

# Gram-Negative Bacterial Septicemia *Vibrio* and Others

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## I. Causative Agent and Disease

Gram-negative bacterial septicemia, also called bacillary necrosis (when motile bacteria are involved), is the most common disease in larval and juvenile shellfish worldwide, especially for bivalve molluscs. Bacterial septicemia can occur wherever nurseries and hatcheries are operating and is indicative of poor sanitary procedures. The most common etiological agents are vibrios including *Vibrio* sp., *V. anguillarum*, *V. ordalii*, *V. tubiashii*, *V. alginolyticus*, *V. splendidus* and occasionally *Pseudomonas* sp. and marine *Flavobacteria*. The motile vibrios and pseudomonads attach and invade soft tissues causing extensive necrosis and also produce exotoxins that can damage mantle and velar tissues without direct bacterial invasion. Filamentous non-motile *Flavobacteria* can invade the hinge ligament (hinge ligament disease) causing liquefaction, necrosis and loss of hinge function allowing secondary infections by other bacteria.

## II. Host Species

All species of cultured juvenile bivalve molluscs worldwide are likely susceptible to bacterial septicemia which may also occur in adult animals when poor environmental conditions are present or when animals are otherwise stressed. Occurrence in nature has been reported but the extent is unknown. In Alaska, occasional bacterial infections of juvenile bivalves has occurred at the shellfish hatchery in Seward. Also, a mortality of adult pink neck surf clams near Juneau was associated with a marine flavobacterial septicemia when clams were stressed by very warm sunny weather during minus tides.

## III. Clinical Signs

Clinical signs of bacterial septicemias include slow growth, failure to set, high morbidity with reduced movement and mortality of larval and juvenile bivalves associated with attached or swarming bacteria. Tissues become necrotic and may detach into the water column.

## IV. Transmission

These bacteria are normal marine flora. Transmission is horizontal via incoming seawater, contaminated algal food stocks and from brood stocks or otherwise infected animals.

## V. Diagnosis

Numerous Gram-negative, motile bacteria in wet mounts of dead or dying larvae and tissues of larger juvenile bivalves provide a presumptive diagnosis. Histological sections demonstrate invasive bacteria in soft tissues and flavobacteria in hinge ligaments. Definitive diagnosis of specific bacteria is based on isolation and biochemical characterization, fluorescent antibody tests or PCR.

## VI. Prognosis for Host

Bacterial septicemia in larvae and juvenile bivalve molluscs generally results in high mortality. Management of the disease is based on enhanced hatchery and nursery sanitation procedures as preventative measures. Lowering of seawater temperatures below the optimum growth range of the bacteria (less than 25°C) can markedly inhibit the disease.

## VII. Human Health Significance

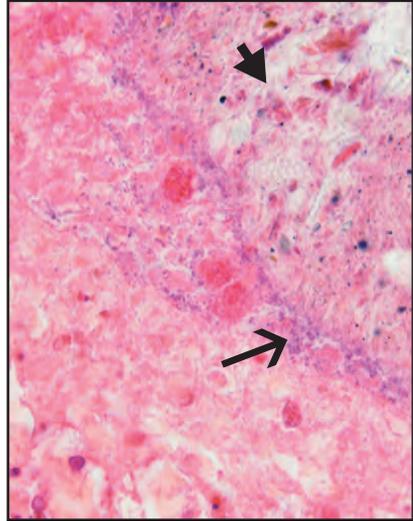
Certain vibrios and pseudomonads infecting shellfish are known to be of

human health concern. However, these bacteria in juvenile life stages that are too small for consumption are not likely

to be of zoonotic human health significance.



Mortality of adult pink-necked surf clams due to flavobacterial infection during warm weather minus tides



Histological section of bacterial septicemia and necrosis of the intestinal mucosa (arrowhead) from Pacific oyster caused by Gram-negative bacteria (arrow)



Wet mount of Gram-negative bacteria (arrow) swarming around the mantle periphery of larval Pacific oysters (Photo: R. Elston, AquaTechnics, WA)