Infection with Aeromonas Salmonicida—atypical strains

(Disease resulting from infection with atypical strains of *Aeromonas salmonicida* is known by such names as goldfish ulcer disease; carp erythrodermatitis; ulcer disease of flounder, eel and salmon; or, in Tasmania, marine aeromonas disease of salmonids [MAS])

Goldfish ulcer disease in goldfish; note characteristic ulcers on the body



Source: J Carson



Atypical A. salmonicida in silver perch (Bidyanus bidyanus)

Source: M Landos



A. salmonicida biovar Acheron in Atlantic salmon (Salmo salar), known as marine aeromonid disease of salmonids

Source: K Ellard

The blood-filled furuncles are specific to this condition, but are rarely noted because they rupture easily, resulting in ulcerations extending into the muscle



K Ellard

Ulcers develop below the surface of the skin, extending into muscle

Source: K Ellard

Ventral side of greenback flounder (*Rhombosolea tapirina*), with lesion caused by the greenback flounder strain of *A. salmonicida*



J Carson



Atlantic salmon (*Salmo salar*) infected with the greenback flounder strain of atypical *A. salmonicida* after cohabitation with infected flounder

Source: J Carson

Signs of disease

Important: Animals with disease may show one or more of the signs below, but the pathogen may still be present in the absence of any signs.

Disease signs at the farm, tank or pond level are:

- lethargic swimming
- abnormal swimming and disorientation
- loss of appetite
- · increased mortality.

Gross pathological signs are:

- white raised patches on the skin that progress to ragged-edged red ulcers
- haemorrhages on the skin and fin bases (usually the paired fins)
- fingernail-sized ulcers found anywhere on the fish but most often on the upper side of the lateral line behind the head or at the base of the tail fin
- · pale gills with petechial (pinpoint) haemorrhages
- intestinal protrusion through the abdominal wall following severe ulceration
- · haemorrhages in muscle and internal organs
- swollen kidneys and spleen.

Microscopic pathological signs are:

- hyperplasia of the gills, which may contain bacterial colonies
- ulcerated areas that show oedema, hyperaemia, leukocyte infiltration and considerable degenerative changes

- · hyperaemia and haemorrhage in the spleen and kidneys
- fibroblast-like cells, which may produce granulomas in the dermis, spleen and kidney.

Disease agent

Atypical strains of the *A. salmonicida* bacterium differ from the typical strain causing furunculosis in salmonids. Atypical strains affect mainly non-salmonids (wild and cultured, marine and freshwater). Infection with atypical *A. salmonicida* does not necessarily result in the acute mortality and septicaemia that are characteristic of the typical furunculosis strain, but manifests more as external lesions and ulceration, often involving secondary infection. An exception to this is infection by MAS in Tasmania; in such cases, Atlantic salmon are most commonly affected, and clinical presentation is similar to furunculosis.

There are five subspecies of *A. salmonicida*, only one of which is known as a typical strain and causes furunculosis (*A. salmonicida salmonicida*). The other four subspecies (*achromogenes, masoucida, smithia* and *pectinolytica*) are referred to as atypical *A. salmonicida* and are recognised worldwide. Of these, all except *A. salmonicida pectinolytica* cause disease in fish. A new atypical strain that has recently been described in Australia, *A. salmonicida* biovar Acheron, causes MAS in Atlantic salmon.

Host range

Species known to be susceptible to atypical *A. salmonicida* are listed below.

Scientific name	
Hippoglossoides platessoides	
Salvelinus alpinus	
Gadus morhua	
Clupea harengus	
Salmo salar	
Sebastes schlegeli	
Salvelinus fontinalis	
Salmo trutta	
Cyprinus carpio	
Leuciscus cephalus	
Oncorhynchus keta	
Rutilus rutilus	
Carassius carassius	
Limanda limanda	
Leuciscus leuciscus	
Anguilla spp.	
Platichthys flesus	
Enchelyopus cimbrius	
Abramis brama	
Carassius auratus	
Ctenolabrus rupestris	
Thymallus thymallus	
Hyperoplus lanceolatus	
Rhombosolea tapirina	
Melanogrammus aeglefinus	
Hippoglossus stenolepis	
	Scientific nameHippoglossoides platessoidesSalvelinus alpinusGadus morhuaClupea harengusSalmo salarSebastes schlegeliSalvelinus fontinalisSalmo truttaCyprinus carpioLeuciscus cephalusOncorhynchus ketaRutilus rutilusCarassius carassiusLimanda limandaLeuciscus leuciscusAnguilla spp.Platichthys flesusEnchelyopus cimbriusAbramis bramaCarassius auratusCtenolabrus rupestrisThymallus thymallusHyperoplus lanceolatusRhombosolea tapirinaMelanogrammus aeglefinusHippoglossus stenolepis

105 BIOSECURITY

Aquatic Animal Diseases Significant to Australia: Identification Field Guide 4th Edition

Common name	Scientific name
Japanese flounder a	Paralichthys olivaceus
Lesser sand eel	Ammodytes lancea
Masu salmon a	Oncorhynchus masou
Minnow a	Phoxinus phoxinus
Pike	Esox lucius
Pink salmon	Oncorhynchus gorbuscha
Plaice a	Pleuronectes platessa
Rainbow trout a	Oncorhynchus mykiss
Redfin perch or European perch	Perca fluviatilis
Rudd a	Scardinius erythrophthalmus
Sablefish	Anoplopoma fimbria
Shotted halibut a	Eopsetta grigorjewi
Shububkin a	Carassius sp.
Silver bream a	Blicca bjoerkna
Silver perch a	Bidyanus bidyanus
Smallmouth bass a	Micropterus dolomieui
Sockeye salmon a	Oncorhynchus nerka
Spotted wolffish a	Anarhichas minor
Striped trumpeter a	Latris lineata
Tomcoda	Gadus microgadus
Turbota	Psetta maxima (also known as Scophthalmus maximus)
Viviparous blenny a	Zoarces viviparus
Whitefish	Coregonus spp.
Whiting a	Merlangius merlangus
Wrasse a	Labrus bergylta
Yellow bass a	Morone mississippiensis

a Naturally susceptible (other species have been shown to be experimentally susceptible)

Laboratory experiments indicate that all trout and salmon species, as well as many non-salmonids, are potentially susceptible to atypical strains of *A. salmonicida*. For example, Atlantic salmon and striped trumpeter can be infected by cohabitation with infected flounder. Rainbow trout are relatively resistant to atypical strains.

Presence in Australia



Atypical *A. salmonicida* has been officially reported from New South Wales, Queensland, South Australia, Victoria (goldfish ulcer disease) and Tasmania (greenback flounder biovar and Acheron biovar). Movement controls are in place to prevent the spread of goldfish ulcer disease to Western Australia and Tasmania. The Acheron biovar has been reported only from Tasmania and is limited to an isolated production area.

Epidemiology

- Transmission occurs horizontally (between fish via the water).
- Susceptibility to the disease increases with damaged mucus and skin, which occurs when fish are handled with nets.
- Outbreaks are expected to occur at water temperatures above 10°C (i.e. summer months in southern waters of Australia) and may be precipitated by stress (i.e. handling, overpopulation and rapid temperature fluctuations).
- Secondary infection with other bacteria often results.
- Fish that survive disease outbreaks are recognised as carriers of the disease and may continue to infect the remaining population without themselves exhibiting signs of infection.
- Diagnosis based on clinical or external signs of disease is difficult because clinical signs vary and skin ulcers are often infected with opportunistic bacteria and fungi. A definitive diagnosis requires laboratory examination.

Differential diagnosis

The list of similar diseases below refers only to the diseases covered by this field guide. Gross pathological signs may be representative of a number of diseases not included in this guide, which therefore should not be used to provide a definitive diagnosis, but rather as a tool to help identify the listed diseases that most closely account for the gross signs.

Similar diseases

Channel catfish virus disease, epizootic ulcerative syndrome, furunculosis, spring viraemia of carp

Sample collection

Due to the uncertainty in differentiating diseases using only gross pathological signs, and because some aquatic animal disease agents might pose a risk to humans, only trained personnel should collect samples. You should phone your state or territory hotline number and report your observations if you are not appropriately trained. If samples have to be collected, the agency taking your call will provide advice on the appropriate course of action. Local or district fisheries or veterinary authorities may also provide advice regarding sampling.

Emergency disease hotline

The national disease hotline number is 1800 675 888. This number will put you in contact with the appropriate state or territory agency.

Further reading

BK Guðmundsdóttir (undated), *The fish pathogen Aeromonas salmonicida subsp.* achromogenes, available at www.nfmikro.net/Vintermotet04/Foredrag/Gudmundsdottir.htm.

This hyperlink was correct and functioning at the time of publication.