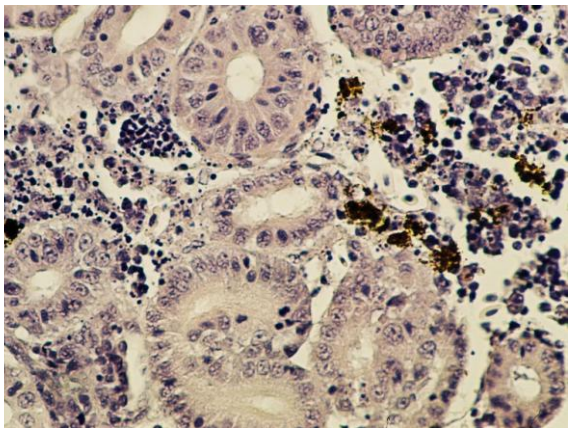
EPIZOOTIC HAEMATOPOIETIC NECROSIS

- **Iridovirus**. South eastern **Australia**. Apart from salmonids and redfin perch, guppies and mosquito fish, many teleosts are suspected to be susceptible. Rainbow trout are susceptible from 8 to 21ºC. All ages are susceptible but most noticeably juveniles.
- **Highly resistant virus**. Mechanical and horizontal spread. Possibly vertical spread.
- Notifiable to the OIE

INFECTIOUS HAEMATOPOIETIC NECROSIS

- **A rhabdovirus** of salmonids.
- Widely prevalent amongst free living salmonid fishes along the west coast of North America
- Introduced with devastating effect into major trout growing areas in Europe in 1987 **with contaminated fish and fish eggs**.
- Transmission occurs horizontally but vertical transmission through the egg may occur in a small proportion of eggs.
- Notifiable to the OIE. Included in S.A. testing protocol for imported salmonid ova.



ONCORYNCHUS MASOU VIRUS DISEASE

- **Salmonid herpesvirus type 2**
- Pacific salmon and rainbow trout. Recorded in **Japan** and is suspected to occur in coastal rivers of north-east Asia. Horizontal transmission or through the water as vector. Vertical transmission not ruled out. Symptoms typically include **tumour formation** around the mouth, caudal fin, operculum, body surface and kidney.
- Notifiable to the OIE.

VIRAL HAEMORRHAGIC SEPTICAEMIA (Egtved disease)

- A **rhabdovirus** infecting rainbow and brown trout as well as some marine species. Included in S.A. testing protocol for imported salmonid ova.
- Widespread in **Europe**, recently recognized in North America and regarded as endemic in parts of the Pacific Ocean.
- Horizontal transmission and mechanical transmission via equipment. **Virus survives in water for several days.** Vertical transmission has not been demonstrated.
- Notifiable to the OIE.

Infectious salmon anaemia

- Orthomyxovirus
- Affecting sea grown atlantic salmon
- First reported from Norway in mid-1980's. Since then from Canada, UK, Faroe Islands, USA, Chile and Ireland
- Severe anaemia, haemorrhages and necrosis of organs
- The virus targets endothelial cells in various organs
- Horizontal transmission
- Spread to new sites via infected fish or well boats
- Prolonged disease course with low cumulative mortality
- Notifiable to OIE

Gyrodactylus salaris

- Serious fresh water ectoparasite of Atlantic salmon
- Livebearing parasite with direct lifecycle
- Can be carried by other salmonids
- Mortalities in fry and parr stages
- Restricted to European countries except UK and Ireland. Import of ova to these countries requires disease free certification.
- Control by disinfection of ova and equipment
- Notifiable to OIE

Red sea bream iridoviral disease

- Mortality in red sea bream and 30 other species of cultured marine fish
- Perciformes and Pleuronectiformes
- First outbreak in Japan in 1990
- East and South East Asia
- Similar iridoviruses in ornamental fresh water fish
- Lethary, severe anaemia, splenomegaly, petechiae of the gills
- Horizontal transmission
- Notifiable to OIE

Spring viraemia of carp

- Rhabdovirus causing contagious and acute haemorrhagic disease in carp (including gold fish, silver carp and grass carp) and some ictalurid species
- Virus remains viable outside of the host in river water up to 5 weeks at 10^{o}C
- For surveillance purposes all cyprinid species must be regarded as potential carriers
- Movement of ornamental fish – goldfish and koi
- Horizontal transmission with possibility of vertical transmission
- Disease outbreaks occur between 11 and 17^{o}C

Spread of SVC

- Originally a disease of the European continent and western states of the former Soviet Union
- 1998 in goldfish in a lake in Brazil
- 2002 from two sites in USA
- 2004 China
- 2006 Canada

FURUNCULOSIS

- ***Aeromonas salmonicida***. A non-motile gram negative rod, belonging to the Vibrionaceae.. Typically associated with salmonids but all species of fresh water and marine fish are considered susceptible, in particular goldfish and koi.
- Considered one of the serious diseases of salmonid aquaculture in North America and Europe.

Furunculosis

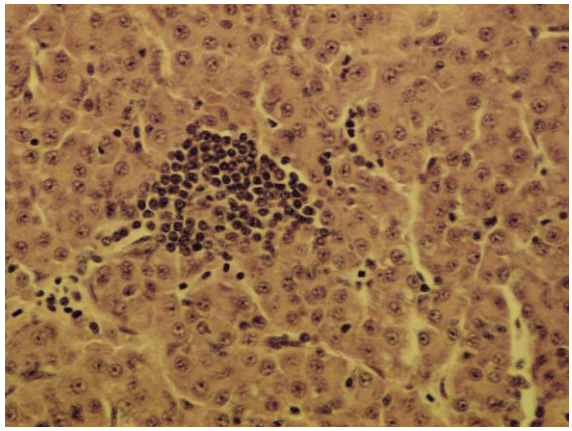
- Symptoms - boils that rupture, raw ulcers and associated symptoms of septicaemia.
- Pathogenesis is complex - linked to the production of extracellular products including proteases, haemolysins, leukocytotoxic factors and outer membrane adhesions. On culture, both typical pigment producing and atypical non-pigment producing forms occur.
- Sporadically isolated from trout and koi in S.A.

BACTERIAL KIDNEY DISEASE

- ***Renibacterium salmoninarum***. A gram-positive, non-motile, non acid-fast rod.
- Isolated from salmonids in North America, Europe, Chile and Japan. **Never recorded in S.A.**
- Disease is only seen in Salmonids. A carrier state has been suggested in herring.
- Symptoms include lethargy, changes in behaviour, exophthalmos, abdominal distension and petechiation at the base of the fins.

Diagnosis

- On post mortem, the **kidney appears swollen**, pale and granular.
- The diffuse granulomatous reactions within the reticuloendothelial tissues and the focal accumulation of macrophages within the heart and kidney are typical of the histopathology.
- Routine bacteriological surveillance takes place on salmonid export farms in S.A.



Pasteurella piscicida.

- Described from America and Japan in cultured marine fish.
- Haemorrhagic septicaemia with formation of granulomata in tissues.
- Also called pseudotuberculosis.

Rainbow trout fry syndrome (RTFS)

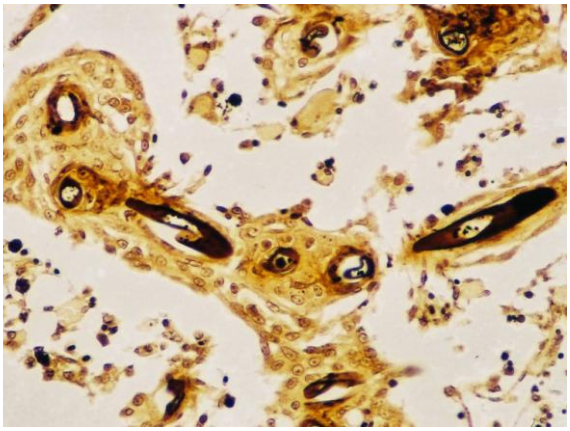
- A septicaemic hatchery disease of trout fry caused by ***Flavobacterium psychrophila*** (Cytophagaceae).
- Disease received much attention in Europe during the past two decades.
- The same organism has been responsible for coldwater peduncle disease in adult fish.

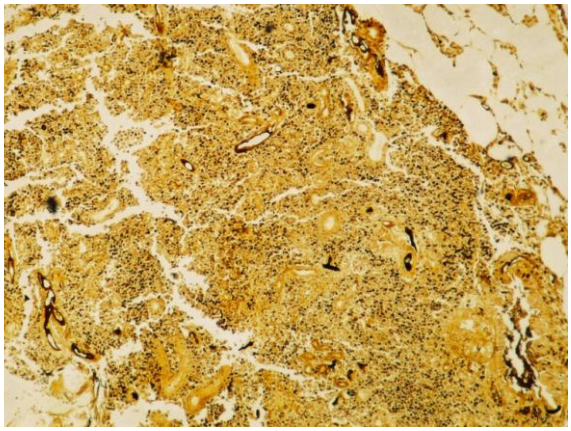
EPIZOOTIC ULCERATIVE SYNDROME (EUS)

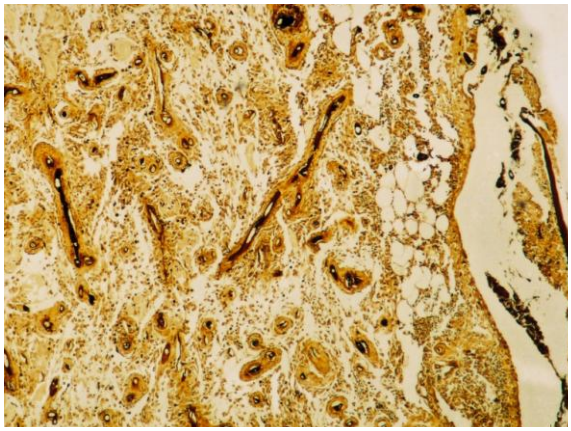
- ***Aphanomyces invadans***
- Serious pathogenic oomycete
- First described from Japan and Australia.
- Spread through Southeast and South Asia and slowly westwards.
- Recorded in estuarine fish along the Atlantic Coast of the USA.
- Identified positively for the first time in the **Chobe and Zambezi Rivers** in **April 2007** following an outbreak that started in October 2006.

EUS

- **Oomycete**
- **Primary pathogen**
- **No host specificity**
- **Affecting both fresh and estuarine warm water fish.**







Crayfish plague

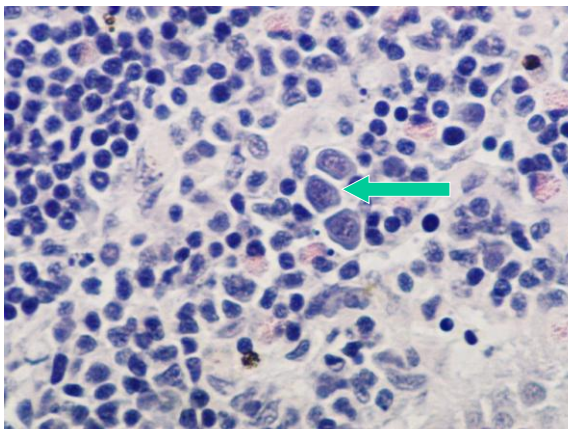
- *Aphanomyces astaci*
- Pathogenic oomycete,
- Responsible for the almost complete destruction of European freshwater crayfish populations between 1870 and 1940
- Followed introduction of faster growing but crayfish plague resistant North American crayfish.

Gill rot

- ***Branchiomyces*.** The fungus seen in European freshwater aquaculture.
- Carp culture.
- Also been reported from Japan, India and the USA.
- High temperatures, organic pollution and poor water quality
- Necrosis and sloughing follows on invasion of the gill tissues and capillaries by fungal mycelia. To the author's knowledge never conclusively identified in S.A.

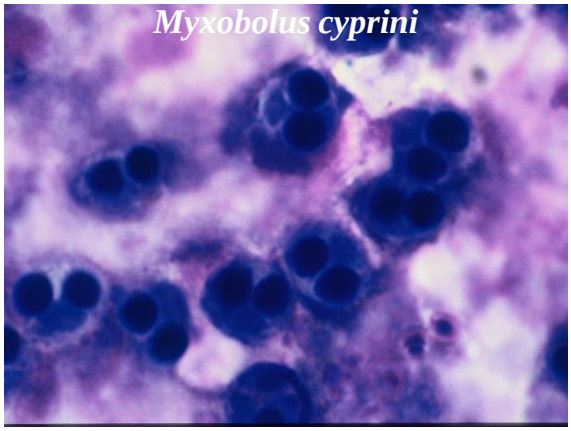
Proliferative Kidney Disease

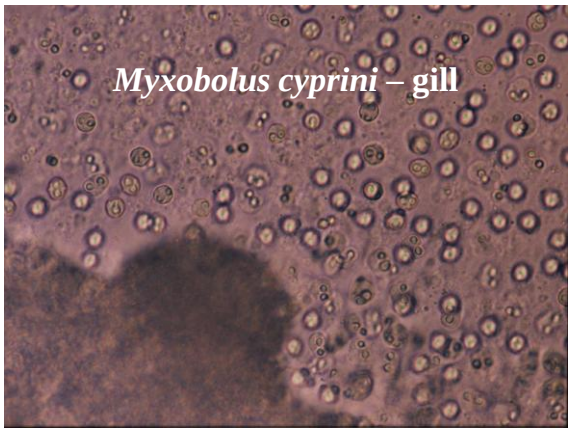
- Myxosporidian - Myxozoa
- Serious problem for salmonid culture in Europe and North America.
- Inflammation and enlargement of the kidneys
- Parasitic cells are referred to as PKX cells.
- Invertebrate intermediate hosts in the environment.
- Disease linked to certain infected waterways
- Temperature dependent. Clinical disease occurs at water temperatures above 16^0C



Whirling Disease

- ***Myxobolus cerebralis*** - Myxozoan parasite
- salmonids in **mud ponds**
- First reported from Europe, and later from the USA.
- Now in more than 18 countries
- Probably spread with imported live or frozen salmonids and salmonid products.
- Not yet in South Africa.
- Notifiable in many countries.
- Frenzied and aberrant swimming
- Skeletal deformities in infected cartilaginous tissues
- Diagnosis by demonstration of typical spores on histological sections.
- Lifecycle direct and indirect through an intermediate host the mud worm (Tubifix).





Other significant diseases

- Channel catfish virus disease - Herpes virus of Ictalurids type 1
- Viral encephalopathy and retinopathy
- Infectious pancreatic necrosis
- Infectious salmon anaemia
- Enteric septicaemia of catfish (*Edwardsiella tarda*)
- Piscirickettsiosis (*Piscirickettsia salmonis*)
- White sturgeon iridoviral disease