a short period.

- Oral treatment with triclabendasole in feed (40 g per kg of feed for 10 days) and nitroscanate (>0.6 g per kg of feed per day) may eliminate an infection.

Chapter 2.2.9. in the OIE *Diagnostic Manual for Aquatic Animal Diseases*, OIE, Paris, France.

Chapter 2.2.9. in the OIE *International Aquatic Animal Health Code*, OIE, Paris, France.

SANITARY PROPHYLAXIS

- Each production unit should have equipment for cleaning and handling fish not used in other units.
- Equipment used for fish transports or that has been in contact with infected fish should be dried, frozen or disinfected (e.g. in 0.5–1% Virkon-S which kills parasites within 10–15 seconds).

MEDICAL PROPHYLAXIS

- None

REFERENCES

OIE Reference Experts and Laboratories in 2005

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