

# CPN/INCP Newsletter



International  
Network for  
Conservation  
Paleobiology

## INSIDE THIS ISSUE:

California Workshop	1
Research Highlight	2
Paleo Proxy Spotlight	3-4
Postcard from the Field	5
Invite Others & Contact Info	6

## Notes from CA Conservation Paleo Workshop

*By Lola Henderson-Thomas and Lily Weissman*

In July 2025, the Network sponsored a workshop hosted by The Nature Conservancy at the Randall Preserve in Tehachapi, California. This workshop focused on understanding the Southern California ecosystem in its natural state, with an emphasis on how Conservation Paleobiology can play a role in preserving this ecosystem.

As student participants, we were able to learn a lot about the role of blue oak trees and their importance as a keystone species. Like much of the region, the preserve is dominated by blue oak woodlands, which play a crucial role in providing key habitat and ecosystem services for a wide variety of species. As the climate warms, blue oak habitat is shifting, which can influence the ecosystems that rely on these trees. We attempted to better understand how these trees might be reacting to warmer temperatures by surveying tree-covered areas and looking at the ratios of adult trees to seedlings and saplings in different plots spread throughout the preserve. Understanding where young saplings and seedlings can thrive is critical for being able to more accurately predict where blue oak trees will be able to continue to survive in the decades to come. The goal of our fieldwork was to try and identify what factors are most important for determining blue oak recruitment rates in different areas of the preserve, to be able to more effectively come up with tailored conservation strategies to increase blue oak resilience in the region for the future.

**Image caption:**  
*Workshop participants in the field in Randall Preserve near Tehachapi, California in July 2025.*



## Conservation Paleobiology Research Highlight

By Darío Fidalgo, Museo Nacional de Ciencias Naturales (CSIC) / Universidad de León

### Loss of the giants from the Cantabrian Mountains: What bones tell us about the decline in the size of bears, chamois and horses?

Our new study published in 2025 in the journal *The Holocene* highlights a surprising pattern in the Cantabrian Mountains of northern Spain: three large iconic mammals—the brown bear (*Ursus arctos*), the Cantabrian chamois (*Rupicapra pyrenaica*), and the wild horse (*Equus ferus*)—have undergone a drastic reduction in body size over the last 10,000 years. This study combines new findings from the archaeopaleontological site of Llamazares Cave with previously published data to trace how these species have changed over the last few thousand years.

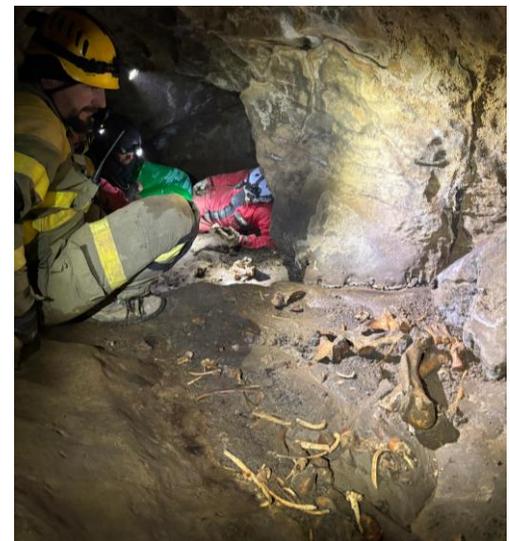
The findings show that during the early Holocene, shortly after the Last Glacial Maximum, Cantabrian brown bears could weigh more than 300 kilograms, much more than today's specimens, which rarely exceed 200 kilograms. Chamois, which were once larger and more robust, began to decline in size from the middle of the Holocene onwards, coinciding with increased human pressure and the loss of forest habitats. Wild horses, which once roamed freely throughout Europe, also gradually decreased in size before finally disappearing from the Iberian Peninsula, a process probably influenced by climate change and the beginning of domestication.

Interestingly, the decline was not due to a single factor. Bears appear to have suffered from genetic bottlenecks and, possibly, changes in hunting pressure. Chamois declined as vegetation changed and humans relied on them for food and, later, as trophies. Horses, on the other hand, show a prolonged reduction in size caused by climate, which was later accelerated by human activity.

This trend toward smaller body size is important because body size is closely related to survival, reproduction, and the ecological role that animals play. Smaller individuals tend to reproduce differently, consume fewer resources, and interact with ecosystems and humans in new ways. By looking back into the distant past, we can better understand how climate change and human activity continue to reshape wildlife today.

The study highlights a key message: species conservation requires more than just preventing extinction; it also involves recognizing how human and environmental pressures can silently but profoundly alter the very biology of surviving animals.

*“Species conservation requires more than just preventing extinction; it also involves recognizing how human and environmental pressures can silently but profoundly alter the very biology of surviving animals.”*



**Image caption:** Members of the Cantabrian Frontier team during fieldwork to excavate the skeleton of a large male brown bear in the caves of the Cantabrian Mountains (northern Spain).

**For more information see article:** Fidalgo et al., *Highlighting the drastic body size decline in Cantabrian Brown Bear, Chamois and Wild Horse during the Holocene.* [doi.org/10.1177/0959683625133](https://doi.org/10.1177/0959683625133)

## Paleo Proxy Spotlight – Leaf Margin Analysis *By Sahale Casebolt*

Many types of paleo proxies depend on complex chemical or taxonomic information. However, not all paleo proxies rely on highly technical methods, and some require no specialized tools to measure. Leaf margins are a simple and intuitive example of a paleo proxy. Here we explore how leaf margin analysis can be used for paleo temperature estimation.

### What are leaf margins?

The leaves of woody dicot plants (most broadleaf trees and some shrubs) grow in a variety of shapes and sizes, and these characteristics can be informative for understanding climate. Fossil leaves are prevalent in the sedimentary record, and the characteristics (size, margin characteristics, shape, etc.) of these leaves are often well preserved by the fossilization process and easily measured. The edges, or margins, of plant leaves vary widely between plant species, and can be characterized in a range from smooth (untoothed) to jagged (toothed). Simple measures or scores of leaf margin shape and relative smoothness are easily observed and quantified.

### How can leaf margins be a paleo proxy?

In general, toothed leaf margins are more common in cold climates, whereas smooth leaf margins are more common in hot climates. The mean annual temperature can be estimated based on the fossil plant community observed in a fossil locality. The mechanism for this was explored by Royer and Wilf (2006), who found that plants with toothed leaf margins in colder climates have more photosynthetic and transpiration activity in these margins early in the growing season, when temperatures are colder, but nutrients and water are still readily available for growth. This may become adaptive for the plants because they can extend the length of their growing season. In climate extremes (very cold or dry environments) the relationship between leaf margins and mean annual temperature breaks down, but in most climates, the relationship holds. The exact nature of why leaf margins correlate so well with temperature is still not entirely understood.



**Image caption:** Leaves are common in the fossil record.  
*Photo credit: Sahale Casebolt.*

### What is the history of leaf margins being used as a paleo proxy?

Leaf margin analysis has a long history, with the first published explanation of leaf margins correlating with temperature occurring in 1915 (Bailey and Sinnot, 1915). At first, the relationship was applied only to modern plant species, but it was later realized that it was very useful for fossil plants as well. Since that time, the method has become widely used in paleobotany (Little et al., 2010), and it has also become more quantitative, with scoring and multivariate methods applied in some cases (Spicer et al., 2021).

## Paleo Proxy continued

### Why does leaf margin analysis matter?

The information gained from leaf margin analysis has the potential to help scientists better understand past climate conditions and how biotic communities have responded to a changing climate over long periods of time. Accurate estimates of past temperature are critical for many reasons, including understanding current climate change and the biodiversity crisis. Leaf margin analysis provides an important non-marine counterpart to the numerous marine paleo proxies, such as stable isotopes.

*Image caption: Leaves with smooth margins are indicative of warmer mean annual temperatures. Photo credit: Sahale Casebolt.*



### References

Bailey, Irving W., and Edmund W. Sinnott. "A botanical index of Cretaceous and Tertiary climates." *Science* 41, no. 1066 (1915): 831-834.

Little, Stefan A., Steven W. Kembel, and Peter Wilf. "Paleotemperature proxies from leaf fossils reinterpreted in light of evolutionary history." *PloS One* 5, no. 12 (2010): e15161.

Royer, Dana L., and Peter Wilf. "Why do toothed leaves correlate with cold climates? Gas exchange at leaf margins provides new insights into a classic paleotemperature proxy." *International Journal of Plant Sciences* 167, no. 1 (2006): 11-18.

Spicer, Robert A., Jian Yang, Teresa E.V. Spicer, and Alexander Farnsworth. "Woody dicot leaf traits as a palaeoclimate proxy: 100 years of development and application." *Palaeogeography, Palaeoclimatology, Palaeoecology* 562 (2021): 110138.

## Upcoming Conference: NACCR 2026

The North American Congress for Conservation & Restoration (NACCR) 2026 will be held in Milwaukee WI in summer 2026. See [HERE](#) for more information.



**NACCR**  
**2026** July 12-16  
 Milwaukee, WI, USA

*Conservation and Restoration  
 for People and Nature*

## Postcard 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](mailto:conservationpaleo@floridamuseum.ufl.edu)*



**Image caption:** *Shungura Formation, Lower Omo Valley (Plio-Pleistocene, southern Ethiopia), a sun-baked, hilly landscape that once formed the bed of the Omo River and occasionally of Lake Turkana, hosting a rich ecosystem including several hominin species. Today, the Omo River flows a few kilometres east, and Lake Turkana lies further south.*

### **Axelle Gardin – Institute of Evolutionary Science of Montpellier, Université de Montpellier, France**

During the 2024 field season in the Shungura Formation, Lower Omo Valley (Ethiopia), we collected fossils of freshwater animals (mollusks, fishes, hippos and crocodiles) to investigate the idea of ancient hydrological refugia. Combining faunal assemblages with geochemical analyses, we aim to reconstruct local water resources and their evolution during Pleistocene episodes of Eastern African aridification, and to explore how aquatic habitats may have acted as refugia from water stress in this area.



**International  
Network for  
Conservation  
Paleobiology**

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](mailto:conservationpaleo@floridamuseum.ufl.edu)

## Invite Your Colleagues to Join our Network!

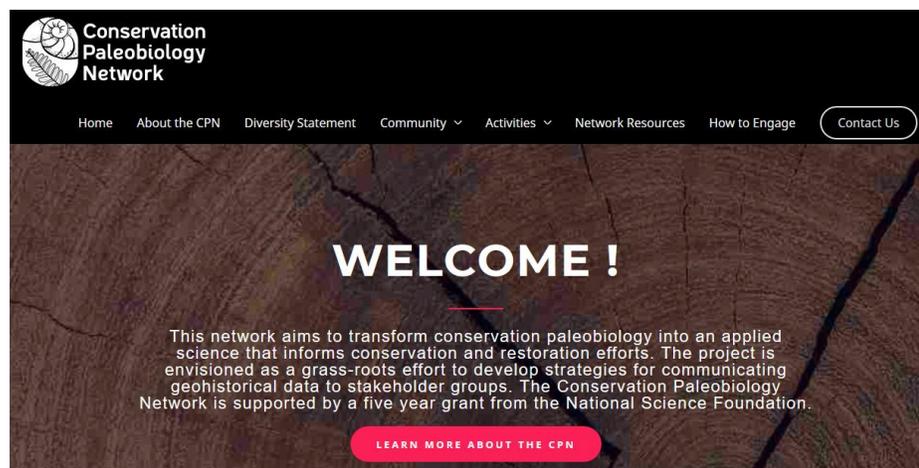
If you know people who might be interested in our network, please invite them to join. You can use the link below to extend your invitation on behalf of our network.

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](mailto:conservationpaleo@floridamuseum.ufl.edu)

### Newsletter Editorial Team:

**Sahale Casebolt  
Darja Dankina  
Lucia Snyderman**

### Newsletter Advisor from CPN Steering Committee:

**Carlos Cintra Buenrostro**