



# Infection with *Enterocytozoon hepatopenaei* (EHP)

Also known as hepatopancreatic microsporidiosis

From *Aquatic animal diseases significant to Australia: identification field guide*, 5th edition

## Signs of disease

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

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

- unusually retarded growth in the absence of other gross signs of disease.

There are no specifically distinctive gross signs of infection by EHP.

Microscopic pathological signs are:

- the presence of basophilic, cytoplasmic inclusions (microsporidian sporocysts) containing clusters of elliptical to somewhat ovoid spores of  $1.1 \pm 0.21\mu\text{m}$  by  $0.6\text{--}0.7 \pm 0.1\mu\text{m}$  in haematoxylin and eosin stained tissue sections of hepatopancreas tubule epithelial cells
- free spores released from lysed cells occasionally observable in the tubule lumens.

## Disease agent

Hepatopancreatic microsporidiosis is caused by infection with *Enterocytozoon hepatopenaei* (EHP), a microsporidian parasite classified within the family *Enterocytozoonidae*. It was first discovered in *Penaeus monodon* in Thailand in 2004.

## Host range

Species known to be susceptible to *E. hepatopenaei* are listed in Table 1 and Table 2. A similar microsporidian has been reported to infect kuruma prawns in Queensland, but the taxonomic affinities of that parasite are unclear. *E. hepatopenaei* has also been detected in frozen *Artemia* biomass and live polychaetes.

**Table 1 Species known to be susceptible to EHP**

Common name	Scientific name
Black tiger prawn <sup>a</sup>	<i>Penaeus monodon</i>
Pacific white shrimp <sup>a</sup>	<i>Penaeus (Litopenaeus) vannamei</i>
Pacific blue shrimp	<i>Penaeus (Litopenaeus) stylirostris</i>

<sup>a</sup> Naturally susceptible.

**Table 2 Non-crustacean carriers**

Common name	Scientific name
Brine shrimp <sup>a</sup>	<i>Artemia salina</i>
Polychaetes <sup>a</sup>	Various genera and species

<sup>a</sup> Naturally susceptible.

## Presence in Australia

Exotic disease—not recorded in Australia.

EHP is considered exotic to Australia. However, other microsporidians have been reported to infect kuruma prawns (*Penaeus (Marsupenaeus) japonicus*) in Queensland.

### Map 1 Presence of *Enterocytozoon hepatopenaei*, by jurisdiction



## Epidemiology

- EHP is known to infect only the tubule epithelial cells of the hepatopancreas of prawns.
- EHP should therefore not be confused with other microsporidians with different tissue tropism, such as *Agmasoma penaei* that infects muscle tissue and connective tissue leading to the gross signs of 'cotton shrimp disease' or 'white back' disease.
- EHP can be transmitted horizontally among prawns cohabiting in rearing ponds.
- Heavily infected prawns may display white faeces that are packed with microsporidian spores.
- Infection with EHP may be a significant risk factor in the development of acute hepatopancreatic necrosis disease (AHPND).

## Differential diagnosis

The list of [similar diseases](#) in the next section refers only to the diseases covered by this field guide. Gross pathological signs may also be representative of diseases not included in this guide. Do not rely on gross signs to provide a definitive diagnosis. Use them as a tool to help identify the listed diseases that most closely account for the observed signs.

## Similar diseases

Acute hepatopancreatic necrosis disease (AHPND) and infection with *Hepatobacter penaei* (NHP).

## Sample collection

Only trained personnel should collect samples. Using only gross pathological signs to differentiate between diseases is not reliable, and some aquatic animal disease agents pose a risk to humans. If you are not appropriately trained, phone your state or territory hotline number and report your observations. If you have to collect samples, the agency taking your call will advise you on the appropriate course of action. Local or district fisheries or veterinary authorities may also advise on sampling.

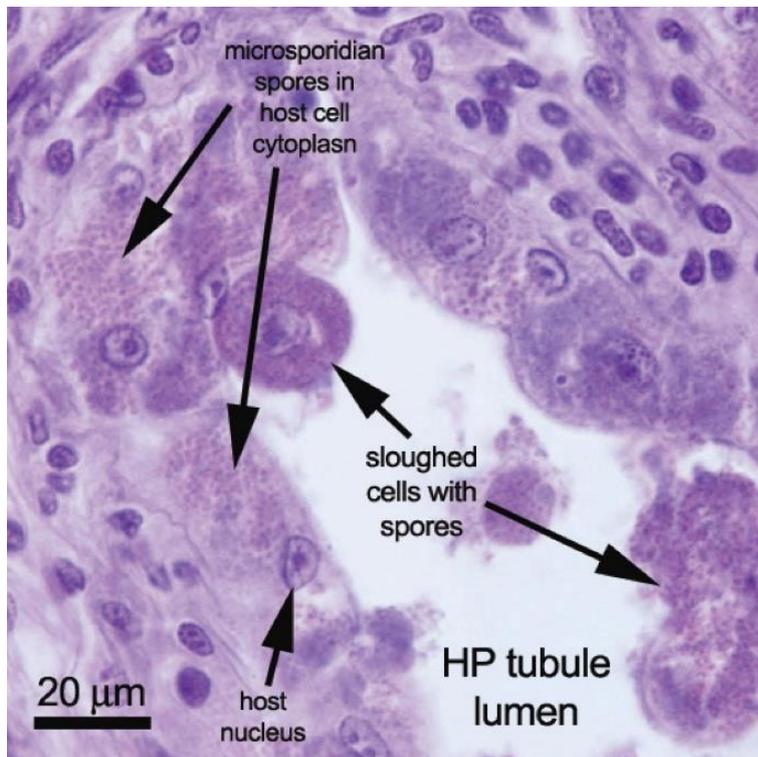
## Emergency disease hotline

See something you think is this disease? Report it. Even if you're not sure.

Call the Emergency Animal Disease Watch Hotline on **1800 675 888**. They will refer you to the right state or territory agency.

## Microscope images

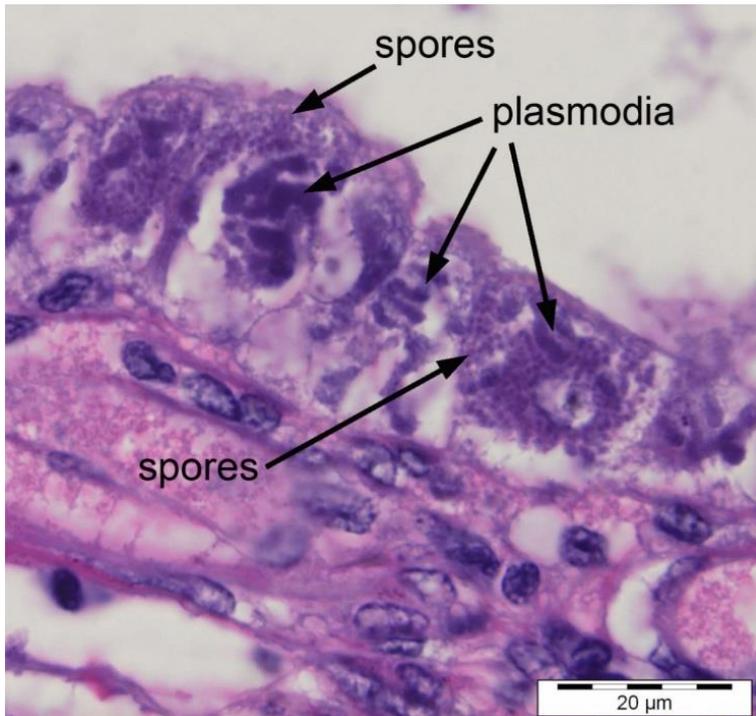
**Figure 1 Histopathology of hepatopancreas of Pacific white shrimp (*Penaeus (Litopenaeus) vannamei*) infected with *Enterocytozoon hepatopenaei***



Note: Sloughed tubule epithelial cells containing many microsporidian spores in the cytoplasm. Scale bar = 20µm.

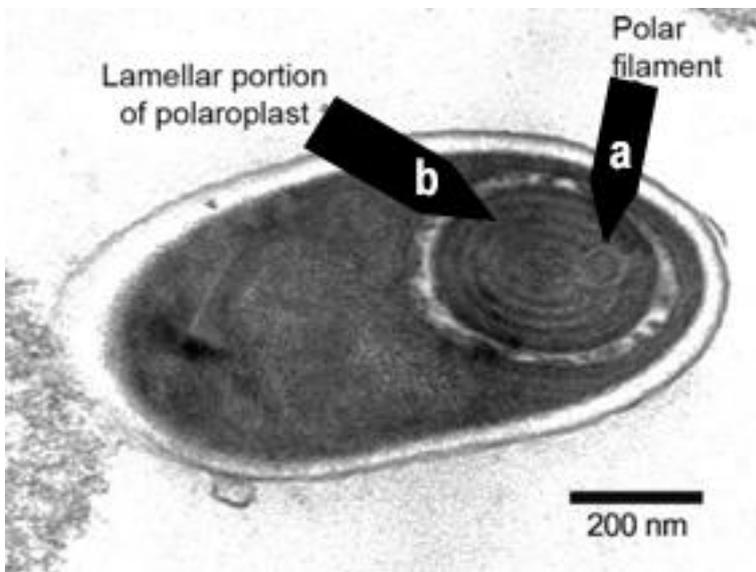
Source: T Flegel

**Figure 2 Histopathology of hepatopancreas of Pacific white shrimp (*Penaeus (Litopenaeus) vannamei*) infected with *Enterocytozoon hepatopenaei***



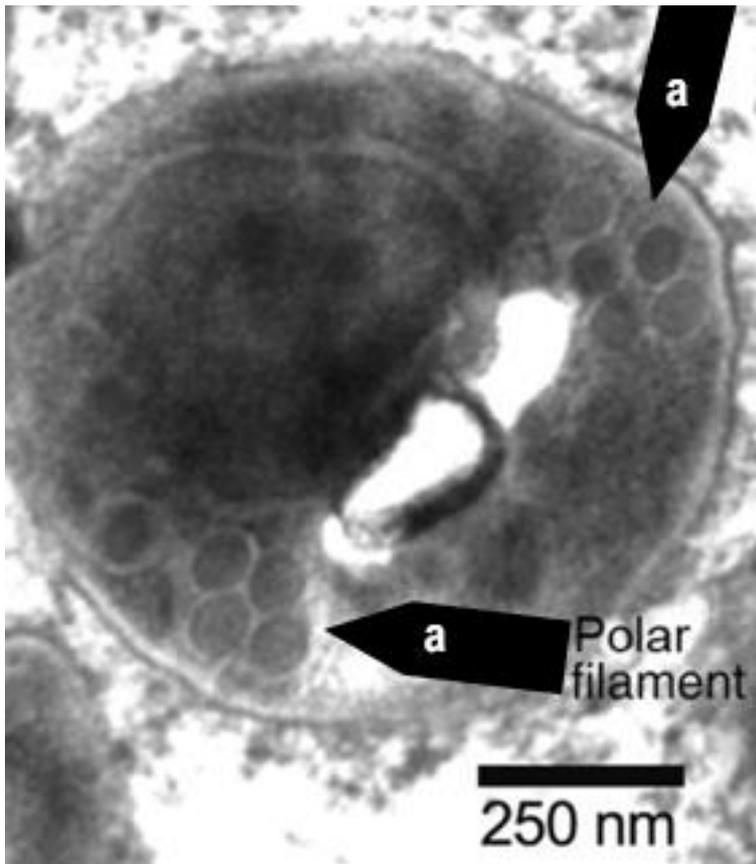
Note: Numerous spores inside sporocysts (plasmodia). Scale bar = 20μm.  
Source: T Flegel

**Figure 3 Electron micrograph of spore of *Enterocytozoon hepatopenaei***



Note: Polar filament (a) with 5 or 6 coils, in lamellar portion of polaroplast (b). Scale bar = 200nm  
Source: T Flegel

**Figure 4** Electron micrograph cross-section of polar filament in *Enterocytozoon hepatopenaei* spore



Note: Cross-sections of coils (a) of the polar filament. Scale bar = 250nm

Source: T Flegel

### Further reading

Network of Aquaculture Centres in Asia-Pacific [Hepatopancreatic microsporidiosis caused by infection with 'Enterocytozoon hepatopenaei': disease card](#)

This hyperlink was correct at the time of publication.

### Contact details

Emergency Animal Disease Watch Hotline 1800 675 888

Email [AAH@agriculture.gov.au](mailto:AAH@agriculture.gov.au)

Website [agriculture.gov.au/pests-diseases-weeds/aquatic](http://agriculture.gov.au/pests-diseases-weeds/aquatic)

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