

## Diseases of crustaceans

### Viral diseases—**Taura syndrome**

#### 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

- lethargy
- cessation of feeding
- animals gather at pond edge when moribund

#### Clinical signs of disease in an infected animal

- pale red body surface and appendages
- tail fan and pleopods particularly red
- shell soft and gut empty
- death usually at moulting
- multiple irregularly shaped and randomly distributed melanised cuticular lesions

#### Disease agent

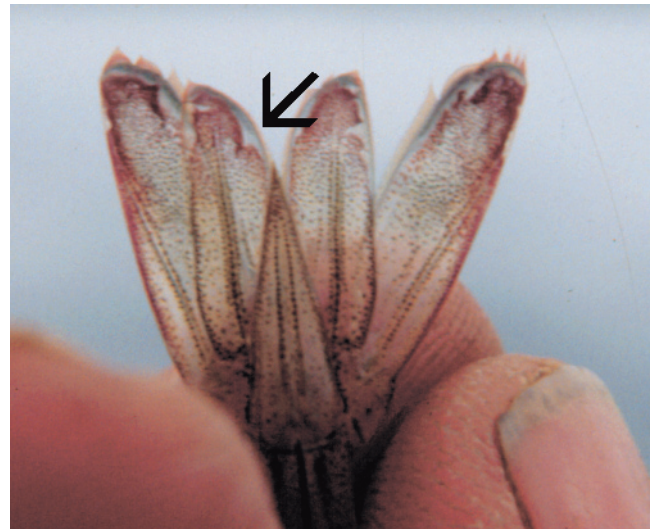
Taura syndrome is caused by Taura syndrome virus (TSV), a small picorna-like RNA virus that has been classified in the new family Dicistroviridae.

#### Host range

Crustaceans known to be susceptible to Taura syndrome:

blue shrimp*	( <i>Penaeus stylirostrus</i> )
Pacific white shrimp*	( <i>Penaeus vannamei</i> )
Chinese white shrimp	( <i>Penaeus chinensis</i> )
giant black tiger prawn	( <i>Penaeus monodon</i> )
Kuruma prawn	( <i>Penaeus japonicus</i> )
northern brown shrimp	( <i>Penaeus aztecus</i> )
northern pink shrimp	( <i>Penaeus duorarum</i> )
northern white shrimp	( <i>Penaeus setiferus</i> )
southern white shrimp	( <i>Penaeus schmitti</i> )

\* naturally susceptible (other species have been shown to be experimentally susceptible)



**Taura syndrome in white shrimp (*Penaeus vannamei*).** Note distinctive red tail fan of Taura syndrome. Rough edges around tail fin are also common

Source: DV Lightner



**Taura syndrome in white shrimp.** Note darkening of body from infection

Source: DV Lightner



## Taura syndrome continued

### Presence in Asia–Pacific

Taura syndrome virus has been officially reported from Burma (Myanmar), China, Indonesia, Thailand and Vietnam.



### Epidemiology

- Taura syndrome is a disease of the nursery phase of the Pacific white shrimp. It usually occurs within 14–40 days of stocking postlarvae into grow-out ponds or tanks, with mortality of 40–90%.
- TSV can persist outside a host and retain infectivity at experimental temperatures between 0°C and 121°C.
- Transmission is horizontal through ingestion. Although vertical transmission is suspected, it has not been demonstrated.
- Migratory birds, aquatic insects and humans are likely mechanical vectors of the disease.
- Resistance of the giant black tiger prawn and the Kuruma prawn to TSV is unclear, but they appear to be more resistant than the Pacific white shrimp.
- Individuals surviving the chronic phase of Taura syndrome are thought to be carriers of the virus.

### 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.

### Similar diseases

Yellowhead disease

### 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.



## Taura syndrome continued

### Further reading

[http://www.oie.int/aac/eng/cards/en\\_diseasecard.htm](http://www.oie.int/aac/eng/cards/en_diseasecard.htm)

The currently accepted procedures for a conclusive diagnosis of TSV are summarised at [http://www.oie.int/eng/normes/fmanual/A\\_00048.htm](http://www.oie.int/eng/normes/fmanual/A_00048.htm)

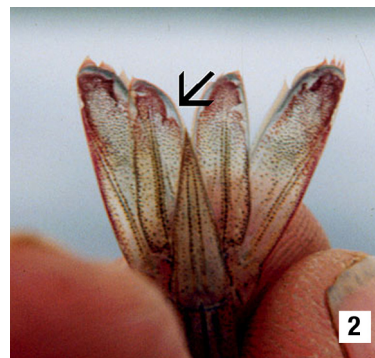
These hyperlinks were correct and functioning at the time of publication.

### Further images



**Moribund, juvenile, pond-reared white shrimp (*Penaeus vannamei*) from Ecuador in the peracute phase of Taura syndrome (TS). The shrimp are lethargic, have soft shells, and a distinct red tail fan**

Source: DV Lightner



**A higher magnification (10x) view of the tail fan of one of the two shrimp shown in Fig 1. Use of a hand lens (or the close-up lens on a camera) shows rough edges of the cuticular epithelium in the uropods that are suggestive of focal necrosis of the epithelium at those sites (arrow)**

Source: DV Lightner



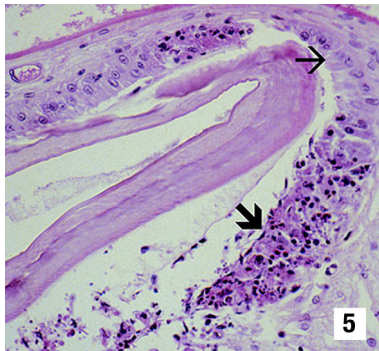
**Juvenile, pond-reared white shrimp (Fig 3 from Ecuador and Fig 4 from Texas) in the chronic or recovery phase of TS. Multiple melanised foci mark sites of resolving cuticular epithelium necrosis due to TSV infection**

Source: DV Lightner



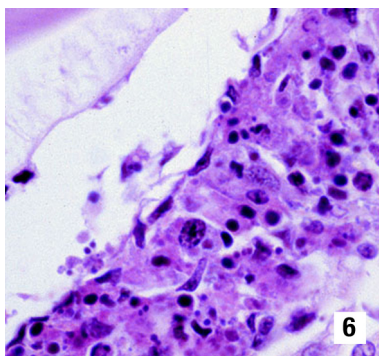
## Taura syndrome continued

### Histological images



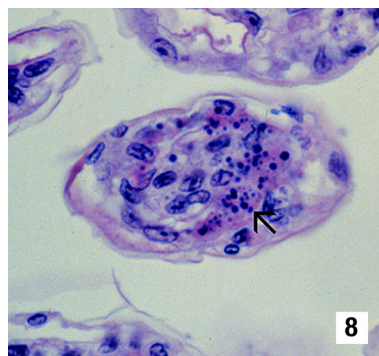
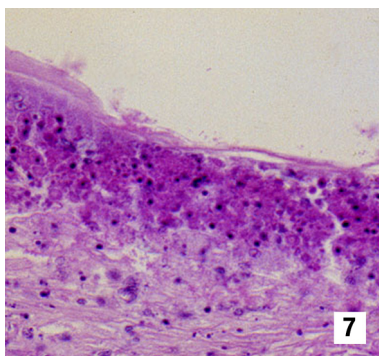
A histological section through the stomach of a juvenile white shrimp with peracute TS. Prominent areas of necrosis in the cuticular epithelium (large arrow), which secretes the overlying acellular cuticle, are apparent. Adjacent to the focal lesions are normal looking epithelial cells (small arrow). 300x

Source: DV Lightner



A higher magnification (900x) of one of the classic peracute phase TS lesions shown near the centre of Fig 5. Classic TS lesions consist of necrotic cuticular epithelial and subcuticular connective tissue cells with pyknotic and karyorrhectic nuclei, a generally increased cytoplasmic eosinophilia, and very numerous, variably staining, cytoplasmic inclusions. The cytoplasmic inclusions and pyknotic and karyorrhectic nuclei give the lesion a pathodiagnostic 'peppered' or 'buckshot-riddled' appearance. The peracute nature of the lesion is suggested by the absence of haemocytes in or near the lesion

Source: DV Lightner



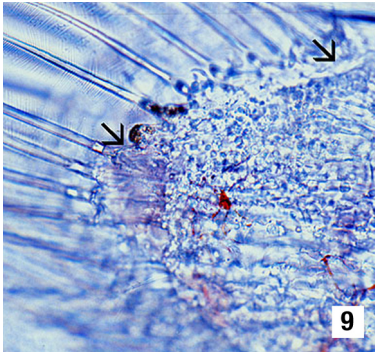
Pathognomonic focal TSV lesions in other tissues (other than those shown in Figs 5 and 6) of a juvenile white shrimp with peracute TS. Fig 7 (450x) is a lesion in the cuticular epithelium and subcutis of the carapace; Fig 8 (900x) is in the gills (arrow). Nuclear pyknosis and karyorrhexis, increased cytoplasmic eosinophilia, and an abundance of variably staining, generally spherical cytoplasmic inclusions are distinguishing characteristics of the lesions

Source: DV Lightner



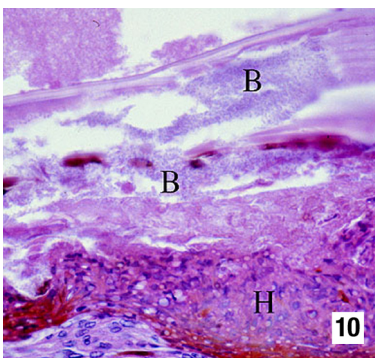
## Taura syndrome continued

### Histological images



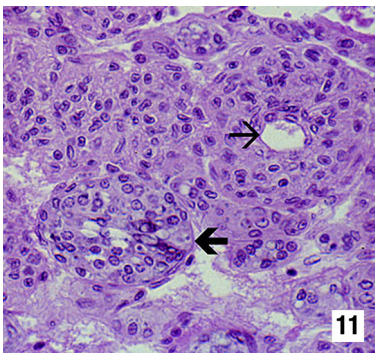
Wet-mount of a uropod of an experimentally infected postlarval white shrimp in the peracute phase of TS. The postlarva was in the D4 stage of its moult cycle as shown by the presence of the 'old' cuticle separated from the 'new' cuticle by a space. The arrows mark the approximate margins of a focal area of necrosis in the cuticular epithelium. The area of necrosis is evidenced by the presence of a vacant zone just under the cuticular epithelium (where the cuticular epithelium should be) and by the presence of refractile spheres (which are pyknotic and karyorrhectic nuclei) near the periphery of the lesion. A few expanded red chromatophores are also apparent in the subcuticular connective tissues of the uropod. No stain, 300x

Source: DV Lightner



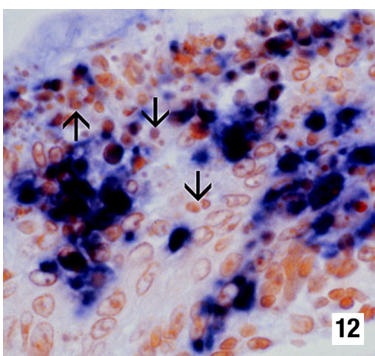
Histological section (600x) of a resolving cuticular lesion in a juvenile white shrimp. A perforated cuticle that is heavily colonised with masses of bacteria (B) is at the top of the micrograph. A thick, melanised, haemocytic 'plug' (H) has formed basal to the cuticular epithelium to temporarily close the 'wound' from the outside. Basal to the haemocyte plug (H), connective tissue elements, and additional infiltrating haemocytes, provide the basal support for the regeneration of the cuticular epithelium. Pathognomonic TS lesions in the recovery/chronic phase of TS are usually few, relative to the resolving lesions shown here, and are often entirely absent.

Source: DV Lightner



Mid-sagittal section (450x) of the lymphoid organ (LO) of an experimentally infected juvenile white shrimp in the chronic or recovery phase of TS. While pathognomonic TS lesions of the type seen in the cuticular epithelium never occur in the LO, TSV does induce some significant lesions in this organ. Interspersed among normal looking LO cords or tissue, which is characterised by multiple layers of sheath cells around a central hemolymph vessel (small arrow), are accumulations of disorganised LO cells that form LO 'spheroids' (LOS). LOS lack a central vessel and consist of cells that show karyomegaly and large prominent cytoplasmic vacuoles and other cytoplasmic inclusions (large arrow)

Source: DV Lightner



Histological section (900x) of an appendage from a postlarval white shrimp in the peracute phase of TS that has been reacted with a DIG-labelled cDNA probe to TSV. The probe has reacted intensely with TSV-infected cells, staining the cytoplasm of infected cuticular epithelial cells and subcuticular connective tissue cells positive for the virus. The probe does not react with the pyknotic and karyorrhectic nuclei (arrows), because TSV is only cytoplasmic. These nuclear remnants contribute to the 'peppered' or 'buckshot-riddled' appearance of TS lesions

Source: DV Lightner

