Newsletter of the Conservation Paleobiology Network

Issue #24
July 2024

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

Future of the Network Survey Results

The CPN is funded by a non-renewable five-year grant from the US National Science Foundation, and that funding cycle is ending in 2025. We recently sent out a survey to get member input on future directions for the network, including options for funding to keep the network running. This input is critical to the decision-making process. We received 169 responses. Thank you to everyone who completed the survey!

In response to the question of whether the CPN should try to continue to exist beyond the initial 5-year funding period, 97.6% said “Yes”. In response to whether there was support for converting the CPN into a permanent professional society, 89.1% said “Yes”. In response to whether a person would be willing to pay an annual membership fee, 80.6% said “Yes”. Regarding membership fee amounts, the majority said they would want to see a sliding scale for different groups with a fee waiver option for qualified members.

Many of you also left valuable feedback in the comments section. Multiple people commented that there is a lot of enthusiasm in the network, and that there are clearly a lot of people interested in being engaged in a conservation paleobiology professional society in some form. Some people suggested becoming an affinity group or a sub-organization under another organization, such as the Paleontological Society. On the other hand, some commenters said that their discipline-specific professional societies did not address their multi-disciplinary interests as well as the CPN does, and they want to see the network continue as an independent society. Several commenters want the network to pursue funding models that will allow greater opportunities for international participants.

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Conservation Paleobiology Research Highlight *By Jason Evans*

Seeds of water lettuce in the paleo-sediments of Lake Annie, Florida

For decades, water lettuce (*Pistia stratiotes L.*) – a highly prolific floating macrophyte – has been identified and managed as a non-native invasive species throughout Florida. There had also long been some controversy about the veracity of this non-native designation, primarily because of 18th century descriptions of water lettuce by botanists John and William Bartram in Florida's St. Johns River that suggested a potential native distribution.

A newly published analysis of a 17.56 m core of paleo-sediments from Lake Annie, located at the southern end of Florida's Lake Wales Ridge, provides definitive evidence that water lettuce was present in Florida at the terminal Pleistocene and early Holocene. This core was originally collected in 1994 by William Watts, Eric Grimm, and George Jacobson, but the core's full pollen and macrofossil data had not been previously published.

"Water lettuce very early in the Lake Annie record suggests that it was widely present in the local paleo-landscape"

The bottom of the core dates to 13,550 cal yr BP, with the lowest portion of the core containing numerous macrofossil seeds of various macrophytes, including water lettuce. Water lettuce seeds in one core fragment were directly carbon dated at 12,910 cal yr BP. The appearance of water lettuce very early in the Lake Annie record suggests that it was widely present in the local paleo-landscape and, like many other macrophytes, probably dispersed by water birds.

The core record also indicates that Lake Annie underwent rapid deepening and hyper-oligotrophication beginning at ~11,500 cal yr BP, resulting in the disappearance of water lettuce – and most other macrophytes – from the sediments. This was presumably in response to global sea level rise at the Pleistocene-Holocene transition elevating the piezometric surface of regional groundwater throughout the Florida peninsula. The late Pleistocene and Holocene pollen record for Lake Annie also closely matches the co-temporal pollen record from a much older (~62,000 cal yr BP) core at Lake Tulane, located approximately 100 km north on the Lake Wales Ridge. This lends additional support to early Holocene climate inferences for central and south Florida that were originally derived from the Lake Tulane record.

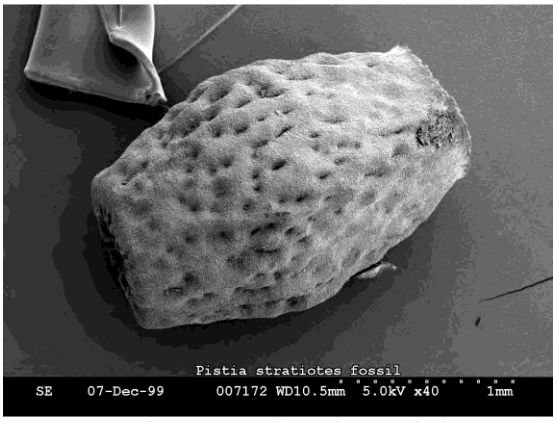

***Image caption**: Scanning electronic image of a water lettuce (Pistia stratiotes) seed from Lake Annie, as published in Evans et al. (2024).*

For more information see the article by Evans et. al. 2024 in Journal of Paleolimnology: https://doi.org/10.1007/s10933-024-00311-5

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Practitioner Perspective *By Lucia Snyderman*

Dr. Maria Viteri – *Dr. Viteri is the Ecologist for the Frank and Joan Randall Preserve with the Nature Conservancy's California Chapter. She received a PhD in Ecology and Evolutionary Biology from Stanford University.*

***Image caption**: Dr.* Maria Viteri

1. How would you introduce yourself to our readers?

As an ecologist with the Nature Conservancy (TNC), my job is to help identify, conduct, and manage research that will help us meet our biodiversity goals. TNC California owns and manages over 500 thousand acres of lands in the state, meaning that conservation recommendations generated by TNC scientists can be both highly impactful and rapidly implemented.

Although I work with folks across TNC California's conservation estate, my focus is the Frank and Joan Randall Preserve at the southern extreme of the Sierra Nevada Mountains. Randall Preserve is a large (~72,000 acre) preserve which is home to many of the state's iconic species, including California condors, mountain lions, and much more. The preserve also faces many challenges familiar to conservation practitioners in and beyond California. The region is acutely impacted by past and future global change, including the introduction of invasive species and the ongoing threat of climate change. For example, the thousands of acres of grassland we protect have been highly altered by the invasion of European grasses and climate change is threatening blue oaks (a keystone species) across the preserve. It is our job to enhance the biodiversity of the lands we manage in ways that will be resilient to the pervasive and ongoing threats of global change. I work closely with the rest of the Randall Preserve team to identify research that will inform these conservation goals and plan management actions based on our results. We hope that our efforts will ensure that Randall Preserve is a stronghold for biodiversity well into the future.

Although my current position sits firmly in the fields of conservation and ecology, my research background is more aligned with conservation paleobiology and historical ecology. In graduate school and during my postdoc, I studied the long-term impacts of land use change on California's terrestrial mammals, especially rodent communities and native ungulates, using subfossils from archaeological sites. I therefore feel strongly about the potential of the fossil and historical record to inform conservation decision-making at my organization and beyond.

2. How does your work at The Nature Conservancy intersect with conservation paleobiology?

Protecting biodiversity in the Anthropocene is a daunting and multi-faceted challenge. Therefore, the more tools we have in our conservation toolbox, the better. Conservation paleobiology is one of the tools I'm most excited about bringing to my work at TNC.

Practitioner Perspective continued

I have noticed that my paleontology background gives me a different perspective than most of my colleagues, who are deeply aware of biodiversity loss and global change, but sometimes have less context by which to understand them. I hope to leverage my background in paleontology to help contextualize the impacts of global change and inform restoration goals at Randall Preserve. In particular, I am looking into using historical photos and specimen records as well as plant macrofossils from nearby paleo sites to inform a climate-resilient restoration project and create rewilding recommendations at the preserve. Stay tuned for more!

I'm also always on the lookout for people to do cool research at Randall Preserve, so (for all you paleo folks reading) please let me know if you have a research question you'd like to explore with us!

3. How do you communicate your work with different communities and stakeholders?

I communicate with many different partners as part of my job, including land managers, government officials, academics, and ranchers. Especially when talking with people who have very different backgrounds from me, the most important things to do are finding shared goals and approaching conversations with curiosity and respect. Although I may have different worldviews from some of the people I communicate with, we often have some shared values and goals - even if those are simply that we both wish for healthy, productive grasslands. It is also important to come to all conversations acknowledging different types of expertise. Some of the folks I work with have been managing and stewarding their lands for generations and therefore have a deep, innate knowledge of local ecosystem processes, even if they don't have the words to attach to them. Don't come to conversations assuming pre-existing knowledge (i.e., don't use jargon) but also don't assume ignorance. People coming from academic backgrounds sometimes can seem patronizing (I'm sure I've been guilty of this at points in my career), and it is neither true nor effective to operate under the assumption that your way of knowing is the only one.

***Image caption**: Dr.* Maria Viteri

4. Do you have advice for students interested in applying paleontological and historical perspectives to conservation practice?

The piece of advice that I would have wanted as a graduate student conducting conservation paleobiology research is to start with the practitioner relationship, not the research question. Non-governmental organizations (NGOs) and other environmental groups love to partner on novel research that informs their conservation efforts, and they will

Practitioner Perspective continued

help you make sure your work is truly applied enough to be implemented. Students should seek out partnerships with land managers and conservation practitioners early in developing their research agenda and then co-develop questions that will be directly relevant to their conservation goals. Otherwise, it is much more unlikely that your research will end up being applied. And when you find a partner to work with, it is important to recognize that conservation partners have relevant knowledge and expertise that you can learn from as much as they can learn from you and your research. Learning should not go one-way.

Student Section

Students, post-docs, and others interested in conservation paleobiology gathered for an evening social event at the North American Paleontological Convention in Ann Arbor, Michigan USA in June, 2024. Thank you Lucia and Priyanka!

Welcome, Lucia!

Lucia Snyderman will be stepping in to take the role of the editor for the Practitioner Perspective section of the newsletter. Lucia is a recent graduate from Middlebury College in Vermont where for her senior thesis she studied the extinction dynamics of the Great Auk. She is moving to the UK this fall to pursue a PhD with the Zoological Society of London and University of Reading to investigate wetland ecosystem change and species extirpations.

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Paleo Proxy Spotlight – Rat Coprolites *By Elizabeth Austin*

How can we understand the context of past ecosystems using the paleontological record? In marine environments, we can look towards our calcareous friends in the sedimentological record; in karst environments, speleothems tell these stories. But what about arid regions in the Pleistocene through Holocene? For this, we can turn to packrat middens, with all the plant material and coprolites they encompass, to paint a picture of past plant communities, ecosystem composition, and draw some climatic connections.

Packrats, genus *Neotoma*, build stick nests (middens) which get preserved in arid regions creating a snapshot of the vegetation present in that region at a given time point. Packrats indiscriminately collect plant and other transportable material from a radius of 30-50 m to build their middens, cache food, and to "decorate" their nest; middens are typically 20-30 cm in diameter, and can house multiple generations (Betancourt et al., 1990). By radiocarbon dating material from middens, we can create spatiotemporal reconstructions of vegetation community shifts—correlated to climatic events from 50,000 years ago to present (Betancourt et al., 1990). *Neotoma* are present across the Southwestern United States today, allowing for a comparison of modern to paleontological packrat middens and the continued capture of modern ecosystems.

Although middens typically are preserved in arid regions, the unique properties of La Brea Tar Pits in Los Angeles, California have led to the discovery of an asphalt-preserved midden that is around 50,000 years old (Mychajliw et al., 2020). We can use these coprolites and associated plant material within this preserved midden to inform a holistic view of the Late Pleistocene plant environment in Los Angeles. Although there are many plants preserved throughout the various seeps in La Brea, the aggregation within a midden at this particular site showcase a snapshot of the plant community at that exact time of preservation. Furthermore, in measuring the width of coprolites in this La Brea midden, we can draw conclusions about *Neotoma* body size at the time using a metric from Smith et al., (1995).

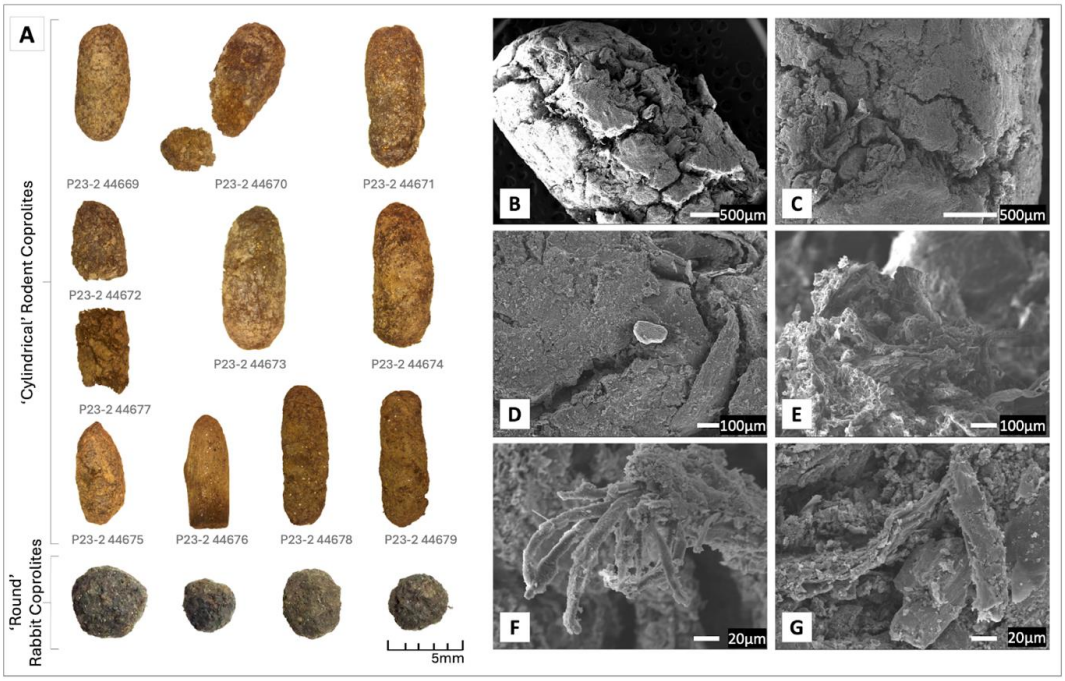

***Image caption**: (A) Images of 11 rodent coprolite samples from La Brea chosen for analysis with sediments. Images of 'round' rabbit coprolites below rodent coprolites. (B-G) overview SEM image of La Brea Box 2 cylindrical coprolite at 500 µm, 100 µm, and 20µm.*

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Paleo Proxy Spotlight continued

I have been working as an undergraduate student to contextualize this La Brea midden within a regional context of Southern California middens from ~48,000 years ago cal BP to present using the United State Geological Survey (USGS) Packrat database, to compare how plant communities have changed spatiotemporally in California. We have been working to calculate the relative abundance of plant material in the La Brea midden so it can be a direct comparison to the data within the USGS database. Additionally, more rodent coprolites have been found in another La Brea deposit, and I have been working to compare these coprolites to the aforementioned La Brea midden (Mychajliw et al., 2020). All of this culminates into a better understanding of how ecosystems have changed across time, so we can have a more robust understanding of our future— feeding into CPN's "Conservation Paleobiology in Cities: Integrating Geohistorical Data into Urban Greening" working group.

***Image caption**: E. Austin and A. Mychajliw observing coprolites under a microscope in La Brea Tar Pits and Museum's lab. Image by J. George.*

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Betancourt, J. L., Van Devender, T. R., & Martin, P. S. (1990). Packrat middens: The last 40,000 years of biotic change. University of Arizona Press.

Mychajliw, A. M., Rice, K. A., Tewksbury, L. R., Southon, J. R., & Lindsey, E. L. (2020). Exceptionally preserved asphaltic coprolites expand the spatiotemporal range of a North American paleoecological proxy. Scientific Reports, 10(1).

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Conservation Paleobiology Network

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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!

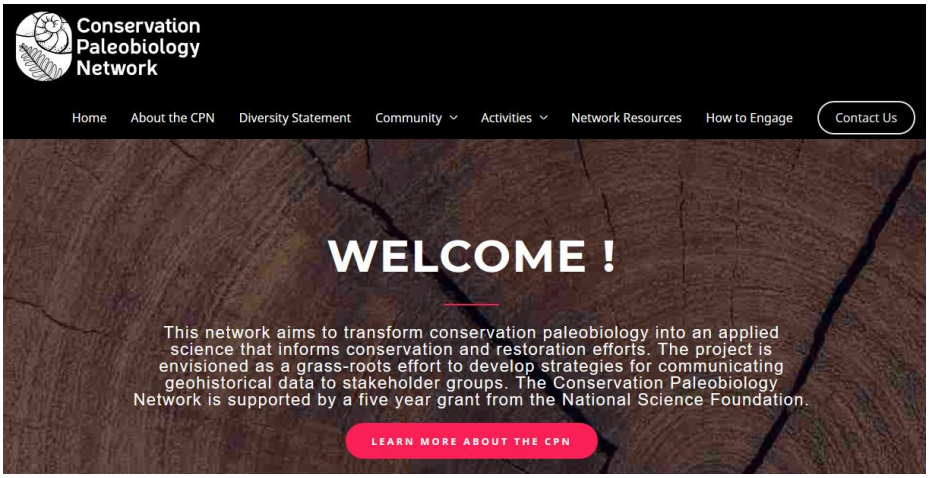
If you know people who might be interested in our network, please invite them to join. You can use the link below to extend your invitation on behalf of our network.

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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