

**MORTALITY OF NATIVE FISH  
FROM WAIKATO TRIBUTARY**

**DISEASE DIAGNOSIS**

undertaken for

**Department of Conservation**

by

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## **DIAGNOSIS**

The fish are suffering from a systemic infection by a small Gram-positive, spherical or ovoid bacterium (<1.0  $\mu\text{m}$  in diameter) occurring singly and sometimes in chains. The histopathology is consistent with *Streptococcus* as the causative agent but without a culture the identity of the bacterium cannot be confirmed.

## **PROGNOSIS**

The conditions in the stream have probably changed suddenly, putting the native fish fauna under some stress, and favouring the rapid proliferation of the bacterial strain involved. It is likely that the epizootic will run its course in the stream until there is some event such as heavy rainfall or a cold period which will create an environment less optimal for the bacterium. For wild fish no treatment is feasible.

The disease is unlikely to spread naturally to other catchments, but would appear to be quite contagious.

Mike Harvey mentioned that he had tried removing affected fish to an aquarium and treating them with proprietary fish disease remedies. The heavy and systemic nature of the infection in the fish I examined is such that only early treatment by prescription antibiotics such as erythromycin would have had any effect.

## **1 Background**

Mr. Mike Harvey, President, New Zealand Native Fish Study Group submitted 12 banded kokopu (*Galaxias maculatus*), 1 bully (*Gobiomorphus cotidianus*) and 1 smelt (*Retropinna retropinna*) for examination on 11 Jan. 1994.

The fish, exhibiting symptoms of a disease, had been collected from a small bush run stream tidal in the lower reaches, about 5 km from the main Waikato River mouth. Mr. Harvey reported that the symptoms of infection first appeared in November and were more prevalent in December. Symptoms included raw red inflammation of the mouth parts, tail eaten away into the caudal peduncle, and open sores on the flanks. Fungal infection was present and the fish had a wasted appearance. Whitespot was also present in the stream. At the date of collection (7 Jan 1994), very few fish were seen other than freshly run whitebait. The usually abundant fish fauna was not in evidence.

All the fish had been fixed immediately after death on 7 Jan 1994, in 10% neutral buffered formalin. A smelt, two banded kokopu and a bully were post-mortemed by me on 11 Jan. 1994 and sections taken for histology.

## **2 Gross pathology**

The smelt had a small lump, described as like a bruise, on the side, but otherwise had no discernable abnormalities.

The bully had a mass of small white cysts (0.3-0.5 mm dia.) on the pectoral fins and on the abdomen, with no other abnormalities, though it was reported to be 'sick', with red lesions on the flanks prior to fixation.

The tail of one of the two banded kokopu was completely eroded away, into the caudal peduncle.

### 3      **Histology**

#### Smelt

The complete transverse section through the fish at the level of the lump revealed that it consisted of damaged muscle myomeres, mild fibrosis and localised haemorrhage. No abnormalities were observed in the kidney or intestine.

#### Bully

The complete transverse section was taken through the fish behind the pectoral fins and through the cysts on the abdomen surface. The cysts proved to be of parasitic origin, probably metacercaria. Encapsulated metacercarial cysts also occurred in the muscle. The liver showed severe congestion and confluent necrosis. Focal bacterial lesions were also visible.

#### Galaxiids

Complete transverse sections were taken behind the pectoral fins, also sections through the gills, and a longitudinal section through the caudal peduncle of the fish with the eroded tail fin. No abnormality was noted in the gills or intestine. However, the liver was congested with blood cells and large numbers of small (<1.0  $\mu\text{m}$ ) Gram-positive spherical bacteria were present in the blood vessels, phagocytosed by white cells, and in the parenchyma of the liver. The kidney showed necrosis and accumulations of the same spherical bacteria. The excellent preservation of the tissues indicated that the bacteria were present prior to death and were not due to post-mortem changes.

The L/S section through the eroded tail also revealed accumulations of spherical bacteria, and occasional rods.

### 4      **Diagnosis**

The lesion ('lump') seen in the smelt was non-fatal but of unknown aetiology. No bacteria were found in section. The fish appeared healthy.

The histopathology of the bully and the banded kokopu is consistent with a systemic infection by a small spherical bacteria similar to or identical with *Streptococcus*, (cell diameter 0.6-0.9  $\mu\text{m}$ ) a known bacterial pathogen of freshwater and cultured marine fishes (see references). The epidermal ulceration and hemorrhage (red patches) are also consistent with a streptococcal infection (Wolke 1975). The identity of the bacterium would need to be confirmed by

culturing and characterising the bacteria. The presence of rod shaped bacteria in one banded kokopu indicates that secondary infections are present. The observation by Mike Harvey of 'fungi' associated with lesions on dying fish would indicate secondary fungal infections are also occurring.

## 5 Further work

The cause of the mortality is the bacterial infection. If the Department of Conservation wish to try and identify the bacterium, it should be relatively straight forward to obtain a sample of blood under sterile conditions. The culture can be characterised by a local commercial medical microbiology laboratory, or we can arrange to have the work done in Wellington.

I would suggest that further work only be done if the problem persists or becomes more widespread.

## 6 Relevant literature

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