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Lim Award

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The Reciprocal Impacts of Bacterial-Host Interactions in Aquatic Environments

Symbiotic bacteria exchange nutrients and signaling molecules with their hosts. The exchange of these compounds results in both organisms experiencing shifts in their metabolism. These shifts can sometimes be beneficial and other times detrimental.

How do bacteria support the growth and health of their eukaryotic hosts?

Bacteria Increase Algal Growth

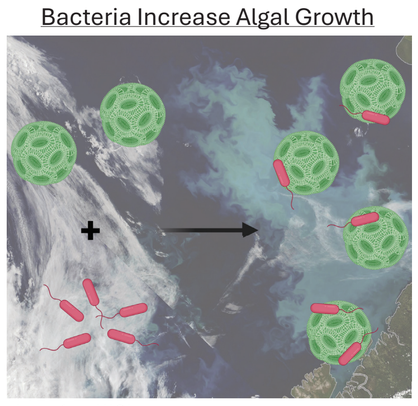


Image from NASA

Bacteria Increase Cordgrass Biomass

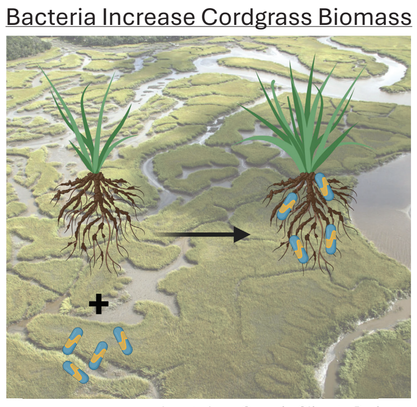
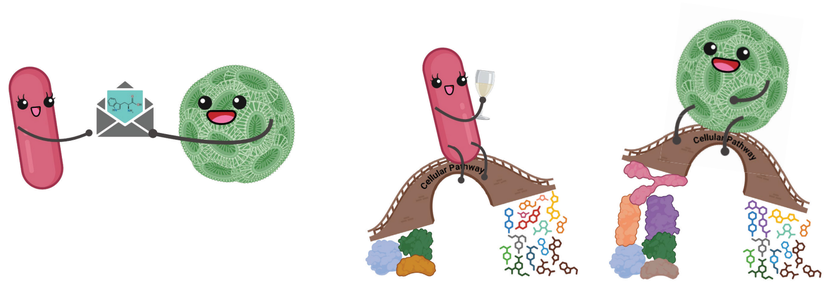
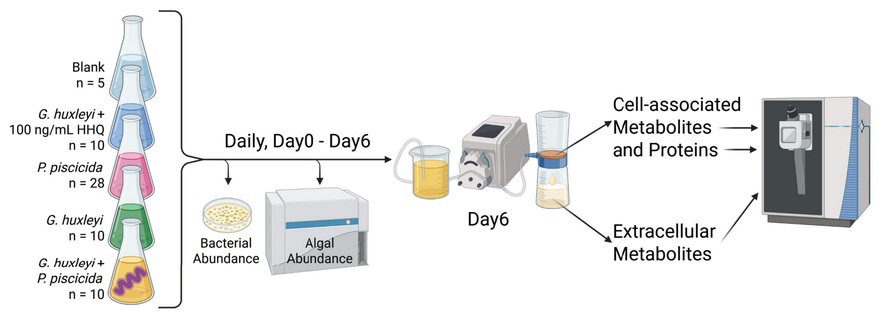


Image from Georgia Climate Project

Bacteria Exchange Nutrients or Signaling Molecules with Their Hosts that Beneficially (or Detrimentally) Alter Host Cellular Processes a.k.a. Metabolism



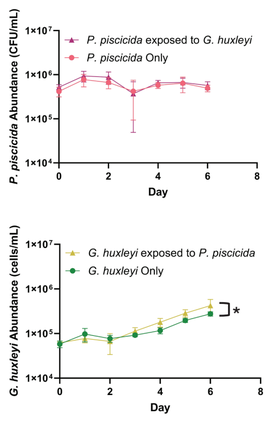
1) What nutrients and signaling molecules does the marine bacterium *Pseudoalteromonas piscicida* exchange with algal host *Gephyrocapsa huxleyi*?
2) How are the cellular processes of each organism impacted by their interaction during co-exposure?



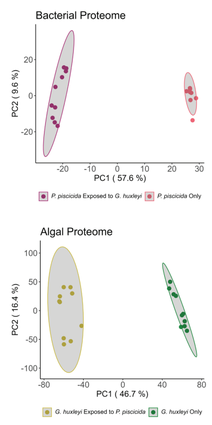
In collaboration with Dr. Brook Nunn and Anaïs Gentilhomme (UW), Dr. Kristen Whalen and Dr. Amanda Platt (Haverford), and Dr. Elizabeth Harvey and Dr. Hannah Reich (UNH)

Algal Growth is Improved by the Presence of Bacteria Algal and Bacterial Metabolisms Shift During Co-exposure

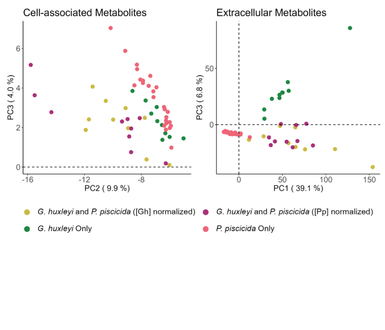
Altered Algal Growth



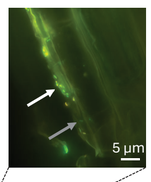
Altered Proteomes

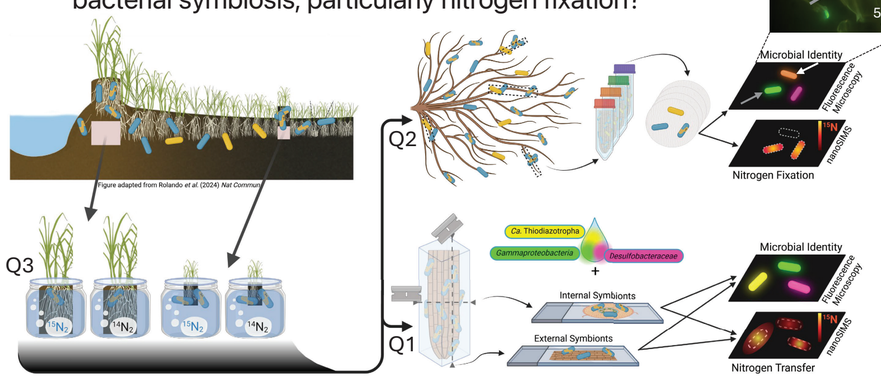


Altered Metabolomes



1) Which bacterial symbionts exchange the most nitrogen-containing compounds with their cordgrass host?
2) Where in the root system are they located?
3) How do natural environmental stressors affect the plant-bacterial symbiosis, particularly nitrogen fixation?





In collaboration with Dr. Joel Kostka and Dr. Jose Rolando (GT), Dr. Wiebke Mohr (MPI, Germany), Dr. Jillian Petersen (UV, Austria)

Beneficial Nitrogen Fixing Bacteria Could Become Bacterial Probiotic Candidates to Aid Salt Marsh Restoration by Improving the Growth and Health of Young Salt Marsh Cordgrasses



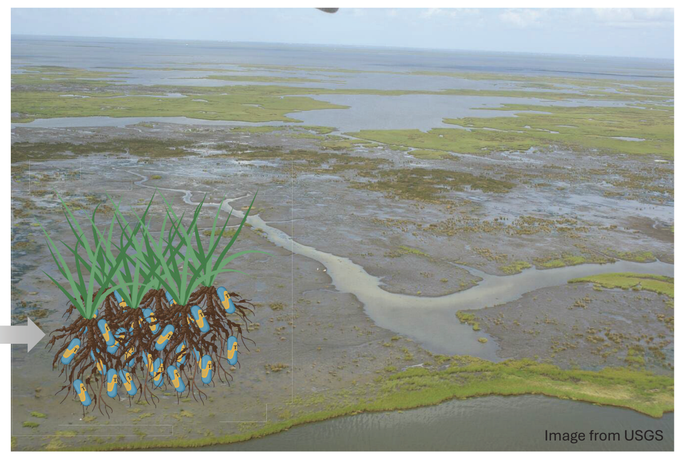


Image from USGS

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