Diseases of Crustaceans – **Translucent Post-larvae Disease (TPD)**

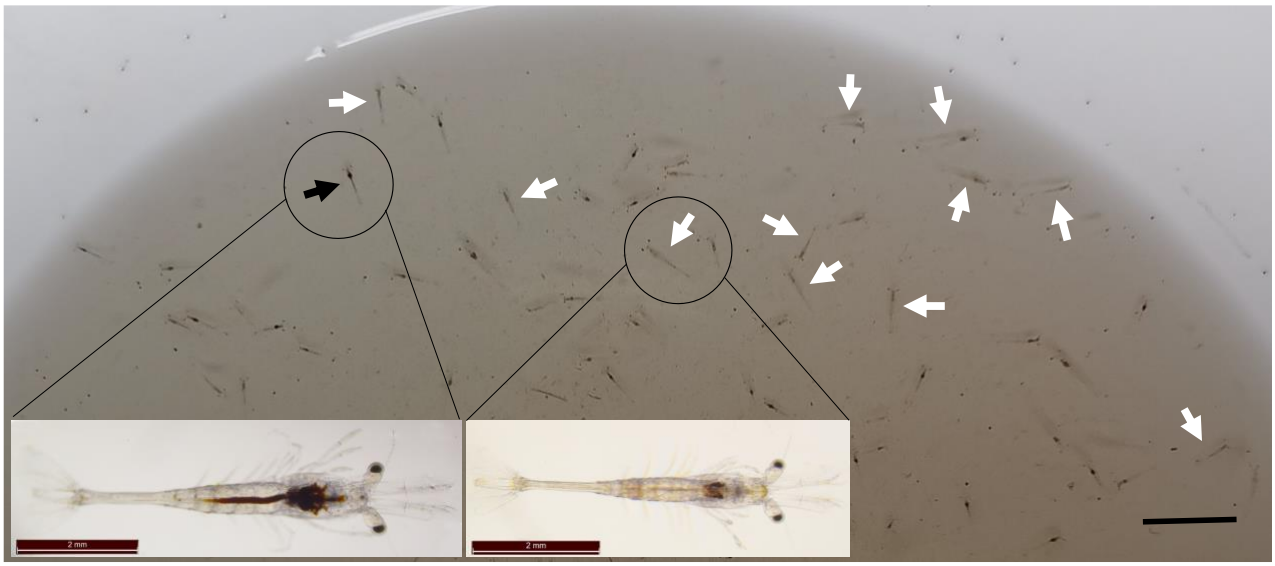

Figure 1. Clinical signs of *Penaeus vannamei* affected by translucent post-larvae disease (TPD) / translucent post-larvae vibriosis (TPV) / glass post-larvae disease (GPD). All the samples were at PL7 stage, and body length was about 0.6~0.9 cm. The diseased individuals (indicated by the white arrows) demonstrated syndromes of abnormal hepatopancreas and digestive tract necrosis. The hepatopancreas and digestive tract of the diseased post-larvae were pale and colorless. The bar scales are 10 mm and 2 mm in the figures and the magnified figures, respectively. Source: QL Zhang

General Signs of Disease

Important: affected animals may show one or more of the signs below, but the infection may be present in the absence of any signs, especially during the early phase of infection.

- The diseased shrimps show pale and colorless of hepatopancreas and digestive tract (Figure 1), as well as pale and shrunken body. The affected post-larvae sink to the bottom of rearing tanks because of the decreased swimming capability caused by the disease.
- The disease progresses very quickly, a few individuals initially show clinical signs on the first day, 60% mortality accrues on the second day, and more than 90% mortality may accrue on the third day.

Disease agent

The pathogen of TPD a *Vibrio* spp. causing TPD (V_{TPD}), which carries the *Vibrio* high virulent protein (VHVP)-1 and VHVP-2.

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Host range

Crustaceans known to be susceptible to infection with V_{TPD} (RT-PCR and ISH positive) include *Penaeus vannamei, P. chinensis,* and *P. japonicus* (Zou *et al*., 2020; Liu, *et al*., 2023; Jia *et al*., 2024).

Geographical Distribution

TPD occurred in hatcheries in China (2020) and Vietnam (2023) (Zou *et al*., 2020; Vietnam Fisheries Magazine, 2023; Hong Tham, 2024).

Similar Diseases

- Acute hepatopancreatic necrosis disease (AHPND). **Note:** the virulence of V_{TPD} is about 1000 times higher than that of V_{AHPND} (Zou et al., 2020; Yang *et al*., 2021).

Epidemiology

- The disease mostly affects post-larvae at four to seven days old (PL2~PL7), and is highly infectious and lethal
- The morbidity of a diseased population can reach up to 60% in 24h after first observation of clinical signs, and even up to 90–100% in severe cases on the second to third day (Zou *et al*., 2020; Yang *et al*., 2021).
- Horizontal transmission was observed in the hatchery tanks and ponds (Jia *et al*., 2024).

Prevention and Control

- Due to the high lethality and transmission of TPD, it is strongly recommended to stop production, destroy affected stock and thoroughly disinfect all culture facilities as soon as the pathogen enters the culture system.
- When the disease becomes obvious, no chemical medicine or disinfectant has been found that is effective in stopping or slowing down the disease.
- PHMB is generally safe with low toxicity. Animal studies show an oral LD50 exceeding 5,000 mg/kg, classifying it as "practically non-toxic." It causes no skin or eye irritation at proper dilutions and has been approved for use in various medical applications including wound care, surgical disinfection, and even eye drops for treating *Acanthamoeba keratitis*. In aquaculture, PHMB effectively controls harmful bacteria like *Vibrio* species and prevents diseases in aquatic species. The environmental impact appears minimal when used at recommended concentrations.

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Histopathology

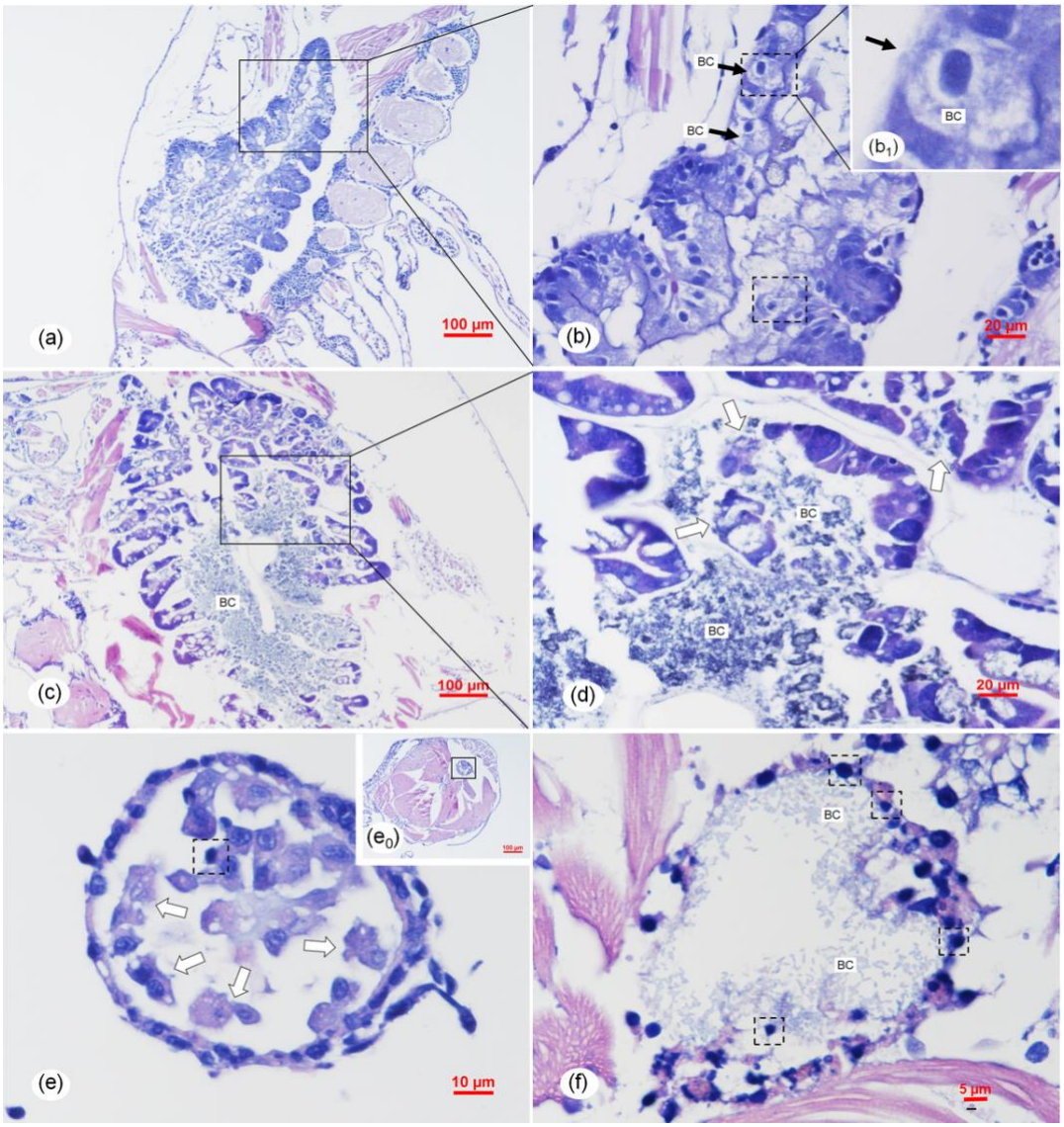

Figure 2. Histological sections of the naturally infected post-larvae in shrimp rearing tanks of post-larvae suffering from TPD. (a, b) Early phase with active destruction of the hepatopancreas. Note the mild necrosis of epithelial cells (ECs) of hepatopancreatic (HP) tubules, especially the ECs in the dotted boxes showing typical dark, smaller, and condensed nuclei. The bacterial colonization (BC) in the early phase of infection were indicted by the black arrows. The arrowed ECs (black arrow) were B-cells with the large vacuoles. (c, d) Acute phase with massive bacterial invasion. There was vast bacterial invasion of the hepatopancreatic tubules in half of the organs, where the bacterial masses and the tubules were destroyed. Note the detachment/sloughing of hepatopancreatic ECs (white arrows). (e, f) Midgut of an affected digestive tract of a naturally infected post-larvae showing necrosis (dotted box) and sloughing (white arrows) of ECs of the digestive tract. Note the mass BC in the tubule lumens of the digest tract at the midgut. (b), (b1), (d), and (e) are the magnified micrographs of the area in the black frames in (a), (b), (c), and (e0), respectively. (a), (b), and (e) show the pathological change in the early phase of infection. (c), (d), and (f) show the pathological change in the acute phase of infection. Scale bars = (a) 100 μm, (b) 20 μm, (c) 100 μm, (d) 20 μm, (e0) 100 μm, (e) 10 μm, and (f) 5 μm.. Source: QL Zhang

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Molecular Diagnostics

PCR methods

Molecular diagnostic method was established based on the sequence of VHVP gene. The reported methods include:

- A comman PCR (PCR) (Jia, *et al*., 2024).

Taqman probe based qPCR methods

- Two different taqman probe based qPCR methods for *V*TPD were described in 2024 (Jia *et al*., 2024) and in 2025 (Zhang *et al*., 2025). The TaqMan qPCR targeted the double fragments on the sequence of VHVP gene reported by Zhang *et al*. in 2025 has better specificity and compatibility.

Table 1. Primers and Probe for the abovementioned methods

Methods	Primers/Probe	Sequences (5'-3')	Ta	Target region
TaqMan Qpcr [1]	vhvp_SpvB-F1 vhvp_SpvB-R1 vhvp_SpvB-P1	AGTCGTTTGGAGTATTGGGTG GCCATCAGAGGTGTAGATCAC 6-FAM-TCTTCGAGTGCTGCGACCACTTT-TAMRA	59°C	72 bp
	vhvp_TcdB-F2 vhvp_TcdB-R2 vhvp_TcdB-P2	GTAATCGTTTGGTTAGCACCG ACCAAACCCACGGAACTC VIC-CACGGCCATCCCAGACTCCAT-BHQ1	59°C	77 bp
PCR [2]	VHVP-1-P -F VHVP-1-P -R	GAGGAGAGTGTTGACCGAAATC CTGCGCCAGTAGTAACGATAAG	58°C	362 bp
	VHVP-2-P -F VHVP-2-P -R	GCTGGTCCGGACGGTGCC GTGATACATTAATACTTGTCTACAA	60°C	864 bp
	VHVP-3-P -F VHVP-3-P -R	CCCGTATCACAGAGCGATTT CTTTGGTGTCGGTCGTAGTT	58°C	306 bp
TaqMan qPCR [2]	VHVP-F VHVP-R VHVP-P	AACTCCCGAAATCCGTCAAG ACACCCAATACTCCAAACGAC AGGCATGGACCGTAAAGCTCTCAC	55.7°C	119 bp

[1] The TaqMan qPCR detection method targeted the double fragments on the sequence of VHVP gene (Zhang *et al*., 2025).

[2] The TaqMan qPCR detection method targeted the single virulence gene (Jia *et al*., 2024).

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