DISEASES CAUSED BY CYTOPHAGACEAE BATERIA

Family Cytophagaceae or Myxobacteria species are free living in the soil and water streams (fresh & marine) as saprophytes but under certain conditions they become opportunistic pathogens of fish and some amphibians causing high economic losses particularly in aquaculture field. They are Gram negative filamentous long-rod bacteria displaying motility by gliding. Almost all species could produce pigment (yellow, orange & red).

COLUMNARIS Disease

Mouth Fungus or Cotton wall Disease

Definition

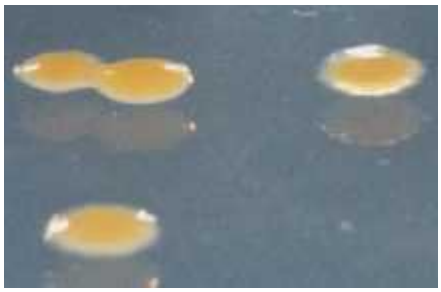
"***Sub acute to chronic bacterial disease of freshwater, brackish and marine fishes as well as aquarium ones characterized by formation of tiny wads of cotton spots on the body surface specially mouth, gills, head and fins*** ".

Etiology

Flavobater columnar (Flexibater columnaris)

Gram negative straight long rods, motile by gliding, non-spore forming, non acid fast, non capsulated and produce pigment, doesn't attack carbohydrates. The organism is strictly aerobic. It grows on Ordal's or Cytophaga agar media giving rhizoid pale yellow pigmented colonies. On sheep blood medium it grows as small smooth colonies surrounded with β-hemolytic zone.

Flavobater (Flexibater) maritimus: Cause salt water columnaris disease. It is similar to *F. columnaris* but is has an obligatory requirement for sea water.



From biochemical pathogenicity point of view the organism produces proteolytic enzymes.

Susceptibility

All fish species are susceptible to Columnaris disease particularly young and cultured ones. Freshwater fishes (e. g. Salmonids, eels, tilapia, carp, mullet, barbs). Marine fish such as sea bream and flounder.

Predisposing causes (stressors)

- Overcrowding.
- Low dissolved oxygen.
- Presence of large amount of organic matter.
- Nutritional deficiencies.
- Injuries of the skin or gill either by trauma or ectoparasites.
- **The disease is temperature-related most epizootics develop at 25° C.**
- Rough handling especially during transportation.

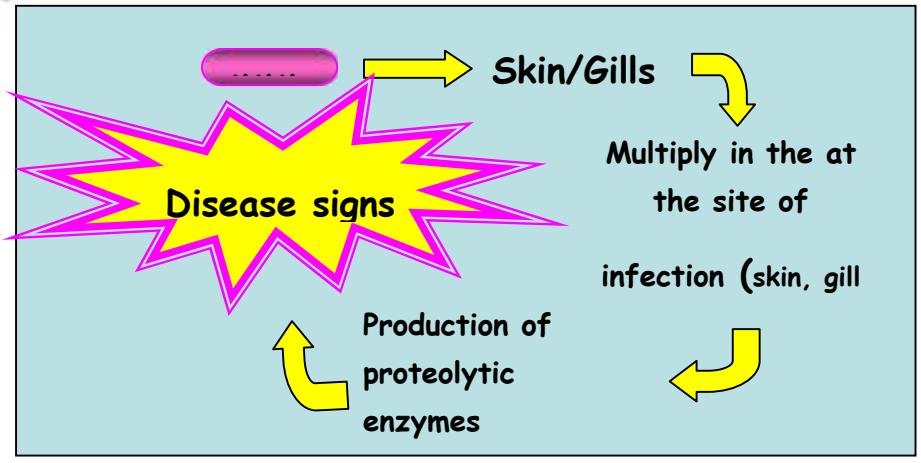
Mode of infection

Mainly through injuries of skin and/or gills.

Transmission & Source of infection

- Shaded microorganisms from infected aquatic animals, infected dead carcasses as well as polluted water with the microorganism act as the source of infection.

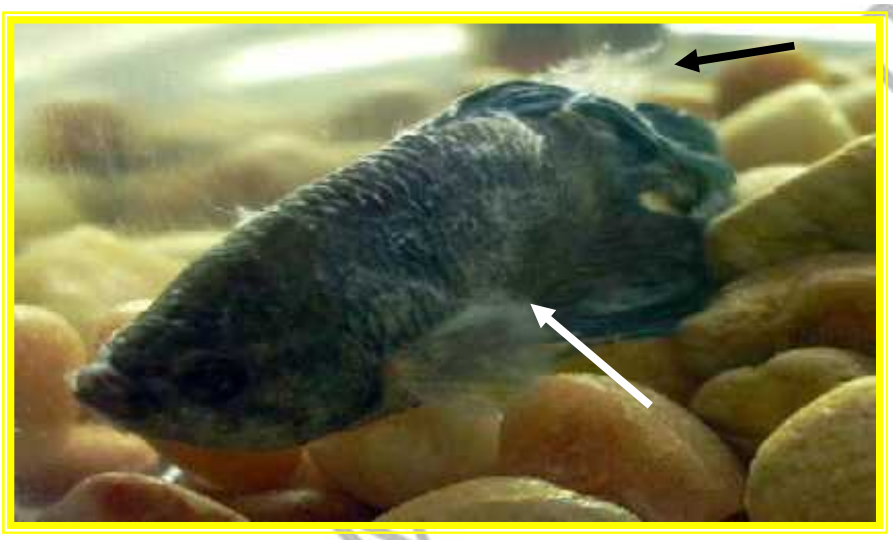
Pathogenesis



The severity of the infection depends upon the severity of the fish injuries and virulence of the bacterial strain as well.

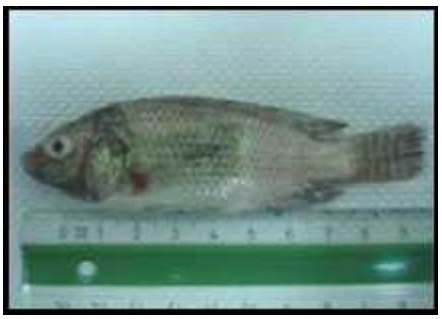
Disease signs

- Thickening of the mucous as various spots on the head, fins, mouth, operculum and around injured parts.
- Tuffs or flaks of epithelia and bacteria appear loosely attached to the affected parts as tiny wads of cotton.

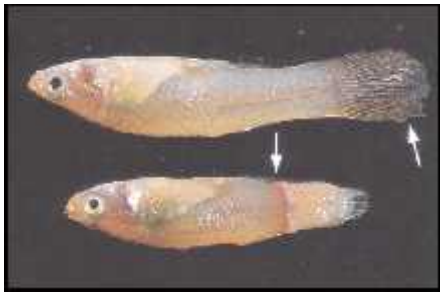


- Affected gills lamellae become clumped and eroded, which under go sloughed as actual loss of gill tissue.

- Grayish white discoloration on the outer margin of the fins that gradually spread and the body surface appears to be covered with mucus.



- Sever cases exists necrosis of the skin in the back region with appearance of small flaks of tissue dangling in the water.



- ***Scale-less fish:*** The lesion usually appears as small circular with grayish blue center and red margin between dorsal fin and caudal fin giving the syndrome namely "***Saddle back Disease***"
- ***In salt water columnaris:*** Slight blistering of the skin surface, which under go destructed leaving row hemorrhagic dermal surface.

N. B: ***Bactriaemia usually associated with excessive necrosis of the skin and gills.***

Mortalities are usually due to:

- **Osmoregulatory failure (Skin Lesion).**
- **Asphyxia and loss of excretory function (Gill Lesion).**
- **Bacterial toxins (Bacteriaemia).**
- **Toxic katabolic substances by the host body resulted under effect of photolytic enzymes of *F. columnaris***

Gross Pathology

- Clumped and eroded gills, which under go sloughed with different degrees of actual loss of gill tissue.
- Erosions of the fins, mouth and skin with different degrees according to the severity of the infection.
- Usually no internal lesion.

Microscopic Pathology

- ***SKIN*****,** Epidermal necrosis, peripheral hyperemia and hemorrhages.

- ***GILLS*****,** hyperplasic proliferation of gill epithelium with dilatation of blood vessels. Fusion of the secondary gill lamellae together with different degrees of gill necrosis.

Diagnosis

I. Case history revealed that:

- Cessation of feeding or the fish refuse the food.
- Sluggish swimming and the fish swimming just below the water surface dangling a cotton wall materials from their body surface and/or mouth opening.
- Presence of mortalities.

II. The disease signs

III. The P. M. findings.

IV. Laboratory diagnosis:

- ***Wet mount preparation:*** from Skin and gill scraping, and pieces of damaged fins directly examined under microscope. Presence of **hay sticks** bacterial colonization is definitive.
- Smear stained with Gram.
- Isolation and identification:

  Ordal's or Cytophaga agar media and Sheep blood agar at 25-28º C for 24-36 hours giving rhizoid pale yellow pigmented colonies. On sheep blood medium it grows as small smooth colonies surrounded with β-hemolytic zone.
- **Identification** through using biochemical tests, API kits, gel-diffusion test, FAT, ELISA, and PCR (polymerase chain reaction).
- Histopathological findings (as mentioned above).

Therapy & Control

Chemotherapy

- In early stages of infection antiseptic bathes are recommended.
- Cupper sulphate 40-500 mg/L for 1 min.

- Potassium permanganate 2mg/L indefinite.
- Hydrogen peroxide 20ml of 3%/L for 10-15 min.
- Furance (nitrofuran) 1.5mg/L for 1hour for 3 successive days.
- Oxytetracycline 55mg/Kg fish in the food for 10 days.
- Sulfamerazine 264mg/Kg fish in the food for 3 days followed by 154mg/Kg fish for additional 11 days.

Control

Good hygiene and removal of all stressors is the proper way for disease control this can be achieved through:

- Avoid overcrowding.
- Proper disposal of dead and dying fishes either by burning or burying.
- Control of aquatic animals such as reptiles and amphibians.
- Destruction of the carriers and disinfectant of the eggs.
- Proper disposal of infected fish if in small number.
- Proper drainage, drying, and disinfectant of the pond (quick lime 4 tone/acre.
- Vaccination using oral bacterine, hyperosmotic infiltration poly-vaccine.

Peduncle Disease

Cold water Disease, Fin Rot

Definition ***"Chronic bacterial disease affects mainly cool and cold water fishes, characterized by destruction of the caudal fin as well as muscular layer of the caudal peduncle ".***

Flexibater psychrophilus:

Etiology

Gram negative straight long rods, motile by gliding, non-spore forming, non acid fast, non capsulated and produce pigment. It grows on Ordal's or Cytophaga agar media giving yellow pigmented colonies. Generally, grow well at 4-24° C (cold water), however, some strains are reported to grow at 20-32° C (warm water).

From biochemical pathogenicity point of view the organism produces proteolytic enzymes.

Susceptibility

All cold and cool water fish species are susceptible particularly young and cultured ones. (e. g. Salmonids, Ayo, carp).

Aquarium fishes are susceptible to warm water strains.

Predisposing causes (stressors)

- Overcrowding.
- Low dissolved oxygen.
- Presence of large amount of organic matter.
- Nutritional deficiencies.
- Injuries of the skin or gill either by trauma or ectoparasites.
- **Low temperature.**
- Rough handling especially during transportation.

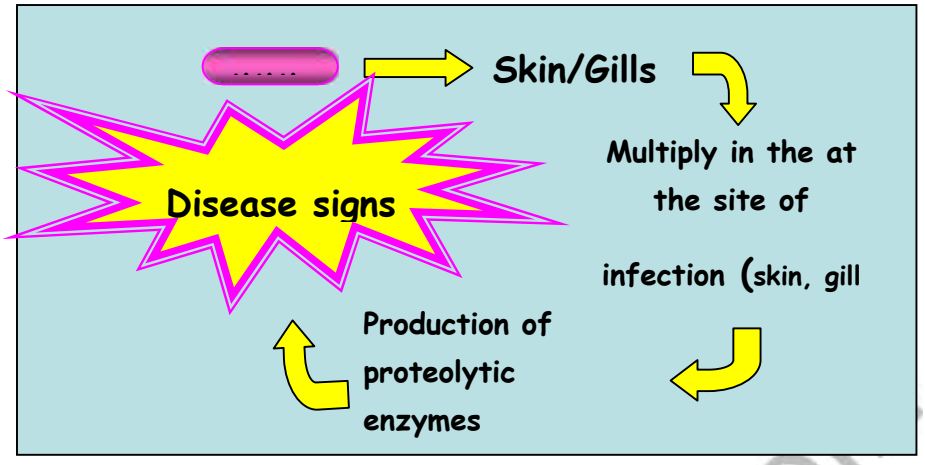
Mode of infection

Mainly through injuries of skin and/or gills.

Transmission & Source of infection

- Shaded microorganisms from infected aquatic animals, infected dead carcasses as well as polluted water with the microorganism act as the source of infection.

Pathogenesis



The severity of the infection depends upon the severity of the fish injuries and virulence of the bacterial strain as well.

Disease signs

- White to gray line start along the margin of the caudal fin and gradually extend towards the base of the fin, caudal peduncle and so on……
- Destruction of the caudal fin, which usually extend to include muscles of the caudal peduncle.

- In sever cases exposure of the vertebral column may occur.

Diagnosis

- I. Case history

II. The disease signs

III. The P. M. findings.

IV. Laboratory diagnosis:

Wet mount preparation: from Skin and gill scraping, and pieces of damaged fins directly examined under microscope.

Presence of **hay sticks** bacterial colonization is definitive.

- Smear stained with Gram.
- Isolation and identification:

  Ordal's or Cytophaga agar media and Sheep blood agar at 10-15 ºC for 24-36 hours giving rhizoid pale yellow pigmented colonies (orange to red color also recorded).
- **Identification** through using biochemical tests, API kits, gel-diffusion test, FAT, ELISA, and PCR (polymerase chain reaction).
- Histopathological findings (as mentioned above).

Therapy & Control

Chemotherapy

- In early stages of infection antiseptic bathes are recommended.
- Cupper sulphate 40-500 mg/L for 1 min.
- Potassium permanganate 2mg/L indefinite.
- Hydrogen peroxide 20ml of 3%/L for 10-15 min.
- Furance (nitrofuran) 1.5mg/L for 1hour for 3 successive days.
- Oxytetracycline 55mg/Kg fish in the food for 10 days.
- Sulfamerazine 264mg/Kg fish in the food for 3 days followed by 154mg/Kg fish for additional 11 days.

Control

Good hygiene and removal of all stressors is the proper way for disease control this can be achieved through:

- Avoid overcrowding.
- Proper disposal of dead and dying fishes either by burning or burying.
- Control of aquatic animals such as reptiles and amphibians.
- Destruction of the carriers and disinfectant of the eggs.

- Proper disposal of infected fish if in small number.
- Proper drainage, drying, and disinfectant of the pond (quick lime 4 tone/acre.
- Vaccination using oral bacterine, hyperosmotic infiltration poly-vaccine**.**

Bacterial Gill Disease

BGD, Environmental Gill Disease

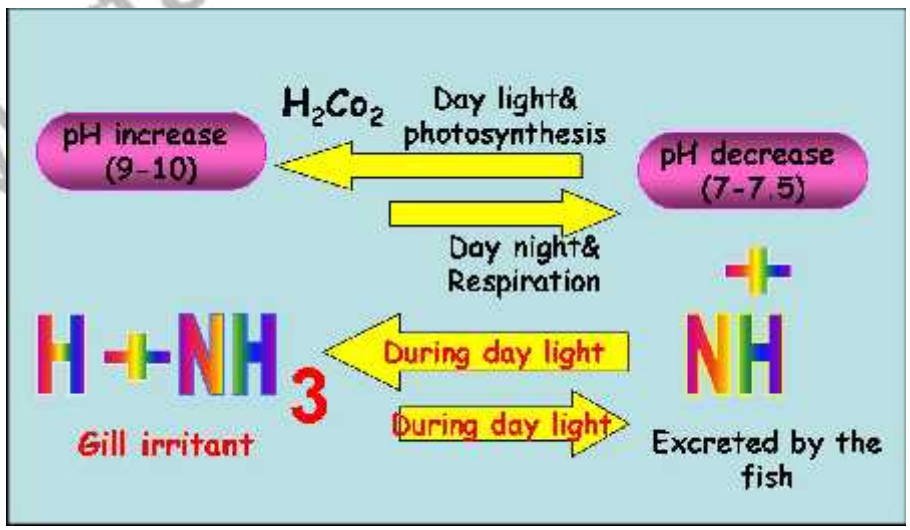
Definition

"Chronic to acute disease affects all fishes, characterized by different degree gill fusions accompanied with different degree of respiratory distress together with high morbidity and 25%-mortality".

Etiology & Pathogenesis

Flexibacteria, and other opportunistic pathogens such as Aeromonads, Pseudomonades, Flavobacteria …..etc, invade the gill epithelium resulting in epizooticof BGD.

Often a single bacterial specie or strain is involved during any epizootic.



Any shift of the pH (due to presence of aquatic plants) will shift ammoni-ammoium ions leading to gill irritation.

Susceptibility All fish species are susceptible particularly young and cultured

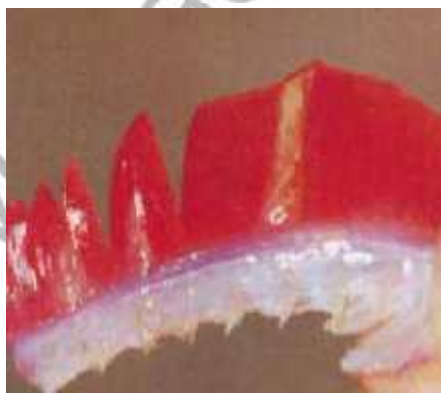
ones.

Predisposing causes (stressors)

- Overcrowding.
- Low dissolved oxygen.
- **Presence of large amount of organic matter.**
- **Nutritional deficiency specially** Pantothenic acid**.**
- Injuries of the skin or gill either by trauma or ectoparasites.
- **High temperature.**
- Rough handling especially during transportation.

Disease signs

- Fish stop feeding suddenly, swim sluggish, surfacing, accumulate near the water inlet.
- ***Increase mucous secretion by the gill.***
- In advanced cases, the gill lamellae clubbed, swollen and fused.
- Mortalities percentage is depends upon the severity of gill affections and/or super-invasion with opportunistic pathogen but never exceed 30%.



Diagnosis

- I. Case history

II. The disease signs

III. The P. M. findings.

IV. Laboratory diagnosis:

Wet mount preparation: from Skin and gill scraping, and pieces of damaged fins directly examined under microscope.

- Smear stained with Gram.
- Isolation and identification:

  Ordal's or Cytophaga agar media, R-S media, BHI.

  at 20-25 ºC for 24-36 hours.

- **Identification** through using biochemical tests, API kits, gel-diffusion test, FAT, ELISA, and PCR (polymerase chain reaction).
- Histopathological findings (as mentioned above).

Therapy & Control

Chemotherapy

- Increase water flow is indicative and may relieve the signs.
- If a pathogen is isolated antiseptic bathes are recommended.
- Cupper sulphate 40-500 mg/L for 1 min.
- Potassium permanganate 2mg/L indefinite.
- Hydrogen peroxide 20ml of 3%/L for 10-15 min.
- Furance (nitrofuran) 1.5mg/L for 1hour for 3 successive days.
- Oxytetracycline 55mg/Kg fish in the food for 10 days.
- Sulfamerazine 264mg/Kg fish in the food for 3 days followed by 154mg/Kg fish for additional 11 days.

Control

Good hygiene and removal of all stressors is the proper way for disease control this can be achieved through:

- Avoid overcrowding.
- Supplementation with a good balanced ration.
- Avoid accumulation of high organic matter especially at hot

season.

- Control the rates of fertilization especially during summer season.
- Proper disposal of dead and dying fishes either by burning or burying.
- Partial change of the water during the summer season together with periodical examination of the phytoplankton concentrations using transparency disk.
- Proper disposal of infected fish if in small number.
- Proper drainage, drying, and disinfectant of the pond (quick lime 4 tone/acre.