

**Exam 1:**

*Corals live in symbiosis with complex microbial communities. Endozoicomonadaceae bacteria are among the dominating symbionts of healthy corals and their abundances reduce drastically when the coral becomes diseased. Standard culturing techniques often fail to cultivate the Endozoicomonadaceae in the laboratory, wherefore we still know little about their functional features, metabolic capacities, and mechanisms of interactions with the host. Design an experiment that allows you to identify the functional gene content of Endozoicomonadaceae bacteria without cultivation. (2 Points)*

Several answers started out by growing the bacterium in the laboratory.... However, this is not a useful starting point as the text informed you that we often fail to cultivate these bacteria in the lab. Your experimental design should be based on full, shot-gun, metagenomics sequencing (high-throughput) of environmental, microbial community DNA obtained from your coral sample. Then follows metagenome assembly of sequence reads into contigs, and binning of the contigs to reconstruct metagenome-assembled genomes (MAGs). You would then try to identify high-quality MAGs which have been classified as *Endozoicomonadaceae* (e.g. using MiGA). Finally, you proceed with the functional annotation of your *Endozoicomonadaceae* MAGs using a suitable database (e.g. KEGG; Pfam, COG, or AntiSMASH for BGCs, etc).