



## **NAAHTWG Slide of the Quarter (January – March 2006) - Australian flat oyster (*Ostrea angasi*) with *Bonamia* parasites**

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### **Case 1 - 03/0658- 45: Cross section of an Australian flat oyster, *Ostrea angasi*.**

#### **Case History**

The oyster from natural beds at St Helens, was collected during April for routine monitoring. This was part of a series of examinations, at approximately two-year intervals, of a population diagnosed with *Bonamia* infection approximately one decade previously.

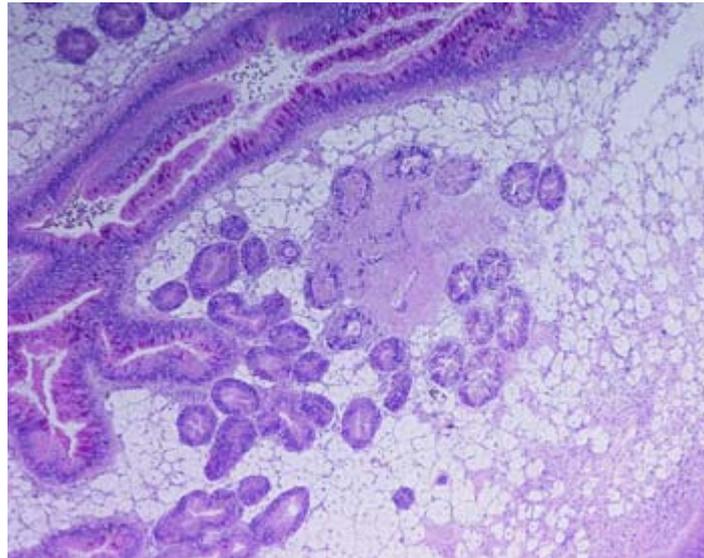
Over this period, the beds appeared to remain in good overall health, although some evidence of mortality was seen on several occasions and the extent of the beds was not fully assessed. This oyster was typical of three of 72 oysters examined, the others showing minimal pathology.

#### **Histopathology**

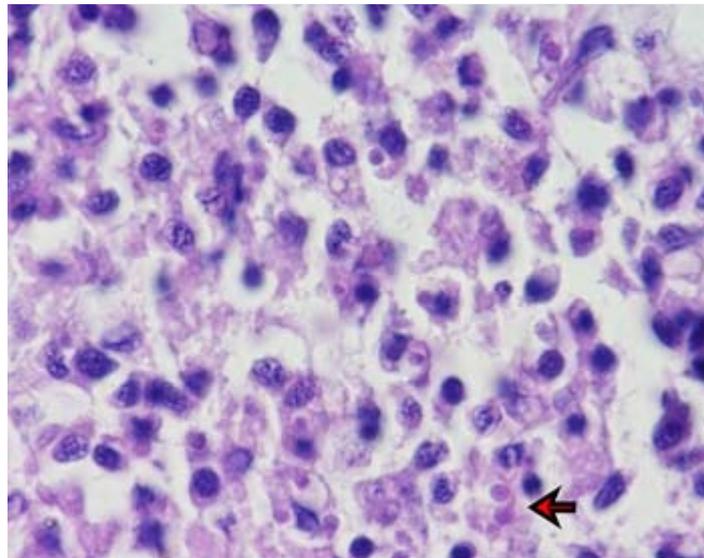
The overall condition is good, with plump Liedig cells indicating abundant glycogen stores, and a high columnar epithelium of most digestive gland tubules, indicating adequate recent feeding. Extensive multi-focal epithelial and sub-epithelial haemocyte infiltrates are present on the palps, main gut (especially stomach) and occasionally digestive gland tubules.

Both granulocytes and more hyaline cells are present in the subepithelial reactions, though granulocytes are rarely discernible within the epithelia. In general, no pathogens can be seen in association with these lesions. Epithelial erosion is present in the stomach lesion (plus artefactual loss in some sections). Haemocytes and sloughed epithelial cells are present in the lumen of tubule with focal lesions, as well as in the surrounding interstitium, with necrotic tissue around some affected tubules.

Sloughed cells may also be seen over some superficial lesions. Other tubules show a light diffuse haemocyte infiltrate. Small haemocyte aggregates are present within many vessels, and there is a general increase in haemocyte numbers throughout the vasculature.



**Figure 1: Low power photomicrograph of multifocal infiltrations of haemocytes within digestive gland epithelium and within connective tissue. Sloughed cells can be seen in the lumen of affected tubules in the centre of the photo. x4**



**Figure 2: The intracellular parasite Bonamia can be seen within haemocytes (arrow). X400**

### **Morphological diagnosis**

Multifocal epithelial inflammation.



## **Aetiological diagnosis**

### *Bonamiasis*

Infiltrates near the main gut erosion contain occasional *Bonamia* parasites, seen as small (two to three micron), round nucleated cells within haemocytes. *Bonamia* parasites in other locations are rare, though in some sections occasional parasites are visible in palp epithelial distended by haemolymph infiltrates. They are very rare in other locations, including sub-epithelial and intravascular aggregates.

Affected tubules occasionally show sloughed cells within the lumen (epithelial cells plus haemocytes), with occasional pale cells not inconsistent with dying *Bonamia* parasites.

### **Comment**

Monitoring of this population over approximately a decade showed *Bonamia* to be most detectable in the autumn, with the prevalence in this area in other years of 25 – 57 per cent. Most lesions were focal and epithelial associated, though systemic dispersal with the parasites in circulating haemocytes was sometimes detected when the overall prevalence was high.

This slide demonstrates lesions typical of mild bonamiasis in Australia, and the difficulty of confirming the parasite when infection levels are low. Systemic infection with high numbers of parasites in circulating haemocytes is rare, except where there is extensive epithelial lesions, a pattern of pathology that differs from that described for *Bonamia ostrea* during the European epizootics, and *Bonamia exitiosa* in New Zealand, which was also associated with devastating losses.

In Australia the parasite is often difficult to find, and the reaction disproportionate to the number of detectable parasites. In populations in balance with the parasite, the lesions disappear over winter, though small numbers of parasites are thought to persist. They are difficult to detect in the small epithelial lesions of early summer or in late autumn, when the host succeeds in killing most parasites, though the lesions may then still be visible.



**Case 2 - 99/0944 (2 slides). Multiple cross section of the Australian flat oyster, *Ostrea angasi*.**

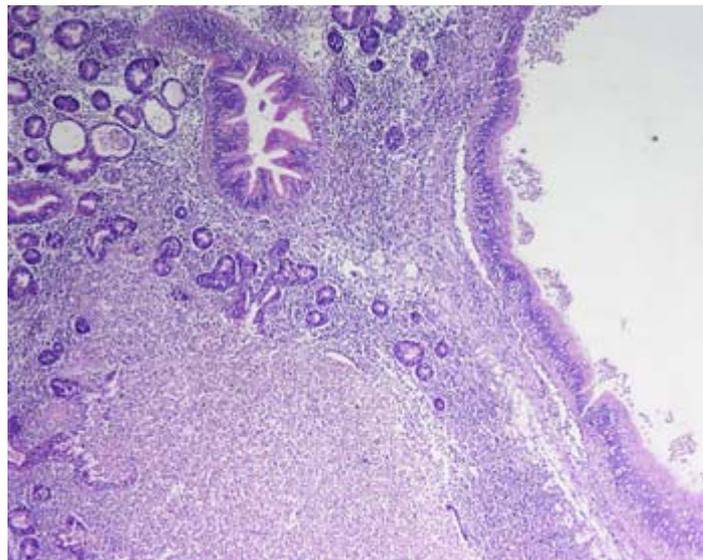
**Case History**

Flat oysters from a natural bed (different from 03/0658), collected during routine monitoring.

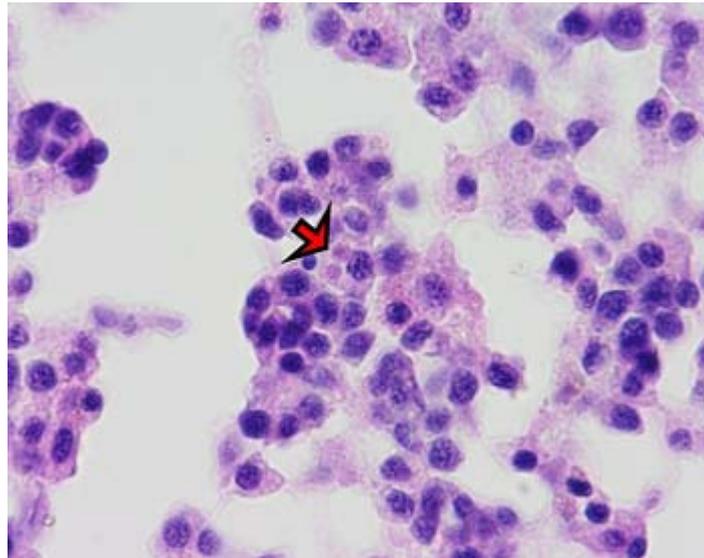
**Histopathology**

**Slide 5-7:** One of the smaller oysters (*No 5*) shows an extensive diffuse to multifocal reaction. The other two oysters are unaffected.

**Slide 8-10:** The smallest of these three oysters (*No 10*) shows a similar systemic reaction, with a large abscess-like focal lesion containing remnants of digestive gland epithelium, necrotic material and large number of haemocytes. Haemocytes are also present within the epithelial remnants, and in other digestive system epithelia. The largest oyster (*No 8*) shows multiple foci of interstitial reaction, with minimal digestive system involvement. The third oyster is unaffected.



**Figure 3: Low power photomicrograph of an oyster infected with *Bonamia*. There are large numbers of haemocytes throughout interstitial connective tissue of the digestive gland. There is an abscess-like lesion in the ,lower left of the photo. Digestive tubules contain sloughed cells within the lumen. Some digestive gland tubules have been destroyed and remnants of digestive gland tubule epithelium can be seen. x4**



**Figure 4: The intracellular parasite *Bonamia* can be seen within haemocytes (as indicated by the arrow). X400**

### **Morphological diagnosis**

Variable systemic and focal or semifocal haemocytosis, with some involvement of digestive epithelia.

### **Aetiological diagnosis**

No pathogens are obvious in most areas of oyster No 5. *Bonamia* parasites (two to four micron nucleated cells) may be detected in some areas, for examples within and near the affected epithelium at the base of the gills.

*Bonamia* parasites can more readily be seen within haemocytes of the diffuse interstitial reactions of No 10, and in aggregates within vessels, but they are not common. They are more easily seen in within heavily infiltrated epithelial foci, but are rare in the larger lesion, except at some margins of the lesion.

No *Bonamia* were detected in the focal lesions of No 8 (the larger oyster) during initial examination, though they were regarded as indicative of likely *Bonamia* infection. (Very occasional *Bonamia* parasites are present in at least some recut sections, confirming the presumptive diagnosis. Good hunting!)

### **Comment**

These slides, together with Case 1 (03/0658), show the wide range of lesion pattern that may be shown with *Bonamia* within Australia. Both of these populations appear to have remained stable despite endemic *Bonamia* infection.



Monitoring over a number of years showed systemic reaction to be considerably more common in this population than St Helens. Despite the widespread haemocytosis, *Bonamia* parasites were still most readily detected in affected epithelia of gut, gills and other surfaces, and rarely common in circulating haemocytes. Nevertheless they were more common within the circulation at this site than at St Helens.

At neither site was mortality or systemic bonamiasis as florid as in the dying stressed oysters from the original Victorian outbreaks, where investigation was prompted by heavy mortality.

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