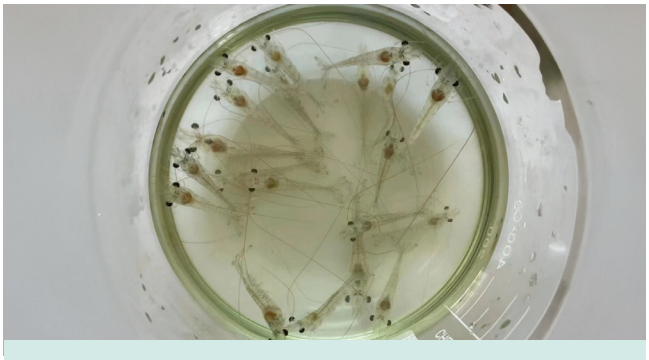
Translucent Post Larvae Disease – a deadly *Vibrio* infection affecting farmed shrimp

Molecular testing is essential for accurate identification of the specific cause combined with stringent biosecurity measures

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TPD infected post larvae at stages 2-4 show empty gut and a colourless, translucent hepatopancreas. Mortality occurs typically within a few hours of infection. Photo credit: Xu Tao

Understanding *Vibrio* infections in shrimp production

Infections associated with *Vibrio* species pose significant challenges in commercial shrimp operations. If unmanaged, these bacteria can establish populations in water, sediment, or biofilms within farm systems, leading to infections and high mortality rates.

In shrimp hatcheries, *Vibrio* species can infiltrate or proliferate through multiple routes. These include introduction via broodstock, infected shrimp nauplii, contamination through water sources, and transmission from microalgae, live feeds, or water and air pipelines. Moreover, they can be transported on personnel equipment, on skin, or dispersed through aerosols (Shinn et al., subm.).

What is Translucent Post Larvae Disease?

Translucent Post Larvae Disease (TPD), also known as Highly Lethal *Vibrio* Disease (HLVD), is a severe condition that has impacted shrimp post larvae production in China and Vietnam since 2020.

The disease is primarily caused by a strain of *Vibrio parahaemolyticus*, though a Baishivirus has also been implicated in some cases. The *V. parahaemolyticus* strain associated with TPD produces a toxin that disrupts the hepatopancreas, affecting nutrition and leading to rapid mortality, especially in smaller shrimp.

Visually, affected post larvae (PL), particularly at stages 2-4, exhibit distinct symptoms such as an empty gut and a colourless, translucent hepatopancreas, leading to diminished activity and sluggish movements. Mortality occurs rapidly, typically within a few hours of infection, with rates reaching as high as 80-100% within 24-48 hours, often occurring 3-5 days post-stocking.

Since other pathogens can cause similar visual symptoms in shrimp, accurate diagnosis requires proper testing rather than relying solely on the visible symptoms.

The role of *Vibrio parahaemolyticus* in TPD

Most cases of TPD are caused by *V. parahaemolyticus* strains that carry an aerolysin gene, which produces a toxin leading to cellular damage in the hepatopancreas and resulting in death. Another shrimp disease, acute hepatopancreatic necrosis disease (AHPND), is also caused by *V. parahaemolyticus*, but these strains carry a different toxin gene. Although both toxin genes cause similar damage to the hepatopancreas and lead to comparable outcomes, molecular testing is essential for accurate identification of the specific cause.

How to test for TPD and AHPND

Visual inspections alone are insufficient for diagnosing TPD or AHPND. Accurate diagnosis requires laboratory testing. To do this, collect a targeted sample of PL (i.e., those exhibiting pale and moribund characteristics, approximately 30-50 individuals). Rinse the PL with sterile distilled water and then fix them in 95-99% molecular-grade ethanol.

Laboratory tests can then identify the different toxin producing genes produced by *Vibrio* species. Simultaneously, request that the samples are tested for the presence of plasmid genes *pir*AB producing the toxins responsible for AHPND, utilising the AP4 nested PCR method developed by Dangtip et al. (2015) and for TPD using primers for the *ldh* gene, which produces the thermolabile hemolysin toxin (Vicente et al., 2020; Zou et al., 2020). If both tests are negative, request that samples are tested for the *Baishivirus*, using primers as specified by Xu et al. (2023).

Parallel assessment of microbiology results is essential. If all three PCR test results are negative, then look to other potential bacterial pathogens that might result in PL that are translucent in appearance.

Why test

Regular testing is crucial for identifying early-stage infections and preventing their establishment and spread. It raises awareness of the local risks of infection. Testing can offer valuable insights into disease dynamics and potential introduction routes. It facilitates timely interventions and enables the revision of biosecurity protocols to reduce the likelihood of future introductions and outbreaks, thereby minimising economic losses.

"Vibrios pose a serious threat to shrimp production, but strict biosecurity measures and regular surveillance can effectively manage these risks."

Managing TPD outbreaks

If TPD is detected, take immediate action:

- **Isolate** infected shrimp and quarantine the affected areas.
- **Conduct tests** to confirm the disease.
- **Assess the risk** to other shrimp batches and the overall farm operations.
- **Cull infected stock** to prevent further spread.
- **Strengthen biosecurity** measures, including monitoring visitors and disinfecting equipment and water systems.
- **Increase surveillance** to monitor the situation and prevent future outbreaks.

Other *Vibrio* infections affecting shrimp

Besides TPD, other *Vibrio* infections can also cause shrimp to appear translucent. For example, some strains of *V. parahaemolyticus* carrying a different toxin gene are responsible for AHPND, also known as early mortality syndrome, which can result in sudden and severe mortality. Additionally, other *Vibrio* species, such as *V. alginolyticus* and *V. harveyi*, can cause systemic infections leading to septic hepatopancreatic necrosis (SHPN).

Need for *Vibrio* vigilance and tight biosecurity

The rapid and severe onset of *Vibrio*-induced mortalities in penaeid shrimp hatcheries, transitioning from a state of apparent health to moribundity and death within mere hours, underscores the critical need for stringent biosecurity measures and vigilant surveillance protocols.

Recognising the risks associated with *Vibrio* infections is paramount from a biosecurity standpoint, necessitating proactive measures to prevent and mitigate potential outbreaks. Establishing robust control and management procedures are essential to effectively manage these risks. Surveillance emerges as a crucial practice for early detection and containment of infections, ensuring swift intervention when necessary.

Best practices for biosecurity in shrimp hatcheries:

1. **Disinfect water and equipment** using ozone, UV light, or hypochlorite.
2. **Conduct comprehensive and regular cleaning** of the entire production system, including pipework, air lines, and air delivery systems, to remove biofilms and surfaces where *Vibrio* can establish.
3. **Use separate, biosecure water systems** to minimise contamination risks.
4. **Add probiotics** to the water to enhance shrimp health and reduce harmful bacteria.
5. **Isolate broodstock** in clean conditions and provide biosecure diets to maintain their health.

Managing *Vibrio* at every stage of shrimp production

Vibrio infections can occur at any stage of shrimp farming, from broodstock to grow-out ponds. Implementing proper disinfection, maintaining strict hygiene, and adding probiotics to feed and water are essential for reducing infection risks.

- **Hatcheries:** Ensure biosecure water systems and conduct regular facility cleanings.
- **Live feeds:** Source live feeds from biosecure providers to prevent introducing *Vibrio*.
- **Pond preparation:** Disinfect ponds, use clean water, and avoid transferring contaminated water.
- **Grow-out ponds:** Monitor stocking densities and manage wastes effectively to minimise the risk of *Vibrio* outbreaks.

Remember!

Vibrio bacteria pose a serious threat to shrimp production, but strict biosecurity measures and regular surveillance can effectively manage these risks. Early detection is crucial for minimising the impact of *Vibrio*-related diseases, improving shrimp survival, and ensuring the sustainability of shrimp farming operations.

References are available on request



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