Diseases of molluscs

# Parasitic diseases—**Infection with *Marteilia sydneyi* (QX disease)**

## Signs of disease

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

### Disease signs at the farm level

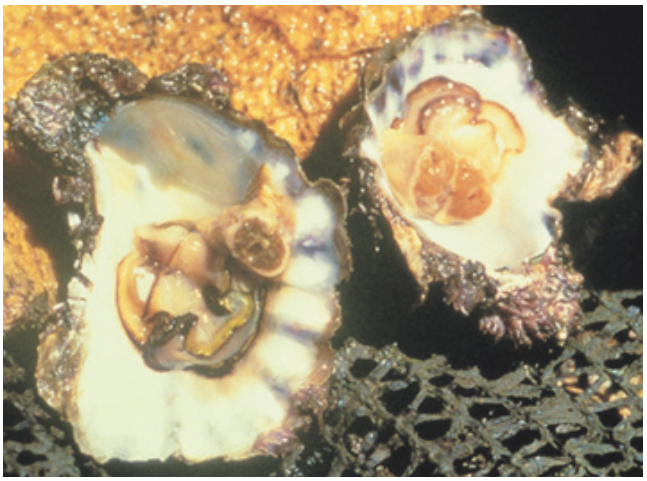
- high mortalities of up to 90%

### Clinical signs of disease in an infected animal

- body very shrunken
- generally poor condition
- oyster may die from starvation within 60 days of infection

### Gross signs of disease in an infected animal

- colourless and translucent tissues because of complete resorption of gonad
- digestive gland (usually a deep green colour) becomes pale yellow-brown



**Infected oyster on right shows yellowish watery body ('pale sick'). Oyster on left is normal**

Source: R Adlard

## Disease agent

QX disease is caused by the haplosporidium protozoan *Marteilia sydneyi* of the Paramyxea phylum. In Europe, a similar disease is caused by *Marteilia refringens* in different species of shellfish.

## Host range

Molluscs known to be susceptible to the disease:

Sydney rock oyster (*Saccostrea glomerata*)

## Presence in Asia–Pacific

Infection with *M. sydneyi* has been officially reported from Australia.

Australian Government
Department of Agriculture, Fisheries and Forestry

Sourced from AGDAFF–NACA (2007) *Aquatic Animal Diseases Significant to Asia-Pacific: Identification Field Guide.* Australian Government Department of Agriculture, Fisheries and Forestry. Canberra.

## Epidemiology

- Despite the presence of the pathogen, disease has never been observed in some eastern Australian estuaries.
- Oysters maybe susceptible to infection for a period of only two weeks.
- Warm temperatures favour parasite development, leading to greatest mortality at the end of summer.
- The disease is associated with low salinity and high water temperature.
- Infection is horizontal; the pathogen passes from the environment into the epithelium of palps and gills where it proliferates without forming spores.
- The cultured Pacific oyster is relatively resistant to QX disease.
- A selective breeding program for QX resistance in Sydney rock oysters shows some promise, but its level of success will not be confirmed for some years.

For a detailed account of known lifecycle of the parasite, see lifecycle of *Marteilia sydneyi*.

## Differential diagnosis

The differential diagnostic table and the list of similar diseases appearing at the bottom of each disease page refer only to the diseases covered by this field guide. Gross signs observed might well be representative of a wider range of diseases not included here. Therefore, these diagnostic aids should not be read as a guide to a definitive diagnosis, but rather as a tool to help identify the listed diseases that most closely account for the gross signs.

The clinical signs of infection with *Marteilia sydneyi* are practically identical to those of infection with other haplosporidia (ie high mortalities associated with colourless and translucent tissues, poor condition, pale digestive gland and a shrunken body). Therefore, any presumptive diagnosis requires histological laboratory examination.

## Sample collection

Because of uncertainty in differentiating diseases using only gross signs, and because some aquatic animal disease agents might pose a risk to humans, you should not try to collect samples unless you have been trained. Instead, you should phone your national hotline number and report your observations. If samples have to be collected, the agency taking the call will advise you on what you need to do. Local or district fisheries/veterinary authorities could advise you on sampling.

## Emergency disease hotline

For your national emergency disease hotline number, see Whom to contact if you suspect a disease.



Sourced from AGDAFF–NACA (2007) *Aquatic Animal Diseases Significant to Asia-Pacific: Identification Field Guide.* Australian Government Department of Agriculture, Fisheries and Forestry. Canberra.

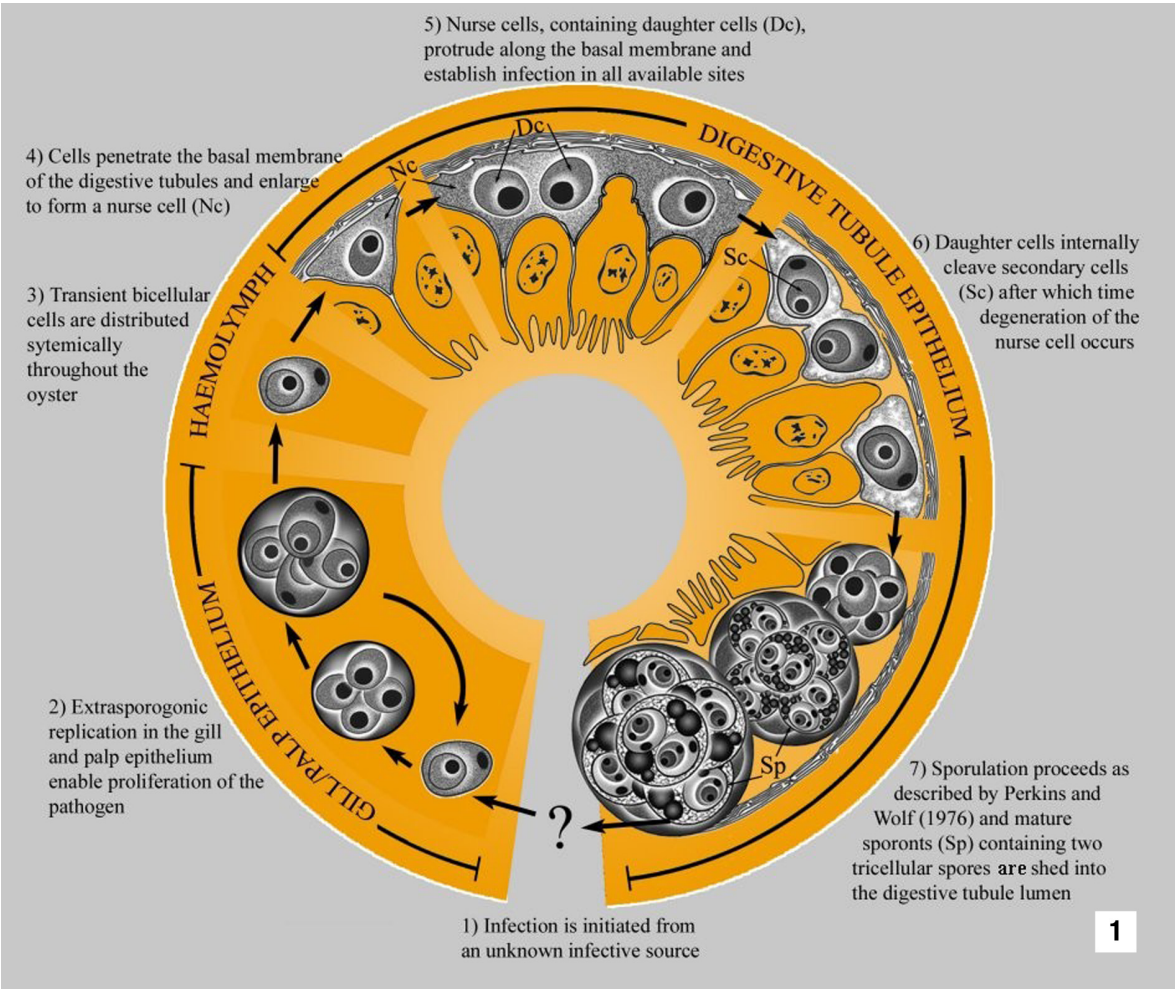
## Further reading

http://www.oie.int/aac/eng/cards/en_diseasecard.htm

http://www.pac.dfo-mpo.gc.ca/sci/shelldis/pages/marsydoy_e.htm

These hyperlinks were correct and functioning at the time of publication.

## Histological images



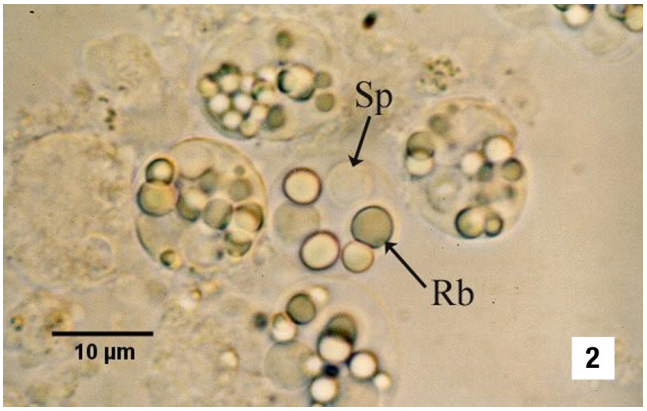

**Hypothetical development of *Marteilia sydneyi* in Sydney rock oyster (*Saccostrea glomerata*)**

Source: S Kleeman



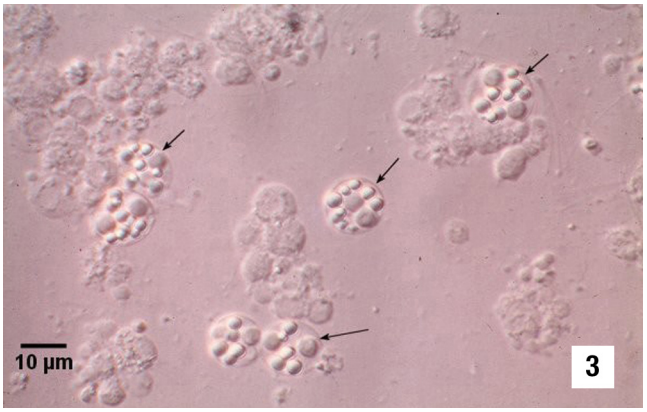
Sourced from AGDAFF–NACA (2007) *Aquatic Animal Diseases Significant to Asia-Pacific: Identification Field Guide.* Australian Government Department of Agriculture, Fisheries and Forestry. Canberra.

## Histological images



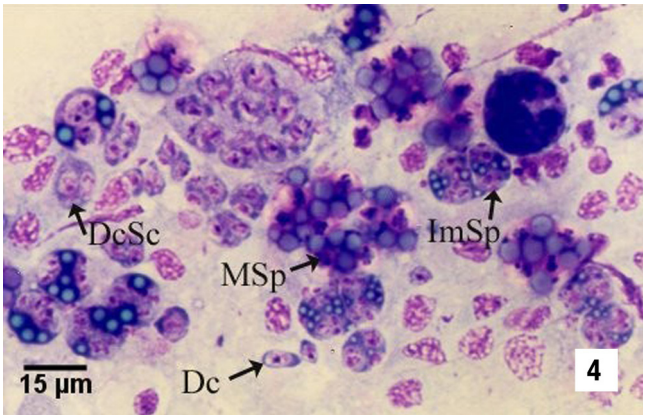

**Sporonts of *M. sydneyi* containing refractile bodies (Rb) and spores (Sp)**

Source: S Kleeman



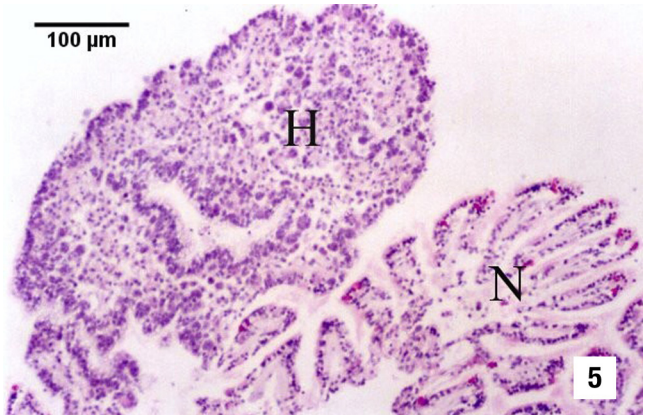

**Sporonts of *M. sydneyi* (arrows) viewed under interference contrast optics**

Source: S Kleeman




**Hemacolor (Merck) stained tissue imprint of the digestive gland of *Saccostrea glomerata* infected with *M. sydneyi*, showing various lifecycle stages including daughter cells (Dc), daughter cells containing secondary cells (DcSc), immature sporonts (ImSp), and mature sporonts (MSp). Note that the various stages observed are often ruptured from their enclosing cells (ie the nurse cells or sporangiosori)**

Source: S Kleeman




**Oyster reaction consisting of epithelial and connective tissue hyperplasia (H) and fusion of filaments due to the presence of numerous extrasporogonic stages in the epithelium of the gills, in contrast to relatively normal-looking gill tissue (N)**

Source: S Kleeman



Sourced from AGDAFF–NACA (2007) *Aquatic Animal Diseases Significant to Asia-Pacific: Identification Field Guide.* Australian Government Department of Agriculture, Fisheries and Forestry. Canberra.

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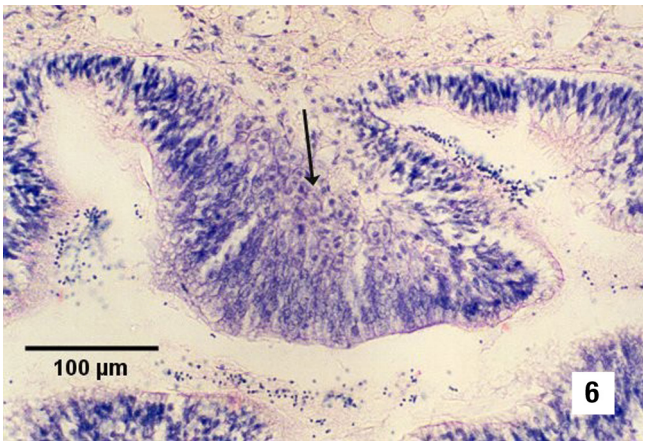
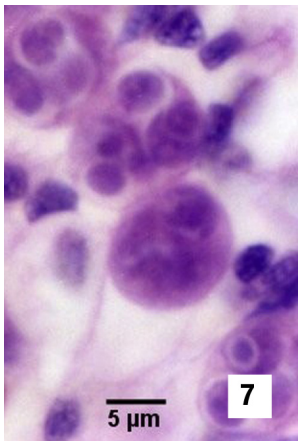
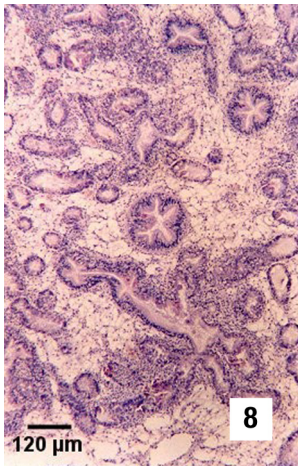


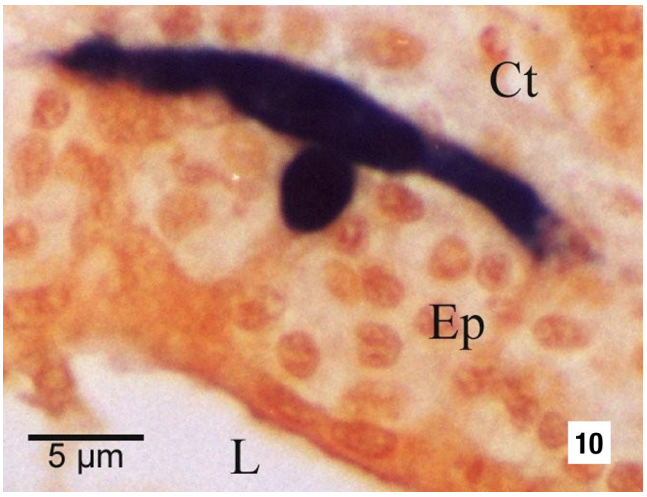

**Replicating stages in the palp epithelium. Note the hypertrophy of the epithelial cells in the presence of proliferating parasites (arrow) in infected areas**
Source: S Kleeman



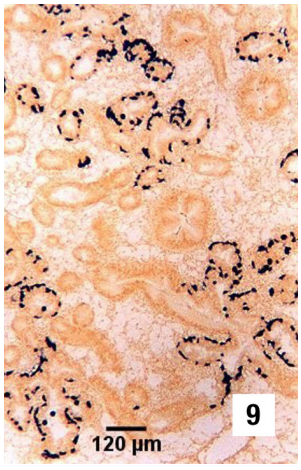

**Higher magnification of extrasporogonic stages in the epithelium of the gills (see phase 2 in Fig 1)**
Source: S Kleeman




**Section showing haemocytic infiltration of the connective tissue surrounding infected digestive gland tubules. Haematoxylin and eosin stain**
Source: S Kleeman




**Nurse cell (stained black by in situ hybridisation) demonstrating the extent of the pseudopodial extensions along the basal membrane of the digestive tubule epithelium (Ep). This feature is not evident with haematoxylin and eosin staining. Other labelled features are the connective tissue (Ct) that surrounds the tubule and the lumen (L) of the tubule**
Source: S Kleeman




**Tissue section showing the location of presporulating nurse cell stages (stained black) in digestive gland tubule epithelia**
Source: S Kleeman

Australian Government
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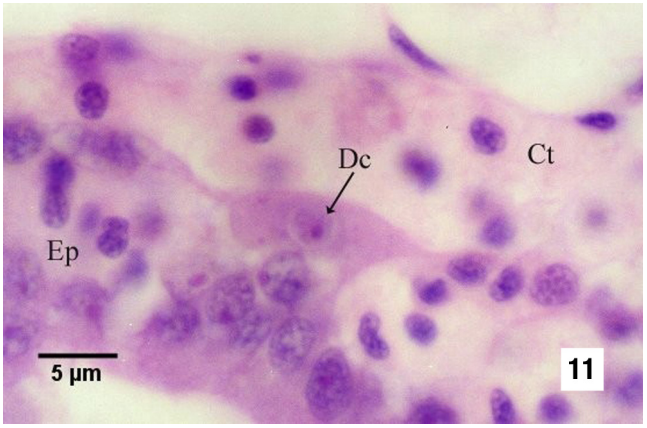
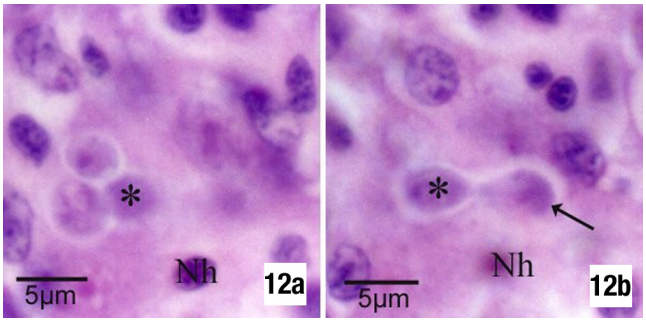
Sourced from AGDAFF–NACA (2007) *Aquatic Animal Diseases Significant to Asia-Pacific: Identification Field Guide.* Australian Government Department of Agriculture, Fisheries and Forestry. Canberra.

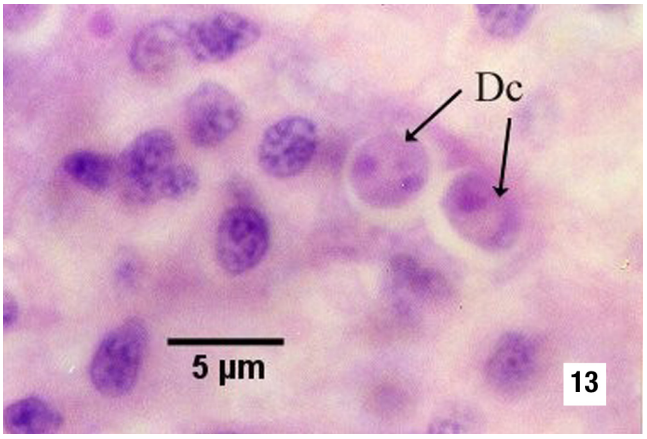
## Histological images



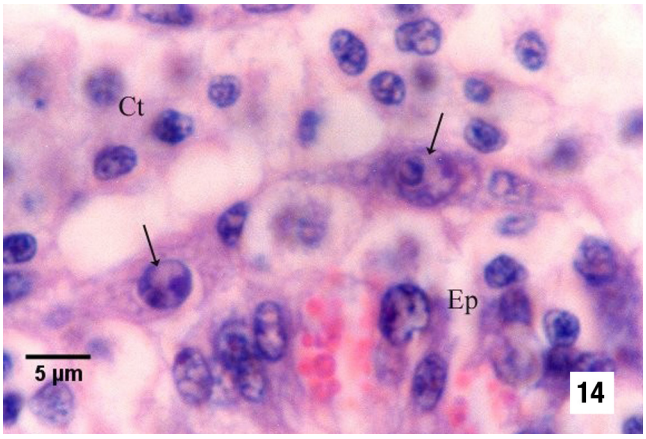

**Nurse cell containing one daughter cell (Dc) and residing along the basal membrane of the tubule between the connective tissue (Ct) surrounding the tubules and the tubule epithelium (Ep)**
Source: S Kleeman




**The same tissue section but at different focal planes demonstrates the budding of a daughter cell (arrow in Fig 12b) within the nurse cell. An asterisk marks the same daughter cell and Nh denotes the same host cell nucleus in each figure. There are two additional daughter cells within the nurse cell (Fig 12a)**
Source: S Kleeman




**Nurse cell containing two daughter cells (Dc, see phase 5 in Fig 1)**
Source: S Kleeman




**Nurse cells containing bicellular daughter cells (arrows) along the basal membrane between the tubule epithelium (Ep) and the connective tissue that contains many infiltrating haemocytes (see phase 6 in Fig 1)**
Source: S Kleeman



Sourced from AGDAFF–NACA (2007) *Aquatic Animal Diseases Significant to Asia-Pacific: Identification Field Guide.* Australian Government Department of Agriculture, Fisheries and Forestry. Canberra.

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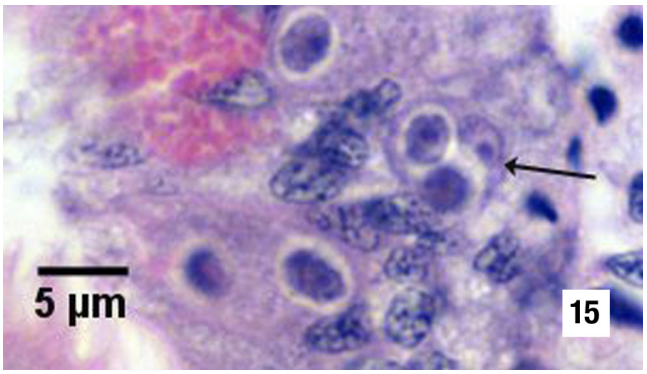
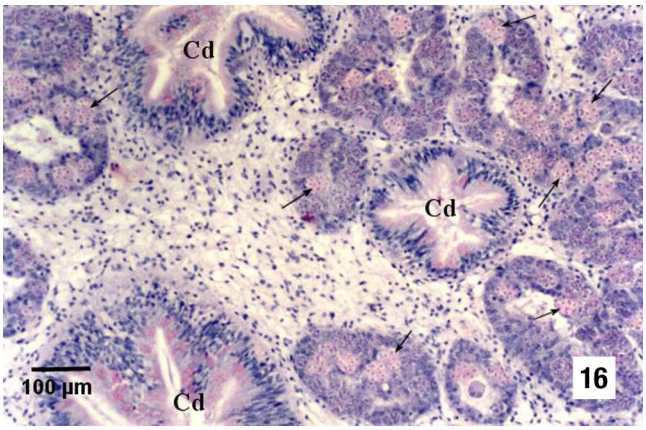
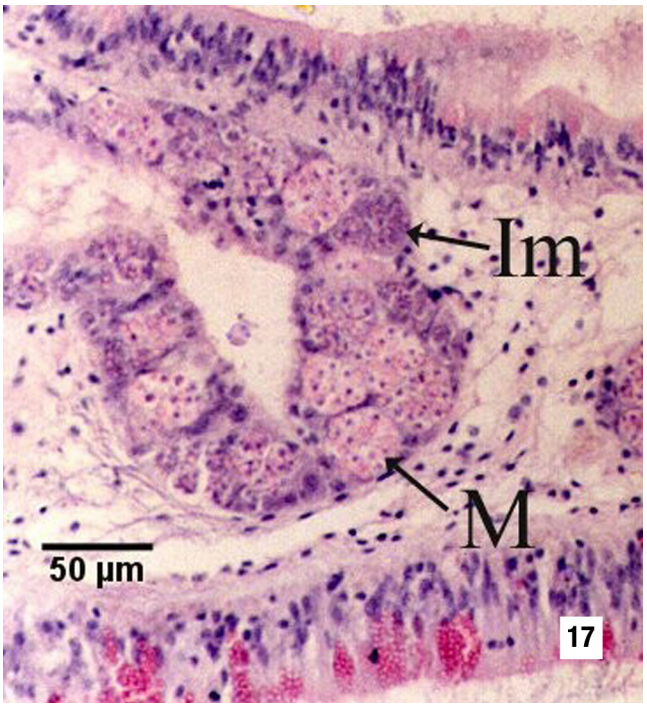



**Primary cell (arrow) containing two secondary cells (sporont primordia) just before sporulation (see initiation of phase 7 in Fig 1)**
Source: S Kleeman




**Numerous sporulating stages (arrows) in the digestive gland tubules. Note that sporulation does not occur in the ciliated ducts (Cd) of the digestive gland**
Source: S Kleeman




**Immature sporonts (Im) and mature sporonts (M) within sporangiosori in a digestive gland tubule. Note that the epithelium of the tubule is almost completely replaced by *M. sydneyi***
Source: S Kleeman



Sourced from AGDAFF–NACA (2007) *Aquatic Animal Diseases Significant to Asia-Pacific: Identification Field Guide.* Australian Government Department of Agriculture, Fisheries and Forestry. Canberra.