

# Disease testing of cultured paua (*Haliotis iris*) in New Zealand

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# Office International des Epizooties (OIE) notifiable diseases of molluscs

Nearly all protozoan parasites !

- **Bonamiosis** (*Bonamia* sp). (NZ Bluff oysters, Oysters, Europe)
- **Haplosporidiosis** (*Haplosporidium* sp.) (Oysters, USA)
- **Marteiliosis** (*Marteilia* sp.) (Oysters, Australia, Europe)
- **Mikrocytosis** (*Mikrocytos* sp.) (Oysters, Australia, USA, Europe)
- **Perkinsosis** (*Perkinsus* sp.) (Abalone (Australia), Clams (NZ, Asia), Oysters (USA))
- **Withering syndrome of abalone** (*Candidatus Xenohaliotis californiensis*) (abalone, California)

\* Orange font denotes diseases relevant to paua farming in New Zealand

## Why are these diseases important ?

They are significant to international trade because:

- They cause significant production losses where they occur.
- They are restricted in distribution (several countries or zones are free of disease).
- They are infectious and therefore likely to be spread via movements of live (or even dead) animal products

# Emergence of a significant disease of paua

**Disease:** Paua haplosporidiosis

**Parasite:** Undescribed haplosporidian

**Host:** Paua (*Halotis iris*)

**Location:** North Island - BoP  
(cultured juveniles in 1 farm)

**Dates:** Summers of 1999/2000 and  
2000/2001



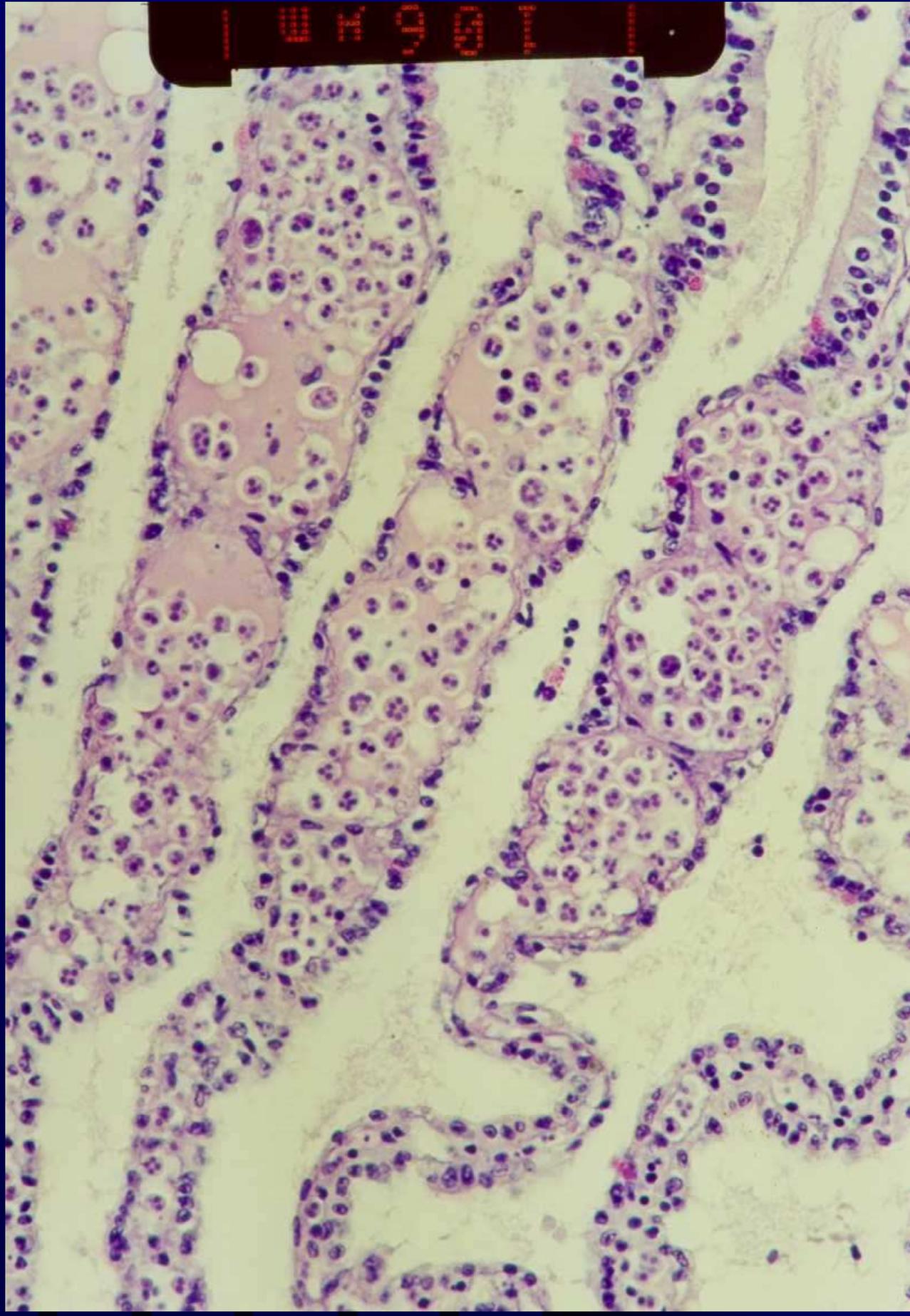
# **Paua haplosporidian - background**

- Associated with chronic mortalities of up to 90% of juvenile paua in **one** aquaculture facility only.
- Affected paua exhibited lethargy, lack of adhesion, runting, and an unusually high mortality rate.
- Histology showed massive systemic haplosporidian infection of all major organs, including muscle, connective tissue, nervous tissue, haemolymph.

# Haemolymph smear



# Haplosporidian - histopathology - gills



## Follow up work

### National histological survey to examine extent of infection

- Summer of 2001/2002 we surveyed all five major spat producing farms (n = 150 paua/farm ●).
- Also surveyed 3 grow out farms (60 paua/farm ●) located in areas where water temperatures exceeded 20°C in summer (including the one originally affected by the haplosporidian).



## Results

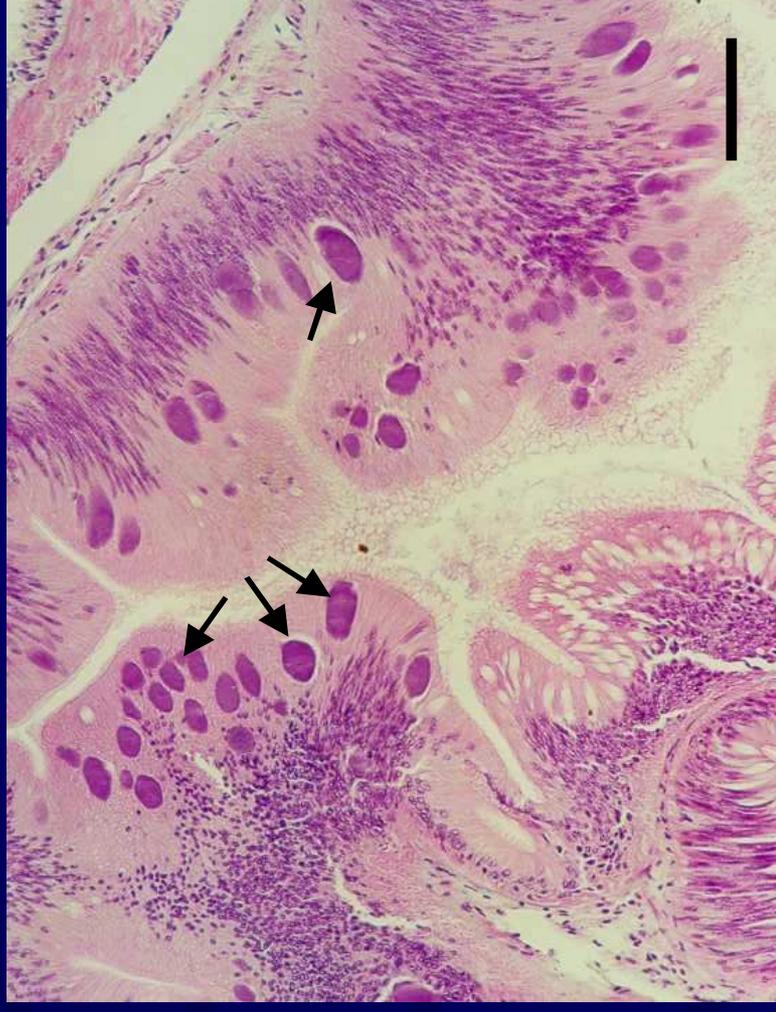
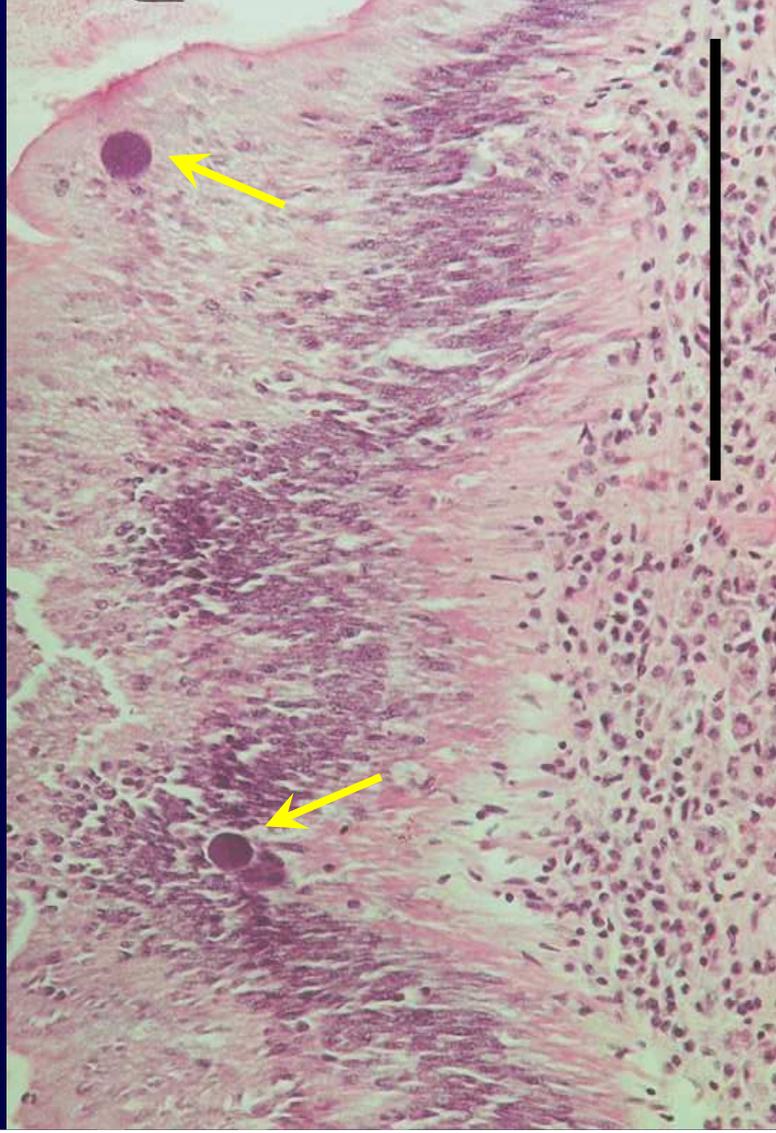
- No haplosporidians were detected in the 1094 juvenile paua sampled.
- Subsequent examination of a number of samples of stock taken in summer of 2003/04 prior to transfers (n = 240 paua) also failed to detect the haplosporidian, total = 1334 paua.
- Currently no knowledge of disease status of wild paua in BoP.
- A number of other pathological lesions and parasites have been detected, but only 2 were potentially of regulatory significance.

# Potentially significant: Rickettsial inclusions in gut

Prevalence: 3/8 farms (2/5 spat producers, 1/3 growout)

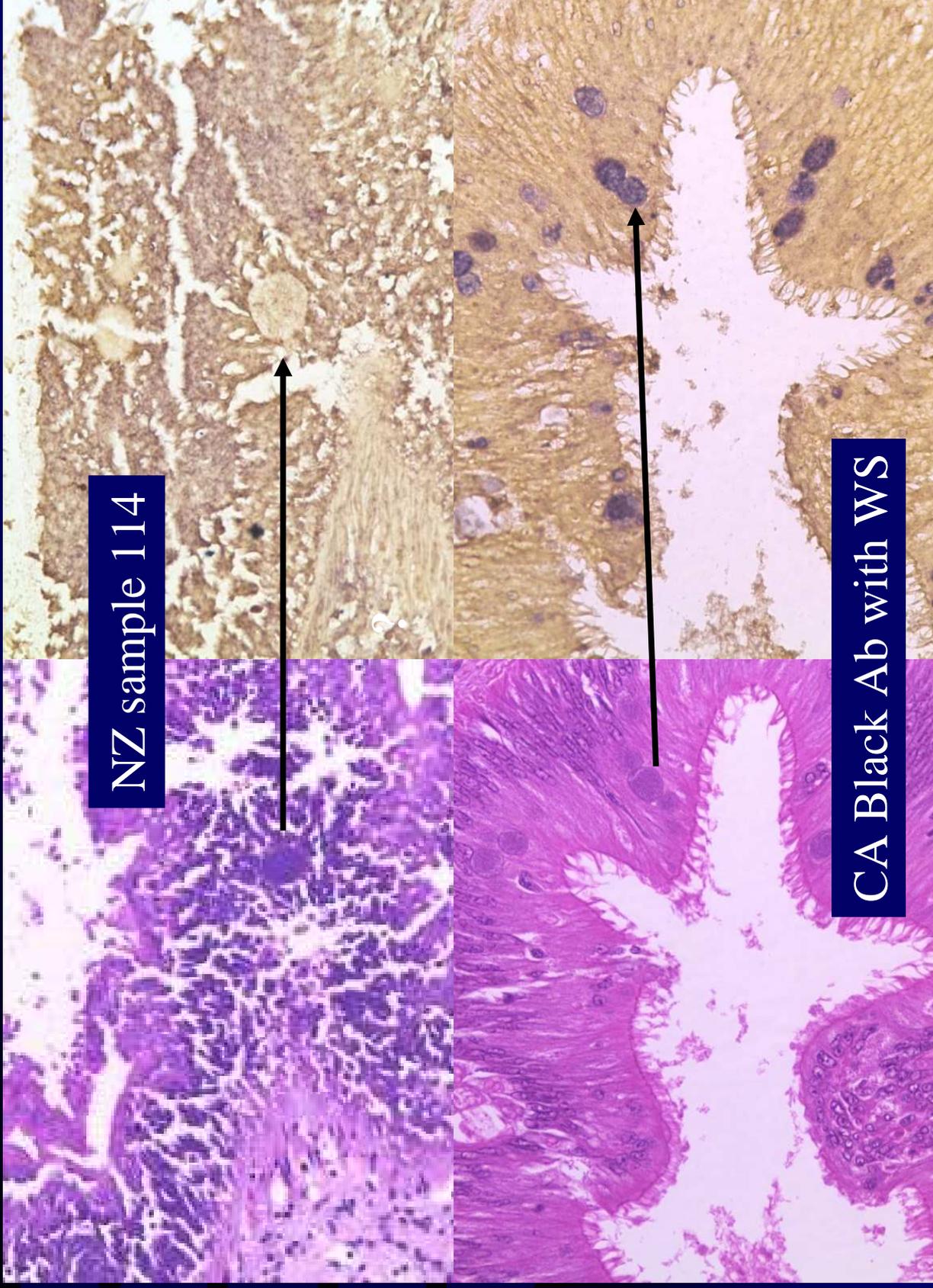
Within farm prevalences:   Spat producing farms: 0 - 2.6%  
  Grow out farms:       0 - 3.3 %

Notes: A rare, but significant finding due to the impact of withering syndrome (caused by a rickettsial organism) on abalone in California.



Rickettsial inclusions (arrows) in gut of paau (left), compared to withering syndrome agent (right)

# Rickettsial inclusions in gut epithelium. *In situ* hybridization with WS DNA probe



NZ sample 114

CA Black Ab with WS

Thankfully,  
the NZ  
ricketsial  
inclusions  
are not  
Withering  
syndrome!

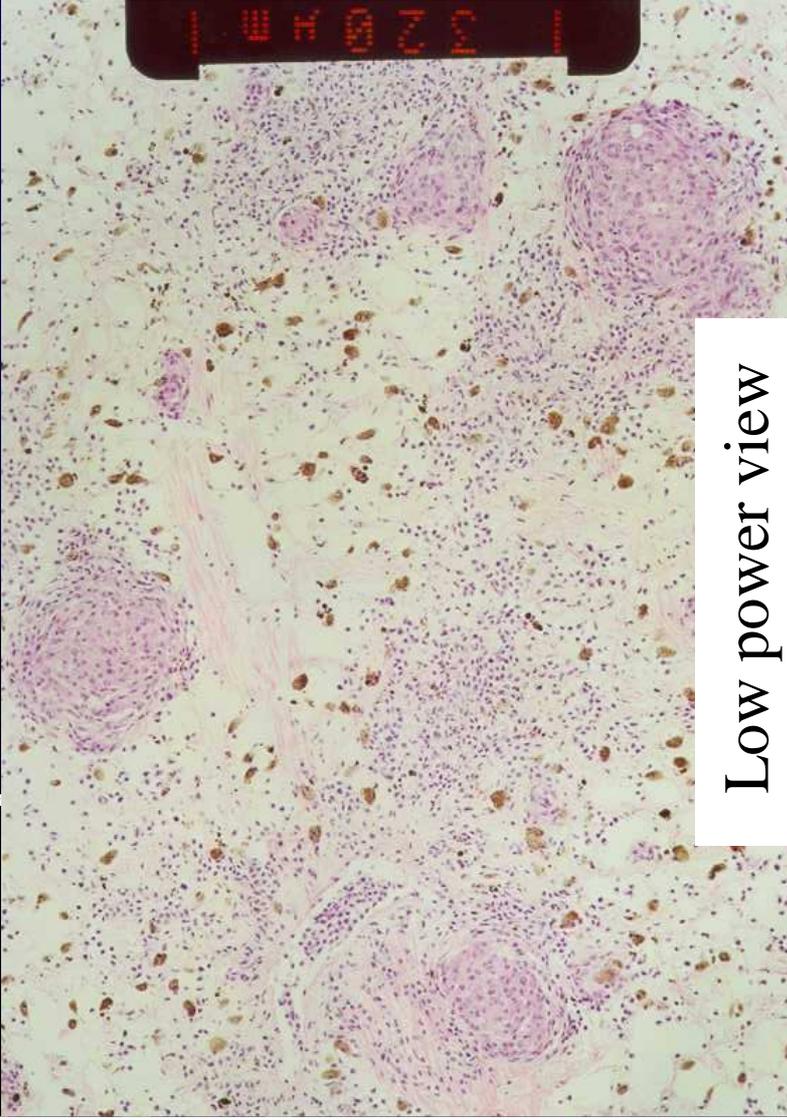
Photos courtesy of  
Carolyn Friedman,  
University of  
Washington

## Potentially significant: Granulomas in internal organs

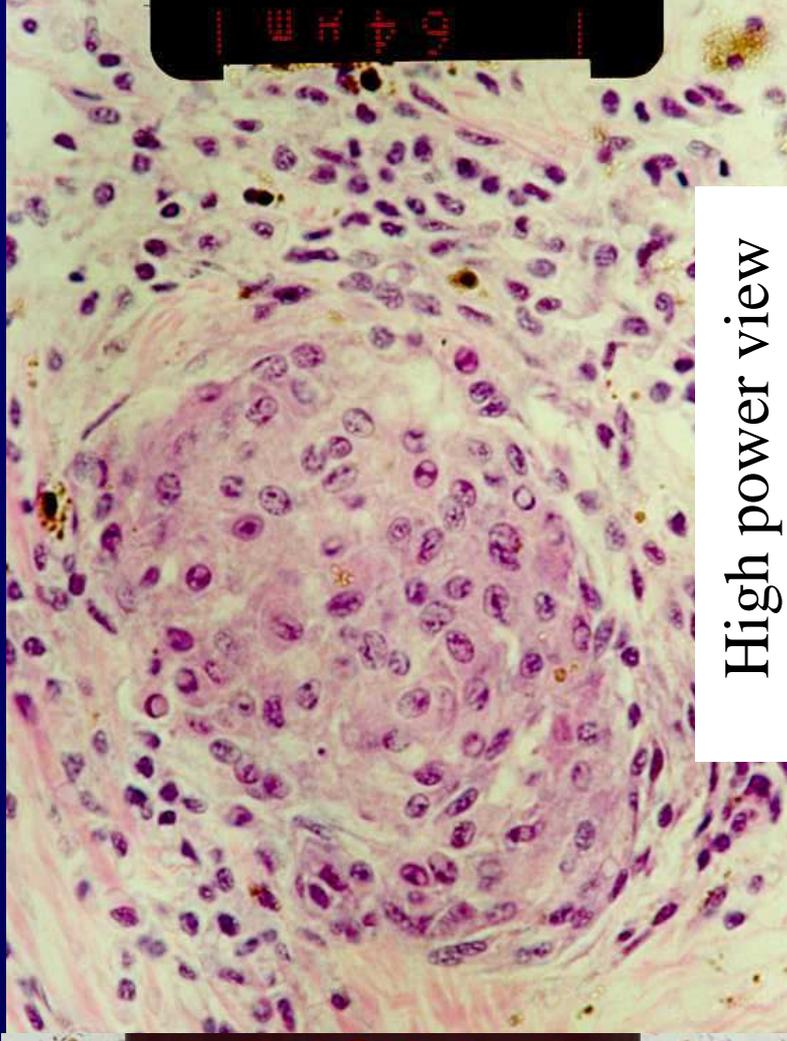
**Prevalence:** 4/8 farms (2/5 spat producers, 2/3 growout)

**Within farm prevalences:** Spat producing farms: 0 - 4.6%  
Grow out farms: 0 - 3.3 %

**Notes:** Another rare, but significant finding. Granulomata are one sign of amyotrophy disease in Japanese abalone, thought to be a viral disease. However, in NZ granulomas were not associated with mortalities, and hence these may be chronic inflammation due to other causes.



Low power view



High power view

# Why disease surveys of spat ?

- The haplosporidian occurs somewhere in northland/BoP, in wild paua and/or other molluscs.
- *Perkinsus olseni* (another OIE listed disease agent) occurs in cockles throughout northland, and is known to cause disease in abalone in Australia. Experiments are required to determine whether paua are susceptible to *P. olseni*.
- Therefore, any movements of paua from northland/ BoP should be examined for these disease agents (minimum sample 60 paua) to minimise chances of spreading disease to other areas.
- Movements of paua from other areas should be examined to monitor presence of these and other potentially significant disease agents (eg. Rickettsias and granulomas) to maintain proof of disease freedom to maintain access to overseas markets.

# Summary

- In the summers of 2000/2001 a haplosporidian parasite caused mortalities of up to 90 percent of juvenile paua in one culture facility. Haplosporidians are disease agents listed by the OIE as significant to international trade, hence this disease outbreak required followup work.
- In 2002 a nationwide survey of 1094 cultured paua failed to detect the haplosporidian (or *Perkinsus olseni*), but no work has been done on wild paua in the BoP or northland.
- A number of other pathological lesions and some parasites were detected during the survey and during subsequent examination of stock sampled prior to transfers.
- While most are of minimal regulatory significance, the need for disease testing and surveillance remains to minimise chances of spreading disease and to maintain access to overseas markets.