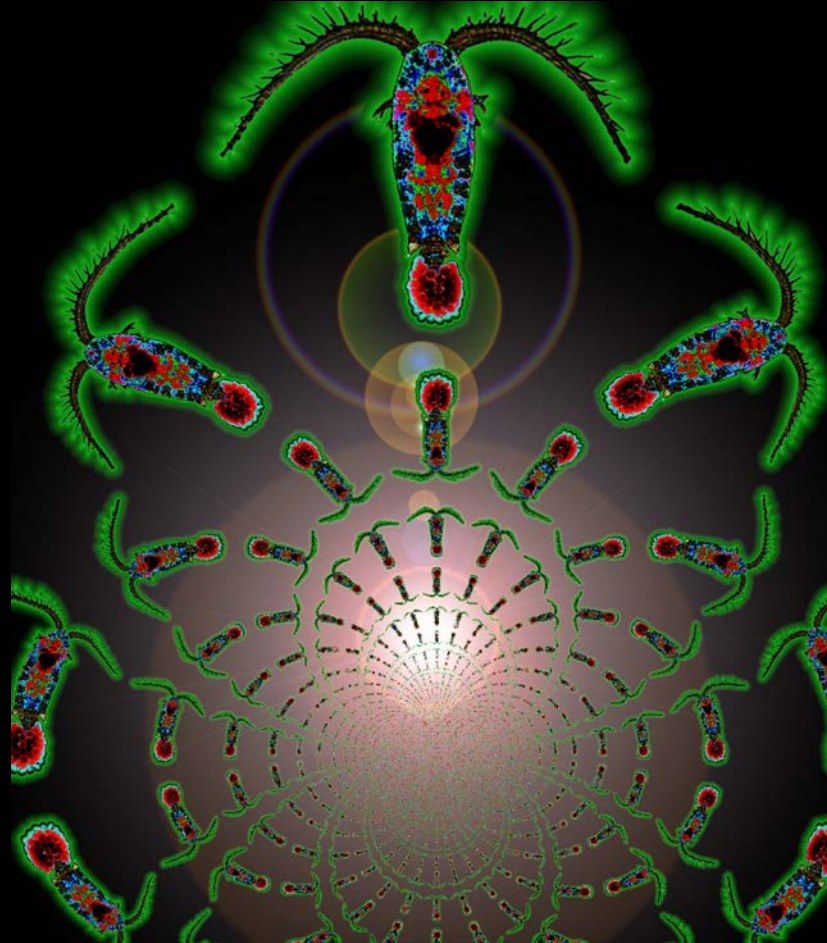


Rapid Evolution during Biological Invasions



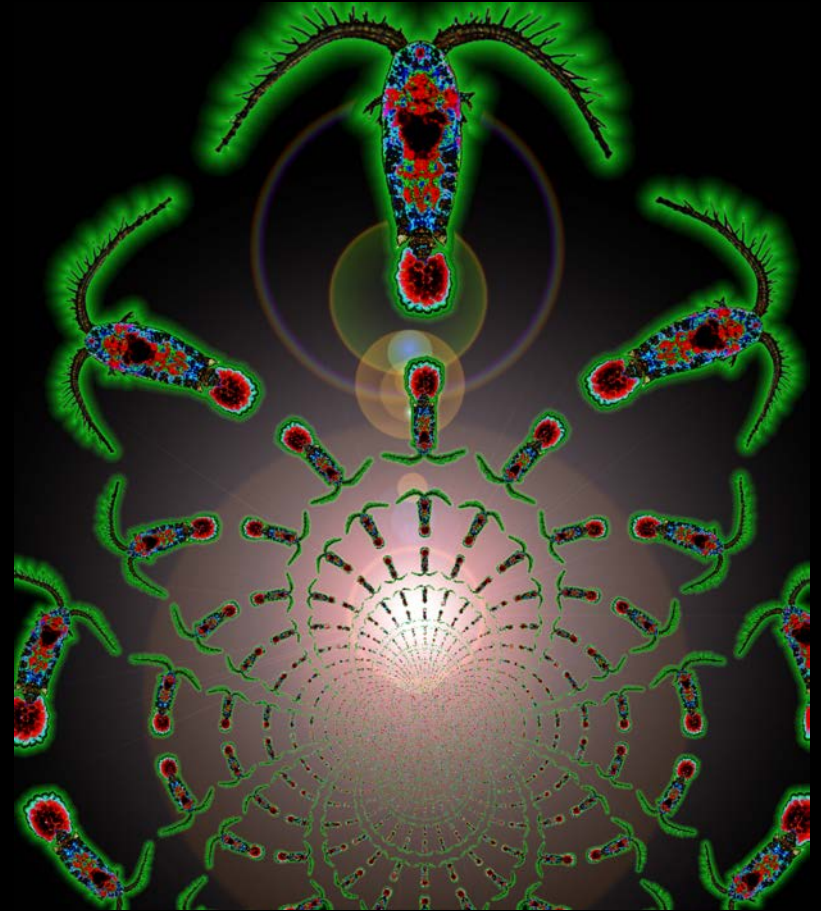
Carol Eunmi Lee

Zoology and Center of Rapid Evolution (CORE)
University of Wisconsin, Madison

Rapid Evolution during Biological Invasions

When species invade, the host is invading with a consortium of bacteria (the microbiome)

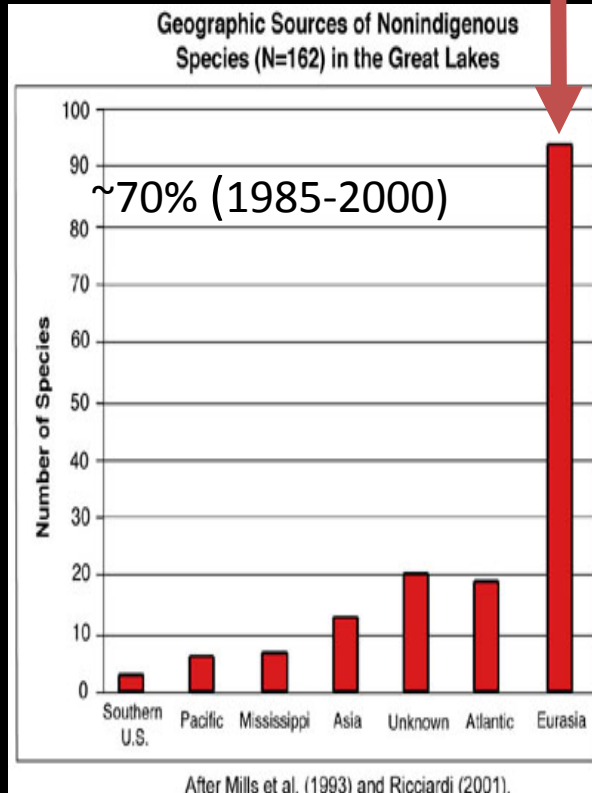
During these invasions, how does the host evolve?
And how does the microbiome evolve?

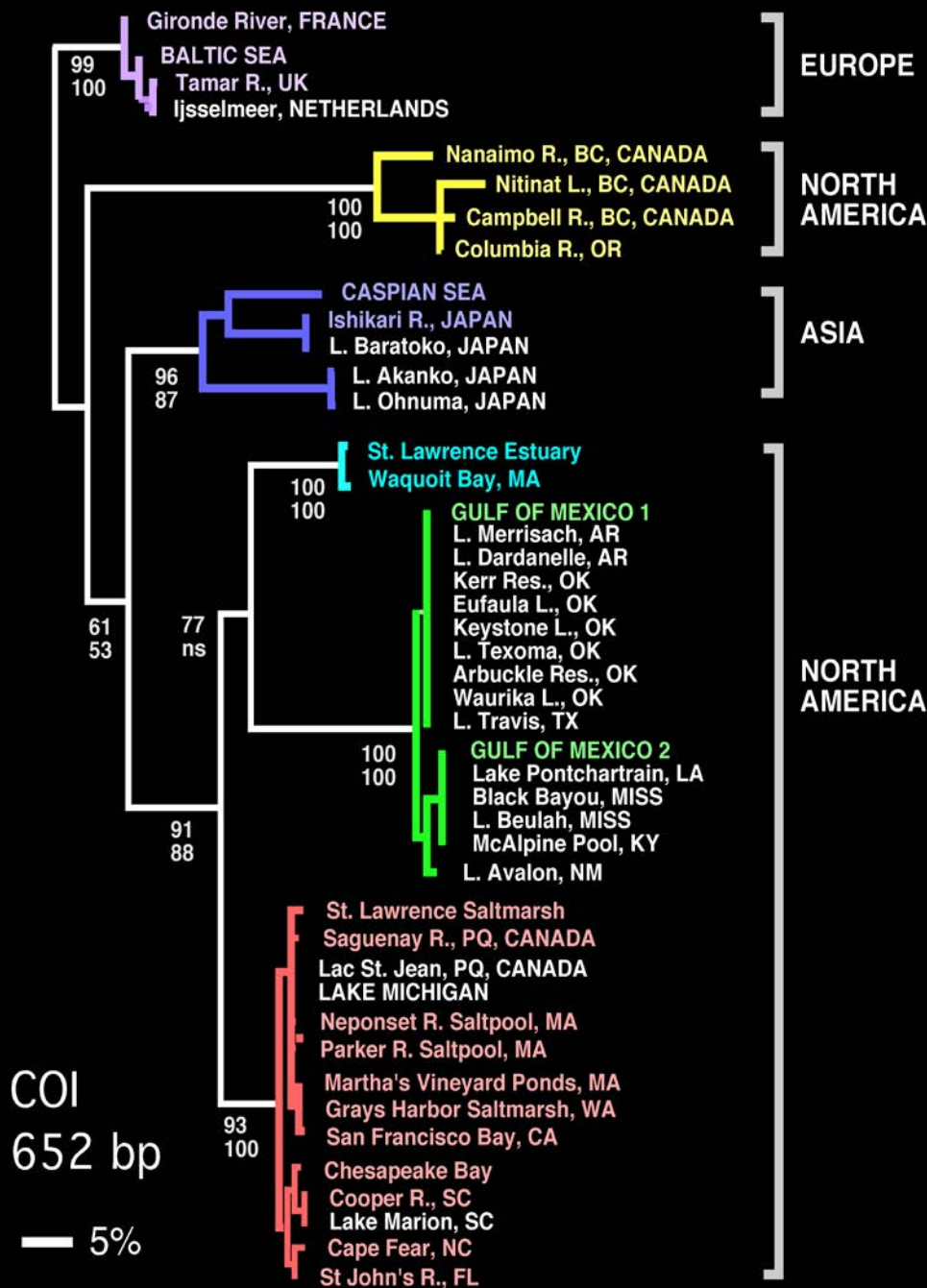


Many invasive species are undergoing fundamental niche expansions:

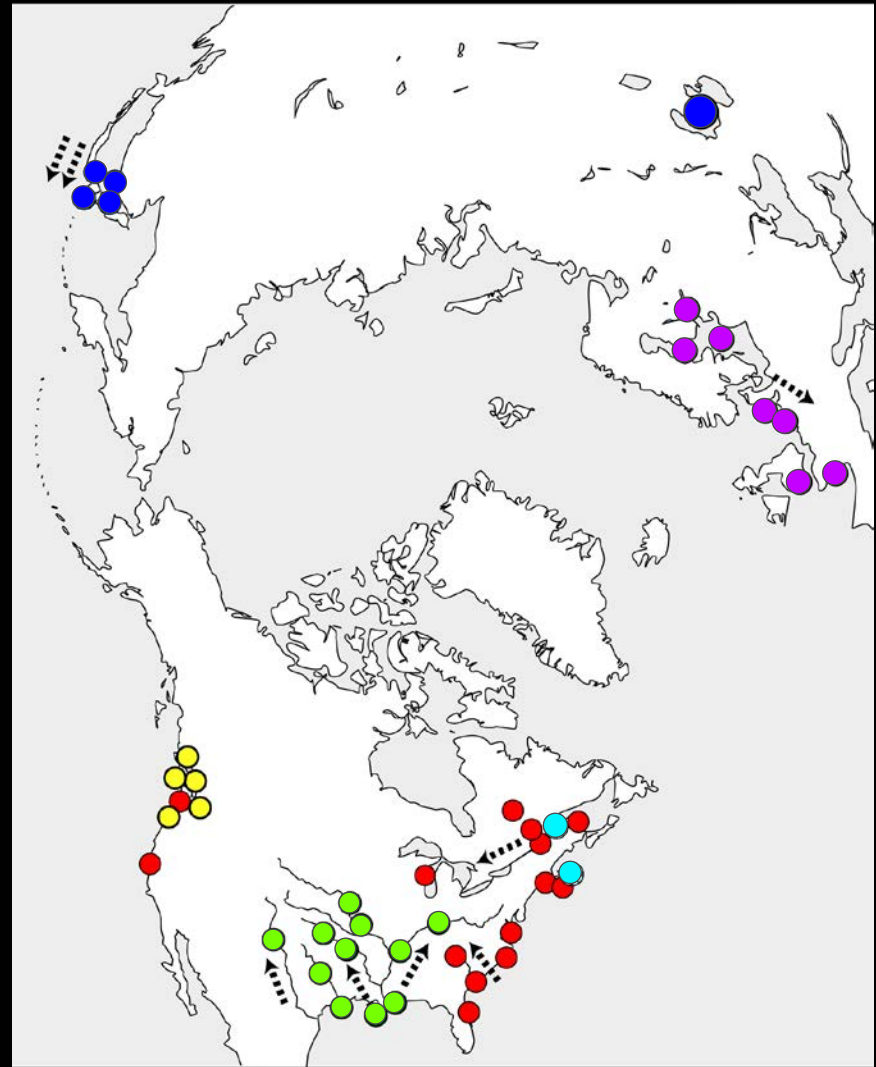
For example, many freshwater habitats are overrun with brackishwater invaders

(Lee & Bell 1999; Ricciardi & MacIsaac 2000)





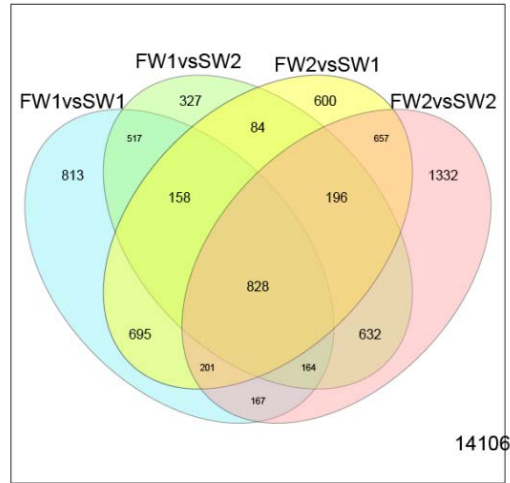
Eurytemora affinis species complex



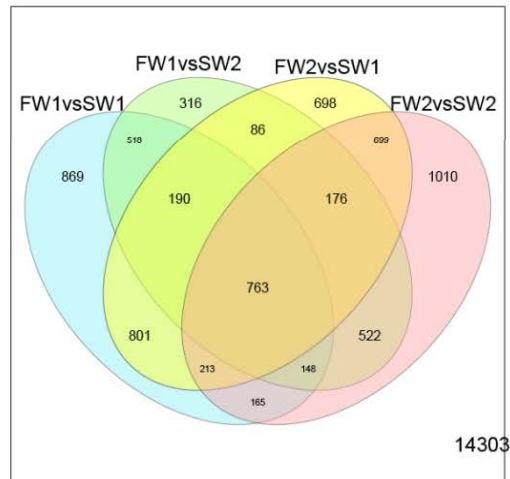
Lee 1999, 2000, Evolution

Evolutionary Shifts in Genomic Expression during Invasions

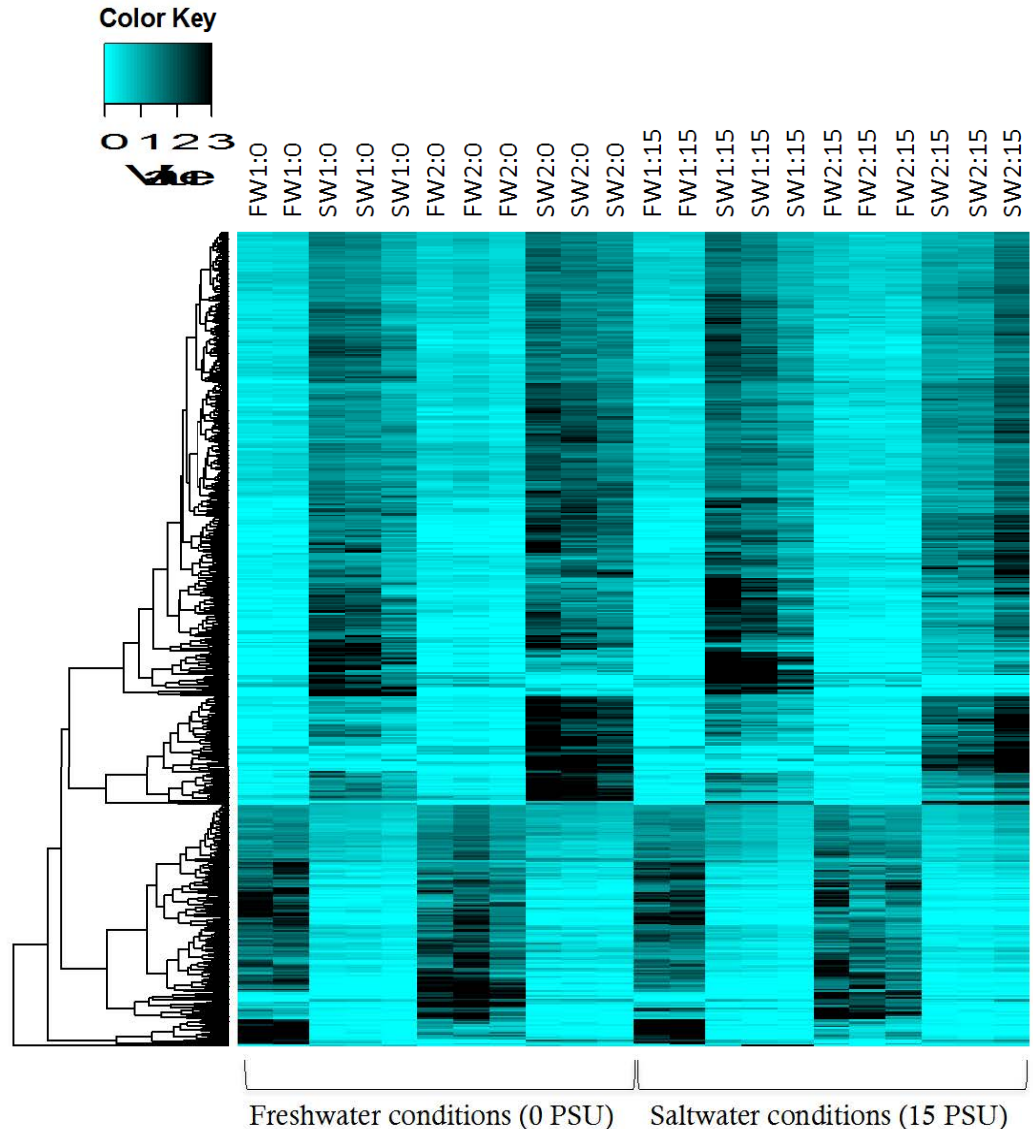
A



B

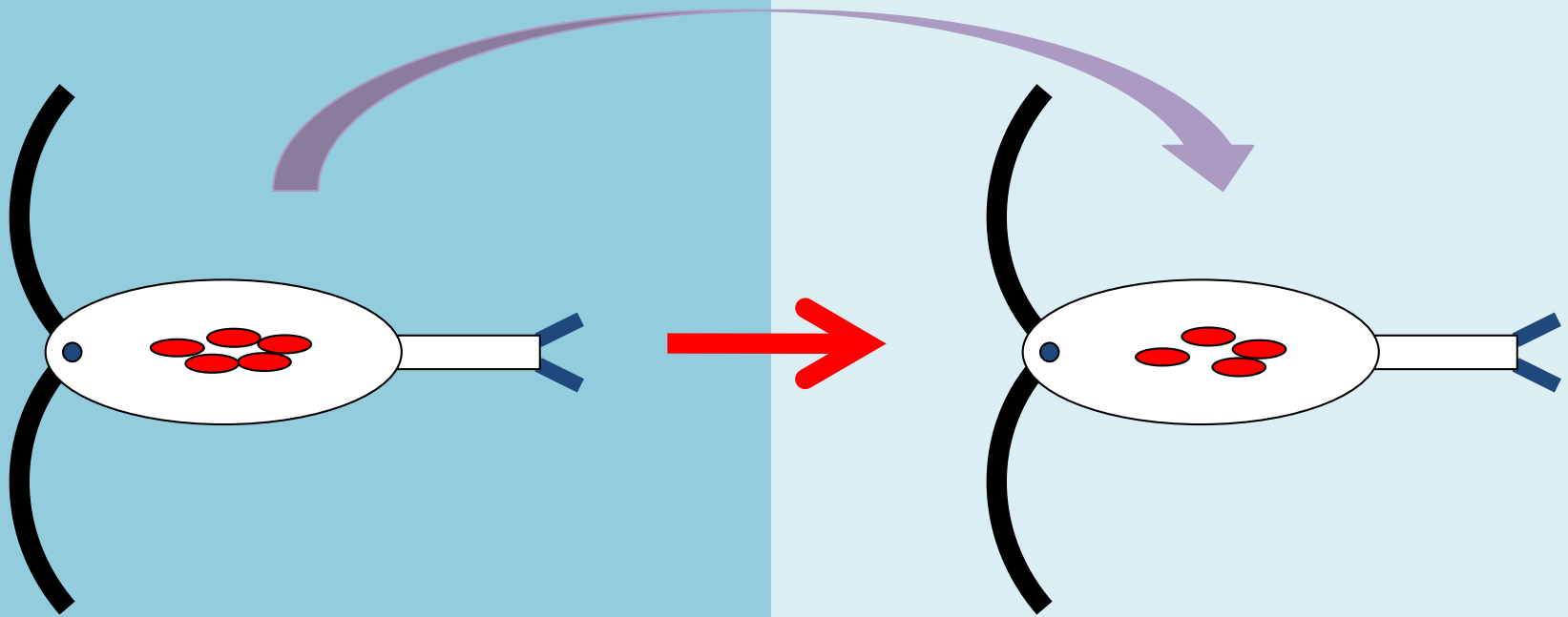


C



Salt Water

Fresh Water



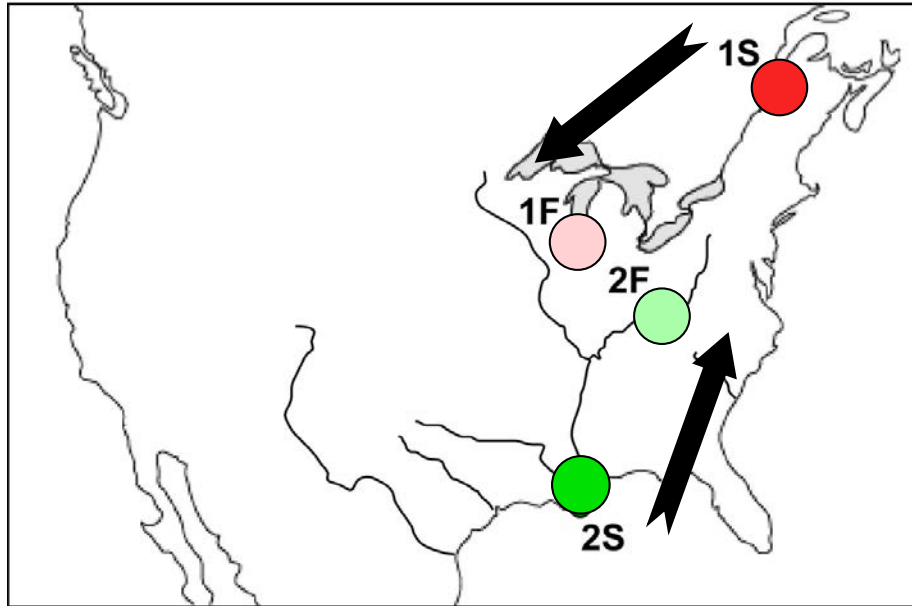
The copepods with an enormous consortium of microbes

50% of bacteria in estuaries found to be associated with zooplankton, primarily with copepods

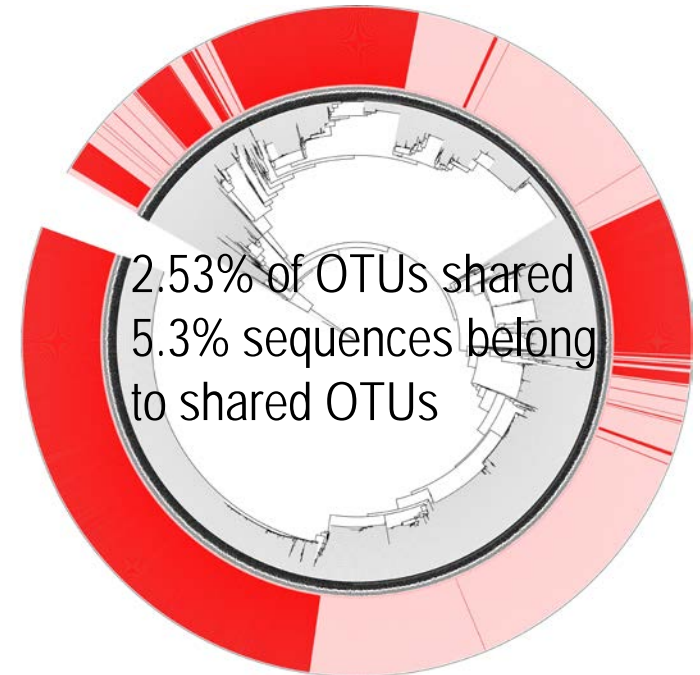
Might the copepod microbiome provide beneficial functions???

And how might the interactions shift during invasions?

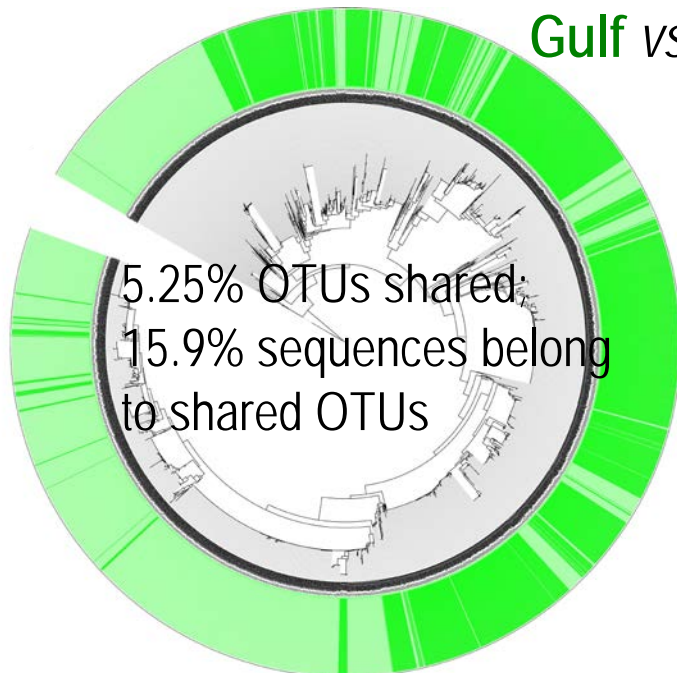
Dramatic Shift in Microbial Composition during Invasions



St. Lawrence vs. L. Michigan



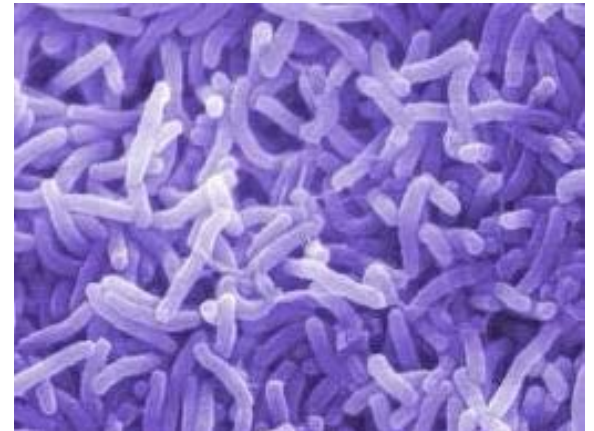
Gulf vs. Louisville



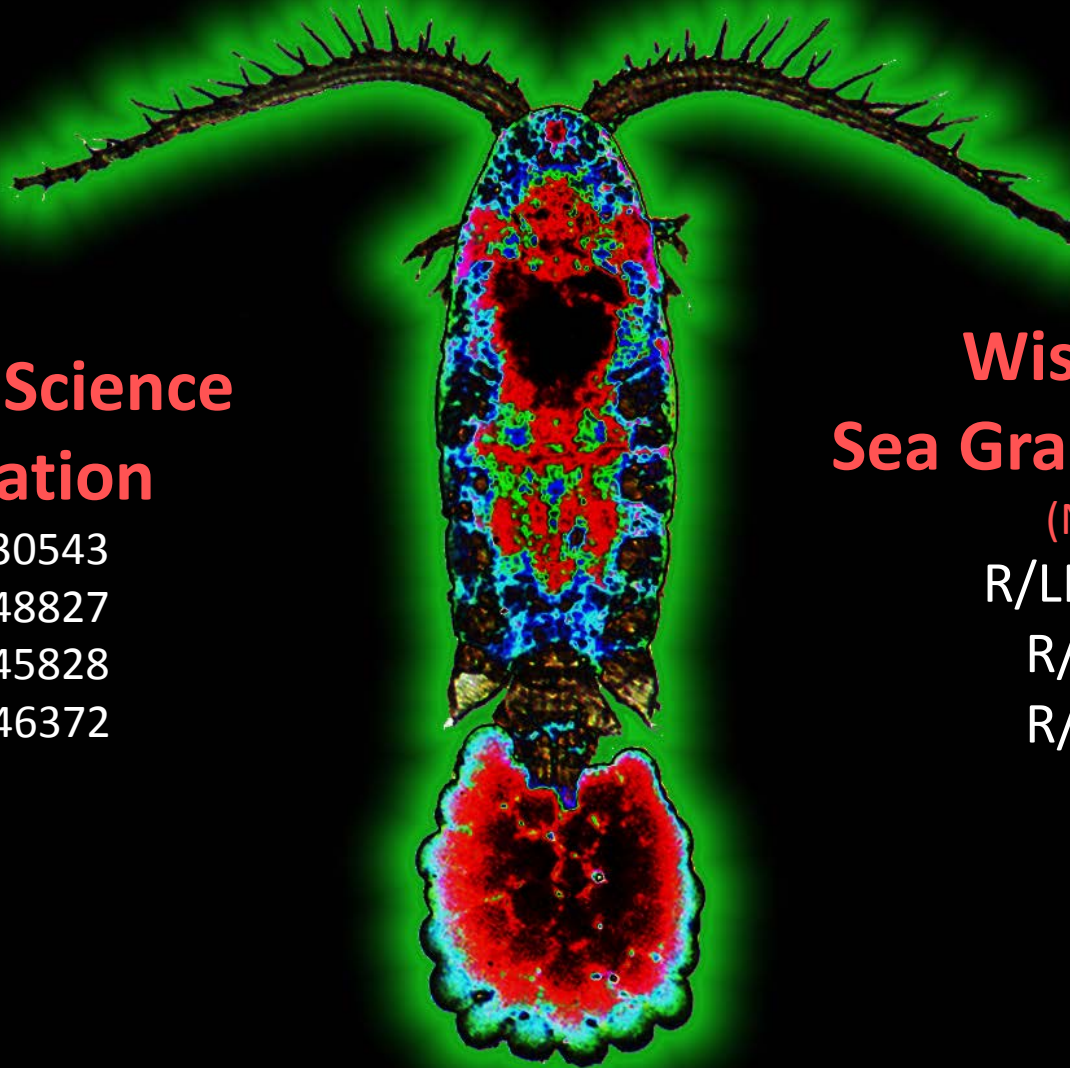
- **Parallel Shift in Microbiome composition during Invasions**
- **Many taxa involved in the fate of Nitrogen**
- Significant Unifrac distances between saline vs. fresh microbial communities ($P < 0.01$)

Copepods as Waterborne Disease Vectors

- **Copepods transport potential pathogens:**
Thought to be the “missing link” in waterborne disease transmission: many of the pathogens are **anaerobic** and cannot live freely in water
- **Putative pathogens found in our samples:**
Salmonella, Shigella, Campylobacter, Corynebacterium diphtheriae, Yersinia pestis, Aeromonas hydrophila, and Acinetobacter haemolyticus, Vibrio cholerae, Flavobacteria, etc.



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