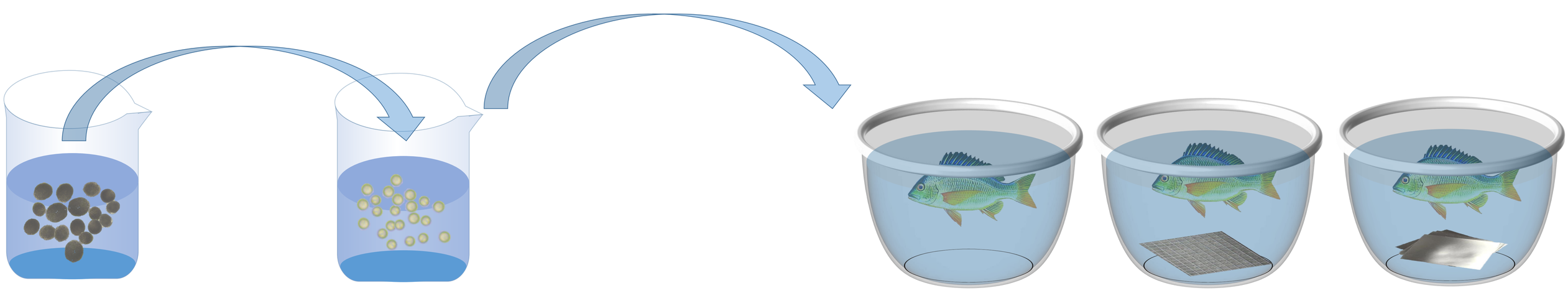
Galvanized material is a promising approach to control *Amyloodinium ocellatum* infection in fishes

Zhi Luo[1], Zhihong Zhong[1], Anxing Li*

State Key Laboratory of Biocontrol/Guangdong Provincial Key Laboratory of Improved Variety Reproduction in Aquatic Economic Animals and Institute of Aquatic Economic Animals, School of Life Sciences, Guangdong Province, Sun Yat-Sen University, Guangzhou, 510275, People's Republic of China.

Abstract

Amyloodinium ocellatum is a parasitic dinoflagellate, which can invade the skin, gills, and fins of marine and brackish water fish and cause amyloodiniosis. The *A. ocellatum* lifecycle is direct but triphasic, comprising trophont, tomont, and dinospore. Our previous study found that galvanized materials bedded on the seawater can control the infection of *Cryptocaryon irritans*. Similarly, galvanized materials may be a potential control strategy to prevent amyloodiniosis. This study evaluated the efficacy of the seawater immersed with galvanized materials (IGM seawater) in controlling *A. ocellatum* reinfection. Furthermore, the toxicity of IGM seawater to the dinospores infectivity, tomonts development, and trophonts parasitism was determined. The results revealed that the IGM seawater significantly decreased parasite abundances and protected the infected fishes. The infectivity of dinospores was significantly inhibited in the [0.4–2 d] group by 89.50% and the reduction of trophonts was 46.24%. The zinc ion concentrations in the IGM seawater were continuously increased. While the expression of zinc transporters in the liver of *A. latus* was significantly down-regulated. Therefore, *A. latus* acclimatizes to a high-zinc environment by reducing zinc ions influx to maintain intracellular zinc homeostasis. These results imply that using galvanized material is a promising approach to controlling *A. ocellatum* infection in fish.



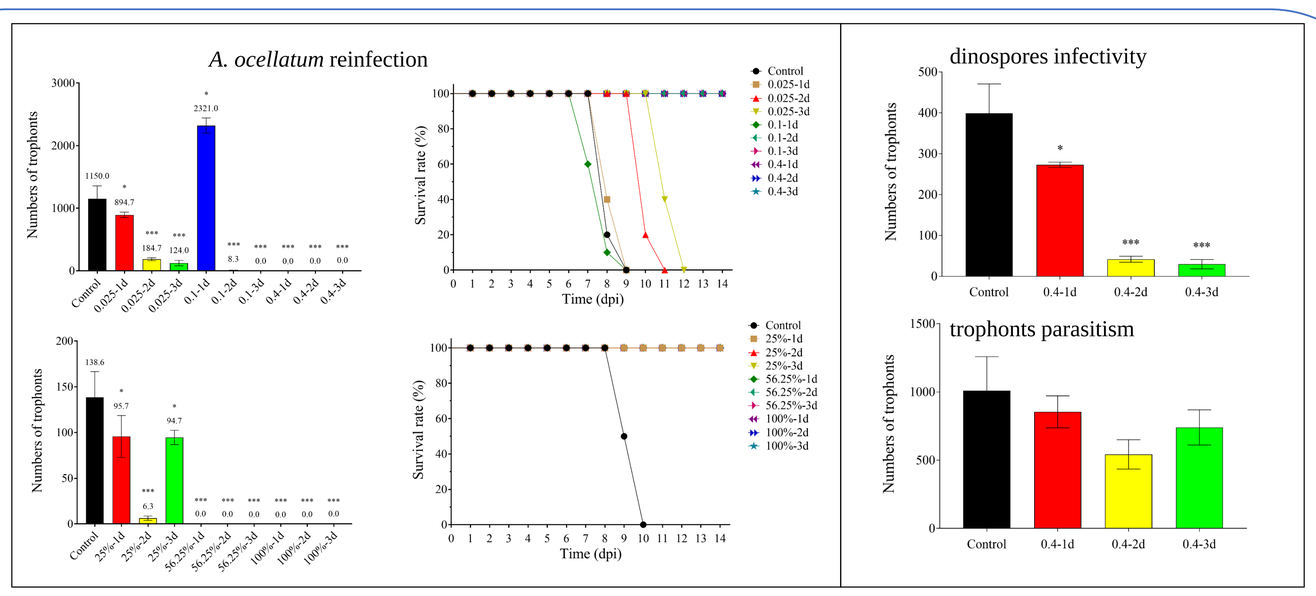


Figure 1. The effect of the IGM seawater on controlling *Amyloodinium ocellatum* reinfection, dinospores infectivity and trophonts parasitism.

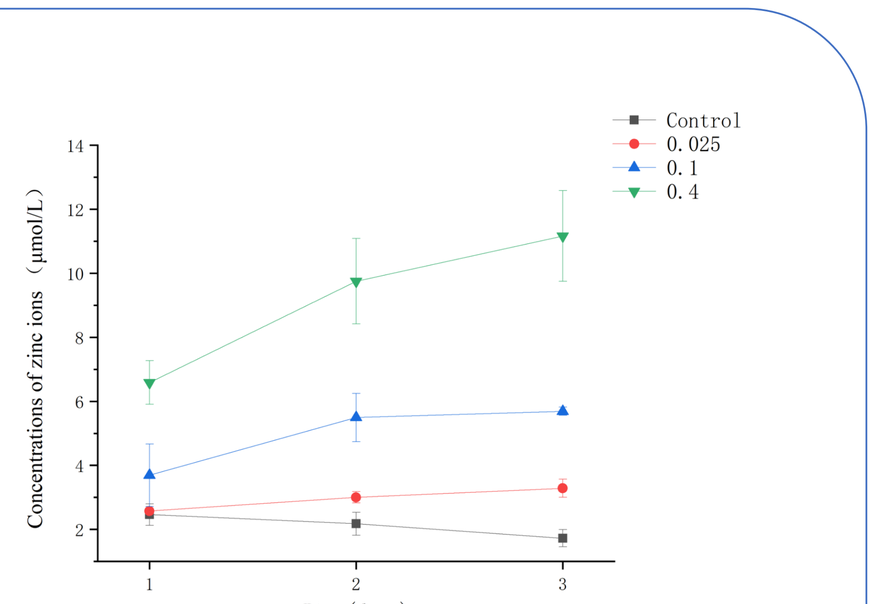


Figure 3. The concentrations of zinc ions in seawater immersed with galvanized iron meshes

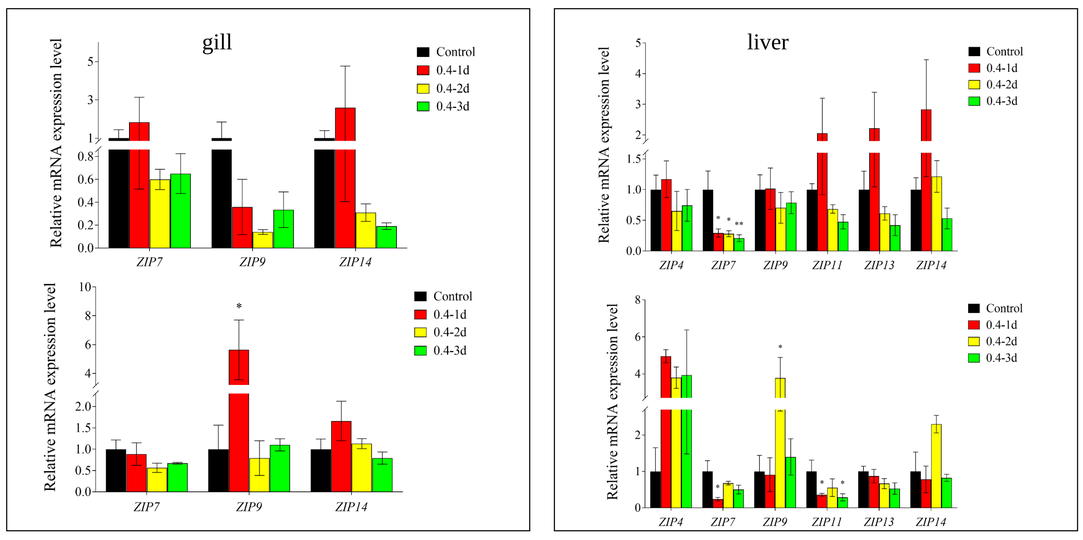


Figure 2. The relative mRNA expression level of zinc transporters in the gill and liver of *Acanthopagrus latus* reared in the IGM seawater.

Result

- The parasite abundance of *A.latus* infected with *A.ocellatum* were significantly decreased with galvanized iron meshes and plates.
- The survival rates were 100% when 0.4m^2/m^3 galvanized iron meshes bedded on seawater or 56.25% of tank was covered with galvanized iron plates.
- The infectivity of dinospores was significantly inhibited in the [0.4–2 d] group by 89.50% and the reduction of trophonts was 46.24%.

Conclusion

This work illustrates the antiparasitic potential of galvanized materials on *Amyloodinium ocellatum*, a ectoparasite. Using galvanized materials in aquaculture facilities or commercial products may be a potential control strategy to prevent and treat Amyloodiniosis.

Acknowledgements

Professor Anxing Li