NCUR 2021 Proceedings

Comparing Small Mammal Communities on Remnant and Restored Prairies with a Special Emphasis on Rare Species

Ecology - Time: Tue 12:30pm-1:30pm - Session Number: 4110
Olivia Vergin, Faith James, Peyton Lehman, and Dr. Joseph Whittaker, Department of Biology, Concordia College, 901 8th St S, Moorhead, MN 56562.
Faith James, Olivia Vergin, Faith James, Peyton Lehman

As urban expansion converts wildlife habitats into agricultural and industrial land, native prairie lands have been reduced to 1% of their original area. This increases habitat fragmentation that disrupts species dynamics and populations, leading to low genetic diversity. Small mammals are vital to prairie ecosystems because they consume plant material and invertebrates, disperse seeds, and provide a source of food for larger species. Trapping of remnant and restored prairies provides data on small mammal community density and diversity. Comparing population data between remnant and restored prairies can inform successful management and restoration practices. We trapped small mammals in various remnant and restored prairies in northwestern Minnesota from 2012 to 2020 to compare small mammal species richness and evenness as well as to monitor populations of rare species. We set two to three grids with 50 traps (alternating Small Sherman, Large Sherman, and Longworth) per grid at each location. When a mammal was captured, we identified species, sex, and mass, and then marked for recapture. We collected body measurements and saliva samples from *Peromyscus* species for species identification. Our data analysis includes Simpson's Reciprocal Index for richness and evenness, population trends for common and rare species, and species comparisons between restored and remnant prairies. Through our prairie surveys, we document occurrences of rare species, such as *Perognathus flavescens*, *Microtus ochrogaster*, and *Zapus hudsonius*. Our findings will help inform future management decisions.

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Demyelination and Interferon Signaling in Axons Cause Retrograde Upregulation of ISGylation Pathway Genes

Biology - Time: Mon 4:30pm-5:30pm - Session Number: 3078

Kenneth R. David, Benjamin D. S. Clarkson, Ph.D., Charles Howe, Ph.D., Department of Neurology, Mayo Clinic, 200 First St. SW, Rochester, MN 55905
Kenneth David

Cognitive impairment in Multiple Sclerosis (MS), an autoimmune disease of the central nervous system, is associated with diffuse gray matter injury but remains poorly understood. Given that axons span both white and gray matter regions, signals within these axons may contribute to the spread of diffuse injury in the brain. We show that retrograde interferon-gamma (IFNg) signaling in axons (in vitro human and mouse) and demyelination (mouse in vivo) cause transcriptional and translational changes in neuronal cell bodies. Chief among the candidate signaling pathways identified is ISGylation, a process whereby a multitude of cellular proteins are modified by the attachment of one or more ISG15 molecules. Using custom adeno-associated viral vectors, we tested how altering ISGylation in neurons affects neuronal synaptic function and how it affects neuronal responsiveness to specific inflammatory factors in cell cultures. We also measured ISGylation in human MS brain tissues to see if neuronal ISGylation correlates with gray matter injury in MS. We report early evidence that increased neuron ISGylation alters the composition of neuron-derived extracellular vesicles. Microglia treated with extracellular vesicles from neurons overexpressing ISGylation pathway genes exhibited morphology consistent with increased phagocytic activity and increased mRNA expression of inflammatory cytokines including: CCL2, IL1b, TNFa, iNOS, CXCL10, CCL5, and IL6. At this point, it is still unclear how these changes are related to gray matter pathology; however, microglial activation by these vesicles may be involved in driving synapse loss as activated microglia are capable of stripping neuronal synapses.

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PI3K Subunits in the Rat Supraoptic Nucleus

Biology - Time: Mon 4:30pm-5:30pm - Session Number: 3080
Riley Irmen, Zaynab Said, Duong Nguyen, Emily Leusink, Victoria Ihry, Austin Grove, Munir Isahak, Sara Whiteman, Marissa Andersen, and Jason Askvig, Department of Biology, Concordia College, 901 S 8th St. Moorhead MN, 56562
Riley Irmen, Zaynab Said, Duong Nguyen

We previously demonstrated that the hypothalamic supraoptic nucleus (SON) undergoes a robust axonal sprouting response following unilateral transection of the hypothalamo-neurohypophysial tract in a young, 35-day-old rat. However, no collateral sprouting occurs following axotomy in a 125-day-old rat. Our lab has in vitro evidence demonstrating the role of CNTF (ciliary neurotrophic factor) in promoting process outgrowth via PI3K signaling. Thus, we compared the protein levels of the PI3K catalytic and regulatory subunits in the SON between 35- and 125-day rats. We found less protein of the catalytic domain, PI3K p110g, in the 125-day rat SON; however, we did not observe changes in the other three catalytic domains or the regulatory domains that we analyzed. Dual fluorescent studies demonstrated that all PI3K catalytic and regulatory subunits analyzed are localized to astrocytes and neurons in the SON. These data suggest that the lack of PI3K p110g found in the 125-day rat SON may prevent the collateral sprouting response from occurring, but future studies need to be performed to confirm this hypothesis.

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Small Crustaceans, Big Implications: Anthropogenic Impacts of Propeller Scars on Floridian Seagrass Ecosystems

Ecology - Time: Tue 12:30pm-1:30pm - Session Number: 4103
Faith James, Ingrid Jacobson, and Dr. Jenn Sweatman, Biology Department, Concordia College, 901 8th St S, Moorhead MN 56562
Faith James, Faith James, Ingrid Jacobson

Seagrass meadows on the Florida coastline provide optimal habitats for many keystone species but are being threatened by increasing anthropogenic activity. This ecosystem is vulnerable to boat propeller scarring that fragments natural habitats and disrupts typical species movements. Long-term impacts of habitat fragmentation are monitored by analyzing seagrass nutrient content, which reflects ecosystem-wide nutrient availability. Communities of amphipods may be useful for analyzing the effects of habitat fragmentation on higher trophic levels. Studies have explored how older seagrass scars affect other crustaceans like crabs and mollusks, as well as the influence of new scars on amphipod communities, but no study has examined the effects of older seagrass scars on amphipods. Our lab is investigating how older propeller scars affect seagrass nutrient content and amphipod communities. Our

lab collected samples from three randomly selected propeller scars in Lignumvitae State Park, Florida, at four distances: 0 m (at the seagrass-scar interface), 1 m, 2 m, and 5 m. Samples were collected using a Virnstein Grabber, which collects aboveground seagrass biomass and associated epifauna. Seagrass samples are currently being dried, homogenized, and analyzed for total phosphorus, carbon, and nitrogen content. Amphipods are being identified to the species level where possible. Species diversity and frequency will be calculated across sampling plots for univariate statistical analysis. We will also conduct a multivariate analysis of amphipod communities across the sampling plots to potentially identify community-level changes. We expect to find reduced nutrient content in the seagrass, as well as low amphipod population density and diversity, due to habitat fragmentation and destruction. The findings of this project would advance our understanding of fragmentation effects on seagrass ecosystems. Data will be reported to the Florida State Parks department, further contributing to conservation management practices in the Florida Keys.

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Volkstrauertag in Michigan as a Microcosm for the Relationship Between West Germany and the U.S. During the Cold War Era

History - Time: Tue 2:00pm-3:00pm - Session Number: 645
Shelby Reidle, Dr. Richard Chapman, Department of History, Concordia College, 901 8th St S, Moorhead MN 56562
Shelby Reidle

In 1953, the Fort Custer military cemetery in Michigan became notable for hosting the first memorial ceremony for World War II German POWs buried in the United States. This paper argues that the connections formed between the POWs and community members coupled with the federal government's promotion of the Cold War narrative of Germany made the establishment of *Volkstrauertag* as an annual ceremony possible. Michigan newspapers detail the community's perspective of these POWs both

during the war and in the context of the Cold War. Comparative analysis with similar ceremonies across the U.S. and Canada distinguishes the memory culture of Fort Custer. The founding of *Volkstrauertag* as an annual ceremony to remember the German POWs buried at the Fort Custer National Cemetery, reflects the empathy of the community for their former enemies. Additionally, due to the influence of West German and American actors, this event acts as a microcosm of the alliance between the two countries during the Cold War Era. The story surrounding *Volkstrauertag* at Fort Custer adds local nuance to the understanding of POW camps in the United States during World War II and how American communities incorporated the Cold War narrative into memorialization.

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