Newsletter of the Conservation Paleobiology Network

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CPN Newsletter

Conservation Paleobiology Network

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Diversity, Equity, and Inclusion Statement:

The CPN upholds a commitment to diversity, equity, and inclusion as a core value. We seek to build on this commitment by striving to create an inclusive community whose members represent diverse cultures, backgrounds, career stages, and life experiences. This commitment is critical to strengthening our relevance, credibility, and effectiveness within the field of conservation paleobiology and broader STEM community. Through these efforts, we strive to transform the field in practice, while diversifying the face of conservation paleobiology for the future.

Supported by RCN-NSF Award: EAR-1922562

2nd Conservation Paleobiology Symposium: Student Activities!

Attention students! This is a reminder that the CPN Student Panel will be organizing the following in-person events during the February 17-19, 2023 symposium:

1. **Student Workshop -** Student and postdoctoral attendees of the meeting are invited to join us for an interactive workshop. This event is aimed to help students convey their science to broad audiences, get others on board with Conservation Paleobiology, and form relationships with public scientists to bridge the academic-agency divide. Guest speakers will present short summaries of how they use storytelling followed by guided activities or discussion topics.

2. **Lunch Roundtable -** A roundtable with distinguished members of the Conservation Paleobiology field will take place during one of the meeting's lunch periods. Students and postdocs are welcome to attend.

3. **Lunch and Evening Socials -** To promote networking among the many students and postdocs expected to be in attendance, the Student Panel will help facilitate informal gatherings at venues across Gainesville. Attendees eager to meet new friends in dedicated and welcoming settings are encouraged to check during the meeting where such gatherings may be taking place. With the flexibility to plan multiple concurrent outings (e.g., a restaurant group versus a brewery group), we hope to have something for everyone!

4. **Opportunities Board -** We plan to establish a dedicated bulletin at the meeting space where ads for postdoctoral, academic, agency, internships, and other opportunities can be viewed by student attendees. Inquiries about your potential flyer or advertisement can be made to members of the Student Panel (students.cpn@gmail.com).

Conference Website:
https://conservationpaleorcn.org/annual-symposium-conference-page/

Conservation Paleobiology Research Highlight

By Broc Kokesh, Department of Geophysical Sciences, University of Chicago

Living and dead bivalves are congruent surrogates for benthic macroinvertebrate communities in Puget Sound

"Novel to this study, we found that surrogacy patterns exhibited by dead bivalves were highly 'congruent' with living bivalves"

Biological monitoring programs regulated by government agencies have high data standards, including a wide taxonomic breadth, species-level identification, and precise abundance estimates. However, paleontological data are typically limited in comparability due to preservational bias (lack of soft-bodied forms), difficulty identifying fragmented/damaged specimens (requiring genus or higher identification), and restriction of many museum/sediment records to presence-absence (occurrence) data. Normalizing the application of paleoecological data to conservation efforts thus requires an understanding of how these limitations may impact direct comparisons, such as during live-dead analyses.

Inspired by the biomonitoring literature, we adopted the well-studied concept of taxonomic surrogacy to simulate these limitations using an exceptional benthic community dataset from Puget Sound as part of an ongoing academic-agency collaboration between the University of Chicago and Washington State Department of Ecology (ECY). The complete taxonomic data matrix – proportional abundances of species-level data for the whole macrobenthic community – was compared to modified datasets at coarser resolutions (genera to orders), coarser numerical resolution (presence-absence), subsets of individual clades (polychaetes, bivalves, and malacostracans), and combinations of these surrogacy approaches. In addition, we assessed dead-collected bivalves as a genuine test of the above-mentioned paleontological limitations in action.

Our results corroborated many past studies of surrogacy: genera and families were reliable alternatives to species-level data and polychaetes were a particularly strong proxy for the whole fauna as they represented the majority of the community. Presence-absence data were less reliable, especially for clades with low evenness.

Novel to this study, we found that surrogacy patterns exhibited by dead bivalves were highly 'congruent' with living bivalves, i.e., they mapped onto each other well during second-stage analysis of distance matrices. This is encouraging for using bivalve dead-shell assemblages to complement conventional monitoring data, notwithstanding strong natural environmental gradients with potential to bias shell preservation as found in the cold-temperate conditions of Puget Sound. Given that shelly death assemblages are already encountered by the sampling gear used for living macroinvertebrates, they are a particularly inexpensive complement to long-term timeseries data as well as a means of getting a baseline estimate where long-term data are lacking.

Image caption: *(A) the ECY Sediment Monitoring Team conducting field sampling in Puget Sound (credit: CM Eaton); (B) sediment sample containing living benthic macroinvertebrates and dead shell assemblages (credit: ECY); (C) students at UChicago sorting dead bivalve shells from ECY samples during the winter 2020 course 'Conservation Paleobiology'; (D) dried sediment sample rescued by ECY from disposal and processed at UChicago.*

For more details see articles by Kokesh et al. 2022 in Frontiers in Ecology and Evolution: **https://doi.org/10.3389/fevo.2022.980753**

and in Marine Ecology Progress Series: **https://doi.org/10.3354/meps13932**

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Practitioner Perspective *Interview by Olivia Olson*

Featured Practitioner: Gabriel-Philip Santos

Gabriel-Philip Santos, MSc, is the Director of Visitor Engagement & Education at the Alf Museum of Paleontology in Claremont, California. He is a cofounder of the science communication initiative Cosplay For Science, which brings pop-up museums and panels of scientists and media representatives to pop culture conventions like the most recent Los Angeles Comic Con. Gabe prioritizes accessibility and engagement in science and capitalizes on the educational potential of pop culture. In February, he is setting sail to Antarctica as a Grosvenor Teacher Fellow with National Geographic and Lindblad Expeditions, where he will learn with other educators about the wonders of Antarctica, bringing the lessons in education and outreach back to California. Find him on Twitter @PaleoParadoX

Image caption: *Gabriel-Philip Santos*

1. So Gabe, I read two very different papers of yours: one was describing a desmostylian fossil and one was about Comic Con. Can you speak to how those two worlds intersect in your work?

My entry to this field was not linear whatsoever. In high school, I was good at science, and in my culture as a Filipino-American, if you're good at science, you become a nurse or a doctor. So as an undergraduate, I completed the premed track, but was horribly unhappy and unfulfilled through most of the experience (I was undiagnosed with major depressive disorder at the time as well). I took a break for my own health and worked in the family business for a couple years and for my birthday, my parents took me on a trip to New York City. We went to the American Museum of Natural History and I was in awe. Touring the museum was amazing - I was so struck by this giant rhino from Mongolia. It was so big, so weird and it was only the bones! It was so inspiring. I wanted to tell stories in nature, in paleontology.

I started volunteering at the John D. Cooper Archaeological and Paleontological Center (I told my mom I got an internship) and started to feel my passion for science return. There, I could tell paleo stories - I felt renewed. A new curator, Dr. James Parham, was hired when I was there and he was looking for MSc students. When we were going through the collections, we found a desmostylian fossil. The teeth really drew me in - they look like sushi rolls stuck together! I had always been interested in marine mammals and when we came across this fossil in the collections I was dumbfounded. I was embarrassed I had never heard of this animal! The story was so enticing - hardly anyone knew about them. There's even a genus in this order called *Paleoparadoxia* - "ancient mystery!" (see my twitter handle).

2. "Storytelling" sounds like something scientists might shy away from. How do you balance that while communicating science?

One of my favorite science communicators, Dr. Danielle Lee says that while people have the lexicon for science, they may not have the connections yet. My job as an educator is to bridge these gaps using connecting words. When we go to Comic Cons, we dress up with the theme of our pop-up museum. If a kid comes to our pop-up at Comic Con where I'm dressed in jedi robes standing in front of our display, they might ask, "Are you a Jedi?" And I will introduce them to the pop-up world's narrative. I'll say, "Well, youngling, welcome to the Galactic Archive." They might ask about a fossil on the table. Then we're very

Practitioner Perspective continued

intentional about breaking the immersion. We'll say "On **Earth**," or "In **our** galaxy…" When words like evolution feel like they are from another planet, we want to show that people already know these ideas, but maybe in a fantasy world like Star Wars.

3. Tell me more about Comic Cons!

Pop-up museums are our bread and butter. And at conventions, we also put together panels, where the public can learn from and make connections with scientists. We bring in, for example, six experts from the media and academics and they talk about the theme of evolution in Star Wars or how paleo has influenced pop culture. We always try to leave time for questions. This gives scientists a break and gives them a chance to introduce themselves to a broad audience as people who also happen to be scientists.

4. For paleontologists reading, how would you suggest they get started with a Communities for Science (C4S) project of their own?

Find something that you want to share, something that you really love. Ask yourself, where does my science connect? What's the story? What can I dress up as? We need to remember that education is exchange, it's not bestowal. You need to remember that the person coming up to your C4S project is, like you, curious about what you study! And you never know what perspectives you will hear.

5. Can you tell me what your two weeks in Antarctica will entail?

I was selected as a 2021 Grosvenor Teacher Fellow and part of that fellowship is this professional development opportunity for educators. We're learning how to be better storytellers. And some of us get to do that by traveling to Antarctica to learn about creatures like penguins and seals in their own natural habitat. Along with naturalists and teachers, we will discuss ecology and climate change. I'll then take my experiences and stories back with me to California to talk about climate change and why it matters to visitors of the Alf Museum.

6. And finally, what's your favorite fossil?

Desmostylians - they're so weird. Their teeth look like sushi rolls stuck together! Also, their artistic reconstructions always look so derpy. They were first described by O. C. March in 1888 and we still know very little about them! Through my work with the desmostylians, I got to know what it means to be a scientist and paleontologist. It taught me how to share stories.

Image caption: *Gabriel-Philip Santos in museum collection with model dinosaur*

Paleo Proxy Spotlight – Corals *by Mollie Mills*

What are coral reefs? Coral reefs are constructed by colonial marine invertebrates in the phylum Cnidaria. Individual coral polyps are responsible for secreting the calcium carbonate (CaCO3) exoskeleton, which forms the foundation for building reef structures. Coral colonies expand outwards over time as the solid calcium carbonate layer builds up. Reef-building corals have a narrow set of environmental conditions in which they can grow, including sunny warm shallow subtropic or tropical oceans. Under these conditions, corals generally grow 0.5-2cm per year, with individual polyps averaging 1-3mm in length. Some corals can grow as much as 4.5cm per year. Coral reefs are an important marine ecosystem, providing food and shelter for many different species, including fishes, marine mammals and molluscs.

How are corals paleo proxies for climate? The environmentally sensitive nature of corals, combined with the sequential secretion of exoskeleton layers, makes them good paleo proxies for past climates. In particular, coral are good for reconstructing changes in water chemistry and temperature on annual to decadal time scales. The layered coral structures are chronologically banded, like tree rings and ice cores, and vary in texture with season and temperature. Lighter bands indicate summer growth and darker correspond to winter periods of slow growth. The chemistry of the layers provides scientists with a wide variety of information such as past ocean temperatures and sea level change, whilst the layered structure allows them to date these conditions. Dead coral can also indicate a change to unfavourable environmental conditions, that are inhospitable to coral growth. Coral records occur mainly in low latitudes and can therefore be correlated and compliment other paleo proxies from mid to high latitudes, including ice cores and tree rings.

When have corals been used as paleo proxies? Modern and fossil coral records have proven to be excellent archives of past environmental change. Aside from being environmentally flexible and chronologically layered, corals have long growth periods of up to 800 years and are ideal for high resolution U-series dating. As a result, high resolution coral-based climate reconstructions have significantly contributed to understanding of glacial-interglacial cycles.

Image caption: *Closeup of a modern Caribbean coral skeleton (photo credit: Sahale Casebolt)*

For instance, a 420-year-old coral-based sea temperature record for the Great Barrier Reef, has helped scientists understand the drivers of the global Little Ice Age. Coral records also offer unique perspectives on the operation of tropical weather systems including monsoons and ENSO (El Niño Southern Oscillation). For instance, fossil corals from Papua New Guinea have contributed decadal information on sea surface temperatures during ENSO over the last 130,000 years. Fossil coral records from Vanuatu have provided information on sea surface temperature variability from the early to mid-Holocene and suggests this region of the tropics was 6.5°C cooler than today. Additionally, as coral reef growth is restricted to shallow surface ocean, fossil corals can provide a record of sea level fluctuation from the Pleistocene to modern day.

Postcards from the Field

In this feature of our newsletter, we showcase members' research in the field, lab, or other settings. Please submit your "postcards" with approximately 100 words of text to us at conservationpaleo@floridamuseum.ufl.edu.

Luis Torres Jr, PhD. Student, University of Florida, USA

My name is Luis Torres, and I am a PhD student in Geology within my second semester at the University of Florida. I recently participated in a 10-day long research cruise along the Caribbean coast of Panama, in which I was able to collaborate with and learn from other scientists from a variety of different institutions. Research performed on this cruise primarily involved the collection of occurrence data and live/dead specimens of mollusks, echinoids, and sea grasses. Methods to obtain data, in which I was involved, included physical collection of specimens along a transect via scientific diving expeditions and sifting of sediment samples collected on site. This data will likely be used in a wide variety of projects, but specifically the current project in which I am a collaborator, "Comparative Anatomy of Mollusk Shells and Echinoid Tests". This NSF-funded project focuses primarily on the comparative analyses of mollusks and echinoids in regard to fossilization processes, preservational biases, and resolution of the fossil record.

Image caption: *Luis (second from left) collecting specimens of mollusks, echinoids, and sea grasses by SCUBA during a 10-day long research cruise along the Caribbean coast of Panama*

Postcards from the Field continued

Lucia Snyderman & Olivia Olson, Middlebury College, Vermont, USA

For the CPN Fur Trade Working Group, we (Lucia Snyderman and Olivia Olson, an undergraduate student and post-bac from Middlebury College) explored the Anthropology Division of the Yale Peabody Museum under Dr. Roger Colton. Our exciting finds include sea mink (*Neovison macrodon*), beaver (*Castor canadensis*), and muskrat (*Ondatra zibethicus*) mandibles. We identified more furbearer elements than were listed online, and identified other extinct animals, such as potential bones of the great auk (*Pinguinus impennis*). We photographed each element and took measurements for ongoing morphological projects. As a student, this was a great opportunity to become more familiar with identifying faunal material, and to reflect on the relationship between humans and furbearers and the importance of conservation. We look forward to working more with collections in the future!

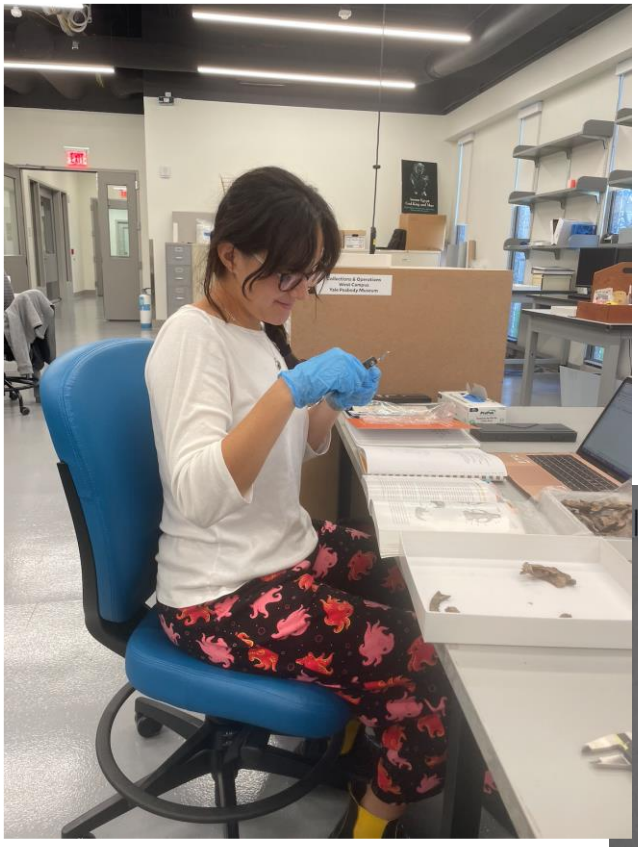

Image caption: *Lucia measuring a sea mink mandible with digital calipers*

Image caption: *A sea mink mandible photographed from Deer Island*

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Are you interested in:

…contributing to **Postcards from the Field**?
…sharing a recent publication as a **Research Highlight**?
…being featured in a **Practitioner's Perspective** piece?
…providing other content suggestions for this newsletter?

If yes, please email us at conservationpaleo@floridamuseum.ufl.edu

Invite Your Colleagues to Join our Network!

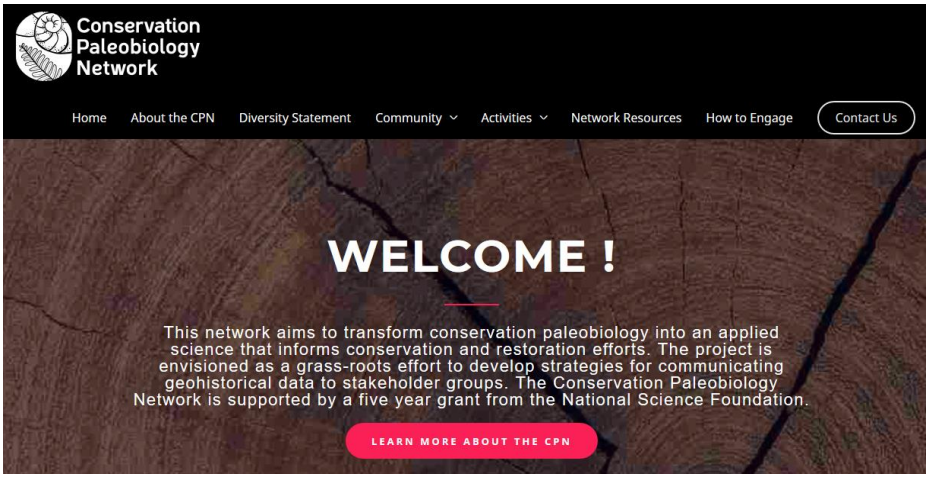
If you know people who might be interested in our network, please invite them to join. You can use the link below to extend your invitation on behalf of our network.

By joining the network, you become a member of our Community of Practice. The membership does not impose any obligations, but enables participants to engage fully in network activities. Members will be able to:

1. Participate in the CPN mailing list
2. Nominate and self-nominate for committees and panels
3. Submit announcements for publication in the CPN Newsletter
4. Apply to participate in the CPN activities
5. View CPN webinars and submit proposals for webinar modules

To join please go to our website and select "Join the Network"

Visit the website! https://conservationpaleorcn.org/



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