

# INTRODUCTION OF FISH MICROBIOLOGY AND PATHOLOGY

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Lecture

Prepared by:

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# INTRODUCTION TO FISH MICROBIOLOGY AND PATHOLOGY

**FIS 306**

**(3 Units) Core Course**

# OUTLINE

- Identification, morphology, classification, taxonomy and history of fish parasites.
- The ecological and pathological effects of parasites and diseases of fish.
- International restriction binding the transportation of fish across country boundaries.
- Fish ponds and public health.

# INTRODUCTION

- There is an increasing awareness of the importance of diseases as one of major detrimental factors in culturing fish.
- The development of fish health science was for many years lagging behind.
- At the same time, development of fish farming in warm water environments was not followed by parallel progress in fish health aspects.
- Our knowledge of fish diseases and pathology in inland water of Africa at this stage is still very limited, scanty and rudimentary.

- In Africa, fish are farmed predominantly by extensive methods, at low stocking densities which reduces the likelihood of epizootics by infections organisms.
- Also, in extensive culture systems unlike in intensive culture systems, risk of stress due to handling is less apparent and diet related disease are less likely to occur since fish diet largely depends on natural feeds rather than in manufactured feeds.

- Modern intensive pond fishery involves greater planting or stocking densities of fish in rearing, foraging and wintering ponds.
- The resulting closer contact between fish increases the risk of the spread of infections and invasive diseases.
- Higher densities of fish call for the introduction of large quantities of concentrated feed and mineral fertilizer.
- This results in the accumulation of zooplankton and zoobenthos which include intermediate hosts of the agents of many diseases of fish.

# Classification of Diseases

- Diseases are classified as
  - infectious,
  - parasitic,
  - non-communicable and of
  - Disease of unknown aetiology.

# Infectious diseases

- Infectious diseases are caused by
  - viruses,
  - bacteria,
  - fungi and
  - less frequently by algae.



# Parasitic diseases

- Parasitic diseases are caused by
  - protozoa,
  - helminthic disease
    - include nutritional fish diseases e.g. goitre or hyperplasia of the thyroid gland due to iodine deficiency,
  - diseases associated with physical or physico-chemical abnormalities of water e.g. gas bubble disease (nitrogen or oxygen); low temperature disease,
  - water borne irritants e.g. particulate irritants

# Phylum- Aschelminthes

- These are bilaterally symmetrical pseudocoelomates which possess a gut. This includes the class Nematode.

# Class- Nematode

- The Nematode are generally elongate worms with a cylindrical body tapering at both ends.
- The mouth is terminal anteriorly.
- The gut is clearly divided into an oesophagus and an intestine.
- The sexes are separate.

# Nematode cont'd

- The parasites of fish include:
  - Trichuridae,
  - Ascaridea,
  - spiridea,
  - filaridea and
  - Dioctophymidea

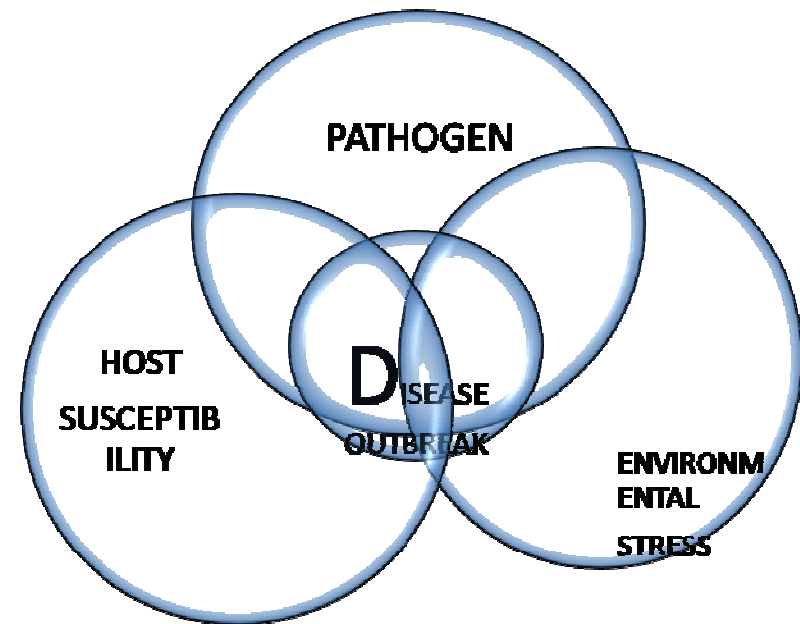
# Diseases of unknown aetiology

- Diseases of unknown aetiology include diseases for which the causative agents have not been identified.
- It includes proliferative kidney disease (proliferation of monocytes in haemopoietic tissues of spleen, kidney, periportal areas of liver) in brown trout, characterized by development of small grey erosions on head or adipose fins.

- Fish diseases do not occur as a single caused event but are the end result of interactions of the aetiological agent, the susceptible fish and a predisposing environmental condition.
- These are factors must occur concurrently in order for an infection disease outbreak to occur.
- Experienced fish famers take precautions to prevent the simultaneous occurrence of all three factors and this is regarded as preventive medicine in fish husbandry operations.

- Fish that are well fed, uncrowded and in good environment are less likely to develop disease.
- They cause problem only when fish are weakened by some outside or pre-disposing environmental factor.
- These environmental factors are generally regarded as “stressors”.
- They include temperature shock, pH variations, pollution, dietary or hormonal deficiencies.

- Stress is believed to reduce the resistance of fish to parasitism and bacterial infection. The relationship between a pathogen host and the environments can be expressed diagrammatically





- When pathogen and host are present but no favourable environment for disease, no outbreak occurs.
- Also when the environment is favourable for disease and the host is present, no outbreak of disease occurs unless the pathogen is also present.

# Parasitology of teleosts

- Many phyla of the animal kingdom have representatives which are parasitic on fish.
- The number of species of fish parasites is measured in thousands and many more remain to be discovered.
- Very few are seriously harmful to fish.
- Most individual fish in wild or cultivated populations are infested with parasites but in the great majority of cases, no significant harm appears to be caused to the host fish.

# Taxonomy of fish parasites

- Because of the great diversity of taxonomic groupings of the parasites found in fish and the dispute which surrounds their taxonomy, a detailed classification may not be possible. Parasitic diseases which are caused by protozoa and parasitic helminthes, cause great damage in pond fishing.

# Diseases caused by protozoa

- There are parasitic species in the
  - flagellates,
  - infusoria,
  - sarcodina,
  - sporozoa and
  - conidosporidia.

# Diseases caused by platyhelminths

- **Phylum-** Platyhelminthes (flat worms).
- The platyhelminths are commonly known as flatworms.
- Members of the phylum are dorso-ventrally flattened, bilaterally symmetrical and acoelomate.
- They usually lack anus and specialized skeletal, circulatory and respiratory systems.

- The great majority of the platyhelminths are monocious i.e both male and female reproductive systems occurring in the same individual.

# Class- Monogenea

- The monogeneans are mostly ectoparasites with no intermediate host involved in the life-cycle.
- They are small worms seldom exceeding 3m in length.
- They all possess a posterior organ of attachment known as the haptor armed with hooks and or clamps or suckers.
- In addition, they usually have some form of attachment organ at the anterior end.
- Other members include the Gyrodactylidae and Dactygyridae.

# Class-Trematoda (digenean)

- The digenean trematodes are endoparasites with a life-cycle involving at least one intermediate host.
- Both adult and laval metacercarial stages are found in fish.
- The metacercaria show many feature of the adult worms but usually lack fully developed reproductive systems.



- The digena include the following families:
  - Clivostomatidae,
  - strigeidae,
  - Diplostomatidae
  - Bucephalidae,
  - Troglotrematidae,
  - Opisthorchiidae and
  - Heterophyidae.

# Class- Cestoda

- The cestoda are also endo-parasite with at least one intermediate host their life-cycle.
- Usually, the body (strobila) is sub-divided into a number of segments (proglottids), each containing a single set of reproductive organs.
- The order Caryophyllidae has no segmented body.
- Scolex which is the organ for attachment is present at the anterior end.

- Larval cestodes are commonly found in fish, often encrusted amongst the viscera and musculature.
- They include the orders;
  - proteocephalidea,
  - pseudophyllidae,
  - tetraphyllidea,
  - trypanorhynchidaa and
  - caryophyllidaa.

# Larval digenetic flukes

- Many flukes are adult worms in fish-eating birds, mammals or fresh.
- Their eggs hatch in water and the swimming larvae (miracidia) must find the right species of snail to continue life.
- Multiple development occurs in the snail and eventually free-swimming larvae (cercariae) are produced.
- If the larvae find fish, they penetrate and migrate to specific parts of the fish where they become grubs (metacercariae) e.g Eye flukes

A large fluke that develops in the lens of the eye of catfish.

Heavy infections may cause blindness.

Has a concave leaflike forebody, a small hindbody and two lateral pseudosuckers near the oral sucker.

They may enter the skin anywhere but must migrate to the eye lens to develop further.

In heavy infections, lens become opaque white and fish is blinded.

Diagnosis is based on observing the flukes in the eye lens.

THANK YOU

