Discription of the fungus:-

B. sanguinis :- The causative agent of the disease grow inside the bronchial blood vessels of the gills . The fungal Hyphae were present within the bronchial B.Vs . which results in respiratory dysfunction and death of affected fish . The Hyphae are non- septated branching 0.8-34 micron in diameter grows on blood broth under 20-27 °C .

Epizootiology

The fungus affects Brackish and fresh water fish as well as aquarium fishes, especially mature ones. The disease appears in high temperature 20-22 °C , It occurs usually in farms containing high organic mater (high acidity) disturbance in hydro chemical regime , unbalanced diet , mortality may occur in two to four days, with an incidence high as 50%

Clinical and pathological lesions

The first symptoms may occurs few days (3-5 days) before death :-

-The fish cease feeding.
-Gather in groups at the surfaces.
-When the disease develops the fish gather at the inlet and die.
-The fish do not react to the approach of man and can be caught by hand.
-They do not swallow air their head is under the water surface.

Gross lesion in early stage

- Focal areas of hemorrhage.
- Peripheral whitened necrotic patches due to thrombosis and ischemia.
- Affected gills show narrow dark red stripes on the gill filaments due to the - observation of the blood vessels by the Hyphae
- The stripes become muddily gray pale pink and dark brown (dirty- dark grayish) Stripes , this is so characteristic for Bronchiomyces on the gills.
- Marbling appearance of the gills due to pale anemic patches in contacts with red congested one due to disturbance of circulation in gills.

Gross lesion in later stages-

- Necrosis of the Gills.
- The appearance as if its battened.
- The gills of recovering fish have a characteristic appearance , it looks as if pieces had been cut off them.

Microscopic pathology

- Lamellar cell proliferation .
- Fusion in gill lamellae.
- Necrotic changes in lamellar epithelium .
- Hyphae and spores can be seen.

Diagnosis : based on

- Clinical symptoms.
- Epizootiology of the disease .
- Macroscopic & microscopic examination.

Control

- Water of the affected ponds should be thoroughly drained .
- Maximum water level.
- Checking the organic content.
- Feeding and fertilizer must be stopped.
- When first symptoms of disease appear increase water flow to decrease the water temperature , dead fish must be removed immediately and not use for human conception .

Treatment : Use CaO + CuSo4

CaO 40-50 kg/ donem daily for 7 days.

CuSo4 0.5 -1 kg/ donem once

As prophelacting may from the disease We can use :-

CaO 40-50 donem every 2 weeks + CuSo4 0.5-1 kg / donem every month during the high temperature months (June, July, August, September).

Saprolegniasis (water mold)

Non systemic disease , usually localized, alocal chronic disease of fish characterized by dermal ulceration and necrosis of the muscles , the disease is also called Dermatomycosis

Description of the fungus

The fungus reproduce sexually by male and female gametes contact and asexually by spoor- forming. The organism is water mold and live on decaying of the organic material (saprophytic mold).

Epizootiology:-

Sprolegnia affects all species of farm fishes especially aged ones as well as their eggs in fish- hatcheries , and also aquarium fish. Lesion are commonly seen after handling and overcrowding conditions and after other systemic bacterial or viral diseases. The disease occurs mostly at 10-18 C.

Clinical and pathological lesions:-

- The fungal agents appear as cotton wool like trufts or layers on the skin, fins, and the gills and these are the branched- non- septic Hyphae with white grayish or brownish cotton like masses distributed on the skin , seen only when the fishes swimming in the water,
- By the time necrosis take place in the affected area due to O2 deficiency.
- The internal organs can be affected due to skin – laceration.
- Mortality rate up to 50%.
- Under P.M. examination we will see the scales lifted Away from the body wall , skin ulcerations, fin necrosis and the muscles can be affected.

Microscopic examination:-

skin sections stained with (H&E) show mycelial masses covering the necrotic epithelium.

- Increase the current of water in the farm , this cause washing off angels and increase the aoieration of farms (O2 contained) , quick lime must be used together with general prodelectic measures.

Ichthyosporediosis

This disease is a systemic granulomatus disease affecting fresh-water and aquarium fish due to the fungus *ichthyosporedium hoferi*.

Description

The development of the fungus occurs in two ways . one way at the end of the thick Hyphae appear great number of spores surrounded with a thick wall 5 micron in diameter . This undergo developing in to new Hyphae , Fig 1.

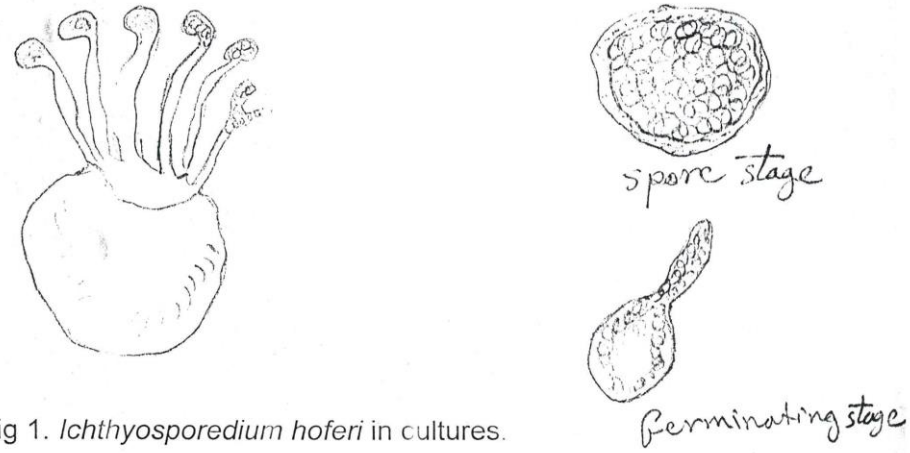

Fig 1. *Ichthyosporedium hoferi* in cultures.

Fungus having three stages of development :-

- Spore or resting stage :- This is development form in life cycle from 10-250 micron with double wall and granulated cytoplasm .
- Germinating stage:- Flask shaped , the neck of the structure constituting the formal Hyphae.
- Hyphae stage:- less frequently elongate Hyphae – non- septets vary in length to 2 mm. and of irregular width varying from 5-40 micron.

Culturing on Saborouds dextrose agar (SDA) slants with 1% bovine serum at 3-20 C optimum temperature 10C . Growth is abundant at 7-10 days . After 3-4 days bounding of the fungus occurs.

Epizootiology:-

All species of fresh water , marine and aquarium fishes , salmon fish very susceptible . the disease appears under two temperatures (3-20 C) . Transmitted through swallowing of the contaminating materials with spores which undergo germination and penetrate the internal wall circulate in the blood stream and is localized in different organs of the body . The spores reach new host after release by ulceration or death decay of original host. Also from intestinal treat . spores may remain viable and infectious in sac water under laboratory conditions for six months.

Microscopic pathology

Development stage may be found in any organ of the body including blood . Spores reported in bronchial blood vessels and can be seen by Giemsa's stained blood smears. Inflammatory cells in closed developing germinating spores , surrounding the cell wall in the form of layers (1-4 layers) . The layers are surrounded by epithelial cells. Giant cells may rarely be present , together with thin layer of fibrous tissue. This granulatous lesion is clearly seen in the muscle layer of the intestine as well as red pulp of the spleen.

Clinical pictures:-

- The symptoms of the disease vary according to the organ infected.
- Brain lesion cause marked change in the behavior (convulsion movement and rest on side) .
- In case of the damage of the swim bladder , fish lies on the bottom of the pond .
- Inflammation of the liver and kidneys associated with exophthalmoses , bristling of scales and the accumulation of the exudates in the body cavity .
- Superficial ulcer are formed when the causative agent is present in the subcutaneous layer and muscles.
- The infected fish cease feeding and emaciated.
- The skin is rough in feature described as the (sand paper effect) which usually occurs on the lateroventral tail region.

This lesion occurs 30 days after experimental feeding of the fungus.

Gross lesion :-

Raised dark round areas approximately 1mm. in diameter involving the skin giving it " sand paper effect" . Numerous nodules (1-3 mm.) similar to granulomatous of (T.B.) Tuberculosis grayish white in color are

observed in the intestinal organs especially spleen , liver , heart , kidney and mesentery .The affected organ is granular in appearance . Ulcer or abscesses of varying size appear on the skin . In aquarium fish the liver is usually affected nodules on the liver , aseites , exophthlmis , bristling of the scales.

Diagnosis :-

- Based on Clinical symptoms.
- Histopathological sections.
- Isolation of the fungus can subaurods dextrose agar media with 1% bovine serum .

Specimens of the affected organ squeezed between glass slide and cover slide and examined under microscope immediately . Spores or germinal stage of the fungus can be demonstrated .

Treatment :-

Antifungal drugs may have some effect in the early stage of the disease especially for aquarium fish but it is so expensive .

Control of the disease:-

- Infected fish should be isolated .
- Severely infected one must be condemned or bunked
- Ponds should be disinfected with quick lime.
- Before transporting the fish must be examined at least 15 specimens of each batch.

Aspergillosis

Aspergillus flavus cause granulomatus disease in farm fishes . But its afla toxins induce hepatoma (tumor in the liver).

Description of the fungus:-

Aspergillous flavus grows on ordinary sabaurouds agar media . colonies grow rapidly and the fungus form conidiophores. Condial head carries one row of stream which contains the conidia .

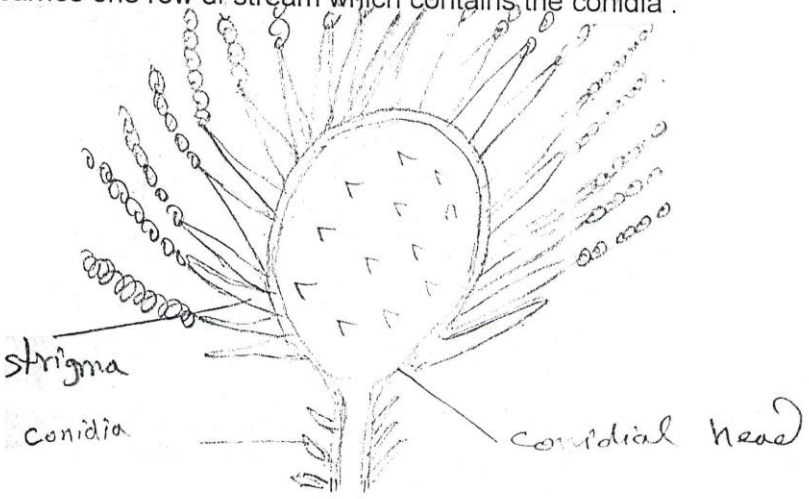

Fig.2 . Conidial head *Aspergillus flavus*.

Conidia and conidial head in early stages having yellowish coloration by time taken dark- yellow greenish coloration .

Epizootiology :-

A. flavus affects farm fish , when the fish are exhausted or in a bad condition as a result of bad environment increase alkalinity or acidity of water , increase amount of organic matters , together with changes of salinity of water and high temperature. A. flavus and its toxins (Afla toxin) contaminate the food of fish especially when the food is storaged under high humidity . After injection of contaminated food the conidia or Hyphae of the fungus penetrate the intestinal wall , circulate in blood to other organs or tissues, cause ting degeneration and necrosis .

Clinical and pathological lesions:-

- Affected fish show signs of disturbance in respiration.
- Swim at the surface of water , try to inhale air .
- Fish gather near the water inlet.
- Loose their equilibrium and lie to the back and die.
- fish cease to feed , its vitality lowered affected fish do not responded to the stimulus and even it can be caught by hand .
- In some cases ascites may be seen together with reddish patches distributed all over the color , gill cavity filled with excessive amount of mucous.
- Necrosis of the gill lamella may be seen changes may extend towards the gill arches and even necrosis may involve gill arches and gill rankers.

- Hemorrhagic areas distributed all over the skin with ulceration . Ulceration of the skin appears reddish in coloration with inflammatory zone separated it from healthy tissue, liver appear enlarged in size and hyperemic .

Microscopic pathology:-

- Reaction of the gill against mycotic invasion is very sever.
- Excessive dilation of blood vessels and lamella.
- Massive infiltration of the affected tissue with lymphocytes and histiocytes.
- Necrotic changes of gills lamellae start from based area near to the gill arch towards the free portion of the lamellae.
- Zenkers necrosis of the muscle bundles with massive invasion of lymphocytes between muscle faculae.
- The Hyphae and condia are seen in between necrotic gill tissues.
- Hyperplastic proliferation of the bile ducts with newly formed one. Excessive dilation hepatic blood vessels is usually observed.

Diagnosis:-

- Epizootiological studies.
- Clinical symptoms.
- P.M. examination.
- Histopathlogical changes.
- Isolation of the fungus.

Control:-

- Never feed fish with contaminated feed.
- Prophylaxis measures against mycotic disease.
- Performance of optimal sanitary conditions for fish culture , avoid stress factors.
- No effective treatment of the disease.