

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.



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### Reminder: 2<sup>nd</sup> Conservation Paleobiology Symposium

The 2<sup>nd</sup> Conservation Paleobiology Symposium will be held Feb 16-19, 2023 in Gainesville, Florida. More information about abstract deadlines, registration, and opportunities for students will be announced in the coming weeks.

We hope you will join us, and we look forward to seeing you in Gainesville!

# ND Conservation Paleobiology SYMPOSIUM

Gainesville | February 2023



*Image caption:* (clockwise from top left) 1) Alligator warning sign in Gainesville, 2) Mangroves on the Gulf Coast of Florida, 3) Fossil display at the Florida Museum of Natural History, University of Florida, Gainesville, 4) View of Newnan's Lake in Gainesville.

### Conservation Paleobiology Research Highlight

By Dr. Lily Pfeifer, School of Geosciences, University of Oklahoma

#### Ghosts of ice crystals suggest ephemeral freezing in early Permian equatorial Pangaea

Delicate impressions in lacustrine mudstone of the lower Permian Usclas Formation (Lodève Basin, France) record freezing temperatures in tropical Pangaea near the peak of the Late Paleozoic Ice Age (~300 Ma). Freezing at low latitude and low-moderate elevation during this time implies colder conditions (globally) than models can replicate.

"...the deep time sedimentary record calls for exploration of a potentially overlooked feature that can contribute to an improved understanding of past icehouse climates"

Three distinct morphologies co-occur in the Usclas Formation. They bear a striking resemblance to a variety of modern (and rare fossil) ice-crystal morphologies. Empirical reproduction of identical features by the freezing of water-saturated mud supports the interpretation that they represent traces left behind by the formation of Permian icecrystals. All three morphologies were successfully reproduced through laboratory freezing, leaving ice as the most parsimonious explanation for their formation as opposed to other potential interpretations (e.g., saline minerals) that exhibit similarities only to individual morphologies within the Usclas Formation. Given the relatively low elevation (1–2 km) of the Lodève Basin during this time, evidence for films of ice in marginal-lacustrine sediment requires cold tropical temperatures (~5 °C cooler than those of the Last Glacial Maximum). The climatic forcing(s) necessary to promote a cool Pangaean tropics remain enigmatic, but the extreme continentality of the Lodève Basin depicted by some Permo-Carboniferous Pangaean paleogeographic reconstructions would have supported more extreme seasonal aridity. The recognition of low-latitude ice traces in the Phanerozoic is sparse, and dates exclusively from the Permo-Carboniferous record. Voigt et al. (2021) recently interpreted ice crystal marks from contemporaneous strata (the lower Permian Maroon Formation loessite) in western equatorial Pangaea (Eagle Basin,

Colorado, USA), corroborating the hypothesis of ephemeral freezing across tropical Pangaea.

Assessing upland (mountain) glaciation in Earth's pre-Pleistocene record is often challenging as the evidence for such phenomena are poorly preserved. Thus, interpretations of upland glaciation in the deep time record must be grounded on multiple observations (cf., Soreghan et al., 2022) and although rare, the recognition of ice crystal traces in the deep time sedimentary record calls for exploration of a potentially overlooked feature that can contribute to an improved understanding of past icehouse climates.



**Image caption:** Interpreted ice crystal traces in the lower Permian Usclas Formation mudstone, which record ephemeral freezing in equatorial Pangea.

For more details see article by Pfeifer et al. in Geology: <u>https://doi.org/10.1130/G49011.1</u> and Soreghan et al. in Frontiers in Earth Sciences: <u>https://doi.org/10.3389/feart.2022.904787</u>

## Practitioner Perspective Interview by Olivia Olson

### Featured Practitioner: Flor B. Hernández Camacho

Flor B. Hernández Camacho is a PhD candidate at the University of Texas at El Paso (UTEP) in the Ecology and Evolutionary Biology program and assistant curator of birds at the UTEP collections. She began her career in ornithology at the Centro de Ornitología y Biodiversidad (CORBIDI) collecting birds in Peru as an undergraduate student. Since then, she has worked on numerous avian collecting expeditions and has prepared over 1000 museum specimens. At UTEP, her dissertation is focused on the genomic sequencing of ducks in mallard systems to better understand the evolutionary consequences of natural and human-mediated hybridization.



*Image caption:* Flor B. Hernández Camacho.

#### 1. How did you get your start in conservation biology?

As an undergraduate student in Peru, I began working with CORBIDI, a non-profit organization that brings together researchers, conservationists, and members of the public to establish Peruvian-led conservation practices. CORBIDI has one of the most complete ornithology collections in Peru, though it began only in 2007. I began by entering specimen data into our database - at that time, preparing the birds was a dream!

#### 2. What was the step into preparing specimens like?

While I was working at CORBIDI, a collecting expedition needed volunteers and I signed up. We traveled around the country carrying our mist nets and all of our prep equipment on our backs. We often were in high altitude regions and did all of our preparing at night by headlamp in freezing temperatures. Other times, we had to hike eight hours to field locations in the forest, carrying nitrogen tanks to keep the collected birds fresh. This is when I got fast at preparing birds - I've prepared over 1000 birds.

#### 3. How does an expedition work? Who are the researchers and what is the process like?

The first expeditions for CORBIDI were led by PhD students from the United States who needed Peruvians as guides and preparators. The expedition leader would be assigned a species and a number. Permits have to be acquired from the National Government, then the community itself. Once you explain your project to the community organizations, you must then present yourself to the town leader, then everyone in the town - even the women and children. If by then you have gained approval, then you may begin collecting in that area. Most of the time this goes smoothly, but sometimes it doesn't. They might say no or they might try to charge you for every bird taken from that area (which isn't allowed!). In Peru, you must give half of the birds you collect to institutions in the country and half of them can be exported. The oldest collections in Peru are those from European expeditions from the 1800s and are held in the University of San Marcos Natural History Museum.

### Practitioner Perspective continued

#### 4. You've worked in several national parks - what's it like working in protected areas?

You need an additional permit to work in these areas and also there are some species that we cannot collect. When you're a Peruvian researcher, it takes more time. They think that since you're Peruvian, you don't have a time constraint. It's easier to get a permit when you're an outside researcher.

#### 5. What is your wish for the future of Peruvian avian conservation biology?

After I have completed my training, I wish to have a research position where I mentor more Peruvians studying our birds - I want Peruvians doing the research! When I first started at CORBIDI, I had no idea that Peru is one of the top two species-rich countries in the world for birds - there are over 1,800 registered species. At the Neotropical Ornithological Society's Conference, there were over 1000 people there, only 20 of whom were Peruvian. We have a growing community of bird watchers, but I also want to see the research community grow.

#### 6. What piece of advice would you give to your younger self?

Discipline is key! Writing the paper is always the hardest part of the research project but it's also the most important because this is when you show your results to the research and public community. We have a banding station in Peru that was started in 2012 and lots of undergraduate students participate in the projects and they show their community what they've done. When people are in the photos in a research presentation, they can see themselves in the research and conservation becomes much more intimate. The pandemic gave me the opportunity to give more talks in Peru to non-scientists. I have to think: how would I communicate what I do to my mother, my aunt, my cousin?

#### 7. What's your favorite fossil?

We have a mammoth tooth in our collections - we teach using photos of this fossil, not the physical object!



Image caption: Flor B. Hernández Camacho holding a bird.

### Student Section

#### **GSA Newsletter Info**

The Geological Society of America's annual meeting is this October and will be FULLY HYBRID. With technical and disciplinary sessions covering *Paleontology, Paleoclimatology, Geobiology, Geoscience Public Policy, and Geoscience Education,* this meeting is sure to feature many new discoveries for members to learn on-site in Denver or from the convenience of home.

Some sessions to watch for include:

- Conservation Paleobiology: Lessons from the Past, Guidance for the Future (T117)
- Laws of the Grave: Advances in Taphonomy across the Paleontologic Record (T119)
- Modeling Ecological Niches and Species Distributions in the Fossil Record: Approaches and Applications (T113)
- Terrestrial Ecosystem Disturbance through Geologic Time (T121)
- Insights from Microfossils and Their Modern Analogs: From Traditional and Emerging Approaches to Critical Re-Evaluations (T106)
- Paleontology: Recent Developments in Paleoecology (D40)
- And many more!

Also check out events and short courses sponsored by related organizations, including the Paleontological Society (<u>www.paleosoc.org/annual-meeting-at-gsa</u>).

**The CPN Student Panel** will be organizing a dedicated social event on Tuesday, October 11<sup>th</sup> for student and postdoctoral members attending the meeting in person. More details to come in a few weeks.

For more information and registration, visit <u>https://community.geosociety.org/gsa2022/home</u>.



# Paleo Proxy Spotlight – Dental Calculus by Olivia Olson

#### What is dental calculus?

Dental calculus results from the calcification of plaque which is formed by sugars and bacteria on the surface of preserved teeth and is present on many archaeological remains. Dental calculus can be found on mammals, including humans. Modern humans often have their plaque removed at the dentist and with regular brushing. Humans who lived thousands of years ago did not, and thus, traces of what they were eating remain on their preserved skeletons.



*Image caption:* Teeth of a domestic dog showing some dental plaque.

#### Why is dental calculus a good paleo proxy?

Sampling dental calculus is a noninvasive way to study past human diet. Where stable isotopes from bone collagen can be used to compare food sources (as discussed in Issue 11 of the CPN newsletter), dental calculus contains direct evidence of food consumption. Preserved in dental calculus are microfossils as well as biomolecules. Because dental calculus is a biofilm, it is a noninvasive way to retrieve data about the human host, the microbiome and their diet.

#### What can dental calculus tell us about the past?

Dental calculus can be used to sequence DNA, reconstruct past diet, and paleoenvironments. Hardy et al. (2017) did not retrieve chemical signatures from the dental calculus, but they did find an assemblage of microfossils which included starch granules. These they identified to grasses from the Triticeae or Bromideae tribe, along with meat and plant fibers, signifying a diverse diet and perhaps oral hygiene activities. Calculus can be used to reconstruct ancient human genomes (Ziesemer et al. 2018) and ancient proteins can be used to reconstruct diet (Hendy et al. 2018). Since archaeological material is finite, nondestructive sampling is integral to preserving the material.

#### **References:**

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## 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 <u>conservationpaleo@floridamuseum.ufl.edu.</u>



#### Conservation paleobiology fieldwork in Vermont

Allison Stegner and Alexis Mychajliw met in California during grad school where they were academic cousins, both conducting research in Holocene paleoecology. Recently, they connected on the other side of the country at Long Pond in the Northeast Kingdom of Vermont, USA, where they are beginning a collaboration to study the post-glacial history of the region. Long Pond is a 99-acre pristine post-glacial lake which is home to beaver, loons, and many other species. Northern white cedar swamps surround the inlets and outlets and hardwood forest dominates the upper slopes. There has been no development immediately around the lake for at least 50 years, and there was minimal development in the watershed prior. This July, Stegner and Mychajliw scouted the site and took depth measurements to identify the deepest part of the lake where they plan to collect a sediment core. Repurposed electrical insulators, a reminder of the region's rich agricultural history, are a perfect weight for the make-shift plumb line pictured.

## Postcards from the Field continued

#### Victor Carvalho - NOVA School of Science and Technology (Lisbon, Portugal)

My name is Victor Carvalho. Currently, I am doing my second Master's degree, this time in Paleontology in NOVA School of Science and Technology (Lisbon, Portugal). My first Master was related to Drawing, with specialization in scientific illustration and paleoart in Lisbon's Faculty of Fine Arts. I have been working on reconstitution of extinct organisms since 2012. In 2021, in the *Iberospinus natario*'s redescription project (former Portuguese *Baryonyx*), I was responsible for reconstructing this species' live appearance. This work which is now exposed in the Lourinhã's Dinopark (Portugal), was awarded with the Lanzendorf-National Geographic PaleoArt Prize by SVP (Society of Vertebrate Paleontology) as the best scientific illustration of that year (see image below). My main interests are taphonomy and vertebrate anatomy based on macro fossils. According to this reason, I have decided to volunteer in SHN organization (Sociedade de História Natural, Portugal). Recently, the SHN team and I are working on a bonebed from the Late Jurassic of western Portugal, the first one found in Europe. Let's see what the Portuguese coasts will bring in the near future.







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/



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