

Department of Ecology, Evolution, and Marine Biology

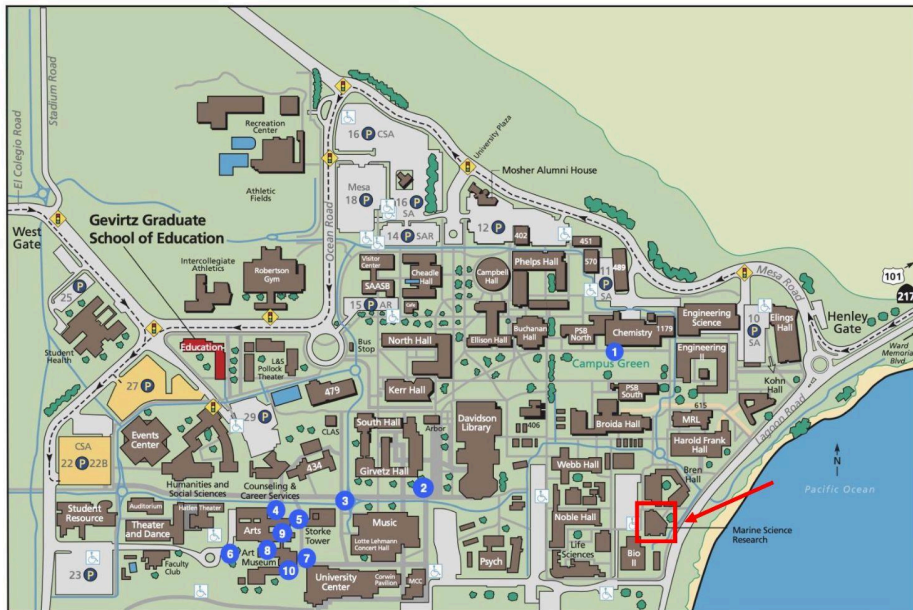
2025 Graduate Student Symposium

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Location

All talks will be in the UCSB Marine Science Research Building (marked in red on the map below) Auditorium on the ground floor. Lunch and the evening reception will be on the second floor MSRB balcony.



UCSB EEMB

Schedule

Breakfast & introduction

8:00 AM | Light breakfast

9:00 AM | *GSS planning committee* - Welcome and logistics

9:10 AM | *Todd Oakley* - Welcome and introduction to EEMB from the Chair

Session 1

9:25 AM | *Amelia Ritger* - Clams Under Pressure: Insights from tribal harvesters on shell condition in a changing ocean

9:40 AM | *Sibelle Odonnell* - First year talk

9:45 AM | *Kacie Ring* - Tick-Talk: quantifying the positive impact of education outreach on tick-related knowledge and confidence in a California county

10:00 AM | *Dexter Davis* - First-year talk

10:05 AM | *Cheyenne McKinley* - The rhythm of love: investigating rhythm in bioluminescent ostracods

10:20 AM | *Mackenzie Kawahara* - First-year talk

10:25 AM | *Cannon Mallory* - Chromosomal Copy Number Variation - Possible genetic driver of variable disease outcomes of the amphibian fungal pathogen *Batrachochytrium dendrobatidis*

10:40 AM | 15-minute break

Session 2

10:55 AM | *Siena McKim* - What's that ooze? Amphipod secretory systems and clues to their evolution

11:10 AM | *Gwendolyn Pohlmann* - First year talk

11:15 AM | *Jacob Weverka* - Grazing-induced changes in soil carbon cycling differ under annual and perennial grasses

11:30AM | *Alitzel Villanueva* - First year talk

11:35 AM | *Ruby Harris-Gavin* - Global ungulate diet meta-analysis: Understanding knowledge gaps in a changing world

11:50 AM | *Rowan Vitro* - Unraveling Isoform-Specific Nanomorphology in iPSC-Derived Cardiomyocytes with cryogenic correlative light and electron microscopy and cellular tomography

12:05 PM | *Zhijun Mavis Ding* - First year talk

12:10 PM | *Jazmin Sedano* - First year talk

Lunch

12:15 - 1:30 Lunch - Second floor balcony of MSRB

Session 3

1:30 PM | *Mads Weise* - First year talk

1:35 PM | *Lisa Mesrop* - Born to Glow: Unraveling the development and evolution of bioluminescent glands

1:50 PM | *Maddie Manzagol* - First year talk

1:55 PM | *Erin de Leon Sanchez* - Maternal effects in response to marine heatwaves in the red sea urchin, *Mesocentrotus franciscanus*

2:10 PM | *Paola Santiago Padua* - First year talk

2:15 PM | *Kayla Kauffman* - Small mammals and their parasites in human-altered landscapes

2:30 PM | 15-minute break

Session 4

2:45 PM | *Joe Celebrezze* - First year talk

2:50 PM | *Charlie Braman* - Crabs all the way down, a first look at atoll forest nutrients across a crab density gradient

3:05 PM | *Piper Lovegreen* - Serpentine's Toxic Touch: Plants know, but do they show?

3:20 PM | 15 minute break to set up for panel

3:35-5:00 PM | UCSB alumni career panel

Reception

5:15 PM | Reception: MSRB 2nd floor balcony

Talk abstracts

Amelia Ritger. **Clams Under Pressure: Insights from tribal harvesters on shell condition in a changing ocean**

- Coastal communities face increasing threats from climate change-induced stressors such as ocean acidification and heatwaves. Shellfish fisheries of the Pacific Northwest U.S. exemplify this vulnerability, as this region is particularly susceptible to ocean acidification, which presents a considerable risk to shellfish survival and growth. The Pacific razor clam (*Siliqua patula*) fishery is one of the most popular recreational fisheries in Washington state and also provides enormous cultural value to coastal tribal communities. In recent years, some tribal harvesters have observed more breakage in razor clam shells during harvest. To investigate biogeographic patterns in razor clam shell traits and their relationship with local oceanographic conditions, we collected razor clams from 13 sites spanning over 700 km of coastline from Oregon, U.S. to British Columbia, Canada. We measured shell size, thickness, and strength and will be assessing their correlation with environmental factors such as ocean pH, temperature, and oxygen. By comparing modern shells to historical specimens, we identified temporal trends in these relationships. Our findings provide valuable information for resource managers to identify at-risk populations and effectively manage the risks and impacts on a calcifying marine species that provides important economic, recreational, and cultural benefits.

Cannon Mallory, Ciara Sheets, Cherie Briggs, and Jamie Voyles. **Chromosomal Copy Number Variation - Possible genetic driver of variable disease outcomes of the amphibian fungal pathogen *Batrachochytrium dendrobatidis***

- The disease chytridiomycosis, caused by the amphibian fungal pathogen, *Batrachochytrium dendrobatidis* (Bd), has contributed to population declines and extinctions of amphibians worldwide. However, the impacts of this fungal pathogen has been highly variable at both the species and population levels, ranging from rapid extirpation of some species and populations to little negative impact on individual or population health. Despite over a quarter century of research, the drivers of this high variance in disease outcomes remain elusive. These disease dynamics may be driven by Chromosomal Copy Number Variation (CCNV) in the pathogen Bd, where the ploidy number of individual chromosomes can change significantly between generations. We investigate the rates of CCNV in Bd both in the field and in the lab and explore how CCNV correlates with strain growth rate, fecundity, and thermal stress tolerance.

Charlie Braman. **Crabs all the way down, a first look at atoll forest nutrients across a crab density gradient**

- Land crab biomass in atoll forests can rival that of all other terrestrial animals combined. Many of these crabs also burrow, creating abundant bioturbation pathways that may influence soil properties. While land crab impacts have been demonstrated for tropical

forest litter consumption or mangrove soils, few if any studies have investigated land crab nutrient impacts within atoll forests. We designed an on-going study to tease apart the impacts of land crabs on forest nutrients to better understand the role these organisms may play in atoll nutrient pathways. A series of exclosures and paired controls have been placed within the forests of Tetiaroa, French Polynesia and Palmyra Atoll across a gradient of crab activity. Soil samples were taken at the surface (<10 cm) and at depth (45-55 cm) to see how the density of land crabs related to soil nutrients. I will report our preliminary first year findings of how soil Carbon, Nitrogen, Phosphorous, and micronutrient content relate to crab density demonstrating that higher crab densities appear to increase available nutrients below the forest soil surface.

Cheyenne N. McKinley and Todd H. Oakley. **The rhythm of love: investigating rhythm in bioluminescent ostracods.**

- Biological rhythms drive many physiological processes and behaviors using two main mechanisms, an endogenous clock or exogenous cues, such as light availability. Here, we begin to investigate the underlying mechanisms of biological rhythms in the bioluminescent courtship signals of ostracods. Luminous ostracods time their bioluminescent mating displays to the darkest periods of the night, when males swim into the water column and produce bioluminescent signals to attract mates. A previous study from field observations proposed that luminous ostracods respond directly to darkness as an external stimulus to determine when to produce mating signals, signaling when less than a third of the moon is visible. Under this hypothesis, we would expect luminous ostracods to signal at similar activity levels throughout the night when presented with constant darkness. To test this hypothesis, we conducted a pilot study, recording ostracod signal activity under constant darkness across several nights. Surprisingly, we found that signal activity occurs during a window of time early in the night and does not occur at similar activity levels throughout the night, suggesting the influence of an endogenous clock. This work challenges previous notions about the rhythm of bioluminescent displays in ostracods and lights the way for future investigation into the mechanisms of biological rhythms.

Erin E. de Leon Sanchez and Gretchen E. Hofmann. **Maternal effects in response to marine heatwaves in the red sea urchin, *Mesocentrotus franciscanus***

- Kelp forests on the Santa Barbara Coast have experienced marine heatwave (MHW) events that coincide with the timing of key life history events, such as gametogenesis, of many benthic invertebrates. Of particular interest is the red sea urchin, *Mesocentrotus franciscanus*: an important ecosystem engineer that controls kelp forest algae abundance and the primary urchin species harvested for its gonads or “uni” in California. To study the effect of thermal stress from MHWs during gametogenesis in the red sea urchin and whether MHWs may induce transgenerational plasticity via maternal effects, adults

urchins were exposed to two conditions in the laboratory: an ambient condition (13-16°C) and MHW acclimation — three MHW events, two weeks each, that mimicked the intensity of the 2015 MHW events on the Santa Barbara coast (maximum temperature 21°C in October, 19°C in November, and 18°C in December). Adults from each condition were spawned and eggs were collected. Egg sizes were measured in ImageJ, total protein concentration was determined via Pierce BCA protein assay, and total lipid concentration was quantified using Iatroscan MK-6/6s thin layer chromatography. MHW-acclimated females had significantly smaller eggs than females acclimated to ambient temperatures. Egg protein concentrations showed no differences. Lipid analysis is in progress. Our results so far show that MHWs induce maternal effects, which may play a role in altering progeny performance of a key fishery species in the face of MHWs.

Jacob Weverka. Grazing-induced changes in soil carbon cycling differ under annual and perennial grasses

- Soil carbon storage is an important function of grassland ecosystems, supporting both ecosystem productivity and global warming mitigation. In grassland ecosystems, grazing management may promote soil C storage by changing how plants allocate C towards root production and activity, but this response varies depending on the plant species that is grazed. In California grasslands, where native perennial grasses have largely been supplanted by exotic annual grasses, differing responses between vegetation types may then control the response of soil C to grazing. To understand how grazing affects soil C cycling under different vegetation types, we grew a native perennial grass and an exotic annual grass in clear-sided rhizoboxes to examine how simulated grazing influenced root growth and mortality. We also measured soil microbial biomass and extracellular enzyme activity under each species. We found that intensively grazed perennial grasses possessed fewer roots and less soil microbial biomass, while extracellular enzyme activity was higher. In contrast, the annual grass showed no response of roots to grazing, and soil microbial biomass and extracellular enzyme activity also showed no response to grazing. These results suggest that the plant-level root grazing responses depend on plant demand for nutrients and water during regrowth, and that these responses can shift the nature of the carbon cycle in the surrounding soil. Improving our understanding of these plant-level responses to grazing could help inform adaptive grazing management for soil carbon storage under different grassland vegetation types.

Kacie Ring. Tick-Talk: quantifying the positive impact of education outreach on tick-related knowledge and confidence in a California county

- The first line of defense in tick-borne disease (TBD) prevention is avoidance, which is contingent on knowing when and where ticks are most active. With all the characteristics of California considered, the most feasible and cost-effective strategy for preventing TBDs is educational campaigns that urge individuals to practice avoidance and

implement protective clothing during peak tick activity. In the Western US, public knowledge and awareness of preventing and diagnosing tick-borne pathogens are much lower than in the Eastern US. To fill this knowledge gap, I partnered with San Mateo County Mosquito and Vector Control District (SMCMVCD) to implement a county-wide education campaign to evaluate the efficacy of animated materials in improving residents' knowledge and confidence to prevent TBDs. Using repeated surveys, we found that our campaign significantly improved knowledge and confidence in the prevention of ticks in San Mateo County residents. Additionally, our outreach for participation increased the engagement of residents with SMCMVCD, with an additional 615 people opting into their newsletter, 11 times their usual growth. This study represents the first county-wide education campaign on tick-borne diseases in California and provides a blueprint for other counties when designing a campaign to prevent infectious disease transmission.

Kayla Kauffman, Georgia Titcomb, Randriamoria Toky Maheriniaina, Michelle Pender, Voahangy Soarimalala, Charles Nunn, and Hillary Young. **Small mammals and their parasites in human-altered landscapes.**

- Land use alters the community composition of animals and the parasites they carry. For example, host species that harbor a greater diversity of parasites are more likely to occur in anthropogenic habitats and host species richness tends to be highest at ecosystem boundaries. In this talk, I will explore how land cover influences which small mammals are present and what parasites they are infected with. I show that some parasites that infect many small mammal species, particularly those that bridge disconnected parasite-host clusters, are often found on the edges of forest fragments. Conversely many parasites that are host specialists tend to be found in habitat cores. This work draws important links between human land use and exposure risk to parasites that are more likely to be shared between animal species, including humans.

Lisa Mesrop, Georg Brenneis, Jakob Krieger, Steffen Harzsch and Todd Oakley. **Born to Glow: Unraveling the development and evolution of bioluminescent glands**

- Secretory bioluminescent systems are evolutionary innovations with significant ecological impacts mediated through chemically secreted light displays. Like other novel secretory systems used for defense and communication, secretory bioluminescence employs a shared “genetic toolkit” for secretion, modified with new genes to produce bioluminescent compounds. This toolkit may not only be expressed in adult tissue but also during the developmental processes underlying the differentiation of the novel secretory tissue, as demonstrated in model mammalian secretory systems. Here, we examined the extent to which the secretory toolkit’s expression is conserved during the development of a novel bioluminescent secretory system - the bioluminescent upper lip - in marine ostracods. First, we performed RNA-seq on bulk embryonic tissue across seven developmental stages, which include the development of the upper lip. Next, using

microscopy techniques, we validated the developmental stages by identifying key developmental landmarks, including those specific to the upper lip. We show that secretory toolkit genes are co-expressed with novel enzymatic genes involved in bioluminescence during upper lip development, similar to co-expression patterns observed in adult upper lip tissue. In addition to the secretory function of the bioluminescent upper lip, our results thus suggest that the secretory toolkit may also play a role in the differentiation of the novel tissues involved in the synthesis and release of the bioluminescent mucus in the upper lip, shedding light on the evolutionary and developmental assembly of secretory innovations.

Piper Lovegreen. **Serpentine's Toxic Touch: Plants know, but do they show?**

- Serpentine bedrock presents a harsh environment for plant life, characterized by nutrient imbalances, heavy metal toxicity, and low water-holding capacity. Identifying serpentine in the landscape can be challenging, as exposed rock can be mapped using spectral signatures, but weathered or buried serpentine remains difficult to detect. However, plants growing on serpentine soils may exhibit distinct physiological stress signals that could serve as indirect indicators of underlying bedrock. By linking plant traits to spectral signals, we explore whether vegetation can reveal hidden serpentine substrates, offering new insights into how bedrock influences plant stress and how remote sensing can enhance geologic mapping in vegetated landscapes.

Rowan KB Vitro, Dorit Hanein. **Unraveling Isoform-Specific Nanomorphology in iPSC-Derived Cardiomyocytes with cryogenic correlative light and electron microscopy and cellular tomography**

- This research seeks to leverage correlative light and cryogenic electron microscopy (cryo-EM) and cellular tomography to perform high-resolution whole-cell protein characterization in induced pluripotent stem cell-derived cardiomyocytes (iPSC-CMs). Specifically, I aim to investigate how variations in motor protein isoform composition influence the nanomorphology of the contractile apparatus in these cells as a function of stress and strain. My approach builds on recent advancements from the Hanein group, including the cryo-MATE protocol, the RCIA protocol, and contactless extracellular matrix micropatterning (CITE). These innovations will be pivotal to the success of this project. In this talk, I will highlight these cutting-edge techniques and their application to my research, alongside an introductory overview of cryo-EM and its relevance to cellular imaging.

Ruby Harris-Gavin. **Global ungulate diet meta-analysis: Understanding knowledge gaps in a changing world**

- Globally, ungulates are critical drivers of ecosystem processes, acting as consumers, disturbance agents, and fertilizers, in addition to being a major food source for humans

and wild carnivores. They are a diverse group of animals, with roughly 250 extant species not including different domestic breeds, of which there are thousands. Ungulates represent some of the last major megafauna on planet earth. As ungulates have been crucial to human existence, it is unsurprising that culture has been built off of our relationship to these animals, and that many of these species are extremely well-studied. Missing from the ungulate story is a database comprising many of these studies that have been done, and an exploration of which ungulates are over or understudied and why. This meta-analysis of ungulate diet has two parts: the specific diet data from each study, and the meta-data about the studies and the animals themselves. We explore the need and uses of such a database and the patterns emerging from meta-data. Audience feedback and input on potential directions are welcome!

Siena McKim, Brittany Cummings, and Siena Waldman. **What's that ooze? Amphipod secretory systems and clues to their evolution**

- Novel secretory systems play a pivotal role in driving specialized functions and the diversity of animals. However, the degree to which these systems arise from pre-existing components and structures remains an open question. A great secretory system to explore this question are silk-spinning systems, found in over 30 arthropod groups, including marine amphipods (corophioids). Corophioids use silk to build a wide range of structures like pockets, rods, and tubes for protection, stability, and feeding. We hypothesize that corophioid silk-spinning systems likely originated from pre-existing ancestral, glandular systems. Using various microscopy imaging techniques on local species and phylogenetic methods, we test this hypothesis, inferring the origin and diversification of corophioid silk-spinning systems. Interesting findings include some species that were thought to have lost silk, actually retain their silk-spinning system and some species were found to have putative venom systems that may have co-opted ancestral silk glands. The secretory systems of corophioids are diverse and provide a wealth of potential for future evolution & biomedical research.

Career panelist biographies



Dr. Nicole Molinari

USDA-Forest Service Province Ecologist for the four southern California forests: Angeles, Cleveland, Los Padres and San Bernardino

Dr. Molinari earned her M.S. in Biology from Cal Poly San Luis Obispo and her PhD in Ecology, Evolution, and Marine Biology from UCSB in the D'Antonio lab. She is a community ecologist specializing in how global changes like wildfires, invasive species, and climate shifts influence vegetation. She serves as the USDA-Forest Service Province Ecologist for southern California forests, focusing on fire ecology, habitat restoration, and vegetation adaptation. Nicole also collaborates with UCSB on long-term ecological monitoring, mentors graduate students, and coordinates the biannual Chaparral Symposium.



Gracie White

Director of Global Ocean Investments for Conservation International Ventures LLC

Gracie graduated from the Bren School at UCSB with a Master's in Marine Resource Management. She now serves as the Director of Global Ocean Investments at Conservation Ventures LLC. Before joining Conservation Ventures LLC she worked primarily in the sustainable aquaculture realm, working for the National Oceanic and Atmospheric Administration, the CREO Syndicate (a nonprofit that leverages investment to help improve the climate crisis), and Hatch Blue (an aquaculture accelerator and investment vehicle). In her current role she uses a blend of debt and equity investment products to support early-stage companies within emerging markets. Gracie is also interested in closing the gender gap in venture capital funding and supporting women pioneers within the blue economy.



Dr. Kim Selkoe

Senior Fellow at the National Center for Ecological Analysis and Synthesis (NCEAS); CEO of Get Hooked Seafood; Executive Director of Commercial Fishermen of Santa Barbara

Kim Selkoe juggles roles a fisheries advocate, entrepreneur and marine scientist. She has a BA in Biology from Pomona College and a PhD in Ecology, Evolution and Marine Biology at UCSB. Her post-doc in the Tobo Lab at the Hawaii Institute of Marine Biology combined landscape genetics and community ecology of coral reefs. Settling in

Santa Barbara, she pursued a research scientist position at UCSB's Marine Science Institute, and became a fellow at the National Center for Ecological Analysis and Synthesis (NCEAS). A hobby interest in sustainable seafood led to becoming Executive Director of Commercial Fishermen of Santa Barbara in 2016, and founding Get Hooked Seafood in 2018. In these roles, she currently leads a new kelp forest restoration program, a Sea-to-School program, and two nascent entities, the Ocean Collective at Santa Barbara City College, and Full Circle Biologicals, a start-up transforming seafood and agricultural waste into regenerative fertilizers.



Dr. Joey Peters

Senior Quantitative Ecologist at Great Ecology

Dr. Peters received his PhD from UCSB in Ecology, Evolution, and Marine Biology in 2023. Before becoming a Gaucho, Joey studied the effects of coastal restoration on mangrove forests at Florida International University in Miami, FL; researched the effects of pharmaceutical contaminants on rocky intertidal and estuarine systems at Portland State University in Portland, OR; For his dissertation work, Joey studied how global change drivers like fishing and ocean warming affected consumer-mediated

nutrients in kelp forest ecosystems in California. In between his Masters and Ph.D. programs, Joey was a Natural Resource Policy Fellow with the Oregon Sea Grant and the Oregon Department of Environmental Quality and a Directorate Resource Fellow with U.S. Fish and Wildlife Service. Joey is now a Senior Quantitative Ecologist at Great Ecology, working on a variety of projects like conservation planning, natural resource damage assessments, and coastal restoration

Food menu

Light Breakfast

Organic Italian Roast Coffee (vgn, gf)

—

Assorted Black, Green & Herbal Teas (vgn, gf)

—

Hot Water

—

Almond Coconut Chocolate Chip Muffin (v, nuts)

—

Zucchini Apple Breakfast Bread (v)

—

Orange Cranberry Scone (v)

General Welcome, Session 1

Coffee Break

Organic Italian Roast Coffee (vgn, gf)

—

Assorted Black, Green & Herbal Teas (vgn, gf)

—

Hot Water

—

Iced Water

Session 2

Lunch

Green Salad with Pepitas, Cranberries, Apples, and Grilled Onions (vgn, gf) (v, gf, goat cheese on side)

Served with Apple Cider Vinaigrette (vgn, gf)

—

Roast Beef Sandwich with Swiss Cheese, Caramelized Onions, Roasted Tomatoes, and Chipotle Horseradish Aioli on Brioche Bun

—

Ratatouille Sandwich with Roasted Vegetables, Arugula Pesto and Butter Lettuce on Focaccia (vgn)

—

Seared Salmon Sandwich with Lettuce, Tomato and Caper Aioli on Focaccia

—

Kettle Chips (vgn, gf)

—

Peanut Butter Cookie (v, nuts)

—

Oatmeal Raisin Cookie (v)

—

Melty Chocolate Truffle Cookie (v)

—

Lemonade

—

Iced Water

—

Organic Italian Roast Coffee (vgn, gf)

—

Assorted Black, Green & Herbal Teas (vgn, gf)

—

Hot Water

Session 3, Break, Session 4

Reception

Deluxe Cheese and Salami Platter with Manchego Cheese, Port Salut, Burrata, Prosciutto, Mortadella and Calabrese Salami with Dried Fruits and Freshly Baked French Baguette

—

Citrus Ricotta, Roasted Pepper Tahini, and Garlic Pesto Torte (v, gf) Served with Freshly Baked French Baguette (v)

—

Lemonade

—

Iced Water

—

Assorted Beer and Wine

\$10 Suggested Donation, Venmo: @erindeleonsanchez

All funds go directly to reimbursing grad students and future GSAC events