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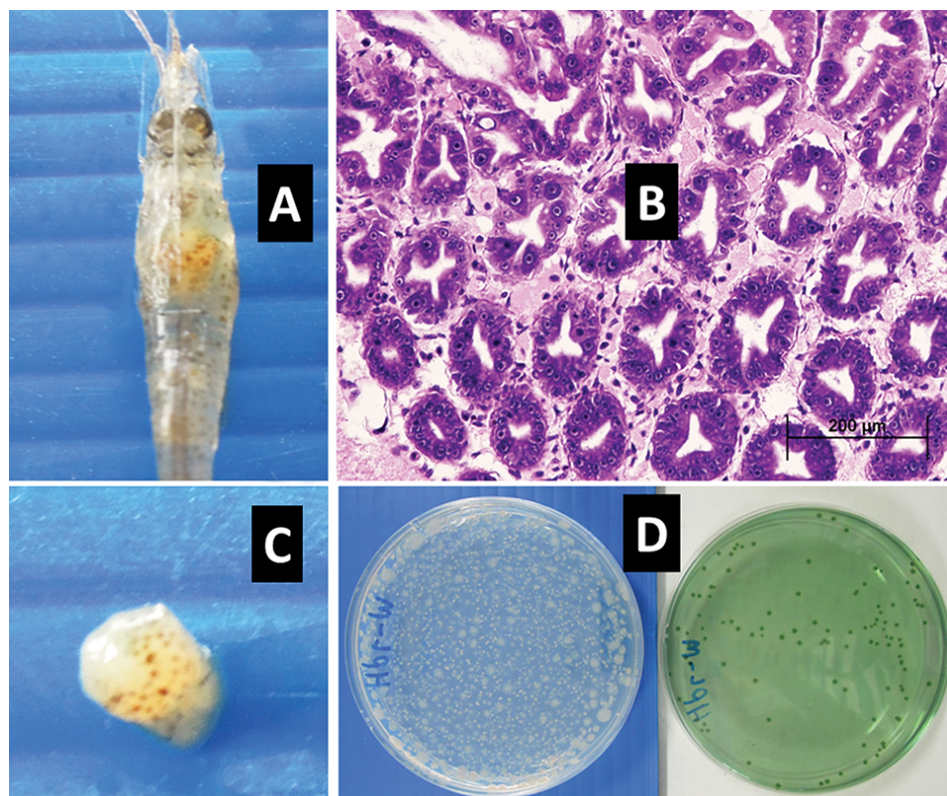
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# Hepatopancreas colors predict survival of shrimp to EMS

2 January 2014

By Dr. Chalor Limsuwan , Dr. Niti Churchird , Dr. Natthinee Munkong Wongsiri and Dr. Carlos A. Ching

## Survey of the broodstock, hatchery facilities identified problematic conditions



Shrimp larvae with brown and white hepatopancreas (A, C) and a *Vibrio* count of  $1.08 \times 10^5$  CFU/g (D) had low survival. The H.P. tissues of these larvae showed an initial condition of *Vibrio* attack (B).

Outbreaks of early mortality syndrome (EMS) or acute hepatopancreatic necrosis (AHPN) have been increasingly seen at shrimp farms in Asia and other parts of the world. At a farm in Thailand, some ponds were hit with EMS, while others were not. Different survival rates were observed depending on the *Vibrio* bacteria concentrations in the larvae in the ponds.

## H.P. color study

A study done at the farm revealed different survival rates depending on the color of the hepatopancreas (H.P.) organs in shrimp larvae stocked in the grow-out ponds. H.P. macerates separated by color were cultured in thiosulfate-citrate-bile salts-sucrose agar to determine a total number of colony-forming units (CFUs) identified later as *Vibrio* species.

The higher concentrations (averaging  $6.02 \times 10^7$  CFU/g) of *Vibrio* came from larvae with white H.P. in ponds exhibiting mortality within the first 10 days of culture. Lower concentrations (averaging  $3.50 \times 10^3$  CFU/g) were observed in larvae with brown hepatopancreas tissue in ponds with the highest survival rates, at or above 60 percent.

Another group of larvae – with both brown and white hepatopancreases – had averaged bacterial concentrations of  $1.08 \times 10^5$  CFU/gram. The survival rate of the shrimp improved when pond conditions were improved, and adequate management procedures were applied.

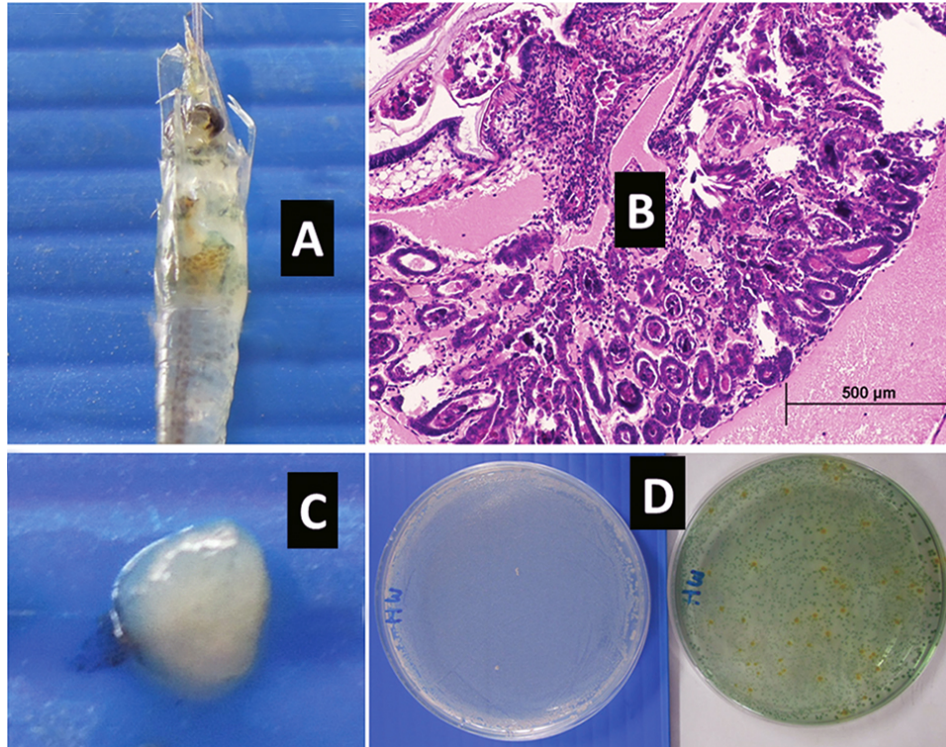
The measures included avoiding overfeeding. The total feed for 100,000 postlarvae should not exceed 200 kg for the first 30 days of culture. A consistent phytoplankton bloom should be achieved during the first 40 days. In addressing water quality, pH should be kept within a range of 7.8 to 8.3, with alkalinity

levels maintained at 120 mg/L or greater.

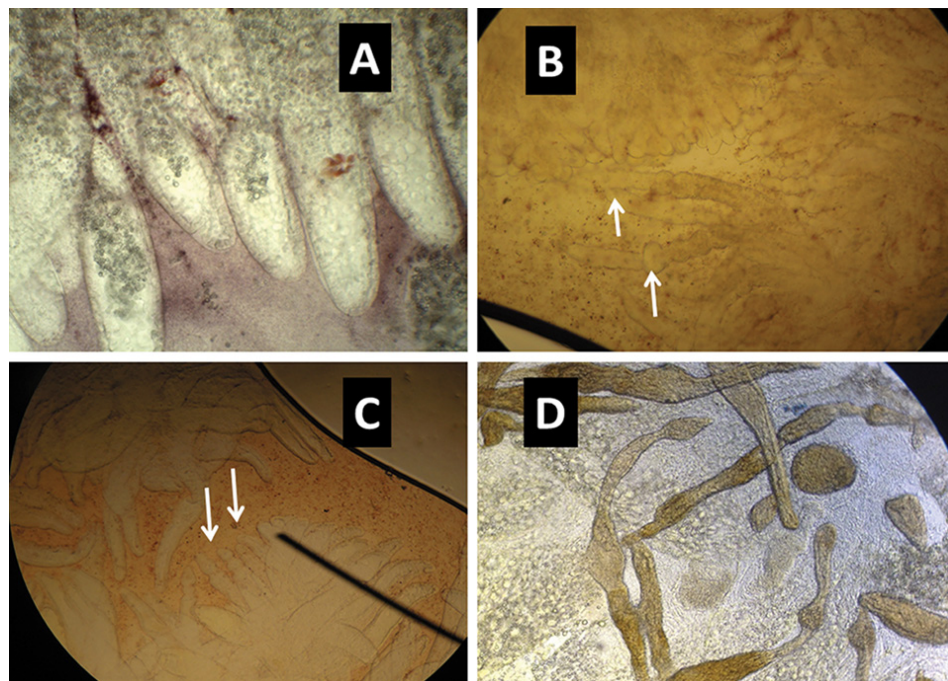
## Causes of unhealthy postlarvae

A survey of the broodstock and hatchery facilities from which the unhealthy larvae came identified some problematic conditions.

Unhealthy broodstock often had unilateral eyestalk ablation. Ablated females usually died after the first spawn. Stocking densities were often high, at over 100 nauplii/L during larval rearing. Temperatures varied during larval culture instead of being maintained within the proper range of  $30 \pm 1$  degrees C. Microalgae populations were inconsistent, with pH values outside the proper range.



Shrimp larvae with white hepatopancreas (A, C) and a *Vibrio* count of  $6.02 \times 10^7$  CFU/g (D) died within 10 days after stocking. The H.P. tissues of these larvae showed an advanced condition of EMS attack (B).



Healthy hepatopancreas shows smooth epithelia and good lipid content (A). Initial *Vibrio* damage is observed in shrunken H.P. tubules (B, C). The final stage of EMS shows some collapsed H.P. tubules with almost no lipid content (D).

## Management after EMS

Some ponds at the farm improved survival rates when the following management procedures were applied when initial EMS mortality was detected.

- ☒ Stop feeding until mortality stops and shrimp in feed trays look healthy, then gradually start feeding again.
- Use probiotic bacteria for improving water quality.
- ☒ Apply lime to maintain pH at 7.8 to 8.0 in the morning and a maximum of 8.3 in the afternoon.
- Turn on aerators fully for optimal dissolved-oxygen concentrations.
- Maintain a consistent phytoplankton bloom.

## Postlarvae quality standards

A survey made by Thailand's Department of Fisheries set a recommended standard for total *Vibrio* counts in shrimp postlarvae at less than 1,000 CFU/g cultured in agar before stocking. Of these 1,000 colonies, a maximum of 100 CFU/g should be green, and the other 900 CFU/g should be yellow. *V. parahaemolyticus* colony count should not exceed 30, while no *V. harveyi* colonies should be present.

Also, some Thai farmers are looking at the H.P. tubules' shapes and lipids content. Tubules with smooth epithelia and good lipids content are considered healthy, while shrunken H.P. tubules with low lipid concentration are considered unhealthy.

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