Effects of Disease Treatments on Captive Coral Health

IAAAM 2013

Ilze K. Berzins[1]*; Paul Anderson[1]; Kathy Heym[1]; Roy Yanong[2]

[1]The Florida Aquarium, Tampa, Florida, 33602, USA; [2]Tropical Aquaculture Laboratory, University of Florida, Ruskin, Florida, 33570, USA

Abstract

Current research in diseases of wild and captive corals is focused on disease incidence, etiology, progression, and host/pathogen dynamics. Disease treatments originates from hobbyist experience[3,8] and currently guides veterinary prescription.[9] Treatment efficacy and effects on corals are still largely untested in controlled experiments.

In this study, the effects of four common treatments (chloramphenicol, Lugol's iodine, freshwater dips, milbemycin oxime (Interceptor™) were evaluated on an Atlantic coral, *Stephanocoenia intersepta*, commonly known as the blushing star coral. Previous research has demonstrated that this species is a good candidate for aquaculture, restoration, and transplantation to wild reefs.[2] Chloramphenicol is a broad-spectrum antibiotic that is prescribed to treat rapid tissue necrosis. Lugol's iodine is a strong oxidant, a broad-spectrum antiseptic, and cauterizes damaged tissues. Freshwater dip is a readily available treatment used to reduce or eliminate flatworm infestations and is also useful against several protozoan and metazoan parasites. Interceptor™ (milbemycin oxime) is an anthelmintic used for dogs and cats that is reported to be successful for treating red bug (*Tegastes acroporanus*) infestations of hard corals.

Treatment concentrations and durations were selected from current veterinarian and hobbyist recommendations.[3,8,9] Each of the test situations had a sample size of 5 fragments per treatment category. Test treatments included: 1) chloramphenicol bath: corals were exposed to 0 (control), 25, and 50 mg/L chloramphenicol for a 24 h bath; 2) Lugol's iodine dip: corals were exposed to 0 (control), 5, and 10 drops/L for 10 minutes and for 20 minutes (6 treatment categories); 3) freshwater bath: corals were exposed to a 1, 2, or 3 minute freshwater bath (and a 3 minute saltwater bath as a control); 4) Interceptor: corals were exposed to a 0 (control), and 0.66 mg/L bath for 6 hours. In this experiment, corals were bathed once a week for 3 weeks (per treatment recommendations) and tested at weeks 1, 2, 3 (immediately after bath each time) and 4.

Health was assessed using a three-pronged approach: a visual health assessment of colony condition and color, a microbial community analysis using the BIOLOG Ecoplate assay, and histology. Health assessments (visual, microbial, histological) occurred at three time points: 0 hours, 24 hours, and 168 hours after treatment.

The visual health assessment utilized a scoring system that categorizes percentage of living tissue and tissue color. It has been used to evaluate aquacultured Caribbean corals that have been transplanted to reefs in The Florida Keys,[1] and to survey captive coral health from U.S. public aquaria. The visual health assessment uses the following scoring scale: Condition: 1 = dead, 2 = < 25% of tissue alive, 3 = 25–50% of tissue alive, 4 = 50–75% of tissue alive, 5 = 75–95% of tissue alive, 6 = no apparent tissue loss. Color: 1 = 100% bleached, 2 = partial bleach, 3 = lighter than normal, 4 = good color.

Microbial community analysis is an indicator of coral health. Corals secrete a surface mucopolysaccharide layer that fosters microbial communities. These microbes may be involved in disease protection, and shifts in community composition under stress could yield increased susceptibility to disease.[6,7,10] The effects of medications on microbial communities and potential implications for coral health are currently unknown. Approximately 20 mL of mucus and seawater were sampled from coral fragments by drawing a sterile syringe over 2 square cm area of the fragment surface. BIOLOG EcoPlates (96-well microplates) were inoculated, incubated at 25–27°C, and read every 24 hours for up to 192 hours. The BIOLOG Ecoplate assay measures the utilization of multiple carbon sources from a mixed microbial community originating from the coral tissue. The assay characterizes the microbial community as a whole via a matrix of biochemical properties. This methodology has been used to discriminate among healthy, partially bleached, and completely bleached coral fragments in aquaculture.[4]

Histological preparation and reading of coral tissues followed guidelines established by Esther C. Peters.[5] Fragments for histology were fixed in a 4:1 seawater/buffered zinc formalin (Z-fix concentrate) solution, enrobed in SeaKem agarose, and exposed to vacuum pressure to pull agar into crevices. Afterward, a window was cut into the stiffened agar to expose the skeleton, and the specimen was decalcified in neutral EDTA. The remaining tissue, held by the agar in a normal position, was processed by routine cutting and staining techniques.

Acknowledgements

Our thanks to Billy Causey, Laurie MacLaughlin, JoAnne Delaney and the Florida Keys National Marine Sanctuary (Permit No. FKNMS-2010-107).

* Presenting author

Literature Cited

1. Berzins, I.K., Czaja, R., Coy, C., Watson, C.A., Kilgore, K.H., Yanong, R.P.E., Graves, S., MacLaughlin, L., Causey, B., 2008. Aquacultured coral and restoration. In: Leewis, R.J., Janse, M. (Eds.), *Advances in Coral Husbandry in Public Aquariums*. Burgers' Zoo, Arnhem, pp. 375–389.
2. Berzins, I.K., Watson, C.A., Yanong, R.P.E., Heym Kilgore, K., Graves, S., Coy, C., Czaja, R., MacLaughlin, L., and Causey, B. 2007. Coral Restoration in the Florida Keys Using Colonies Derived from Aquacultured Fragments. Final Report. Florida Wildlife Legacy Initiative, Florida Fish and Wildlife Conservation Commission Grants Program. SWG04-038 (Modification No. 1: FWC No. 05045).
3. Borneman, E.H., 2001. *Aquarium Corals: Selection, Husbandry, and Natural History*. T.F.H. Publications, Inc., Neptune City, 463 pp.
4. Kilgore, K.H., Graves, J.S., Yanong, R.P.E., Watson, C.A., Berzins, I.K., 2008. Metabolic profiling of microbial communities within the surface mucopolysaccharide layer of corals. In: FASEB (Ed.), *Proceedings of the 11th Annual International Coral Reef Symposium*. Office of Scientific Meetings and Conferences, Ft. Lauderdale, pp. 321.
5. Peters, E.C., 2001. *Coral Tissue Slide Reading Workshop*. Experimental Pathology Laboratories, Inc., Sterling, VA.6
6. Ritchie, K.B., 2006. Regulation of microbial populations by coral surface mucus and mucus-associated bacteria. *Marine Ecology Progress Series* 322, 1–14.
7. Rohwer, F., Seguritan, V., Azam, F., Knowlton, N., 2002. Diversity and distribution of coral-associated bacteria. *Marine Ecology Progress Series* 243, 1–10.
8. Sprung, J., Delbeek, J.C., 1997. *The Reef Aquarium: A Comprehensive Guide to the Identification and Care of Tropical Marine Invertebrates*. Ricordea, Coconut Grove, 546 pp.
9. Stoskopf, M.K., 2006. Coelenterates. In: Lewbart, G. (Ed.), *Invertebrate Medicine*. Blackwell Publishing, Ames, pp. 19–51.
10. Wegley, L., Yu, Y., Breitbart, M., Casas, V., Kline, D.I., Rohwer, F., 2004. Coral-associated archaea. *Marine Ecology Progress Series* 273, 89–96.

Speaker Information

(click the speaker's name to view other papers and abstracts submitted by this speaker)

Ilze K. Berzins (/apputil/content/defaultadv1.aspx?pId=11375&authorId=53063)
The Florida Aquarium
Tampa, FL, USA

URL: https://www.vin.com/doc/?id=5768620 (https://www.vin.com/doc/?id=5768620)