Southeast Asian Fisheries Development Center **Aquaculture Department**

SEAFDEC/AQD Institutional Repository **http://repository.seafdec.org.ph**

Journals/Magazines Aqua Farm News

1994

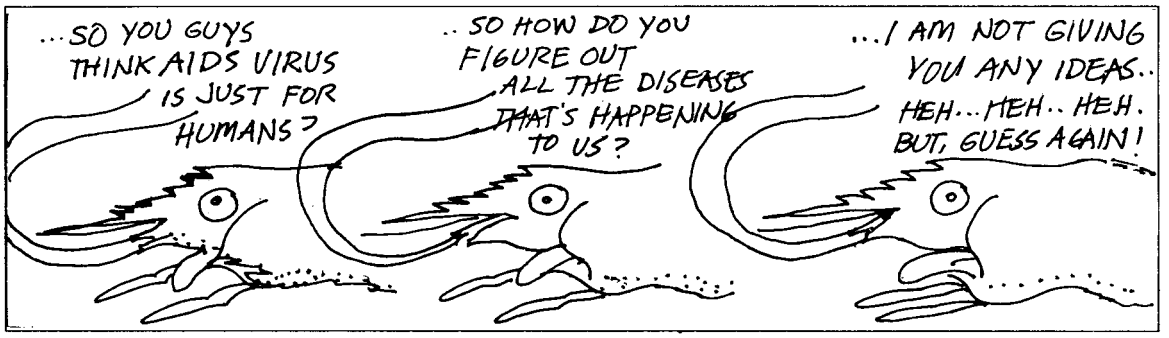
Disease control in hatcheries

Aquaculture Department, Southeast Asian Fisheries Development Center

Southeast Asian Fisheries Development Center, Aquaculture Department (1994). Disease control in hatcheries. Aqua Farm News, 12(4), 13-14.

http://hdl.handle.net/10862/2524

Downloaded from http://repository.seafdec.org.ph, SEAFDEC/AQD's Institutional Repository



NEW TRENDS

Disease control in hatcheries

Shrimp aquaculture is a major industry in a number of countries in Asia, where 89% of the global output was produced in 1989. However, diseases and health management constrain the sustainable development of the industry. Viruses, bacteria, fungi, and protozoa are all common pathogens causing morbidity and mortality in farmed Asian shrimps. Besides the infectious diseases that involve pathogens, a number of noninfectious diseases caused by poor nutrition, poor water quality, and environmental pollution have surfaced.

Reference: M Shariff and RP Subasinghe. 1992. *Major diseases of cultured shrimp in Asia: an overview.* p. 37. In: W Fulks and KL Main. **Diseases of cultured shrimp in Asia and the United States.** The Oceanic Institute, Hawaii.

Microbiological techniques

Live microorganisms have been successfully applied to eradicate organic or inorganic wastes in water or mud. There have also been many attempts to maintain a stable and superior culture environment for fish or shrimp using microorganisms. The probiotic microbes for potential application in aquaculture are as follows:

- ***Bacillus* sp.** These are a group of facultative anaerobes. The enzymes they produced may utilize or dissolve solid or insoluble proteins, lipids or carbohydrates. For example, they may convert insoluble lipid into water-soluble glycerol and fatty acid.

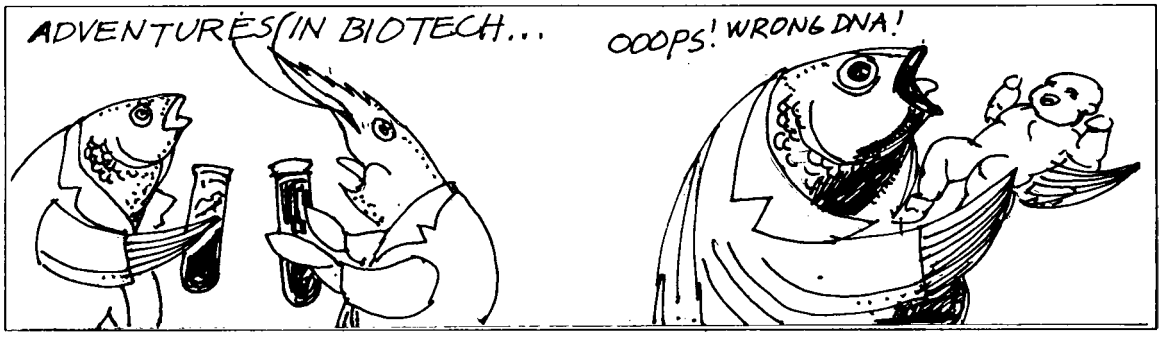
- ***Pseudomonas* sp.** These are also facultative anaerobic bacteria. They may dissolve various solid organic substances in sludge.

- ***Nitrosomonas* sp.** and ***Nitrobacter* sp.** These two groups of bacteria play a major role in the nitrification process that convert toxic nitrogenous substances into non-toxic substances. Nitrification is performed in two steps: conversion of ammonia to nitrite by *Nitrosomonas*, followed by further conversion of nitrite to nitrate by *Nitrobacter*. Both *Nitrosomonas* sp. and *Nitrobacter* sp. are autotrophic. They can utilize CO_2 as the carbon source and nitrogen as the energy source.

- ***Cellulomonas* sp.** This group of bacteria is aerobic and may dissolve cellulose in sludge.

- ***Aerobacter* sp.** They may convert carbohydrate into fatty acid and ethanol.

Based on their characteristics, heterotrophs like *Bacillus* and *Pseudomonas* can remove sub-



stances toxic to shrimp under aerobic or anaerobic conditions. Autotrophs like *Nitrosomonas* and *Nitrobacter* can remove ammonia and nitrite.

Experiments have been conducted to demonstrate the use of bioaugmentation processes with live microorganisms. Non-pathogenic autotrophic and heterotrophic bacteria can effectively reduce the multiplication of pathogenic bacteria like *Vibrio harveyi* and enhance the survival of shrimp larvae (*Penaeus monodon* and *P. penicillatus*). This technique has also been successfully used in some hatcheries in southern Taiwan.

Reference: ***Asian Shrimp News***, 4th quarter, 1991.

Biotechnology in disease diagnosis for shrimp viruses

Twenty years have elapsed since the first shrimp virus *Baculovirus penaei* (BP) was described from the Gulf of Mexico shrimps. Today, more than a dozen penaeid viruses are identified, and all except BP are discovered in the past 12 years. Despite the considerable economic importance of penaeid viruses to world aquaculture, relatively little is known about these pathogens.

Until recently, the diagnostic methods available to pathologists were traditional -- light microscopy, histopathology, electron microscopy, direct serological methods, enhancement, and bioassays -- and these have been employed in other areas of animal and human pathology. Now, advanced biomedical methods are being applied to improve diagnostic procedures. Monoclonal antibodies for the infectious hypodermal and hematopoietic necrosis virus (IHHNV) and gene probes for IHHNV and BP have been developed. These are the first of their kind as research tools and diagnostic reagents.

To develop the antibodies, IHHNV was injected to mice, and the mice spleens cultured. Spleens normally produce antibodies. Researchers characterized the antibodies in a series of tests. But, they found that the murine monoclonal antibodies to IHHNV are bound to substances that may be lectins. Lectins are large glycoprotein molecules that bind to specific polysaccharides on other glycoproteins. They are important components of the immune or defense mechanisms of crustaceans. Researchers are now trying to develop methods to block lectins to be able to use the IHHNV antibodies.

Gene probes for IHHNV and BP are developed by extracting the DNA of the viruses and having the DNA transformed by the bacterium *E. coli* cells. The gene probe for IHHNV can detect virus-containing areas in shrimp cytoplasm and nucleus. The BP gene probe can detect the virus (and latent infection) from the sample from which it was derived but not so successfully of other samples.

Reference: DV Lightner, BT Poulos, L Bruce, RM Redman, J Mari, and JR Bonami. 1992. *New developments in penaeid virology: application of biotechnology in research and disease diagnosis for shrimp viruses of concern in the Americas*, p. 233-253. In: W Fulks and KL Main. **Diseases of cultured shrimp in Asia and the United States.** The Oceanic Institute, Hawaii.

Support sustainable aquaculture