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Diseases of cultured prawns in Australia

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Abstract — ***Plebejus Baculovirus*** *and other MBV-related viruses have been found in* ***Penaeus plebejus, P. monodon*** *and* ***P. merguiensis****. They appear highly pathogenic in certain situations currently undefined. We have found Hepatopancreatic Parvo-like Virus (<hpv) in wild* ***P. esculentus*** *and* ***P. merguiensis*** *but not yet in cultured prawns. The amphophilic intranuclear inclusion bodies we find in* **P. esculentus** do not appear to have a viral cause.

Black Gill disease, caused by a build-up of bacteria and ciliates on the gills, occured in ***Metapeneus macleayi*** *in ponds in New South Wales and was associated with high organic load and poor water exchange. Heavy infections with an apostome ciliate similar to* ***Synophrya hypertrophica*** *were found in the same area on* ***M. macleayi*** *and* ***P. plebejus.***

Fungal infections not yet identified to genus are found on and under the carapace of larval and adult prawns. Conditions of undetermined cause that we have seen include swollen uropods, soft shell, craped abdomen and red prawn. High mortalities occur in the early larval stages in hatcheries. These have been associated with bacterial necrosis and bacterial Haemolytic enteritis.

INTRODUCTION

Studies on the diseases of prawns in Australian aquaculture began in 1984 with the school *Penaeus macleayi*, which was grown at the first Australian prawn farms in Yamba, northern New South Wales. A commercial prawn hatchery was established in the same year in Darwin and protocols were set up to test prawns for disease when they were moved interstate. There are now about 30 prawn farms along the east coast of Australia, mostly in Northern Queensland. Post-larval prawns are supplied to the industry by at least 13 hatcheries.

We monitor the health of prawns on several farms and that of prawns moved interstate. Diseases we have found, together with some seen by other workers, were summarized in Paynter and Lester (1988). Below is modified and updated version of that review.

VIRUS INFECTIONS

A virus, *Plebejus baculovirus* (PBV), was found in the epithelium of the digestive gland of *Penaeus plejebus*, and a similar one in *P. monodon* and *P. merguiensis*. Mysis and early post-larvae were more heavily infected than juveniles and adults (Lester et *al.*, 1987); Doubrovsky et *al.*, in press). The viruses are similar to the *Monodon Baculovirus* (MBV) but differ in two ways. They frequently produce a single occlusion body rather than multiple occlusions, particularly in *P. plebejus* where over half the infected cells contain only a single inclusion. The capsid envelope of the virions has two electron dense bands regardless of the fixatives used (Doubrovsky et *al.*, in press; L. Owens, pers. com.) whereas this feature is rarely seen in MBV (Lightner et *al.*, 1983; Johnson and Lightner, 1988).

In our preliminary cross infection experiments we successfully transferred virus from *P. monodon* to other *P. monodon* (by feeding post-larvae infected material) but were unable to transfer virus from *P. plebejus* to *P. monodon*. It is possible we have two MBV-like viruses in Australia.

High mortalities in some Australian hatcheries have been attributed to these viruses, which appear to multiply rapidly in stressed individuals. Heavily infected post-larvae of *P. plebejus*, have cloudy digestive glands, spiral in the water column and swim sideways along the surface before dying. The rate of infection diminishes with age and the viruses do not appear to produce clinical disease in juvenile and adult prawns. Hatcheries which have experienced an outbreak drain all water, then chlorinate and dry all surfaces and equipment before restocking. In some cases this has removed the virus from the hatchery.

MBV-like viruses have been reported from hatcheries and farms on most parts of the east coast of Australia. They appear to be endemic rather than introduced : imports of live penaeids from overseas are prohibited.

We have not yet found MBV-like virus in *P. esculentus*, though this species is reported to be a host for MBV elsewhere (Johnson and Lightner, 1988). Inclusion bodies which are amphophilic and intranuclear have been found several times in the epithelium of the digestive gland. On three occasions they have been examined found. The inclusions, which we refer to as Shann Bodies after the name of the original supplier, appear to be the result of aberrant protein synthesis. Prawns showing the condition have normal growth and mortality rates (Lester et *al.*, 1987).

Hepatopancreatic Parvo-like Virus (HPV) has been found in wild caught *P. esculentus* from Moreton Bay, Queensland (Paynter et *al.*, 1987) and wild caught *P. merguiensis* from Mackay, Queensland (Roubal et *al.*, in press). It has not yet been detected in cultured prawns.

Bacterial infections

Bacteria are often assumed to be the main cause of high mortalities in Australian hatcheries. Larval mortalities have been associated with bacterial necrosis and bacterial hemolytic enteritis (I. Anderson, pers. com.). Frequently, filters are used to limit the number of bacteria entering

hatchery water. Some hatcheries routinely use broad spectrum antibiotics in larval rearing tanks and this has increased survival rates.

Surface filamentous bacteria of the *Leucothrix* type are commonly found on prawns from hatcheries and ponds, but they do not appear to influence their health.

Fungal infections

An *Atkinsiella*-like fungus formed discrete craters up to 2 mm across in the carapace of adult *P. esculentus* from a holding tank. Hyphae did not penetrate into the underlying tissue.

A *Lagenidium*-like fungus has been found on the eggs and in the body of larvae and post-larvae of *P. plebejus* (N. Preston, P. Ketterer, pers. com.). Hyphae invaded and damaged extensive areas of host tissue. High mortalities were observed.

Peritrich ciliates

Peritrich protozoans of the genera *Cothurnia, Epistylis, Vorticella* and *Zoothamnium* are common on Australian prawns and have been found from most farms. Recent reviews of the taxonomy of *Vorticella* and *Cothurnia* are given by Warren (1986) and Warren and Paynter (in press), respectively.

Prawns may carry so many peritrichs that they look furry, but they are not harmed unless the protozoans on the gills block respiration. Peritrich abundance can be a useful indicator of poor and pond water quality and they may also reflect the frequency at which prawns are moulting. They thus can give early warning of an imminent health problem.

Peritrichs are usually controlled by changing the water.

Apostome ciliates

An apostome ciliate similar to *Synophrya hypertrophica* was found in the gill tissue of juvenile *M. macleayi* and juvenile *P. plebejus* from ponds in northern New South Wales. Heavily infected gills turn black and much tissue is destroyed from melanin produced when the prawn reacts to the parasite. The capacity of the gills to absorb oxygen decreases and this may stress the prawns.

Apostome infections are difficult to control though high water exchange rates after the prawns moult may help to flush the infective stages from ponds.

Bryozoans and algae

Bryozoans, filamentous algae and *Zoothamnium* sp. were abundant on the carapace of juvenile *P. esculentus* from a southeast Queensland farm. Affected prawns kept in the laboratory did not moult properly and

died. Possibly the stress of cold weather stopped the prawns feeding, they became weak and failed to moult, and this allowed the epibionts to accumulate. Increased water exchange, the addition of EDTA to the pond (to stimulate moulting) and the onset of warmer weather removed the problem.

Black gills

Juvenile *Metapenaeus macleayi* developed black gills and died in the summer of 1987 in ponds in northern New South Wales. The gills were clogged with organic debris, and overgrown with peritrichs, bacteria and filamentous algae. The gills tips were melanised and dead, probably because of the anaerobic conditions generated by the detritus. It is likely the prawns died from hypoxia. The condition rapidly disappeared when the pond water was exchanged.

Blistered tail

This occurred in *P. monodon* in a pond in New South Wales as the temperature dropped in autumn. Large prawns (45 g) developed swollen uropods within which were a gelatinous matrix, blood cells and some bacteria. The edges of the tail had become melanised. The condition probably arises from tail damage during of shortly after moulting.

Cramped abdomen

Prawns with cramped abdominal muscles are regularly seen in ponds especially during summer. It appears to be related to environmental stress.

Soft shell

Juvenile *P. monodon* (4-5 g) at a southeast Queensland farm were soft shelled, anorexic, lay near the pond edge and eventually died. The prawns had been fed Taiwanese pellets and trash fish including orange roughy *Hoplostethus atlanticus*. The skin of orange roughy is known to contain a waxy ester which has a laxative effect on humans. It may have an adverse effect on prawns.

The symptoms disappeared when trash fish was removed from the diet and water exchange increased.

Red prawn

Juvenile *P. monodon* and *P. esculentus* have been found with red discolouration of the body, especially around the edges of the tail, along the dorsal abdomen and on the legs. No mortality in ponds has been associated with the condition. It is believed to relate to rancid fish or shell fish in the diet; the condition does not occur among prawns fed fresh or cooked feed.

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