



## Praziquantel Project

Praziquantel (PZQ) is an antiparasitic drug used to treat various fluke infections for both human and animal health. While the mechanism of action is yet unknown the high efficacy, low cost, and minimal side effects make PZQ an ideal drug in both medicine and animal-related fields such as the aquarium industry. Previous observations have shown that PZQ is being degraded at an accelerating rate in marine systems thereby requiring aquariums to increase the dosage concentrations or the frequency of administration of PZQ to combat parasitic infections. Work conducted by Thomas et al. has provided evidence suggesting that increased PZQ breakdown is caused by microbes and unrelated to loss resulting from mechanical filtration, animal metabolism, or natural breakdown.<sup>1</sup> An aquarium system contains many different types of microbial life including protozoa, bacteria, cyanobacteria, and fungi thus leaving a large pool of potential culprits that may be metabolizing the drug. The purpose of this project is to ascertain the identity of the offending microbe and to assess possible corrective measures. This work is not only relevant for the health of the exhibit animals but also has significant importance for human health as the spread of PZQ-degrading bacteria may result in the impaired treatment of parasitic fluke infections in the future.

**Aim 1:** Water samples will be taken from various exhibits at the Aquarium of the Pacific in Long Beach, CA. PZQ will be administered to the samples and changes to PZQ concentration will be monitored over several days. Controls will consist of sterilized samples taken from the ocean and the exhibits. The exhibits that display the most rapid depletion of PZQ will be subjected to further analysis as the unique chemical and biological characteristics of these microenvironments will be an important clue for identifying the target microbe. Furthermore, this aim will serve as an independent verification of the Thomas et al. study cited below.

**Aim 2:** Additional samples will be taken from the identified exhibits and will include water, soil, and filter isolates as well as microbial swabs taken from the various surfaces. These will be evaluated under the same conditions used in Aim 1 to further distinguish the location of the responsible microbes. Microbes from the areas with the strongest responses will be cultured and cataloged using DNA sequencing. Finally, these microbes will be separated, cultured independently, and treated with PZQ to evaluate the efficiency of PZQ degradation. Upon the discovery of the causative agent, treatment options will be explored to combat the offending microbes without harming the animal and plant life in the exhibits.