

***Ichthyophthirius multifiliis* (ich, ick, fish white-spot disease)**

cellular organisms - Eukaryota - Alveolata - Ciliophora - Intramacronucleata - Oligohymenophorea - Hymenostomatida - Ophryoglenina - Ichthyophthirius - Ichthyophthirius multifiliis

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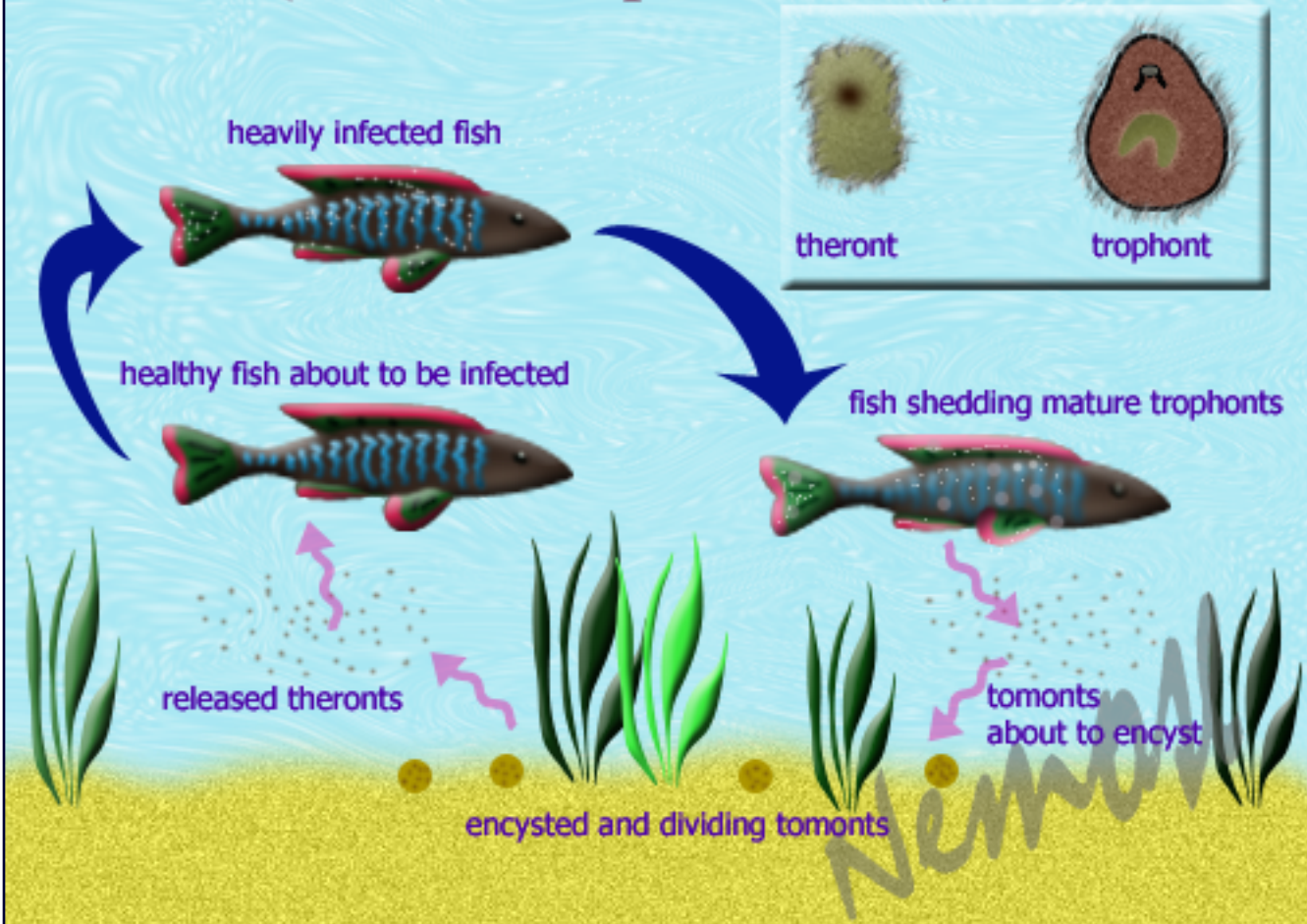
Brief facts

- *Ichthyophthirius multifiliis* (described by Fouquet in 1876), a ciliate protozoan, causes white-spot or ich disease in fresh water fish. It has extremely low host specificity and can infect virtually any fresh water fish species. Unlike apicomplexan parasites, such as *Plasmodium* or *Toxoplasma* species *I. multifiliis* is not intracellular parasite.
- The scientific name of the parasite is translated as "the fish louse with the many children" reflects its reproductive capacity.
- Concentration of the parasite in wild populations is low and massive mortalities from the infection are rare. In closed systems (ponds, fish farms, ornamental fish tanks) ich infection can lead to rapid fish death and devastating economic losses.
- The most common treatments for white-spot disease in fresh water fish are: raised temperature, raised NaCl concentration,

formalin, and malachite green (banned in many European countries). First two treatments are especially effective in combination. Fish species respond differently to different medications. It is very important to research effects of high temperature and chemicals on each fish species because some treatments can cause acute distress and might kill fish quicker than the disease would. For example, scaleless fish cannot tolerate malachite green. Cold-water fish might suffer from high temperature.

- Recovered specimens can acquire various degrees of immunity against the parasite. Fish farms may choose to immunize cultured fish (theronts injected intraperitoneally into fish elicit protection). Vaccines against *I. multifiliis* are under development.

Life cycle of *Ichthyophthirius multifiliis* (ich, white-spot-disease)



Developmental stages

Life Cycle Stages

At 24-26°C the entire life cycle may take four days, but at 7°C as many as 40 days may be required.

- free-swimming stage

- theront

at 20°C theronts lose their ability to infect the host within 24 hours after release from the reproductive cyst; theronts penetrate epithelium of the host very quickly (within 5 minutes); the parasite invasion is usually restricted to epithelium of skin and gills; the theront destroys cells in the process of establishing itself in the host; in the host theronts become parasitic trophonts; developing trophonts cause localized tissue necrosis; the host dies from secondary microbial infections and osmoregulatory failure

- parasitic stage

- trophont

although, immediately after invasion the trophont is surrounded by destroyed cells, intact epithelium overlies the parasite within 45 minutes of entry; trophonts grow and feed within epithelia (skin, gills, and buccal cavity) accumulating nutrients required for following non-feeding stage and can grow up to 1 mm in diameter; each "white spot" represents a maturing trophont(s) within the skin; mature trophonts rupture epithelia and exit the host

- non-feeding stages

- tomont

- free-swimming tomont

exited trophonts for a short time become free-swimming tomonts which settle on the substrate and encyst

- encysted and dividing tomont

inside the cyst the tomont divides repeatedly to produce daughter cells, tomites; the number of tomites varies between 50 and a few thousand; tomites exit the cyst and differentiate into next generation of theronts; the time required for the tomont division and release of theronts is temperature-dependent: from 9 days at 5°C to 18 h at 25°C

References

PubMed articles

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