The Impact of Bryozoans on Zebrafish Systems and Possible Mitigation Solutions

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BACKGROUND

- Bryozoans are microscopic aquatic invertebrates that live in colonies.
- They have adaptations to marine and fresh-water systems and can reproduce both sexually and asexually. The most unique way being through statoblasts, a hard seed-like pod created in their bodies that can withstand the variable conditions of freshwater systems.
- Statoblasts can survive for years in unfavorable conditions, allowing them to restore the colony whenever conditions improve.
- Statoblasts can also survive the digestive tract of zebrafish, so they can be introduced to a system by adding fish or water from an infected system.

Figure 1: A single bryozoan with a scale for size.

Figure 2: A colony of Bryozoa on a tank wall.

PROBLEM

Figure 3: A statoblast under a microscope.

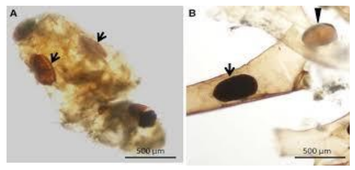

Figure 4: How to identify statoblasts, with a scale for size.

- Bryozoans may serve as a vector for other pathogenic species.
- They are a fouling species notorious for clogging pipes, filters, and pumps which can cause system failures if left unchecked.
- Due to the vast and unique ways they reproduce, it is difficult to eradicate colonies once they are established.
- Statoblasts are very hardy, with very little information on how to kill them.

OBJECTIVE

- Reduce harm to zebrafish systems by determining strategies to mitigate the issues caused by bryozoans.

SOLUTIONS

Figure 5-6: A sump before and after cleaning.

Figure 7: Our facility's chart to track monthly tank changes.

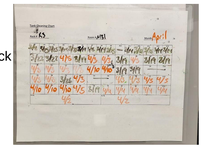

Figure 8: Our facility's bleach baths.

Figure 9: Our dishwasher for cleaning zebrafish supplies.

Tailored Feeding Plans

- Adjusting feeding schedules to reduce overfeeding can decrease excess resources that encourage bryozoan growth

Extra Filtration

- Filter mesh smaller than 0.09mm can be placed strategically to keep statoblasts from spreading further throughout the system

Diligent Cleaning efforts

- Cleaning the sump weekly to scrub and siphon live bryozoans off surfaces
- Scrubbing and siphoning excess food out of juvenile tanks and tanks with small populations
- Replacing tanks monthly to kill any new bryozoan colony grow

Heat/Chemical Treatments

- Soaking dirty tanks in 5% bleach baths for 30mins-1hr to kill live bryozoans
- Hot water rinses (1hr) in a dishwasher between 60-72C to sanitize tanks and kill live bryozoans

Figure 10: Our facility's color-coded guide to manage feeding plans.

Figure 11: Bryozoan colony clinging to a pipe inside of the sump.

CONCLUSION

- While the chances of eradicating bryozoans are low once they are introduced, the problem can be managed.
- Diligent cleaning efforts help remove live bryozoans from surfaces.
- Hot water and chemical disinfection can kill live colonies that aren't removed through scrubbing by hand.
- Tailored feeding plans reduce the excess resources that can encourage bryozoan growth.
- Extra filtration can catch and remove statoblasts to prevent new colonies from forming.

FUTURE DIRECTIONS

- Future research should be conducted to determine effective methods for killing statoblasts that are also safe for the zebrafish.
- Various approved tank cleaning solutions should be tested for their effectiveness against bryozoans and statoblasts.

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