

BACKGROUND

Do Octopus Have a Skin Microbiome?

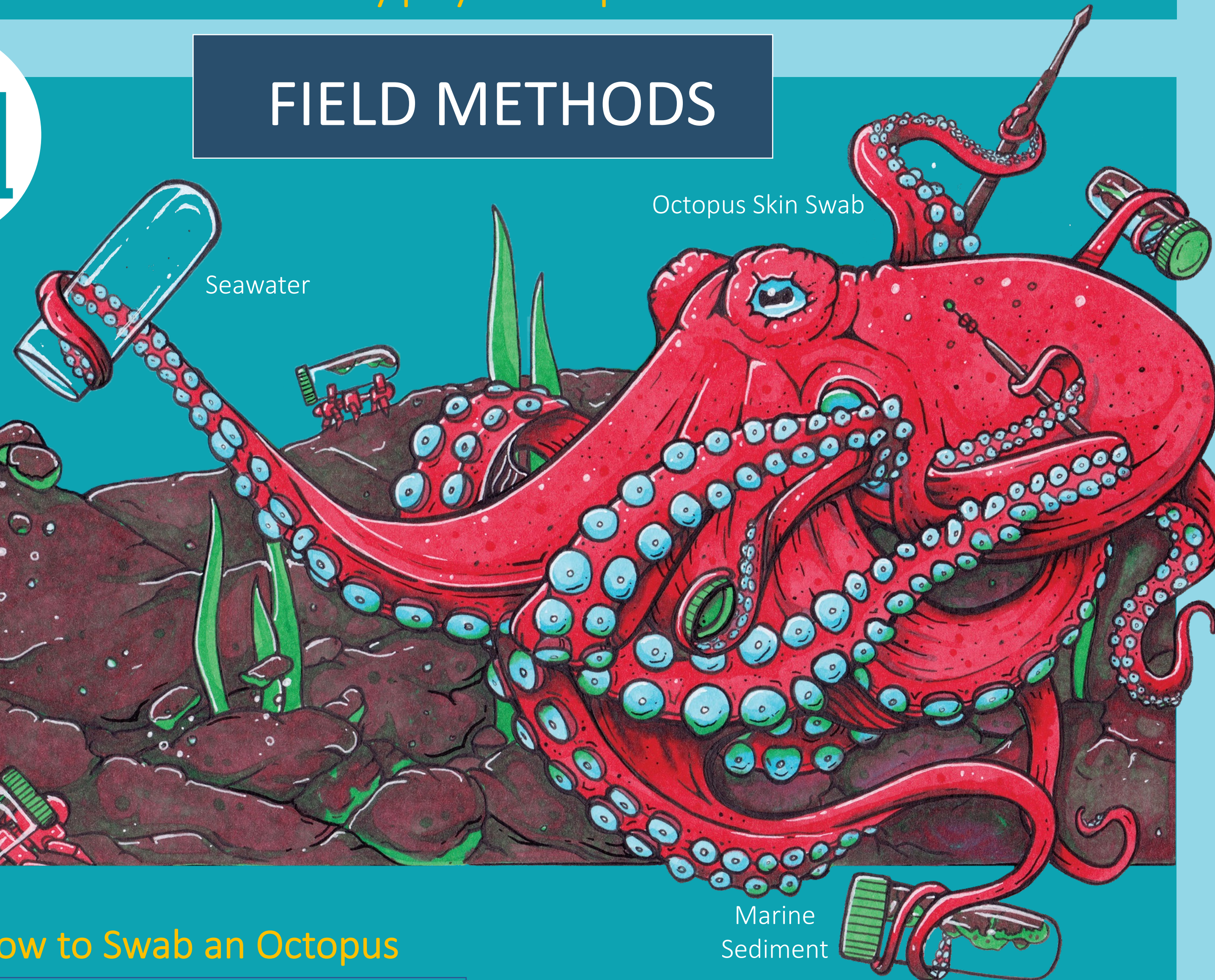


Macrotritopus defilippi



Octopus vulgaris

FIELD METHODS



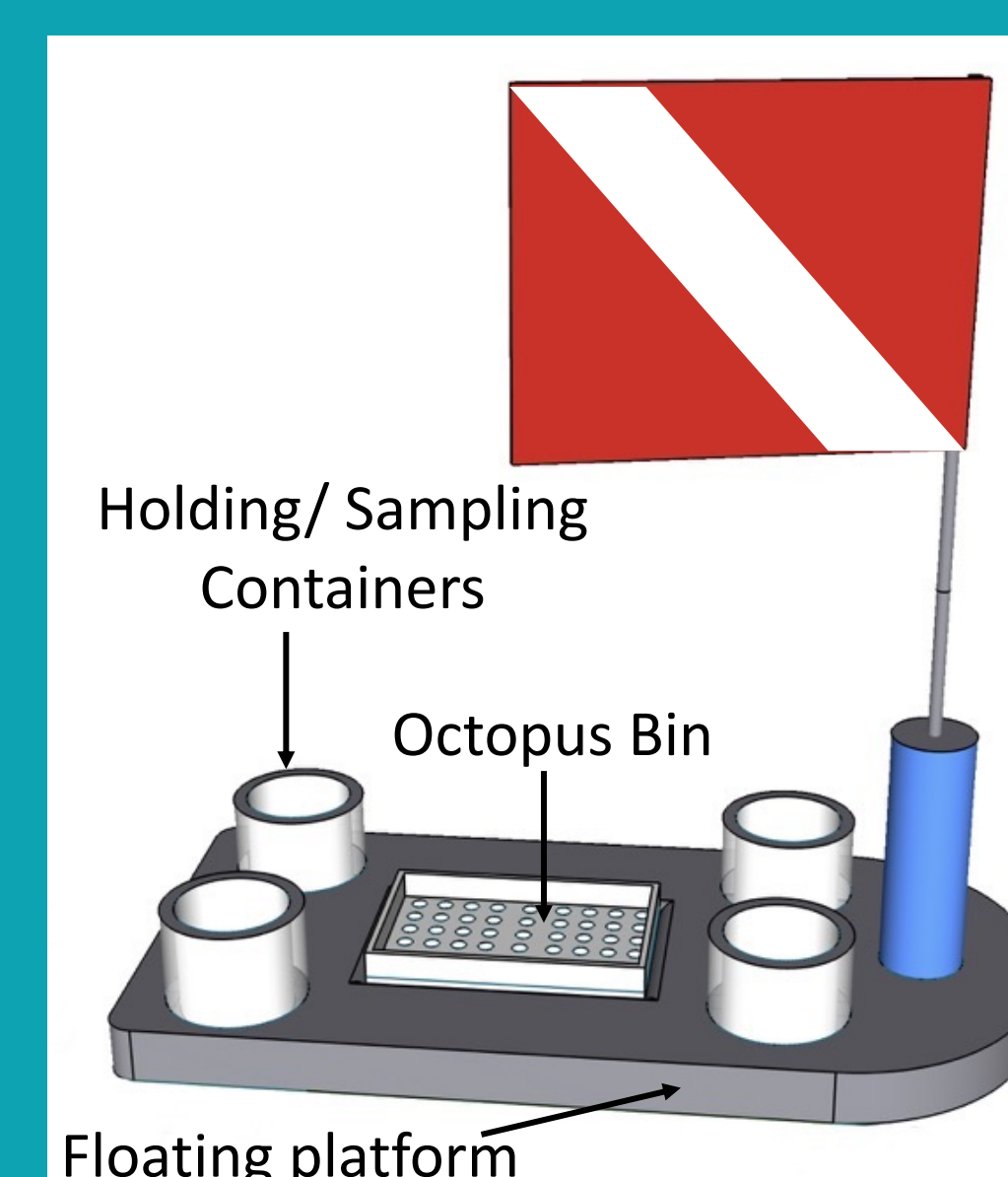
How to Swab an Octopus

- Samples were collected from Lake Worth Lagoon, FL
- Floating lab was built for in-water sampling

Foam tip swabs were used for octopus skin samples

LAB METHODS

- DNA Extraction with DNeasy PowerSoil Kit
- DNA sequencing using Illumina MiSeq
- Bacterial 16S rRNA gene V3-V4 region



RESULTS

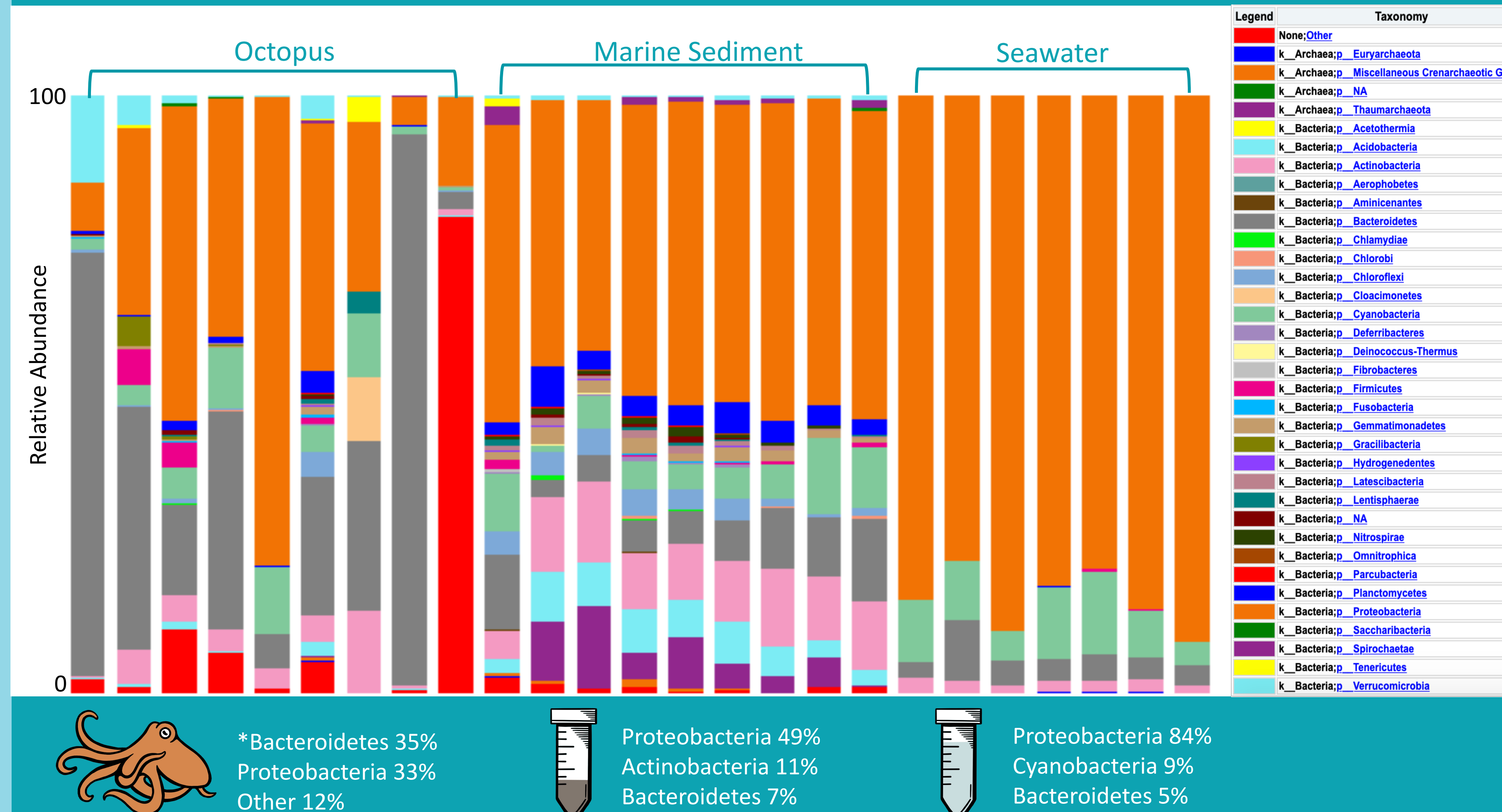


Fig. 1: Microbial composition of octopus skin (*O. vulgaris* and *M. defilippi*; n=9) and ecological samples (sediment, n=9; seawater, n=7) within the Lake Worth Lagoon, FL. Most abundant bacteria phyla for octopus, sediment, and water with octopus having significantly different phyla representation (LEfSE, $p < 0.01$).

- Overall, 33 phyla were represented with the three most abundant phyla across sample type including Proteobacteria (53.2%), Bacteroidetes (16.7%) and Cyanobacteria (6.8%) (Fig.1)
- Composition changes by group with octopus having significantly different representation from Bacteroidetes, Verrucomicrobia, Gracilibacteria, and Lentisphaerae (LEFSE, $p < 0.01$)

Octopus Have a Unique Skin Microbiome

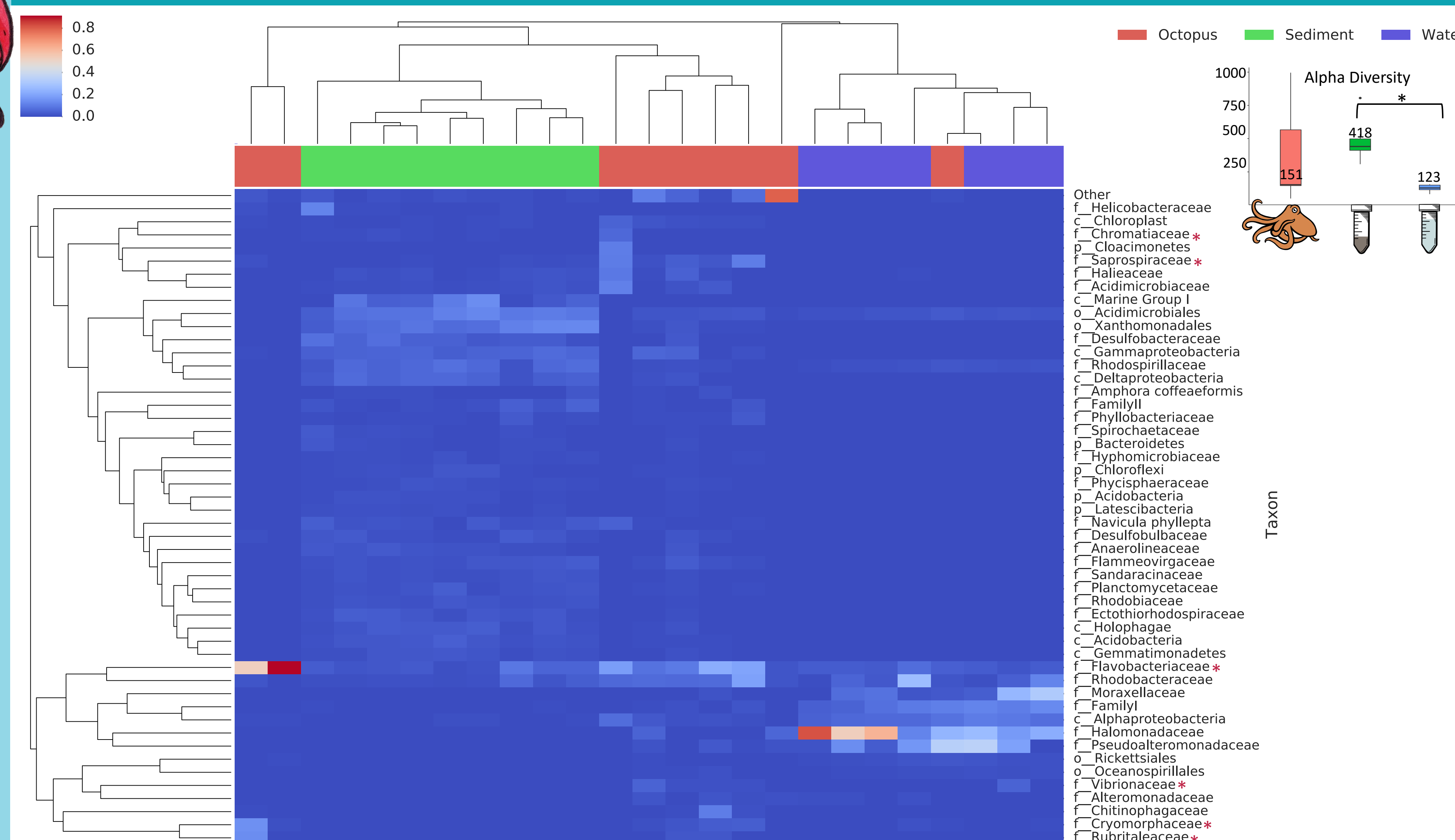


Fig. 2 Microbial Diversity: Taxonomy abundance heatmap with sample clustering to identify patterns of microbial distribution among samples. * indicates a significant difference in octopus skin microbiome between environmental samples (seawater and sediment) (LEfSE, $p < 0.01$) with Alpha diversity (observed species) for all samples ($n=25$) located in top right. Median number of species indicated on box plots. Alpha diversity was different between seawater and sediment samples (ANOVA, Games-Howell's multiple comparisons; * indicates a significant difference $p < 0.05$).

RESULTS

Octopus Species-Specific Microbiome

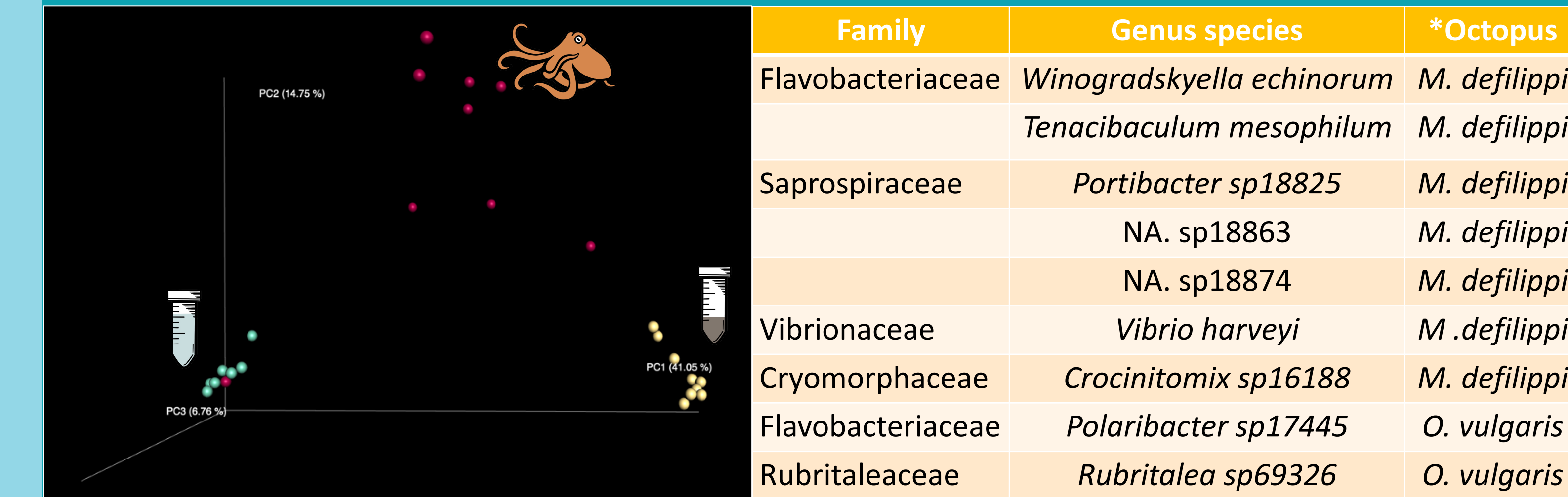
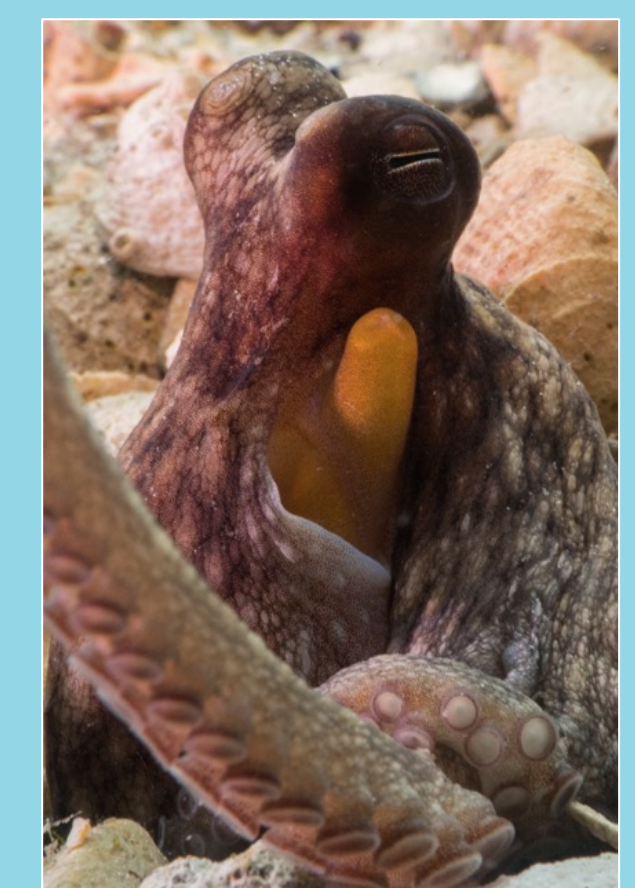


Fig. 3: Beta Diversity Plot (PCA, Bray-Curtis dissimilarity) for differences across microbiome samples plotted (ANOSIM; $R = 0.76$, $p = 0.001$) and Table 1: Bacteria by family, genus, and species (if identifiable) associated with octopus species (*M. defilippi*, $n = 4$; *O. vulgaris*, $n = 5$). * indicates significance (LEfSE, $p < 0.05$).

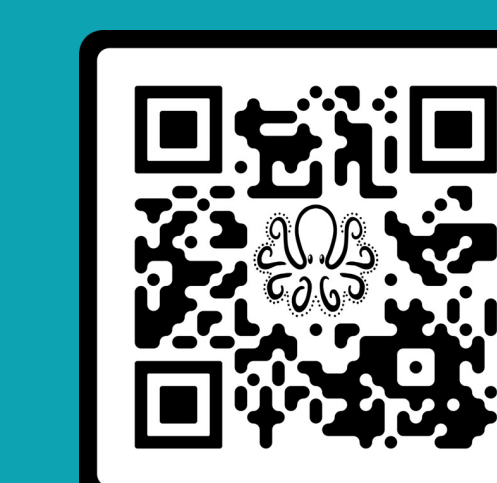
- Microbial community composition differs across groups (Fig.3)
- Octopus species have similar contributing bacteria to microbiome on the family level, with the exception of Rubritaleaceae (*O. vulgaris*)
- Microbiomes differ at the genus and/or species level for octopuses
- *M. defilippi* has more unique bacteria contributing to its microbiome than *O. vulgaris*



TAKEAWAYS

Octopus Microbiome May Play a Role in Lifestyle

- Octopuses have a unique microbiome that differs from their environment which is dominated by Bacteroidetes
- Group containing pathogen-suppressing bacteria
- Bacterial symbionts consisted of both non-pathogenic and possibly pathogenic bacteria
- Flavobacteriaceae, Rubritaleaceae, Vibrionaceae
- Some members of the octopus skin microbiome were species-specific
- Saprospiraceae could be involved in the organic Carbon breakdown on *M. defilippi*

 SCAN ME

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