

2- Parasitic diseases

These diseases are most frequently caused by small organisms called parasites which live in the aquatic environment. There are a variety of parasites which infest the gills and skin of fish causing irritation, weight loss and sometimes death. Most parasites infections are relatively easy to control using standard fishery chemicals. Usually parasites need to avoid killing their hosts, since extinct hosts can mean extinct parasites. Parasites can be internal (endoparasites) which live in the tissues, blood and/or organs including the gastrointestinal tract like nematode or external (ectoparasites) which live on the outside of the host including the gills, mouth, skin and fin surfaces like monogeneans and copepod. Most fish parasites would not develop in humans unless it was eaten raw, none are harmful to humans if the fish are thoroughly cooked.

Some of the more common parasites found in freshwater fish are listed as follows:

External Parasite	treatment
<i>Ichthyophthirius multifiliis</i> & <i>Trichodina</i> & <i>Ichthyobodo</i> & <i>Tetrahymena</i>	Salt, formalin, malachite green, other commercial products
Gill flukes, skin flukes	Copper, malachite green, formalin
External protozoa, flukes	Malachite green and formalin, others
dinoflagellates	Antiparasitic medication, salt, copper
Fish lice, gill maggots	formalin, potassium permanganate, metrifphonate
Anchor worms	organophosphate, manual removal and then dip with antiseptic
Internal Parasite	treatment
<i>Hexamita</i> & <i>Spirotrunculus</i>	Metronidazole, other commercial products
Blood parasites	If flukes: praziquantel, others difficult to treat
Nematodes (roundworms)	remove dead fish, piperazine
Spiny-headed worm	Appropriate anthelmintic drag
Tapeworms	Praziquantel
Digenetic flukes	Difficult to treat, praziquantel

The major parasitic pathogens

1. Protozoa
 - a. Ciliates
 - i. *Ichthyophthirius multifiliis*.
 - ii. *Chilodonella* *sp.*
 - iii. *Tetrahymena* *sp.*
 - iv. *Trichodina* *sp.*
 - v. *Ambiphyra* *sp.*
 - vi. *Apiosoma* *sp.*
 - vii. *Epistylis* *sp.*
 - viii. *Capriniana* *sp.*
 - b. Flagellates

- i. *Hexamita sp.*
- ii. *Ichthyobodo sp.*
- iii. *Piscinoodinium sp.*
- iv. *Cryptobia sp.*
- v. *Myxozoa sp.*
- vi. *Microsporidia sp.*
- vii. *Coccidia sp.*
2. Monogenean trematodes
 - a. *Dactylogyrous sp.*
 - b. *Gyrodactylus spp.*
3. Digenean trematodes
4. Nematodes
5. Cestodes
6. Parasitic Crustacea
 - a. *Ergasilus sp.*
 - b. *Lernaea sp.*
 - c. *Argulus sp.*
7. Leeches.

ICHTHYOPHTHIRIASIS (WHITE SPOT DISEASE) (Ich)

It is one of the most prevalent disease affecting all types of cultured fish, caused by *Ichthyophthirius multifiliis*, characterized by presence of white spots all over the external body surface (skin, fins, gills and body surface), the outbreaks of this disease lead to mass mortality and reduce the growth rate of fish.

Ichthyophthirius multifiliis its protozoan ciliate, round to oval in shape, the body surface covered with cilia. The parasite needs 3 day to 5 weeks to complete its life cycle depends on water temperature.

The disease **is transmitted** through direct and indirect contact with infected fish or by water act as vehicle for spreading the infection.

This disease (**Clinical signs**) is characterized by appearance of white spots on the skin, gills, fins and cornea of the eye, the white spots appear as white specks on their skin as though they were sprinkled with salt. The fish react to the infestation of parasites by irritation, rubbing on the bottom, swimming violently and holding the fins close to the body. When the gills become infected, they appeared pale in color and swollen, respiration become difficult and the fish aggregate at the water inlet and die.

To prevent this disease, the main steps must be carried out are decrease of stocking rate of fish in pond must be done, increase of water inflow to the pond, dead fish should be removed, wild fish should be prevented from entry through water inlets.

There is no chemical available that kills the trophonts in the skin of the infected fish without killing the fish too. Thus, **the treatment** goes forward to all unprotected stages (protomont) of the parasite in water like sodium chloride by short baths at a level of 1.5 to 2.5% for 10 to 30 minutes/ 7 days., Potassium permanganate the does is 2 ppm for scaleless fishes and 2 to 5 ppm for scald ones as continuous treatment., Formalin with 15 to 25 ppm.



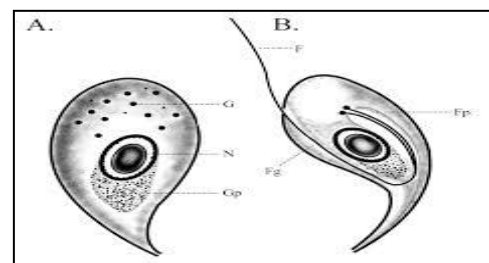
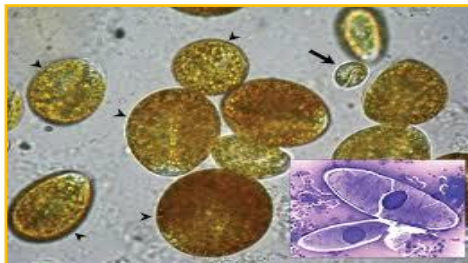
ICHTHYOBODOOSIS (COSTIASIS)

It is one of the more common disease caused by heavy infestation of *Ichthyoboda* (*Costia*), affecting the most species of fish in aquarium.

There are two species of *Ichthyoboda* are responsible for ichthyobodoosis. *Ichthyobodo necator* and *I. pyriformis*. its protozoan flagellate, small, bean-shaped. It has two flagella; the parasites are **transmitted** from fish to other through water.

Clinical signs of the infected fish may roll in the water and rub against immersed object and sides of tank this due to skin irritations caused by the parasite, thickening of the mucous at the different parts of the body and fins lead to form dull spots on infested part. The gills are usually swollen and sometimes covered with mucous lead to respiratory distresses, damage of fins may be occurred and fish become unable to maintain an upright position or to swim to the water surface.

To prevent this disease must provide good environmental and nutritional conditions in the pond, water supply assists in control of the infection. All equipment should be disinfected before and after using, rising of water temperature above 30C helps in control the infection. Care must be taken so that the parasites are not transmitted by wild fish. Use formalin by bath method. Sodium Chloride 10-15 gr/l for 20-30 minutes or 2 gr/l for 10 hours. Acriflavine 10 mg/l for 10 hours by bath method.



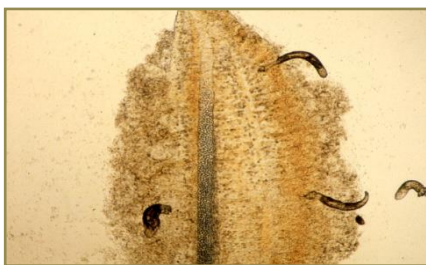
DACTYLOGYROSIS (GILL FLUKE)

The disease caused by the genus *Doctylogyrus*, this genus belongs to monogenetic trematodes that are usually found as ectoparasites of fish, it has direct life cycle. affecting the fresh water & marine water fishes. There are several recognized species from *Dactylogyrus*, like *D.vastator*, *D.extensus*, *D.anchoratus*, *D.lamellatus* etc.). All species have seven pairs of marginal hooks and usually one pair of median hooks. They have two to four eyespots located on the anterior of the body. The disease was known as gills flukes because of most are located on the gills of their host.

Transmission of monogenetic trematodes occurred from fish to other by direct contact or contaminated water.

The Clinical signs of infected fish are the gills are pale and covered with mucus, fish gasp for air and their respiration is impeded, dark coloration can appear among the diseased fishes. At the point of attachment of the parasites there is destruction of the epithelium & disruption of tissues, Hyperplasia and necrosis of the gills may occur.

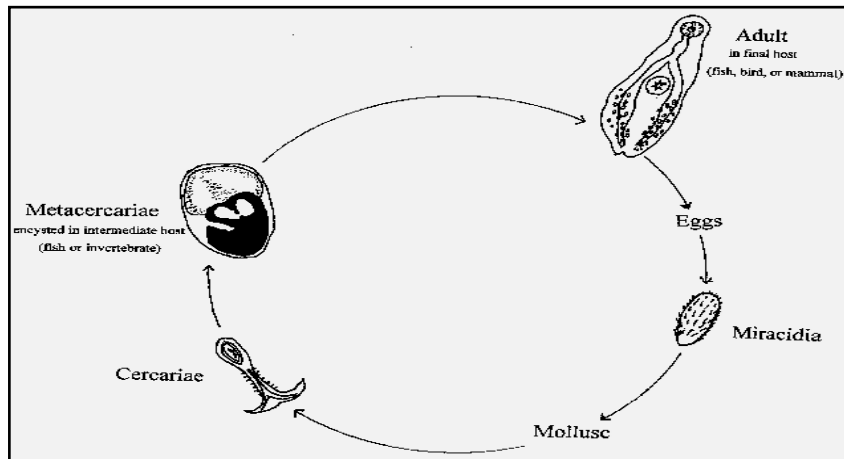
To Prevent and control this disease, the Good management & nutrition help in control of the infection. Nurseries and rearing ponds must be supplied with water free from parasites. The introduction of exotic fish must be prevented can be carriers of parasites. The diseased fish is treated with Sod. Chloride: 2.5% for 1 hour by bath. Mebendazole: 1mg/liter for 24 hours by bath method. glacial acetic acid: 1 to 2 ml/L for 1-10 minutes by bath method.



DIGENEAN TREMATODE INFESTATION

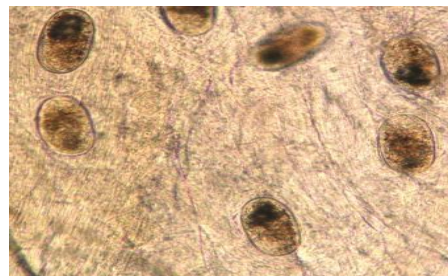
Digenea are common parasites in wild fish, it is endoparasitic flukes and have an indirect life cycle, about 1700 species of adult digenea infest fish. The Life cycle of digenea is summarized as follows:

Adult digenea (Fish, birds or mammals) → Eggs (large and operculated) → Hatch to Miracidia infect a mollusk (snails) → the miracidia develop into cercaria penetrating the fish to form encysted metacercaria the infested fish are eaten by the final host.



Common Clinical signs are migration of the cercaria causes hemorrhages, necrosis and inflammation along the migration path, White nodules found in skin, muscles or viscera or other parts of the body, the color of lesions depends on the color of the worm and/or the host reaction. Sometimes the cercaria infest the eye of the fish causing blindness and the fish cannot find the feed. metacercaria cause severe gill damage, hypoxia and mortality. In case of heavy infestation, death of the fish may occur especially small fish.

there is no therapeutic drug for treatment of the metacercaria stages of trematodes in fish. Eggs of the parasites and snails can be killed by draining, drying, or freezing the ponds or by use some chemicals as copper sulphate 5mg/l.



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