Newsletter of the Conservation Paleobiology Network

Issue #27
January 2025

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

Students Attend Beaver Convention

By Kendall Schilling & Samuel Medina, Middlebury College (USA)

In October, six students had the opportunity to attend BeaverCON, hosted by the Beaver Institute, thanks to Dr. Alexis Mychajliw, a principal investigator in multiple Conservation Paleobiology Network working groups. Funding from several sources, including the CPN, supported them in traveling to Boulder, Colorado, USA for three days to attend the Beaver Institute's series of presentations, panels, discussions, and more.

The students, who had previously worked with the Beaver Institute on ArcGIS StoryMaps as part of Dr. Mychajliw's Conservation Biology class at Middlebury College, presented their work. This event not only provided an opportunity for the students to hear the perspectives of conservationists, but it also gave them the opportunity to present about a useful tool that can have an impact on the field of conservation. Utilizing data from open-source databases, which potentially include types of historical data, it becomes possible to take scientific research and data that might be inaccessible to the public and build a story that can be understood by a greater number of people.

The students learned about human-wildlife conflict mediation and the importance of beaver conservation. The convention emphasized collaboration among diverse stakeholders, including farm workers, business owners, and Indigenous groups, and it left them with a deeper understanding of conservation science and its application in their future careers.

***Image caption**: Middlebury College students (left to right: Samuel Medina, Helen Vaughn, Claire Ellerbrook, Haydn Suske-Funk, Lucy Day, Kendall Schilling) setting off to BeaverCON at Burlington International Airport. Photo credit: Haydn Suske-Funk.*

Conservation Paleobiology Research Highlight

By Dr. Skye Yunshu Tian, University of Bonn, Germany

Cenozoic history of the tropical marine biodiversity hotspot

Today, the world's highest marine diversity occurs in the Indo-Australian Archipelago (IAA), commonly known as the Coral Triangle biodiversity hotspot. Its evolutionary history, and more importantly the mechanisms underpinning the disproportionately high biodiversity, had been an enigma. In our study, we revealed how this hotspot has developed during the past 40 million years to its modern size and structure.

"Understanding the history of the IAA hotspot helps us to predict its future under current scenarios of anthropogenic warming."

We took Cenozoic outcrop sediments from the IAA region and studied the microfossils they contained. In this way, we constructed the first comprehensive microfossil dataset of this region. Our analysis using the birth-death model showed that the IAA exhibited a unidirectional trend of diversification since ~25 million years ago (Ma), without any major extinction events. The number of species had increased sixfold until the Pleistocene. Such a continuous increase in diversity over long geological time is amazing and rarely documented before. We further showed that habitat size was a key driver of this process, as the tectonic collision between Australia and Southeast Asia plates created extensive areas of suitable shallow-marine habitats that could accommodate more species. Noticeably, the Cenozoic climate cooling was also essential for the establishment of the IAA hotspot. Diversity was low in the IAA before ~14 Ma when the tropical temperature was too high. The relief of thermal pressure after that enabled rapid speciation instead.

In addition to on-site origination, the migration of species into the IAA from peripheral Indo-Pacific regions and vanished historical hotspot of the western Tethys Ocean also contributed to the conspicuous increase of total diversity. In ideal environmental conditions in terms of habitat and temperature, the IAA finally grew into the largest modern biodiversity hotspot.

Understanding the history of the IAA hotspot helps us to predict its future under current scenarios of anthropogenic warming. We may quickly lose this fantastic biodiversity center as too high tropical temperatures are suggested to hinder speciation. We thus urge conservation efforts to protect the IAA in face of global and regional stressors.

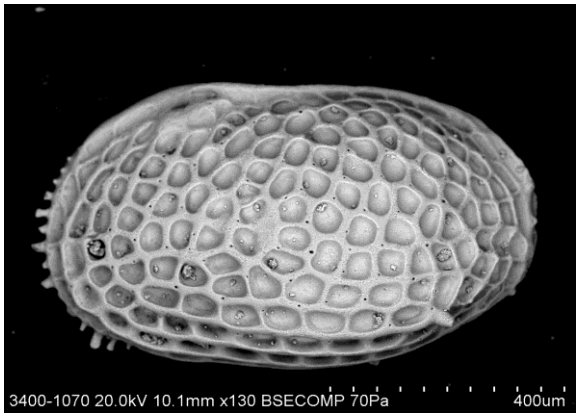


***Image caption**: A fossilized marine ostracod.*

For more information see the article by Tian, S.Y., Yasuhara, M., Condamine, F.L. et al. Cenozoic history of the tropical marine biodiversity hotspot. Nature 632, 343–349 (2024).
https://doi.org/10.1038/s41586-024-07617-4

First published online: January 2025

Practitioner Perspective *By Lucia Snyderman*

Harvey-Jay Tweats – *Director of Celtic Rewilding, working across disciplines to deliver innovative reintroductions, rewilding, zoo services and media projects with a diversity of clients and stakeholders.*

***Image caption**: Harvey-Jay Tweats with a white stork.*

1. How would you introduce yourself to our readers?

I am a Director of Celtic Rewilding and Celtic Rewilding is a Rewilding Consultancy, so we specialize in nature and nature restoration. We've worked with such a variety of different organizations and people from country estates to farms to media to zoos, and each of those different clients are working to have British native species at center stage. Core to our company are species reintroductions which create the most amount of press, excitement, and interest.

2. What data do you consider most useful for informing species reintroductions and rewilding?

I definitely think up there you've got the fossil record. We need to formulate a baseline, and I say that sort of in inverted commas because there is no such thing really as a baseline. The baseline shifts depending on where we're looking at it. We are very limited in Europe where we've had significant human impact on the environment for thousands of years. We've had this vast amount of time that's passed between something that was close to near natural and the anthropogenic landscape of today. Palaeoecology and studying the fossil record is that bridge between today and what we could and should have in our ecosystems. You've got to know when a species was native. You've also got to talk about the social sciences as well with reintroductions.

3. How does your work engage with conservation palaeobiology?

White storks have a patchy history of being native in Britain. It seems that they were a species that had bred and gone extinct and was a transient species, but nonetheless it was native. There are only a few historical records of storks but there are actually quite a few subfossils. This massively helps inform us that this species was here and probably in high enough numbers for a proportion of that population to be subsequently fossilized. The study of those fossils has allowed white storks to now be introduced to the south of England which is absolutely awesome. We've also got cranes as well and are looking at the fossils for cranes. You've got a divergence with

Practitioner Perspective continued

cranes between palaeontology and history. What informed cranes was place-name evidence and these placenames could be several thousands of years old in some cases. Isn't that cool that people were naming places after cranes and that is showing that they were native?!

Now talking about the pond turtle, small reptiles and amphibians present a significant challenge with trying to reconstruct baselines because they do not fossilize well. You are dealing with very fragmentary remains. The fact that pond turtles have been found here opens up a totally different view of what Britain's past life and landscape would have been like. When we're looking at the east of England as one giant steamy swamp and who knows what else we could have had, I think what really excites me about this field is actually going beyond physical fossils and evidence and looking at the new revolution in environmental DNA studies. We've now been able to look at ecosystems which existed in excess of 2 million years ago. I think this has the potential to revolutionize conservation and the way we do rewilding. We will be able to see how ecosystems changed with such a degree of resolution that I think it will be sensational. We're very much trying to be at the cutting edge of that with the work we're doing at Celtic Rewilding and with our academic partners.

Regarding the lynx, a topical species right now!, prior to the 2000s it was believed this species was found in boreal and taiga environments and died out with the mammoths. But thanks to the study of fossils and more importantly radiocarbon (dating), we've been able to show that lynx existed until as little as a few thousand years ago. If we look to the historical records, we potentially see lynx surviving to 400-500 years ago.

Palaeobiology and the study of fossils help form this bedrock and if we can add these extra layers of historical references and place-name analysis, we can provide a really good temporal look at how a species has been distributed.

4. Is there anything you'd like to say to youth who want to get involved with conservation?

Most importantly, especially those from a palaeontology background, keep your eyes and ears open. Try to connect what you're doing with the world around you. There's nothing more important than spending time out in nature, out in wild landscapes, and observing how nature actually happens beyond a slab of rock or beyond the lab. And that applies to nature that existed 250 million years ago. We can still see parallels today. Remain curious at all times, but at the same time sometimes the best discoveries, the best epitomes, come from a walk in the woods. Get involved with a local nature conservation group if that's going to lectures or talks. Make sure your voice is heard. How can your studies, your academic interest, add something to the discussion?

5. What are the next steps for collaboration between palaeontologists and conservation biologists?

Someone discovering an elk fossil in Britain in a palaeontological sphere is seen as a rather minor discovery as compared to finding a new ichthyosaur or mammoth, but to conservation that is like

Practitioner Perspective continued

gold dust. To be able to find the presence of new species is really cool. Many senior conservationists have started from a baseline in the UK say from the 1930s when already the whole of the country was massively modified, and no wilderness was left. We need to look past that further into the past in order to formulate what was here. I hope that there is greater collaboration and unity between palaeontologists and conservationists. If we can have more money to fund searches for younger (more recent) fossils, think about what we could discover and how we could revolutionize the way we look at conservation in Britain and other parts of the world.

Relevant links:

https://celtic-rewilding.co.uk/

https://www.nature.com/articles/s41586-022-05453-y

Student Section

Activities at CPEG in Switzerland Summer 2025:

Save the date for the **3rd Conservation Palaeobiology Symposium & 4th Crossing the Paleontological-Ecological Gap (CPEG)** Meeting! This joint event will be from July 27 to August 1, 2025 at the University of Zurich, Switzerland. Abstracts are due February 1, 2025.

Learn more here: https://www.cpeg-cpb25.uzh.ch/en.html

The Training Coordinator of the Student Panel, Lucia Snyderman, is excited to present the following social networking events at the symposium meeting:

1) Students, postdocs, and professionals working in or interested in conservation palaeobiology are encouraged to network during a formal roundtable lunch on Tuesday, July 29 at the University of Zurich (exact location and time TBD). Professionals will introduce themselves and their research and postdocs and students will rotate tables to engage in a variety of discussions. Food will be provided. Please state your interest in participating at this event when registering!

2) Students and postdocs are invited to an informal gathering at a restaurant (location TBD) in Zurich on the evening of Wed, July 30. A form will be sent later to gauge interest and choose a venue, but anyone is welcome to show up without registering! We hope that this will be a welcoming space for people to get to know each other and the CPB community better. We hope to see you there!

Society for Vertebrate Paleontology Futures Award:

SVP futures award is open now which funds one summer of independent research. SVP encourages students interested in paleo from underrepresented backgrounds to apply:

https://vertpaleo.org/svp-futures-award/

Paleo Proxy Spotlight – Whale Ear Wax *By Sahale Casebolt*

In this section we highlight data types that can be used as proxies for information about past conditions. One very unusual paleo proxy is whale ear wax. Baleen whales have plugs of wax in their ears, consisting of lipid and keratin wax, forming in accretionary bands as the whales grow. These bands can be used to determine the age of the whale, similar to how tree rings can be used to date trees. Unlike trees however, this whale ear wax also contains hormones and other substances that can yield information about the whale's life and the conditions that it experienced in the environment that it lived in. Significantly, the accretionary nature of the wax also allows for an understanding of changes in these variables over the lifetime.

For example, Trumble et al. (2018) found that by examining whale earwax they could see the physiological response of the whales to whaling and other environmental stressors, including changes in sea temperature and activities associated with human warfare such as explosions underwater and war vessels like submarines. The authors compared earwax over a 146 year period (1870-2016) using 20 baleen whale earplugs from multiple species. Stress-related hormones seemed to drop after whaling was reduced in the 1970's, then increased again in the 2010's due to recent anthropogenic stressors. These recent stressors include sea surface temperature anomalies (records of unusually high sea surface temperatures).

This proxy is particularly interesting because unlike many other proxies that rely on fossil or preserved remains of organisms, the wale earwax records history on a sublethal level, giving potentially more detailed information.

Reference: Trumble, S.J., Norman, S.A., Crain, D. et al. Baleen whale cortisol levels reveal a physiological response to 20th century whaling. Nat Commun 9, 4587 (2018). https://doi.org/10.1038/s41467-018-07044-w

***Image caption**: A humpback whale, one type of baleen whale that was included in the whale earwax study (image in the public domain).*

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

***Image caption**: Gwyn at Hog Island Oyster Co. in Tomales Bay, California.*

Gwyn Chilcoat – PhD student at the University of California - Davis and Bodega Marine Lab

As a PhD student at the University of California - Davis and Bodega Marine Laboratory, I study intertidal ecosystems on the North American west coast, with a focus on the Olympia oyster (*Ostrea lurida/conchaphila*). I am reconstructing the environmental history of these oyster reefs using cores and published fossil occurrence data. One of the key stakeholders in this work are aquaculturists who work on sustainably and regeneratively growing oysters and building a market for these "unusual" varieties. This Fall, we visited collaborators at Hog Island Oyster Co. in Tomales Bay, California, to see how they raise and sell oysters.

Florida Museum of
Natural History
University of Florida
1659 Museum Road
Gainesville,
Florida 32611
USA

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!

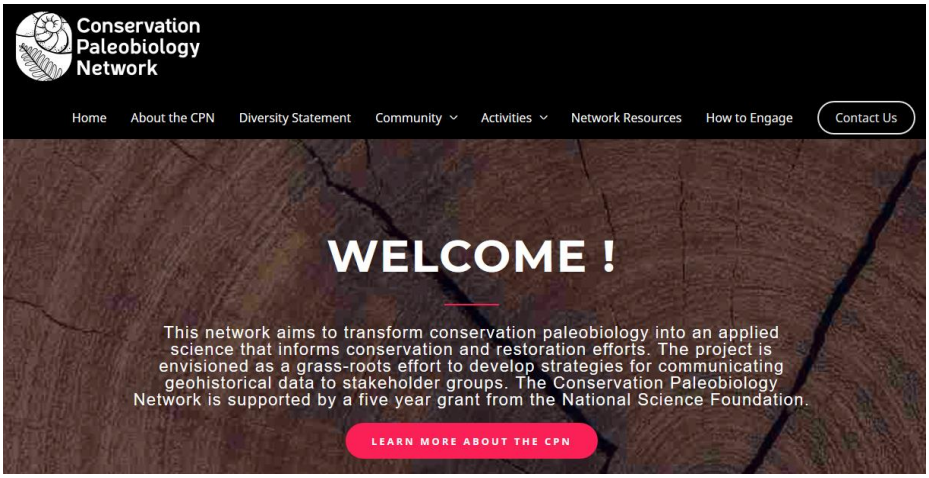
If you know people who might be interested in our network, please invite them to join. You can use the link below to extend your invitation on behalf of our network.

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/



E-mail us at: conservationpaleo@floridamuseum.ufl.edu

Newsletter Editorial Team:

Sahale Casebolt
Darja Dankina
Mollie Mills
Lucia Snyderman

Newsletter Advisor from CPN Steering Committee:

Carlos Cintra Buenrostro

Supported by RCN-NSF Award: EAR-1922562