

# FISH AND SHELLFISH DISEASES IN CULTURE SYSTEMS

## I. Concept of disease and pathogen

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"Causes of diseases are reasonable and discoverable causes are removable"

Just as in land animals or in agricultural crops, fishes and shellfishes living in the aquatic environment are susceptible to diseases whenever certain abnormal biological, physiological or environmental changes occur. The problem of diseases has assumed greater significance in the context of aquaculture of these organisms in different culture systems. New and new diseases are found coming up in all high productive systems, whether they are on land or in water, and unless we have a sufficient knowledge of the nature of these diseases and their control, the management of the natural resources as well as the culture practices can hardly become successful. This article in the series attempts to define disease and pathogen, and different categories of diseases.

The term 'disease' (absence of ease) by its popular acceptance sets to denote a condition or a state of the body in which there is departure from normal function as a result of one or more of the following: the effect of heredity, the affecting or contamination with disease producing organisms, variation in diet or environment. Every disease,

generally speaking, has a cause or causes and likewise an effect or a set of effects. Let us take as an example, amebiasis, a parasitic disease of man. The amebiasis, which is characterised by pathological intestinal manifestations, is caused by an animalcule scientifically named, *Entamoeba histolytica*. It produces different signs and disorders which cause ailment or suffering of the afflicted, of which the most important is an acute dysentery phase. The cause, or causes, lead to a chain of effects (incorrect functions, disorders etc.) in succession, of which the manifested ones (apparent ones) are called symptoms. Symptoms are medically of much importance inasmuch as they are signposts — indicative of the disease. However, search for the prime cause of a disease is nearer to the way to put an end to the ailment.

Now, we may define disease as any state or condition, as a result of abnormal change in the anatomy and/or physiology of cell (s) or organ (s), which harms the normal life of a living thing and disease may be:

### 1. Biotic disease:

Involving attack by viruses, bacteria, algae, fungi and other animals eg. tuberculosis.

2. Abiotic disease:  
Due to malfunctioning of cell (s)/organ(s) and/or associated changes due to unfavourable ecological or other accidental conditions eg, gas embolism.
3. Nutritional disease:  
Owing to lack of suitable balanced diet eg, gastroenteritis.
4. Genetic disease:  
Due to inherent susceptibility to a disease eg. melanoma in *Xiphophorus* spp.

Of all these diseases, biotic diseases are most important and merit greater attention in research. It has to be emphasized that to prevent a disease the cause has to be pin-pointed and removed. Clinical symptoms of the disease generally help to diagnose the case to a certain extent. Take the case of vibriosis. It is the detection of the aetiological agent, *Vibrio anguillarum*, which definitely confirms the disease. Such causative agents are called pathogens. However, it should be borne in mind that *anything* which causes disease is not a pathogen. Sometimes, certain phytoflagellates, for example, *Prymnesium parvum*, when present in blooms, may cause fish mortality. Here, the causative factor, the algal toxin, is lethal and is an abiotic factor but not a pathogen. A pathogen is an organism, which survives and flourishes in a host, causing clinical symptoms which result in a diseased condition. Moreover, in order to be termed an aetiological agent of a disease, the organism must satisfy certain stringent stipulations known as "Koch's postulates" which are:

1. The suspected organism should be associated regularly with all

cases of the suspected disease, and in logical pathological relationship to the disease, and its symptoms and lesions.

2. The suspected organism should be isolated in pure culture from the suspected case.
3. When such pure culture is inoculated into suitable animals, the disease should be reproduced.
4. The same organism should be reisolated in pure culture from the inoculated animals.

Only when an organism satisfies these four requisites, can it be incriminated as a pathogen causing a particular disease of biotic nature. Viral diseases such as lymphocystis, infectious pancreatic necrosis, and infectious haematopoietic necrosis, and bacterial diseases like furunculosis, tuberculosis and ulcer are typical biotic diseases.

Abiotic diseases, which can also harm and upset the fish culture systems, are anoxia, hypoxia, a dosis, alkalosis and intoxication etc. These should also be timely checked and their causes rooted out for safety.

Another aspect of prime importance for successfully managing the culture systems is to provide adequately balanced diet as any imbalance in the diet may also result in mass mortality. So, care should be taken in formulating a suitable balanced diet to avoid nutritional diseases such as avitaminosis, hypervitaminosis and dietary gill disease.

Diseases of genetic origin like certain kinds of tumours and deformities are not of serious problems as they occur only infrequently. ●