2025 Graduate Colloquium

April 28, 2025
Biology Building
Rooms 113, 121 & 122

Graduate Colloquium 2025 - Schedule

Integrative Biology - Room 113

Time	Format	Student	Supervisor
Session 1 - Chaired By: Dr. Catherine Febria			
9:00 am - 9:30 am - Responses to Human-Induced Change I			
	6 mins	Introduction & Welcome by Dr. Isabelle Barrette-Ng	
	5 mins	Pieniazek, Rachel	Dr. Dennis Higgs
	5 mins	Kemp, Angelina	Dr. Christina Semeniuk
	5 mins	Beneteau, Gabrielle	Dr. Dennis Higgs
9:30 am - 10:00 am - Animal Behaviour I			
	5 mins	Tormasi, Isabelle	Dr. Christina Semeniuk
	5 mins	Ogloff, Wesley	Dr. Nigel Hussey
	5 mins	Peterson-Galema, Jacob	Dr. Christina Semeniuk
10:00 am - 10:30 am - Responses to Human-Induced Change II			
	5 mins	Rokitnicki, Patricia	Dr. Oliver Love
	5 mins	Tranze-Drabinia, Elena	Dr. Oliver Love
	5 mins	Cyr, Kristen	Dr. Christina Semeniuk
	5 mins	Whited, Kenzi	Dr. Christina Semeniuk
10:30 am - 11:00 am - Coffee Break in Room 122			
Session 2 - Chaired By: Dr. Hannah ter Hofstede			
11:00 am - 11:30 am - Ecological and Environmental Genomics			
	5 mins	Nolan, Shayenna-Rae	Dr. Daniel Heath
	5 mins	Mosco, Holly	Dr. Christina Semeniuk
	5 mins	Beach, Riley	Dr. Dennis Higgs
11:30 am - 12:00 pm - Animal Behaviour II			
	5 mins	Ste-Marie, Eric	Dr. Nigel Hussey
	5 mins	Shinas, Leila	Dr. Sherah VanLaerhoven
	5 mins	Dow, Rachel	Drs. Oliver Love/Christina Semeniuk
	5 mins	Nardone, Isabella	Dr. Sherah VanLaerhoven
12:00 pm - 12:30 pm - Animal Communication			
	5 mins	Acorn, Connor	Dr. Dan Mennill
	5 mins	Nino, Nelsy	Dr. Dan Mennill
	5 mins	Dobney, Sarah	Dr. Dan Mennill
12:30 pm - 1:30 pm - Lunch and Poster Viewing in Room 122			
Session 3 - Chaired By: Dr. Christina Semeniuk			
1:30 pm - 2:00 pm - Assessing and Appreciating Biodiversity			
	5 mins	Bondy, Michelle	Dr. Dan Mennill/Dr. Isabelle Barrette-Ng
	5 mins	Damphousse, Lauren	Dr. Catherine Febria
	5 mins	O'Leary, Liam	Dr. Hannah ter Hofstede
	5 mins	Monson, Anna	Dr. Sherah VanLaerhoven
2:00 pm - 2:30 pm - Applied and Evolutionary Ecology			
	5 mins	Fotso Tagne, Joseph	Dr. Nigel Hussey
	5 mins	Saqib, Maiza	Dr. Trevor Pitcher
	5 mins	Sulthana, Azimove	Dr. Sherah VanLaerhoven
	5 mins	Tellier, Grayson	Dr. Trevor Pitcher
2:30 pm - 3:00 pm - Coffee Break in Room 122			
Session 4 - Chaired By: Dr. Dennis Higgs			
3:00 pm - 3:30 pm - Behaviour, Cognition and Neuroscience			
	5 mins	Aurangzeb, Zeenat	Dr. Barb Zielinski
	5 mins	Nadeem, Hadia	Dr. Hannah ter Hofstede
	5 mins	Dube, Keanna	Dr. Siyaram Pandey
3:30 pm - 5:00 pm - Poster Viewing in Room 122 & Social in Biolearning Centre (BB223)			

Between a blast and a hard plaice; Seismic noise effects on the behaviour and physiology of American plaice (*Hippoglossoides platessoides*)

Pieniazek, R.H.[1], Morris, C.J.[2], Hanlon, J.M.,[2] Higgs, D.M.[1]

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Higgs Lab, Integrative Biology

Once accounting for 10% of the Canadian groundfish fishery, American plaice (*Hippoglossoides platessoides*) populations collapsed in the 1990s due to overfishing, leading to subsequent reductions in their age and size at maturity, as well as increased natural mortality. Seismic surveys produce powerful underwater sound waves to map subsurface structures and resource reserves; however, they have raised concerns regarding their effects on fish. The current study investigated the behavioural and physiological impacts of sound blasts (~168 dB re 1mPa) on American plaice in the laboratory and compared those results to wild plaice sampled during a seismic survey. American plaice were collected and sampled at exposed sites near the Hibernia Oil Fields (Grand Banks of Newfoundland, Canada) during an extensive seismic survey and control sites 60 km away in the summer of 2024. Immediately after collection, plaice heads were preserved, and live fish were transported back to shore for laboratory-controlled experiments. Behavioural reflexes and hair cell density of the plaice were assessed before and at multiple time points following a one-hour exposure to high-intensity broadband noise to evaluate changes, damage, and recovery. Responsiveness varied between the reflexes tested, with only body flexing and head-grabbing reflexes fluctuating after the blasts. Preliminary hair cell imaging suggests physiological damage to the fish's ears from the sound blast. The results of this study give insights into the effects of seismic surveys on wild fish and aim to establish a baseline for understanding the impacts of seismic sound on plaice.

Bridging the Gap Between People, Birds, & the Land: Snow buntings (*Plectrophenax nivalis*) as a means to study the behavioural impacts of urban noise and to engage youth in science in Iqaluit, Nunavut

Kemp, A.[1], McKinnon, E.[2], & Semeniuk, C.[1]

[1] Department of Integrative Biology, University of Windsor, Windsor, Ontario, Canada
[2] University of Manitoba, Winnipeg, Manitoba, Canada

Semeniuk Lab-Predictive Ecology

As urbanization increases in the Arctic, noise pollution from human activity can affect critical avian behaviour and disrupt communication. Despite their presence in Iqaluit, Nunavut, little is known about how snow buntings, an Arctic-breeding songbird experiencing population declines, respond to urban noise or their ability to cope with an altered acoustic environment. A key adaptive trait for urban birds is their degree of behavioural adaptive capacity, allowing them to quickly adjust to, learn, and/or tolerate environmental changes. My research will explore how snow buntings' reactions to noise vary with urbanization by using playback experiments to test whether urban noise i) is perceived as a threat and increases vigilance while foraging; and ii) impairs communication by masking the bird's alarm call, potentially affecting overall fitness. Additionally, my research seeks to engage youth in science using snow buntings as a means of outreach in Iqaluit, Nunavut. Due to limited opportunities for Inuit youth to participate in science, this study seeks to engage youth in environmental research by creating and delivering place-based environmental education curricula that prioritize educational needs and gaps emphasized by teachers, alongside local bird knowledge and ecological understanding. Using snow buntings as a targeted focal species for these programs, I hope to teach basic songbird monitoring techniques and other transferable skills to youth. This research will provide insights into the adaptability of snow buntings to urban environments, informing conservation and city planning, while fostering collaboration between researchers and the Iqaluimmiut community, promoting scientific literacy and knowledge sharing.

The Role of Habituation to Underwater Sound in Freshwater Fishes

Beneteau, G.M., Higgs, D.M.

Aquatic Sensory Ecology Lab, Department of Integrative Biology, University of Windsor, Windsor, Ontario, Canada

The increase in human-mediated activity has raised concerns regarding the potentially negative impacts of noise pollution on fish populations. Anthropogenic noise impacts the acoustic scene, disrupting fish communication and behaviour however, research is limited in the amount of time that this disruption lasts and whether fish are able to habituate to prolonged exposures. To examine the role of noise habituation, foraging behaviour was observed through field experiments that were conducted at three different sites, each containing a quiet and noisy environment, throughout Windsor-Essex county. To attract fish to the field site, a baited underwater video station equipped with a GoPro camera, an underwater speaker, and earthworms (*Lumbricus terrestris*) was deployed into the water. Three individual treatments were administered throughout the study: two stroke engine, four stroke engine, and silence (as a control) to observe potential behavioural differences based on sound type. I hypothesized that prolonged noise exposure will alter foraging behaviour observed in wild fish. I predict that behavioural alterations will vary depending on the type of environment. Fish residing within quiet environments will exhibit more pronounced behavioural responses when exposed to noise. As concerns surrounding aquatic noise pollution gain attention globally, the interest of determining guidelines for the duration and level of noise exposure allowed within aquatic environments increases. Additional knowledge of species-specific responses to prolonged anthropogenic noise and the role of habituation gained from this research may be required to build comprehensive guidelines and alleviate pressures imposed on vulnerable species.

Bass With No Boundaries: Investigating the drivers of smallmouth bass (*Micropterus dolomieu*) invasion in the southwest Margaree River, Nova Scotia

Tormasi, I.A., Cyr. K., Mosco. H., Semeniuk, C.

Predictive Ecology Lab, Integrative Biology

Invasive fish species present threats to native populations through predation, displacement, and competition. Dispersal potential of invasive fish is influenced by environmental factors, including temperature, flow, and substrate as they impact key life-history traits. Behaviours such as boldness, aggression, and exploration also play a critical role in driving invasive fish movement. With water temperatures warming due to climate change, warm-water adapted invasive species like smallmouth bass (*Micropterus dolomieu;* SMB) are expected to expand into new habitats. SMB have spread beyond their native Great Lakes range to multiple provinces, including Nova Scotia; however, their riverine usage and drivers of movement in the province remain poorly understood. My study investigates the role extrinsic and intrinsic factors have on SMB movement and invasiveness in the southwest Margaree River, Cape Breton. Using acoustic telemetry, I will be examining the influence of i) abiotic factors such as water temperature, flow, and substrate on SMB movement and occupancy; and ii) intrinsic behavioural drivers on invasion potential. In-stream behavioural studies will assess boldness and exploratory traits of telemetry-tagged fish through assays involving predator avoidance, shelter use, and acclimation. I predict that SMB will move to river sections that present optimal flow, temperature, and substrates and show higher occupancy in these areas. Furthermore, I anticipate that SMB will exhibit traits associated with invasiveness, with bolder individuals being detected farther downstream at a faster rate. The spread of SMB in the Margaree River is a threat to species of cultural and commercial significance. My findings will provide a better characterization of the distribution of SMB and can be used to help create integrated management strategies.

Preliminary analysis of white shark movement behavioural types in Mahone Bay, Nova Scotia

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[4] Mote Marine Laboratory & Aquarium, Sarasota, Florida, USA

Hussey Lab, Integrative Biology

White sharks have historically been considered rare in Atlantic Canada, but they are now known to have a consistent seasonal presence. Consequently, there is a need to better understand their movements and high-use areas to determine their ecological role and assess the risk of human-shark conflict. Mahone Bay is a large ecosystem located on the southeastern side of Nova Scotia where human recreation is common and where white sharks are known to be present. We deployed an extensive acoustic receiver array in Mahone Bay between June and November of 2022 (n=34), 2023 (n=46), and 2024 (n=51) to detect white sharks acoustically tagged between Nova Scotia and Florida (n≈400) since 2014. The array detected 83, 91, and 61 individuals in 2022, 2023, and 2024, respectively, with peaks in occurrence in July and October. Preliminary analysis identified three movement behavioural types: use of the outer islands as a transit/migration corridor; temporary residency for short periods (~1 week); and longer-term seasonal residency (>1 month). The next phase of this research is to refine movement behaviour-type classifications by quantifying a series of movement metrics for each individual, pertaining to temporal (e.g., duration of presence) and spatial (e.g., inner vs. outer bay) use of the bay as well as activity levels (e.g., movement rates), and classifying distinct behavioural groupings using hierarchical cluster analysis. Results will broaden our understanding of white shark space use within a representative bay system in Atlantic Canada, informing the ongoing species management plan and supporting strategies to prevent negative human-shark interactions.

Do predator refugia exist for eider hens? Examining the spatiotemporal drivers of polar bear foraging patterns and eider anti-predator responses on East Bay Island, Nunavut

Peterson-Galema, J.W.[1], Richardson, E.S.[2], Semeniuk, C.A.D.[1]

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The increased rate of a warming Arctic has altered species interactions via changes in species distribution. Reductions in sea ice due to increasing temperatures are forcing polar bears (*Ursus maritimus*) on land earlier each year, which has led them to rely on alternative food sources, such as bird eggs. Colonial nesting seabirds, such as the common eider (*Somateria molissima*), are particularly vulnerable to this novel predation threat. Little is known about how hens respond to spatial and temporal variations in this predator's foraging patterns; specifically, if eiders can recognize differences in variation of risk across space and time and respond accordingly. My study examines the foraging space use patterns of polar bears on East Bay Island (EBI), Nunavut, and associated eider anti-predator behaviours. I will be using a combination of data from aerial drone surveys of EBI to extract habitat features as well as relative eider nesting densities, drone videos of foraging polar bears, and trail cameras to examine drivers of bear space use and eider responses. Using these datasets, I will be testing the occupancy and predation intensity of polar bear foraging patterns and how these are influenced by different spatiotemporal drivers. Equally, I will be investigating the flight-initiation-distances, flushing response, and return latency of eider hens in relation to bear space use and other (a)biotic characteristics. My goal is to examine if refuges exist on EBI and determine if eiders in these areas can modify their anti-predator response to lower their chance of nest predation.

City Living in the North: Flexibility in breeding decisions in Snow Buntings in a novel urban environment

Rokitnicki, P.[1], Mckinnon, E.[1,2], Dow, R.E. [1], Kemp, A. [1], Tranze-Drabinia, E. [1], Vézina, F.[3], Semeniuk, C.A.D.[1], Love O.P.[1]

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Integrative Avian Ecology Lab, Integrative Biology

Urbanization is increasing worldwide, profoundly affecting the environment and biodiversity, leading to changes in urban animal behaviour, physiology, and fitness. Most studies examining urbanization's impact on wildlife have occurred at southern latitudes, resulting in a knowledge gap for rapidly-developing northern communities. However, climate change and urbanization in the North may synergistically affect life history decisions such as when and how much to invest in reproduction. Although individuals may adjust these decisions to maximize success in response to environmental variation, our understanding of how and why cold-adapted species respond to the combined effects of climate change and urbanization, and the impact those responses have on fitness remains very limited. I am examining differences in breeding decisions (e.g., lay date, clutch size) and outcomes (e.g., fledging success) between two populations of Snow Buntings nesting in an urban (Iqaluit, Nunavut, Canada) and non-urban (East Bay Island, Nunavut, Canada) site. Using banding and breeding data from Iqaluit (2023-24) and East Bay Island (2007-23) I will compare breeding decisions and outcomes between the sites. This work will help us identify factors influencing inter-population variation in laying phenology and intra-population variation in fitness to explore the costs and benefits of urban Arctic expansion. Ultimately, results will provide insight into whether this declining Arctic songbird can flexibly adjust investment decisions to maximize performance and fitness in response to the cumulative effects of urbanization and climate change.

Quantifying the thermal limits and behavioural flexibility of urban snow buntings amidst accelerated Arctic warming

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Love Lab, Integrative Biology

Climate change effects are felt worldwide, though some places, like the Arctic, are more vulnerable than others. This system is put under additional stress as species and humans move poleward. The increase of urban development further warms the microclimate within Arctic cities through the urban heat island (UHI) effect, wherein temperatures of city centers are higher than the outskirts. While UHIs have been studied in the Eurasian Arctic, they remain generally unstudied in the Canadian Arctic, especially regarding their biological or ecological implications on wildlife. To fill this gap, I will study how an Arctic breeding songbird, the snow bunting (*Plectrophenax nivalis*) is responding to a city lifestyle in Iqaluit, Canada, which faces rapid urbanization and increasing summer temperatures. Specifically, I will examine the potential trade-offs birds face when living at the forefront of UHIs, and whether this habitat acts as a thermal refuge from the harsh Arctic conditions, or an ecological trap where birds cannot successfully raise their offspring. The goal of my research is to quantify how Iqaluit snow buntings are affected by climate- and urban-induced heat stress, and what mechanisms they use to mitigate that stress. I will measure snow bunting responses across high, medium, and low urban pressures using a thermally sensitive tag under their skin to determine how trade-offs between body temperature and activity impact breeding success. By investigating how wildlife responds to the ecological effects of rapid environmental change in the Canadian Arctic my work will help optimize conservation strategies for Arctic breeding songbirds.

Risky Refugia? Using acoustic telemetry and underwater cameras to characterize effects of Aquatic Invasive Species on juvenile Atlantic salmon (*Salmo salar*) within thermal refugia

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Predictive Ecology Lab, Integrative Biology

Cold-adapted fishes are increasingly exposed to cumulative stressors from warming water temperatures and the sequential influx of warm-adapted invasive fish. Whether cold-adapted fish can persist under these conditions relies on their ability to simultaneously cope with heat stress, novel predation, or increased competition. Under heat stress, Atlantic salmon (*Salmo salar*) behaviourally cope by seeking refuge in thermal anomalies to regulate their physiology and thereby moderate their preferred internal temperatures. While these thermal refugia serve as critical habitats that can buffer effects from rising temperatures, aggregating in these localized areas may increase the risk of predation or competition interference from invasive species such as smallmouth bass (*Micropterus dolomieu*) or brown trout (*Salmo trutta*). Nevertheless, it remains unclear whether juvenile salmon can behaviorally cope with the combined pressures of high temperatures and invasive species presence when occupying thermal refugia. To address this knowledge gap, we assessed fine-scale habitat use and behavior of Atlantic salmon, smallmouth bass, and brown trout within a thermal refugium in the Southwest Margaree River, Cape Breton. Habitat use was quantified using an acoustic telemetry VPS array deployed in a thermal refugium, and V3 tags internally inserted into Atlantic salmon parr and adult smallmouth bass and brown trout. In addition, underwater time-lapse cameras were deployed to identify fine-scale behaviors such as competition, predation, and predator avoidance within the thermal refugium. Preliminary results indicate extended use of the refugium by both Atlantic salmon parr and brown trout during high-temperature events. Ongoing work includes analyzing camera footage and assessing smallmouth bass habitat use. Understanding how juvenile salmon behaviorally cope with these cumulative stressors will help guide more targeted strategies towards supporting such behaviors, which can reduce the vulnerability of salmonids to climate-induced impacts.

Temporal patterns in a changing Arctic: Natural and human drivers on Arctic predators' foraging behaviours

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Semeniuk Lab, Integrative Biology

Rapid environmental change in the Arctic is altering predator behaviours and interspecies interactions, especially in small island ecosystems. This study investigates how both natural and anthropogenic factors influence the foraging behaviours and temporal movement patterns of Arctic foxes (*Vulpes lagopus*) and polar bears (*Ursus maritimus*) on East Bay Island (EBI), Nunavut. Using over two decades of ecological and environmental data, Chapter 1 identifies key biotic and abiotic drivers, such as prey availability, sea-ice breakup, weather conditions, and human researcher presence, that influence Arctic fox visitation patterns to EBI over time. Chapter 2 expands on these findings by analyzing trail camera footage from five field seasons to examine diel foraging patterns and the potential behavioural response of both Arctic foxes and polar bears to human presence. Specifically, it tests whether these animals perceive researchers on EBI as a disturbance, refuge, or neutral presence, and whether this perception affects their foraging activity. By examining how natural and anthropogenic factors shape Arctic predator temporal patterns over time, this study contributes to our understanding of behavioural adaptive capacity and the complex dynamics of human-wildlife interactions. Together, these findings offer insights into how mesopredators and apex predators respond to environmental change, supporting more informed conservation and management strategies for similar Arctic ecosystems.

Session 1 – Voting

Stream and Riparian Zone Microbial Community Structured by Land Use

Javad Sadeghi[1, 2], Shayenna Nolan[1], Patricia Voyer[3], Zeena Biro[3], Yasmin Ismail[3], Emma Mineau[3], Gina Peters[3], Daniel Heath[1,3]*, Terrence Bell[2]*

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Anthropogenic activity negatively impacts riparian and stream ecosystems, leading to a decline in biodiversity and ecosystem function. Microbial communities in these environments play crucial roles in primary production, nutrient cycling, and maintaining air, soil, and water quality. However, little is known about how soil and freshwater microbiota respond to land-use changes. In this study, we characterized bacterial communities in six small to moderate-sized streams across a gradient of urban and agricultural land uses using 16S rRNA gene amplicon sequencing. Our findings reveal distinct microbial compositions between stream water and riparian soils, with soil communities exhibiting greater richness and diversity than those in water. Additionally, soil samples collected at 3 meters (3m) and 1 meter (1m) from the river shared similar microbial compositions with edge and sediment samples but differed significantly from water communities. Alpha diversity indices (Chao1 and Shannon) indicated a significant effect of land use on water microbiota, with agricultural sites displaying higher microbial diversity than urban sites. In contrast, soil microbiota appeared more resilient to land use changes, as their alpha diversity remained unaffected. However, PERMANOVA analyses demonstrated significant effects of both land use and location on microbial community composition in soil and water samples. Given the sensitivity of the water microbiota to land use changes, our results suggest that it could serve as a potential bioindicator for assessing ecosystem health.

Gasperbro or Gasperfoe? Investigating the Relationship Between Gaspereau (*Alosa pseudoharengus)* Migration and Aquatic Invasive Predators to Assess Impacts on Atlantic Salmon Parr (*Salmo salar*) Using Behavioural Transcriptomics

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Predictive Ecology Lab, Integrative Biology

Atlantic salmon (*Salmo salar*) face increasing stress from rising temperatures and expanding ranges of invasive predators such as smallmouth bass (SMB; *Micropterus dolomieu*). These stressors can produce conflicting behavioural responses, including heightened thermal stress behaviours (i.e. erratic movements) and reduced antipredator responses. These may be especially concerning for Atlantic salmon during younger, more vulnerable life stages. However, seasonal increases of alternative prey, specifically juvenile gaspereau (*Alosa pseudoharengus*), may buffer juvenile salmonids against SMB predation. This study investigates how juvenile Atlantic salmon respond at both molecular and behavioural levels to interacting thermal and predation stressors, and how these responses change with gaspereau migration. We collected salmon parr across four sites in the Southwest Margaree River, Nova Scotia, that differ in temperature and SMB abundance. Gill and mucus samples were collected to assess the interactive stress effects of temperature and predation pressure on transcriptomic expression. In 2025, additional parr will be sampled before, during, and after gaspereau migration at these sites. Before tissue collection, behavioural trials will be conducted to assess parr activity and anti-predator responses. Data will be analyzed using GLMMs to explore combined effects of temperature and predation on transcriptomics and behaviour. This study will provide insight into early warning signs of stress in Atlantic salmon exposed to cumulative stressors, and the concomitant behavioural responses. Exploring the relationship between gaspereau and salmon can improve conservation strategies, including time-specific targeted SMB removals in relation to gaspereau migration, or by ensuring gaspereau maintain stable populations to serve as an effective prey buffer.

Evaluating gill swabs as a proxy for invasive tissue sampling to determine stress in marine fish

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Aquatic Sensory Ecology Lab, Integrative Biology

With the expected exacerbation of alterations to the global climate, a stronger emphasis is likely to be placed on the protection of critical marine habitat through the designation of protected areas and conservation of at-risk species. Protected areas offer refuge for many organisms, but pose logistical challenges for researchers, often necessitating the adoption of non-invasive approaches for monitoring/research. Research involving physiological or molecular questions conventionally requires the collection of potentially harmful tissue samples. Non-invasive molecular sampling protocols, such as gill swabbing and fin clipping, offer the potential to increase the ease in which the health of vulnerable ecosystems and/or fish populations can be monitored. To evaluate the efficacy of different collection methods, we explored relative expression levels of key stress genes using a high-throughput OpenArray system. In general, fin and gill tissue are known to indicate different transcriptional responses due to variations in cell type and turnover. The current research aims to explore these transcriptional trends across tissues to determine if stress profiles may be gleaned from fin and gill tissue or gill swabs. Once validated, non-invasive molecular measures of fish health will aid future studies by allowing the use of a minimally disruptive approach for sampling protected species or collecting specimens from protected areas. Gill swabbing might prove less effective than conventional sampling, however data may still inform researchers regarding the assessment of fish health through fin and gill tissue.

The ups and downs of life: Biologged diving behaviour provides evidence of both positive and negative buoyancy in Greenland sharks (*Somniosus microcephalus*)

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Hussey Lab, Integrative Biology

Buoyancy is an omnipresent force that governs how aquatic animals move through three-dimensional space, leading to physiological and behavioural adaptions across species. Swimming effort during vertical movements is increasingly being used to infer buoyancy in animals which exhibit oscillatory diving behaviours and for which collecting direct measurements of buoyancy is infeasible. Here, we estimate the relative buoyancy of 32 Greenland sharks (*Somniosus microcephalus*) tagged with biologgers recording acceleration and depth. Comparing swimming effort (ODBA [Overall Dynamic Body Acceleration]/speed) during ascending and descending dive phases, we find that Greenland sharks appear to span the buoyancy spectrum from positive to negative buoyancy, even when accounting for the effects of varying dive geometry. Neither sex, body size, nor tagging location explained the observed buoyancy variation. As a large and slow-moving species typically inhabiting deep waters, Greenland sharks are expected to be near-neutrally buoyant, yet large differences in directional swimming effort were observed across individuals. Negatively buoyant individuals exerted up to 233% more effort during ascents than descents, while positively buoyant sharks exerted up to 154% more effort during descents than ascents. Given the slow metabolism and low activity levels typical of Greenland sharks, even small deviations from neutral buoyancy could drive large behavioural differences, since countering buoyant forces likely represents a larger proportion of their overall locomotory energetic costs compared to other sharks. Opposing relative buoyancy across individual Greenland sharks may regulate movement and foraging strategies, as sharks are forced to either cope with, or exploit, their tendency to sink or float.

The Effect of Interspecific Interaction and Environmental Conditions on Blow Fly (Diptera: Calliphoridae) Oviposition Behaviour

Shinas, L., VanLaerhoven, S.

Department of Integrative Biology, University of Windsor

VanLaerhoven Lab, Integrative Biology

Under natural conditions, multiple species of blow flies have been observed to aggregate their egg laying, yet competition for larval resources can result in local patch extinction when one species outcompetes another for the resource. In spite of individual patch outcomes, seemingly poor competitors in these outcomes not only persist but thrive, and lab-based studies suggest a trade-off between competition and facilitation under varying environmental conditions. The aim of this study is to measure the oviposition behaviour of three locally relevant blow fly species in the presence of interspecific eggs when presented with a thermal gradient (40°C to 10°C) for oviposition. We test the hypothesis that for species that benefit from aggregation with other blow flies, they will modify their oviposition preference away from their preferred optimal temperature to oviposit with an interspecific clutch placed in a suboptimal (but still acceptable) temperature, trading off temperature for aggregation. We predict that in the presence of suboptimally placed interspecific eggs, the warm-weather thermal specialist *Lucilia sericata* (Meigen) will prefer to oviposit at a lower temperature closer to the interspecific clutch, thermal generalist *Phormia regina* (Meigen) will expand its preferences to higher temperatures in order to oviposit closer to the interspecific clutch, and cool-weather thermal specialist *Calliphora vicina* (Robineau-Desvoidy) will maintain its preference for cooler temperatures compared to preferences exhibited by each of these species in the absence of interspecific eggs. Understanding oviposition choices between interspecific females gives insight into coexistence mechanisms for species that share the same resource. In addition, oviposition behaviour provides evidentiary value in forensic investigations when insect evidence is used to estimate post-mortem interval.

Behavioural responses of an Arctic-songbird across varying degrees of urbanization

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Love and Semeniuk Labs, Integrative Biology

Increasing urbanization is altering natural landscapes and creating novel environments worldwide. Several species appear able to adaptively respond to these changes through behavioural adjustments. Studies at temperate latitudes have found that species living in urban environments have contrasting behavioural responses compared to non-urban counterparts in terms of degree of boldness, exploration and activity levels. Many communities in the north are becoming increasingly urbanized due to a growing population and the effects on Arctic species remains largely unknown. In particular, we know nothing about whether these flexible behavioural responses enable individuals to adapt rapidly to urban change. My study will examine the behavioural responses of an Arctic-breeding songbird -the snow bunting (*Plectrophenax nivalis*) – to urbanization in Iqaluit, Nunavut. Specifically, I will investigate differences in risk-taking, exploratory and responsiveness behaviours between birds breeding in urban and non-urban areas. I hypothesize that individuals will differ in their fearfulness of humans, willingness to explore a novel food source, and responsiveness to a novel object at the nest depending on their exposure to urbanization. To answer these questions, I will combine standardized breeding data collected from 2024-25 with field-based behavioural tests conducted on birds nesting across various urbanized regions of Iqaluit, to compare differences in behavioural responses between urban and non-urban nesting sites. As this species is rapidly declining, my findings will provide insight on if i) inter-individual differences in behavioural flexibility exist, and ii) these differences relate to fitness outcomes. These findings would provide conservation organisations with vital missing mechanisms to estimate population vulnerability.

Undercover Agents: Assessing the Behaviour of Four Mirid Species in Canadian Greenhouses

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The Canadian greenhouse industry plays a crucial role in ensuring national food security by providing a year-round supply of fruits and vegetables. However, this industry faces the challenge of pest infestations, which leads to significant crop damage and economic loss. Integrated Pest Management (IPM) strategies, particularly the use of biological control agents (BCAs) such as predacious mirid species, are implemented to mitigate pest damage. Among these, species of the genera *Dicyphus* and *Nesidiocoris* are recognized for their effectiveness as BCAs. *Dicyphus* species are native to Canada, whereas *Nesidiocoris tenuis* naturally establishes in greenhouse facilities around the Mediterranean basin, yet has been recently observed in Ontario. *Nesidiocoris tenuis* causes significant crop damage in milder climatic regions by feeding on and girdling plants, which outweighs its benefits as a BCA. This study aims to assess the predatory and dispersal behaviours of four mirid species—*Dicyphus hesperus*, *D. familicus*, *D. discrepans*, and *N. tenuis*—in Canadian greenhouses. Intraguild predation (IGP) will be assessed using no-choice Petri-dish arenas and within-plant distribution trials. Preliminary results suggest low IGP by *D. hesperus* when offered *N. tenuis* nymphs. Dispersal behaviours will be assessed using flight capacity, pest localization, and greenhouse-wide movement through lab trials of flight initiation, Y-tube assays, and greenhouse-wide dispersion from banker plants. Preliminary Y-tube assays suggest that *D. discrepans* prefers whitefly-infested tomato leaves versus clean leaves. By examining movement and IGP behaviour, this research will provide valuable insights into optimizing pest control in greenhouse environments, ensuring ecological sustainability and crop protection with effective species-specific IPM strategies.

Clamorous and amorous: Amplifying our understanding of an overlooked trait through field-based studies of Ovenbirds

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Signal amplitude is an important aspect of acoustic communication for many animals. The amplitude of a signal determines how far it travels through the environment and how loudly the signal is perceived. In songbirds, song amplitude is a flexible trait that can be modulated according to social context. Previous laboratory studies have revealed that male songbirds sing at different amplitudes depending on the presence of conspecific males or females and the type of interactions they are partaking in, but variation in amplitude is rarely quantified in wild, free-living birds. Our objective was to quantify variation in the amplitude of the songs of male Ovenbirds (*Seiurus aurocapilla*) during inter-sexual and intra-sexual encounters, to determine song amplitude is context-dependent in a field setting. Using a high-precision sound level meter, we compared the amplitude of male Ovenbird songs during different types of spontaneous intra-sexual interactions. We also conducted a playback experiment to measure the amplitude of songs sung in response to simulated male versus female audiences. During spontaneously occurring vocal interactions, we found that Ovenbirds sing at higher amplitudes during long-distance countersinging interactions and at lower amplitudes during close-range countersinging interactions. In response to the playback, we found that males sang louder in the presence of females and quieter in the presence of males. This study provides insight into how signal amplitude relates to acoustic communication during inter- and intra-sexual interactions between songbirds in their natural environment.

The silence of the females: the importance of documenting their vocalizations in a megadiverse country

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The vocalizations of female animals are widespread globally and phylogenetically but have received scant research attention compared to the vocalizations of male animals. Historically, avian vocal research has focused on male song, resulting in a critical knowledge gap. This bias is particularly evident in the tropics, where female song is often more prevalent than in temperate zones, yet significantly underdocumented in both scientific literature and sound libraries. To address this gap, we compiled data on vocal behaviour for male and female birds in Colombia, the country with the highest avian biodiversity in the world. Using the Birds of the World database, we documented the presence or absence of songs, calls, and duets for each sex, along with plumage dichromatism, across all Colombian species. We conducted an extensive literature review in Englissh, Spanish, and Portuguese using Scopus, ISI Web of Science, and Google Scholar to identify additional records. We report vocal behaviour in females of 809 Colombian species (579 species listed in Birds of the World and 230 species in 86 publications). To strengthen our dataset, we are currently searching for archived recordings from four major sound repositories and libraries. Our findings reveal a persistent lack of documentation of female vocal behaviour. This deficiency is driven by factors such as monomorphism, geographic barriers, and challenges in accessing tropical regions, where female vocalizations are more prevalent. There is a need to expand research and documentation efforts on vocalizations in the tropics to strengthen knowledge of avian vocal ecology, and the role of females in the diversity of acoustic communication strategies in the tropics.

Songs of the studs: do male song traits influence female choice in a wild, promiscuous bird?

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Acoustic performance often influences the reproductive success of vocal animals. Many songbird species have high levels of extra-pair paternity, where females copulate with high quality males in nearby breeding territories. Extra-pair mating success has been repeatedly associated with male song features, however, few studies have compared female preference for acoustic traits of their social partner versus their extra-pair partner. Females should prefer social males that signal direct benefits for raising offspring, while preferring extra-pair males that signal indirect, genetic benefits to offspring. We investigated song and reproductive success in wild Savannah Sparrows (*Passerculus sandwichensis*) to understand how female choice is influenced by male song, and how this choice may differ for social versus extra-pair mates. We analyzed nestling paternity and songs of social and extra-pair males over five breeding seasons to compare social reproductive success (number of raised offspring) and genetic reproductive success (number of sired offspring) to song structure and performance features. Surprisingly, we found only weak evidence that song structural features relate to reproductive success. We found that older males raise and sire more within-pair offspring, and males with higher song rates sire more extra-pair offspring. Interestingly, we found that greater annual male density reduced male genetic success. Our results suggest that multiple factors influence reproductive success each year. We discuss the importance of considering multiple aspects of individual quality and the complexity of female choice.

Session 2 – Voting

Using bioacoustics and community service learning to assess the benefits of urban parks for birds and humans: a case study of Ojibway National Urban Park

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Urban parks provide space for humans and wildlife to coexist and often exhibit lower levels of anthropogenic noise than surrounding urban areas. Urban parks also represent an opportunity for local youth to engage in outdoor environmental education activities. Until recently, there has been little focus on the importance of urban parks in the context of both biodiversity and education. The proposed Ojibway National Urban Park is a fragmented but protected urban natural area in Windsor-Essex. Using Ojibway as a case study, I will measure the benefits of urban parks for both birds and humans. I will use bioacoustic recordings to calculate bird species richness in park fragments, and to compare avian biodiversity between central and edge locations. I will also compare avian biodiversity in fragments near the Gordie Howe International Bridge before and after the bridge opens to international traffic, measuring the impacts of increased traffic noise on species richness. To study the benefits of parks for urban youth, I will conduct a scoping literature review on the topic of urban environmental education. My research will inform the development of a community service learning program in which University of Windsor students will teach elementary and high school students about nature. Finally, I will evaluate the learning and attitudinal outcomes for undergraduate students who participate in the service learning program. By demonstrating the importance of urban parks to birds and humans, my research will contribute to the continued protection of urban green spaces and the species who rely on them.

Translocation as Conservation: Evaluating Freshwater Mussel Translocations in Canada

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Freshwater mussels (Unionidae) are among the most imperiled animal groups globally, with steep population declines driven by habitat loss, pollution, and infrastructure development. In Canada, mitigation translocations—relocating mussels ahead of construction activities—are increasingly used to prevent direct harm to mussel assemblages, particularly in areas where species at risk (SAR) are present. However, the long-term effectiveness of this practice remains poorly evaluated. In this study, I synthesized data from 12 mussel translocations conducted in southern Ontario rivers, drawing on industry reports submitted to Fisheries and Oceans Canada. Each translocation included three population groups: mussels relocated from the Prescribed Search Area (PSA), resident mussels at the Relocation Site (RS), and undisturbed mussels at a Control Site (CS). I calculated percent population declines over two years for each group and assessed site- and species-level trends using mixed models, non-parametric tests, and multivariate analyses of community composition. Across sites, all three groups exhibited substantial declines, with CS populations showing slightly higher long-term reidentification rates than PSA and RS populations, although differences were not statistically significant. Community composition changed significantly at translocated sites but remained stable at controls. Species-level trends were observed but not significant due to high variability. These results suggest that mitigation translocations alone may not fully conserve mussel populations or community structure. Moving forward, conservation actions should prioritize site assessments, long-term monitoring, standardized reporting, and less invasive follow-up methods such as PIT tagging to improve detection and inform adaptive management of critical habitat for SAR.

Listening to the Landscape: Assessing Anthropogenic Impacts on Species Composition in the Carolinian Zone

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The growing human population is placing significant pressure on the natural environment through direct habitat modification which negatively affect wildlife and ecosystems. Southern Ontario's Carolinian Zone, Canada's most biodiverse region, exemplifies the conflict between preserving biodiversity and accommodating rapid human development. This study aims to investigate how human disturbances impact native bird and bat populations. The focus will be on assessing how habitat modification affects wildlife, hypothesizing that modified habitats, while potentially serving as partial replacements for natural ones, will exhibit lower biodiversity and activity levels. To test these hypotheses, acoustic monitors were deployed across paired natural and modified habitats (forest-suburban and prairie-agriculture) in Essex County. These devices captured audible and ultrasonic sounds allowing for species identification through specialized software. Background noise levels will also be analyzed to assess their influence on biodiversity. Results indicate that habitat type has no significant effect on bat presence but rather closer proximity to standing water correlates with an increased abundance. Early results are also suggesting that habitat has no significant effect on bird activity though it suggests prairie to be the most diverse habitat. The study aims to provide critical insights on how changes to natural habitats affect wildlife and emphasize the importance of conserving natural areas. By highlighting the value of making modified habitats more ecologically similar to natural ones, the findings will support informed conservation efforts and sustainable development in rapidly changing biodiverse regions like the Carolinian Zone.

Temperature, Crop, and Water source effects on the biodiversity and abundance of Calliphoridae in Windsor-Essex across seasons.

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The Calliphoridae of Windsor-Essex area play a key role in the decomposition and nutrient cycling processes. Because they are adapted to quickly find and utilize carrion, an ephemeral resource, the availability of carrion plays an obvious role in predicting blow fly distribution, but other factors such as temperature, humidity, non-carrion protein and sugar resources are possible factors influencing the abundance and diversity of blow fly species within an area. Key species of Calliphoridae are known pollinators, additionally, recent research demonstrates a correlation between some species and water sources such as rivers and lakes. Seasonal temperature variation, presence of water/higher humidity, and varying vegetation sources of pollen protein and sugars offer possibilities for blow fly species niche differentiation to explain the presence of 14 overlapping and seemingly competing blow fly species in Windsor-Essex. While previous research has sampled in both urban and rural areas, current research aims to distinguish between mainly rural species, increasing trapping frequency in cropland. Fifty blow fly trapping sites were sampled for 24h once a month between May and November in 2024. Blow fly species will be identified and their diversity compared against previously developed spatiotemporal predictive models evaluating the role of distance to water, crop types, seasonal temperature changes and other landscape regression factors. The spatiotemporal distribution of blow fly species is not only valuable from an ecological perspective, but also provides evidentiary value when using these critical species to estimate the post-mortem interval, movement of deceased individuals, and disturbance of their bodies in forensic investigations.

Exploring novel ecological questions through repurposed underwater video datasets: Case studies with jellyfish and white sharks

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Underwater video systems have been deployed across marine habitats worldwide, generating extensive footage of species and ecosystems. While typically focused on specific research targets, these systems record a wealth of largely unused incidental observations, that if repurposed could offer a cost-effective way to explore new ecological questions. Here, we present two case studies demonstrating how Baited Remote Underwater Video System (BRUVs) observations can be repurposed to gain novel ecological insights. In the first case, we reanalyzed BRUV footage and associated environmental data from 15 deployments originally collected to study Greenland shark behavior in Arctic waters, repurposing it to estimate the vertical distribution of jellyfish. By counting the number of jellyfish visible during the BRUV descents through the water column, we found that jellyfish abundance was highly variable (mean: 2,606 ± 2,803 individuals), but over 85% of observations occurred at < 25 meters depth with abundance tied to temperature, dissolved oxygen and chlorophyll-a. In the second case, we re-examined BRUV footage collected to detect white shark presence and used this to assess evidence of predator-prey interactions by analyzing external injuries. Among 14 white sharks examined, all exhibited scars consistent with seal interactions, which accounted for more than 90% of recorded injuries. Additionally, these injuries were predominantly located on the dorsal region of the head and prevalence increased with body size. Together, these case studies highlight the untapped potential of existing video datasets to address novel ecological questions, providing an efficient and cost-effective way to expand our understanding of marine ecosystems.

Effects of tank colour on fish colouration

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Colouration in fishes can reflect physiological status, stress, or social rank, and is influenced by both environmental and genetic factors. Understanding how rearing environment impacts colouration has implications for post-release survival in hatchery-reared populations. We investigated the effects of rearing environment and structural enrichment on body colouration in juvenile Chinook salmon (*Oncorhynchus tshawytscha*) at the University of Windsor's Freshwater Restoration Ecology Centre. Fish were reared in one of six coloured bucket environments (white, grey, black, red, blue, green), with a subset of tanks later provided with gravel substrate as structural enrichment. Lateral photographs were taken at multiple time points (baseline, 3-, 7-, and 14-days post-treatment and post-substrate). Colour values (RGB and HSV) were extracted from four consistent body regions (sclera, dorsal stripe, underneath dorsal stripe, and next to gill) using Adobe Photoshop. Ongoing analyses are evaluating whether bucket colour and enrichment influence colouration and how these changes develop over time. Additional assessments included behavioural trials using mirror image simulation to evaluate aggression. The findings of this study will indicate whether body colouration and levels of aggression are impacted by tank colour and enrichment conditions. These findings contribute to the development of more naturalistic rearing environments by investigating their impact on the physiological and behavioural outcomes in hatchery-reared salmon.

Better biological aphid control for sustainable and resilient greenhouse production

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The greenhouse industry is a vital contributor to Canada's agricultural economy, supporting year-round production of crops such as tomatoes, cucumbers, and peppers. This intensive cultivation creates conditions that are highly susceptible to aphid infestations. These aphids (*Myzus persicae*, *Aphis gossypii*, and others) cause significant yield losses through direct feeding and virus transmission. Insecticide resistance and growing restrictions on chemical pesticide use highlight the urgent need for more sustainable Integrated Pest Management (IPM) strategies. This research aims to improve aphid biocontrol in greenhouse systems by integrating ecological, toxicological, and molecular approaches to optimize use of biological control agents (BCAs). Four objectives will guide this research: (1) determine how differences in insecticide Modes of Action (MOAs) affect aphid mortality; (2) assess whether systemic insecticides translocate into aphid honeydew, resulting in prolonged indirect exposure for BCAs such as *Aphidius colemani* and *Aphidius ervi*, and evaluate how both indirect and direct exposure affect BCA survival, behavior, and reproduction; (3) evaluate the biocontrol potential of syrphid flies, an underused but promising predator group, focusing mainly on predation capacity and also feasibility for integration into IPM; and (4) investigate regional genetic variability in aphid populations using SNP markers to predict insecticide susceptibility and guide resistance management strategies. Expected outcomes include identifying insecticide delivery strategies that minimize harm to BCAs, highlighting syrphids as effective and compatible predators in multi-agent systems, and uncovering resistance patterns in aphid populations. This work is anticipated to provide evidence-based recommendations for improving aphid control and enhancing the long-term sustainability of greenhouse production systems in Canada.

Influence of ejaculate age and female reproductive fluid on sperm quality, reproductive success, and offspring development in a wild population of Chinook salmon (*Oncorhynchus tshawytscha*)

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Reproductive senescence is defined as the progressive deterioration of reproductive cells (i.e. sperm cells), leading to declines in fertility and fitness. It has been previously documented that female reproductive fluids (FRFs) are able to "rescue" declining sperm quality (related to sperm senescence), by acting as a buffering mechanism to select high quality sperm cells within a sample. Chinook salmon are an external fertilizing species, meaning gametes are released into the environment before fertilization occurs. Current management practices collect and transport gametes back to hatcheries before fertilizing. Therefore, it is important to study temporal sperm senescence progression, its impact on reproductive ability, examine compensatory mechanisms, and downstream effects. To test sperm senescence effects, wild males were sampled, and their ejaculate was analyzed for traits related to reproductive success at multiple time points post-ejaculation (0.5h, 2.5h, 4.5h, 6.5h). To test the effect of FRFs on sperm quality, samples were activated at each time point twice; once with river water and once with a 25% ovarian fluid solution. To determine the relationship between sperm senescence, FRFs, and offspring quality, collected gametes were fertilized and egg metrics were collected. Preliminary results indicate that sperm senescence was not significant within the time frame examined, but ovarian fluid improved sperm quality across all time points. Hatch and fertilization success did not differ between treatments. Chinook salmon rely on captive breeding efforts to supplement populations. This work provides insights into evolutionary aspects of aging, fertility, parental effects, and may directly influence conservation policies for similarly managed species.

Session 3 – Voting

Putative Gustatory Receptors and Associated Proteins in the Sea Lamprey (Petromyzon marinus)

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In fish and mammals, both the taste and solitary chemosensory system relies on specialized G protein-coupled receptors (GPCRs) to mediate responses to bitter, sweet, and umami stimuli. Sea lampreys as basal vertebrates lack identified orthologs of these typical vertebrate taste receptors. However, they possess functional pharyngeal taste buds and solitary chemosensory cells that respond to a range of tastants, including bitter compounds, amino acids, and bile acids. This study examines the lamprey genome for alternative receptor families that can underlie gustatory and solitary chemosensory function. Prior research has detected olfactory receptor cDNA in mammalian tongue tissue, implying potential roles in taste perception. Vomeronasal receptors (V1Rs), part of the GPCR families C and A alongside taste receptors, may share evolutionary origins and functions with canonical taste receptors. We investigated the expression of mRNA for vomeronasal receptors V1R324, V1R4, V1R342, and V2R1 in lamprey pharyngeal tissue containing taste buds, as well as downstream signaling components like G-proteins and the TRPM5 ion channel. The mRNA detection in pharynx tissue that contains taste buds and the gill pore that contains solitary chemosensory cells points to a complex molecular framework supporting taste perception in lampreys. The pharmacological evidence suggests lamprey use IP3 and TRPM5 as downstream component to activate cells signalling in taste cells, indicating part of taste signalling is conserved throughout vertebrate taste evolution. Further studies are needed to clarify whether these components are indeed expressed in taste cells of lamprey using techniques such as immunolabeling and in situ hybridization. These findings advance our understanding of sensory evolution and hold potential implications for comparative physiology and biomedical research.

Unraveling Moth Evasive Responses: A 3D Analysis of Variability in Prey Escape Behavior

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Predator-prey interactions are shaped by an evolutionary arms race, where prey must continuously adapt their defenses to evade predation. Moths, as prey to echolocating bats, exhibit a wide range of evasive flight behaviors. However, the variability in these responses, both within and between moth species remains poorly understood. In this study, we use 3D video recordings to analyze the evasive flight behaviors of 19 local moth species in response to bat echolocation calls. Recordings were conducted in a large flight tent using synchronized playback experiments. For each moth, we recorded flight both in silence and in response to bat calls. Flight trajectories were visualized and quantified using ProAnalyst software. We now have sufficient data for within-species analysis of one focal species (*Noctua Pronuba*), allowing us to compare intraspecific variation to the combined interspecific variation across all other species. Preliminary visualizations reveal two main flight path shapes: looping and straight-line trajectories, indicating both species and individual-specific evasive strategies. Our findings provide insight into the adaptive significance of this behavioral variability and contribute to our understanding of how prey species evolve diverse tactics in response to predation pressure.

Multi-Disciplinary Approach to Evaluate the Efficacy of Combined Treatment of UbisolQ10 and Ashwagandha in a Transgenic Mouse Model of Alzheimer's Disease

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Alzheimer's disease (AD) has become a significant global health challenge, with no cure at present. Currently available pharmaceuticals may alleviate some symptoms, but long-term use can cause harmful side effects and toxicity. Therefore, the current study employs a multi-modal approach to evaluate the efficacy of a novel nutraceutical treatment of a combination of Ubisol-Q10 (UQ) and Ashwagandha root extract (ASH) in a transgenic (5xFAD) mouse model of AD. UQ, a water-soluble formulation of Coenzyme-Q10, has shown promise in mitigating mitochondrial dysfunction, while ASH is recognized to clear amyloid plaques. Therefore, the treatment aims to provide a non-toxic alternative therapy to target several AD-related mechanisms. To evaluate, 24 female and 24 male mice are divided into three groups: wild-type, untreated transgenic, and treated transgenic. Designated solutions are provided within the mice's home-cage water-bottles for free consumption. All subjects undergo longitudinal assessments of magnetic resonance imaging (MRI) and spatial and non-spatial recognition tasks in an X-maze. Advanced MRI techniques are applied to monitor structural changes in the hippocampal and entorhinal regions, as well as evaluate the severity and longevity of neural inflammation, while behavioural measures evaluate how structural changes within the brain relate to memory. Lastly, post-mortem Golgi-Cox staining is used to evaluate neuronal morphological characteristics and dendritic processes. This collaborative research study provides an in-depth look into a non-toxic remedy to potentially halt the progression of Alzheimer's disease.

Keywords: neurodegenerative diseases, Alzheimer's, MRI, behavioural, biochemical, nutraceutical treatment

Session 4 – Voting