Rebuilding the Coral Tree of Life to Inform the Sustainability of Coral Habitats

Summary: Anthozoans (corals and sea anemones) are among the most ecologically and evolutionarily significant animals on Earth. Yet, our understanding of their true diversity and evolutionary history remains limited. Accurate estimates of species richness and phylogenetic relationships are critical for predicting how these organisms will respond to environmental change and for guiding effective conservation and restoration efforts. In this seminar, I will discuss how genomic approaches are transforming our understanding of anthozoan diversity and revealing patterns of diversification across deep evolutionary time. High-throughput sequencing, coupled with phylogenomic analyses, allows us to reconstruct the coral "tree of life" with unprecedented resolution. I will highlight recent advances (including Vaga et al. 2025, *Nature*), which demonstrate how integrating genome-scale data with fossil and ecological information can clarify the timing and drivers of coral diversification. Beyond phylogenetics, I will discuss efforts to improve reference databases for environmental DNA surveys, enabling more accurate monitoring of coral communities. By linking genomic with ecological data, this work provides a framework for rebuilding coral biodiversity knowledge and supporting the long-term sustainability of coral ecosystems in a rapidly changing ocean.