62nd Northeast Algal Symposium, April 5–7, 2024

NEAS

Middletown, RI

• 2024 •

1:10 – 1:35 Rhodoliths and their importance for macroalgal ecology and biodiversity in the NW Gulf of Mexico. **Suzanne Fredericq**, Sherry Krayesky-Self, Thomas Sauvage, Joe Richards, Ronald Kittle, C. Frederico Gurgel, Daniela Gabriel & William E. Schmidt. (Abstract 13, p. 25)

1:35 – 2:00 Fumbling towards the ecstasy of the deep: how mistakes lead to a search for understanding community dynamics in a marine transition zone. **Wilson Freshwater**. (Abstract 14, p. 26)

2:00 – 2:25 Mesophotic algae in paradise: The interplay of nutrients and light in structuring mesophotic macroalgae in the Hawaiian Archipelago. **Heather Spalding**. (Abstract 15, p. 26)

2:25 – 2:50 Just when you think there's no light and you turn on the floodlights – spectacular macroalgae! **Craig Schneider**. (Abstract 16, p. 27)

2:50 – 3:30 **Salty talk panel discussion**

3:30 – 3:45 ***Coffee Break***
Atlantic Pavilion

SESSION IV ***Poster Session for Student Awards Competition***
Atlantic Pavilion

3:45 – 5:45 **Poster Session I**

7:00 – 10:00 ***Social & Banquet, Awards, Silent & Live Auctions***
Atlantic Pavilion

Sunday, April 7, 2024

7:00 – 8:20 AM ***Breakfast***
Atlantic Pavilion
Session V speakers load ppts
Poster setup for contributed poster, Atlantic Pavilion

8:25 – 8:30 **Morning Announcements – Brian Wysor**

SESSION V ***Contributed Papers*** **– Moderator, John Wehr**
Atlantic Pavilion

8:30 – 8:45 Lake mesocosms showing nitrogen as a driver of cyanobacterial bloom development and species composition. **Michael E. Kausch** & John D. Wehr. (Abstract 17, p. 27)

8:45 – 9:00 Iron wars over ligand soup: exploring chemical crosstalk in Symbiodiniaceae – bacteria interactions. **Hannah G. Reich**, MacNeill C. Matthews, Nicole R. Cunningham, Corinne Richard, Cassidy Stadtfeld, Hayden R. Wink, The Students of Siderophore SuperLab, The TAs of Siderophore SuperLab, Kristen E. Whalen & Elizabeth L. Harvey. (Abstract 18, p. 27)

9:00 – 9:15 Tracing the inheritance of bacterial endosymbionts among *Nephromyces*

infection of *Vertebrata lanosa* by *C. polysiphoniae.* Transcriptomes were obtained from host and parasite across eight time points of parasite development and uninfected tissue. Differential gene expression analysis was applied to identify differentially expressed genes during parasite development and in response to infection. Gene expression profiles only represent a snapshot of cellular activity, but changes in gene expression can dramatically influence biological processes. Changes in gene expression in *C. polysiphoniae* correspond to growth and lifestyle, whereas gene expression in *V. lanosa* correspond to infection response. Transcriptomic data show higher upregulation of Glycolysis, Citric Acid Cycle, and carbohydrate metabolism pathway in the parasite across infection. These data also suggest alternations between *C. polysiphoniae* growth and *V. lanosa* infection response. Combining transcriptomic and morphological data allows for a more thorough assessment of significant pathways involved with or impacted by parasite infection. This study highlights manipulations of the host by parasite transmission and growth, highlighting the evolutionary history of host/parasite relationships.

12 – Determinants of Longevity in *Chlamydomonas reinhardtii.* **Navpreet Kaur**, Ghaith Zamzam & Dion G. Durnford. Department of Biology, University of New Brunswick, Fredericton NB E3B 5A3, Canada. **(Wilce Award candidate)**

While aging is a well-studied phenomenon in multicellular organisms, in microalgae how and under what circumstances they age is not well understood. Under ideal conditions, microalgae are immortal, but when nutrients are limited, conditional senescence occurs. *Chlamydomonas reinhardtii* is a single-celled, mixotrophic alga; its nutritional flexibility and ease of culturing make it an ideal organism for studying aging. Calorie restriction (CR) is a robust environmental intervention to increase lifespan in animals. In *Chlamydomonas,* the determinants of longevity were explored through CR using varying acetate concentrations. Higher acetate concentrations in batch cultures were found to decrease longevity, aligning with the CR hypothesis. Interestingly, Starch-deficient strains exhibited prolonged viability in high-acetate media, indicating a link between starch accumulation and lifespan. We hypothesized that elevated acetate leads to increased chloroplast metabolic activity, promoting starch accumulation and subsequent reactive oxygen species (ROS) production, causing damage, and reducing lifespan. ROS estimation using DCFH-DA (2,7-dichlorodihydrofluorescein diacetate) confirmed higher ROS levels in high-acetate cultures, correlating well with reduce longevity. However, in the starch-deficient mutant, ROS levels were also high indicating that a direct-connection between ROS production through metabolism and longevity was not the sole determining factor. This study sheds light on conditions influencing microalgal survival during conditional senescence and emphasizes the role of ROS production in lifespan regulation which will be helpful to study other species senescence as well.

13 – Rhodoliths and their Importance for Macroalgal Ecology and Biodiversity in the NW Gulf of Mexico. **Suzanne Fredericq**[1], Sherry Krayesky-Self[1], Thomas Sauvage[2], Joe Richards[1], Ronald Kittle[1], C. Frederico Gurgel[3], Daniela Gabriel[4] & William E. Schmidt[1]. [1]Biology, University of Louisiana, Lafayette, LA 70504-3604, USA; [2]Ifremer Centre Atlantique Nantes, France; [3]Botânica, Universidade Federal de Rio de Janeiro, Brazil; [4]Research Center in Biodiversity and Genetic Resources, University of the Azores, Portugal.

Understanding the ecology and biodiversity of deep-water communities is a major challenge. In the NW Gulf of Mexico, unique deep bank habitats associated with salt domes occur at ~50-90m on the continental shelf offshore Louisiana and Texas. In these mesophotic rubble habitats rhodoliths are the main hard substrata for the attachment of macroalgae. Metabarcoding of

environmental DNA using molecular markers for rhodolith's endolithic portions has revealed hidden cryptic algal diversity including spores, propagules, and unsuspected life history stages. We explored cryo-SEM in the study of endolithic cell inclusions which brought to light a suite of microalgal stages. We were able to differentiate floridean starch from cellular inclusions. Analyses of combined 16S V4 metabarcodes and 16S Sanger sequences of several macroalgal orders increased the established record of diversity in the region. Progress is underway to link the eukaryotic component of the rhodolith holobiont ("total organism") with its co-occurring prokaryotic component. Rhodoliths are marine biodiversity hotspots that may function as seedbanks, temporary reservoirs for life history stages of ecologically important eukaryotic microalgae, or as refugia for ecosystem resilience following environmental stress.

14 – Fumbling Towards the Ecstasy of the Deep: How Mistakes Lead to a Search for Understanding Community Dynamics in a Marine Transition Zone. **D. Wilson Freshwater**. Center for Marine Science, UNCW, Wilmington, NC 28409, USA.

Through a series of unwitting mistakes, the author received decompression and technical dive training, which lead to a series of studies on epibenthic community dynamics along North Carolina's coast. An initial study of hard bottoms ranging from 18–42 m depths found depth was the most important factor structuring the epibenthic communities. The largest difference was found between depths ≤31 m and ≥32.5 m where there was a shift from macroalgae dominance to shared macroalgae and sessile invertebrate dominance. A subsequent study assessed the seasonal epibenthic communities on five hard bottoms along a 17–36 m depth gradient and found seasonal development and community composition was determined primarily by depth and proximity to the Gulf Stream. Although the studied depth zones were different, community composition converged in 'winter' and diverged during the growing and peak algal coverage seasons. Multiple sites on a single hard bottom were then surveyed over 16 months at a frequency to allow a better understanding of intra-annual and short term inter-annual change. Temporal communities were allowed to define themselves by grouping sampling days that did not differ. Community composition was significantly different between these communities, but a consistent intra-annual cycle did not occur. The cause for this (probably light), our current work, and other cool findings will be discussed.

15 – Mesophotic Algae in Paradise: The Interplay of Nutrients and Light in Structuring Mesophotic Macroalgae in the Hawaiian Archipelago. **Heather Spalding**, Department of Biology, College of Charleston, Charleston, SC 29424, USA.

The Mesophotic Coral Ecosystem (MCE) in the Hawaiian Archipelago is a low-light and presumably oligotrophic environment, yet it contains a high diversity and abundance of macroalgae. What processes are driving the high abundance and diversity of these algae? Measurements of macroalgal tissue nutrients, stable isotopes, and irradiance profiles in the water column were conducted across a gradient of anthropogenic impact in the Hawaiian Archipelago to determine how bottom-up processes may be influencing macroalgal abundance. Invasive macroalgae were abundant at mesophotic depths in areas offshore of densely populated areas and contained elevated tissue nutrients, suggesting that eutrophication may be impacting some MCEs via hypothesized submarine groundwater discharge. Several different genera of native and invasive psammophytic, bryopsidalean algae were observed to 90 m depths, and appeared to compete for available space. These data suggest that some macroalgae have evolved to thrive in these low-light habitats and have created islands of biodiversity that may be under threat from invasive species influenced by anthropogenic nutrients.