Understanding the role of DMSP as a potential chemotactic cue for coral associated bacteria.

By Leidy Gonzalez & Dr. Mauricio Rodriguez-Lanetty

Most reef-building corals are known to engage in symbiosis not only with unicellular dinoflagellates from the genus, *Symbiodinium,* but they also sustain highly complex symbiotic associations with other microscopic organisms such as bacteria, fungi, and viruses. The details of these non-pathogenic interactions remain largely unclear. The impetus of this study is to gain a better understanding of the symbiotic interaction between marine bacteria and a variety of coral species representative of differing morphologies. Studies have shown that certain bacterial orders associate specifically with certain coral species, thus making the symbiotic synergy a non-random consortium. Consequently both corals and bacteria may be capable of emitting chemical cues that enables both parties to find one another and thus creating the symbiosis. One potential chemical cue could be the compound DMSP (Dimethylsulfoniopropionate) and its sulphur derivatives. Reef-building corals are believed to be the major producers of the DMSP and its derivatives during times of stress. As a result corals could potentially attract their bacterial consortium depending on their DMSP production. Corals may be able to adapt to fluctuating environmental conditions by changing their bacterial communities to that which may aid in survival. The cause of this attraction may stem from the capability of a variety of marine bacteria to catabolize DMSP into different metabolically significant pathways, which may be necessary for the survival of these mutualistic interactions. To test the hypothesis that coral-produced DMSP play a role in attracting symbiotic bacteria, this study utilized the advent of high-through sequencing paired with bacterial isolation techniques to properly characterize the microbial community in the stony coral *Porites astreoides*. We conducted DMSP swarming and chemotaxis assays to determine the response of these coral-associated bacterial isolates towards the DMSP compound at differing concentrations. Preliminary data from this study suggests that six out of the ten bacterial isolates are capable of conducting unidirectional motility; these six isolates are also capable of conducting swarming motility in the direction of an increasing DMSP concentration gradient. This would indicate that there is a form of positive chemotaxis on behalf of the bacteria towards the DMSP compound. By obtaining a better understanding of the dynamics that drive the associations between bacterial communities and corals, we can further aid in the protection and conservation processes for corals. Also this study would further elucidate the significance of the DMSP compound in the survival of corals under times of stress.