Bone, Tools, and Traditions
15th WBRG Meeting (Paris, 2024)
Organized by Nejma Goutas and Marianne Christensen
Paris, Société préhistorique française, 2026 (Séances de la Société préhistorique française, 24)
pp. 17–26
www.prehistoire.org
ISSN : 2263-3847 – ISBN : 978-2-9588382-2-5

Introduction

Marianne Christensen, Nejma Goutas

Three years after the 14th International Meeting of the WBRG[1], held virtually in Johannesburg in 2021, the 15th meeting took place in Paris from the 13th to the 17th of May 2024. On this occasion, the group members could finally meet in person, one year later than usual, in order to avoid overlapping with the major ICAZ General Meeting in Cairns, Australia. This was the second time that a WBRG meeting was held in Paris.

Organising the meeting in France in 2024 provided an opportunity to highlight the fact that this date marked exactly fifty years since the First International Symposium on Prehistoric Bone Industry, organized by the French researcher Henriette Camps-Fabrer, was held at Sénanque Abbey in the south of France in Spring 1974. The Sénanque symposium represented a major milestone in promoting research on worked bone in past and present societies, first in Europe, then worldwide. We can therefore only emphasise that, since that time, the study of worked bone has established a solid foundation upon which further research continues to develop.

The 15th Paris meeting brought together approximately 120 participants (researchers, PhD students, and Master's students), who provided featured a total of 73 contributions, reflecting the strong interest among researchers in bone as a raw material. More than 180 authors from 23 countries across Europe, the Americas, Asia, and Africa presented their work (fig. 1). Only one third of the presentations were delivered virtually. Although not an ideal format, keeping the meeting hybrid widened its intellectual scope. Importantly, the 15th WBRG meeting took place in a warm and welcoming atmosphere, providing numerous opportunities for face-to-face discussions during sessions and breaks, as well as during the conference cocktail reception and banquet.

Through its dynamism and the diversity of its members, the WBRG has become a leading force in shaping a global scientific community dedicated to the study of worked hard animal materials. It was therefore both a great pleasure and an honour for us to organise the 15th international meeting in 2024 (fig. 2 and fig. 3).

The WBRG meetings bring together experts in technology, use-wear analysis, and archaeozoology who are engaged in the study of worked hard animal materials, spanning periods from the Palaeolithic to the Early Modern era and covering a wide geographical range. The group promotes this field of study by encouraging scientific dialogue, the exchange of knowledge, and the pooling of documentary resources. It relies in particular on its international mailing list, the bonetool.list, a genuine platform for communication through which members can share information, news, and publications, as well as seek advice from the community on their study material. The dynamism and longevity of this mailing list owe much to the dedication of Hans Christian Küchelmann (Deutsches Schiffahrtsmuseum, Germany) and Alice Choyke (Central European University, Medieval Studies, Hungary), whose sustained efforts have contributed significantly to the vitality of the group.

This international community aims at a deeper understanding of the complex relationships between humans and animals over the long term, whether economic, social, or symbolic. In doing so, the WBRG helps structure a continually expanding community and works to harmonise its "best practices". Through the diversity and richness of the approaches and contributors it brings together, the group provides a fruitful framework for the cross-fertilisation of research traditions across countries, chronological periods, and even types of artefacts studied. The WBRG's biennial meetings constitute a privileged opportunity for exchange, strengthening the ties between established researchers and early-career scholars, fostering new collaborations, and ensuring the continuity of international inter-institutional networks.

This 15th scientific meeting was held under the auspices of the French Prehistoric Society (Société préhistorique française; SPF), which also published papers from the 2024 meeting as part of the « Séances de la SPF » (SPF Series). The proceedings appear in an open access online journal, without restrictions. We would like to take this opportunity to thank its board of Directors,

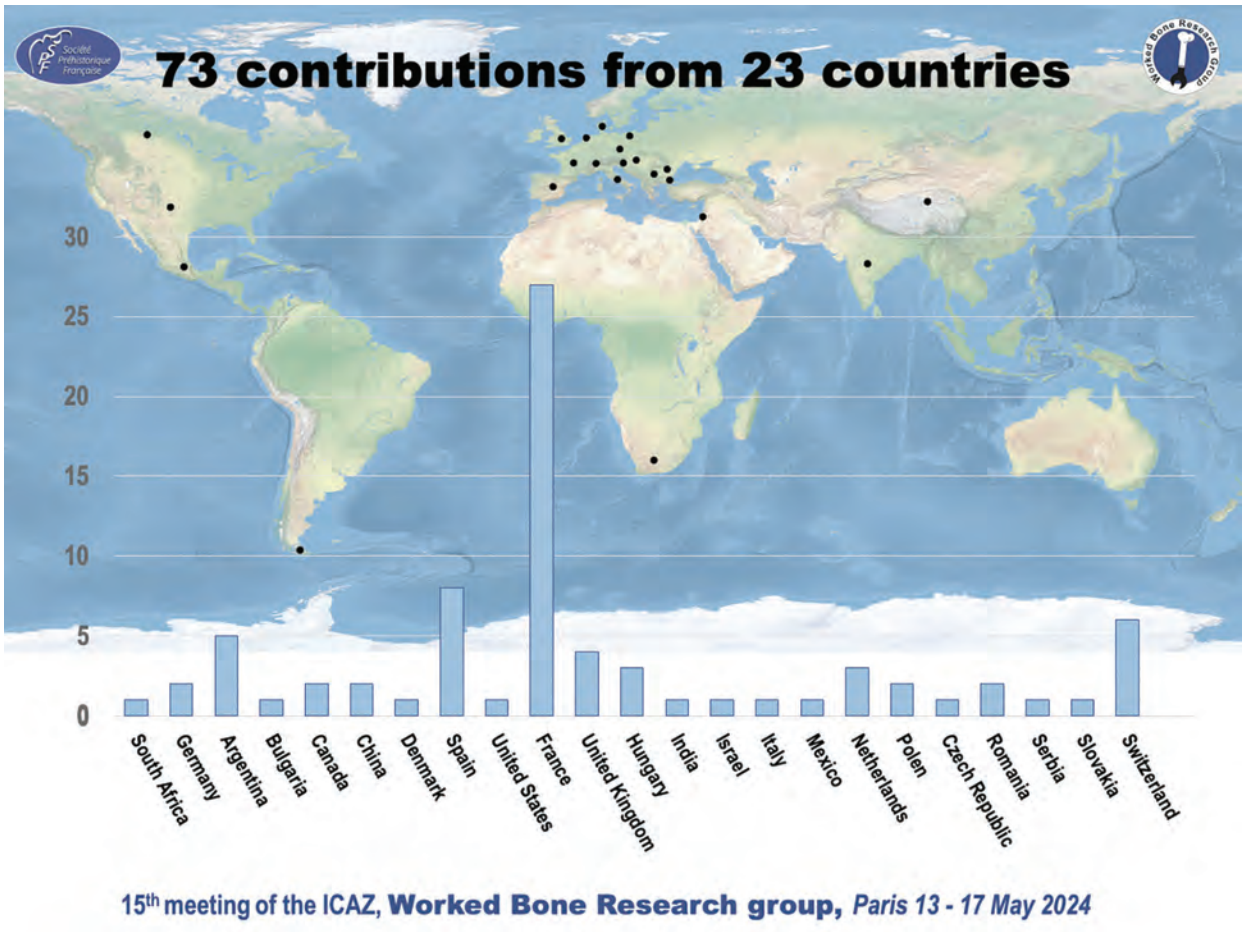

Fig. 1 – Geographical origin of participants at the 15th WBRG meeting (Paris,2024).
***Fig. 1** – Origine géographique des participants à 15e rencontre du WBRG (Paris, 2024).*

Fig. 2 – Attendees at the 15th WBRG meeting (Paris, 2024).
***Fig. 2** – Participants à la 15e rencontre du WBRG (Paris, 2024).*

Fig. 3 – a-b) Two presentations at the 15th WBRG meeting (Paris, 2024).
Fig. 3 *– a-b) Deux communications lors de la 15e rencontre du WBRG (Paris, 2024).*

as well as to Claire Letourneux, the scientific editor, who carried out the editorial work for this substantial volume.

1. WBRG 2024: FIFTEENTH INTERNATIONAL MEETING IN PARIS

As noted above, the 15th meeting gave us a chance to celebrate the 50th anniversary of the first International Symposium on Prehistoric Bone Industry, organised in Sénanque. These first encounters between researchers of different nationalities (French, Belgian, Spanish, German, American, etc.) helped develop a new framework for the study of bone tools and a chance to address the technical aspects of manufacturing these objects.

The 1970s and 1980s were marked by the development of a new technical approach among lithic researchers. The use of the analytical tool known as the operational chain, borrowed from technical ethnologists, made it possible to better understand the technical organisation of actions and gain access to the nature of economy. This dynamism had an impact on students, as evidenced by numerous university dissertations from this period. Christiane Leroy-Prost was one of these students and actually she was part of the new generation of researchers who, in the 1970s, transformed the study of worked bone industries (fig. 3). In 1975 and 1979, she published her doctoral research on the Aurignacian bone industry from major French sites, marking a turning point in research by moving beyond the study of a single category of artefacts to consider the entire spectrum of bone production, from tools to waste materials. Christiane then devoted 36 years of her career to the Musée de l'Homme, where she played an active role in the Nomenclature Commission for bone industries and contributed to the training of several generations of students, including one of the organizers of these meetings (NG).

We honoured François Poplin, who had passed away a few days before the meeting. François Poplin, an internationally renowned archaeozoologist had taken part in this very first International Symposium on the Prehistoric Bone Industry at Sénanque. He always maintained his deep interest in the technical exploitation of bone and particularly ivory in manufacturing objects. He was particularly well known for his distinctive approach to their production given his expertise in the field of identification of animal raw materials. We all remember, François Poplin as a very active contributor to the bonetool.list, he was always full of ideas and never hesitated to share his knowledge generously with colleagues. His contributions to bone tool studies and his presence on the bonetool.list will be sorely missed. The Mystery Bone Tool used for the May edition of the bonetool.list was dedicated to his memory (fig. 4).

The conference was highlighted by two guest lectures. The first, presented by two WBRG pioneers—Alice Choyke and Hans Christian Küchelmann—, was entitled *The Worked Bone Research Group and forgingconsensus on the study of worked hard osseous materials*. The authors provided participants valuable historical insight into the WBRG history, from its creation to the very present. Their presentation was delivered with humour and punctuated with marvelous anecdotes. The second lecture, entitled *Raw materials identification: Developments and mimits* and presented by Sonia O'Connor (Archaeological Sciences, University of Bradford), was particularly valuable from a methodological point of view, clarifying current protocols for analysing and identifying raw materials, highlighting their limitations and potential biases, and finally suggesting ways to improve the rigour of these analyses (see O'Connor, this volume).

2. OBJECTIVES AND TOPICS OF THE 15TH WBRG MEETING AND ABSTRACTS OF THE PRESENTATIONS

The 15th meeting was organised into eight thematic sessions, five of which addressed current issues in research on hard animal materials industries (1, 2, 3, and 8), while the other three explored less common topics (4, 5, and 7) and the final session was an open session (6). Participants were entirely free to choose one topic or another. The proceeding contains 32 articles out of the 73 oral contributions made during the week-long meeting (cf. the session-wise lists of presentations).

2.1. Appropriate experimental procedures

In the last few years, the term "experimentation" has taken on a very broad meaning in research on HAM industries and, more generally, on exploitation of animal resources. Based on archaeological case studies and/or examples drawn from the history of our discipline, this thematic section aims to engage collective brainstorming to better define the meaning applied to specific terms and concepts. From didactic tests (often exploratory) to large-scale experimental programs, is it possible to create and define a typology of different experimental approaches? What are their objectives, their contribution, but also their limits? Examples of unexpected or problematic results are especially welcome since failures and mistakes are also a form of learning experience. The diversity of approaches among the WBRG meeting participants offers a framework for valuable comparisons of practices in different countries, on material from various chronological periods and various kinds of animal resources. This thematic section aims at contributing to increased consensus over what constitutes proper experimental practice and terminology. This session contributes to a greater homogenization of our practices and terminologies and helps in asking better research questions in relation to the resources required to mobilize to answer them, and vice versa. In addition to these issues, the section contains a variety of presentations dealing with the experimental approach

Fig. 4 – The Bonetool of the month in honor of François Poplin (photo P. Saussereau/DHAAP).
***Fig. 4** – The Bonetool du mois, en hommage à François Poplin (cliché P. Saussereau/DHAAP).*

to understanding hard animal material processing and transformation chains (*chaînes opératoires*) or the use of objects manufactured from these materials.

This session at the WBRG meeting included six presentations, four of which are published in the present proceedings.

The presentation by Christian Gates Saint-Pierre and Jessica Labonté, published under the title *Of beaver teeth and human hair: A tale of two experiments in bone use-wear*, focused on experimental use-wear analyses of prehistoric bone tools. The authors tested the hypothesis that beaver incisors were used as woodworking tools and also examined the microtraces produced by bone objects used as hairpins, which can be confused with bone awls. Their results underscore the importance of careful functional interpretation of prehistoric bone tools based on rigorous analyses.

The presentation by Miriam Luciañez Triviño and Corina Liesau von Lettow-Vorbeck, published under the title *Ivory segmentation procedures with copper-based tools: Archaeological and experimental evidence*, investigates the early use of copper- and bronze-based saws and axes in prehistoric ivory working in Spain. Through experimental tests and archaeological comparison, the authors assessed the effectiveness and limitations of these tools for segmenting elephant tusks. The study demonstrates that Chalcolithic tools allowed for controlled division of smaller ivory pieces, while Bronze Age tools were more efficient, enabling the sawing of larger tusks. Their results provide insights into the technical skills of prehistoric ivory artisans and the evolving strategies for managing a highly valuable raw material.

The presentation by Hildegard Müller, Dorota Wojtczak, Nicole Reynaud Savioz, and Aurélie Schenk, published under the title *Sledge runners or tools? Experimental and micro-wear approaches in the study of a curious assemblage of abraded hemi-mandibles of the Late Iron Age site "La Brocante" in Avenches (Switzerland)*, focuses on experimental and use-wear analyses of transformed bones from the second Iron Age. The authors tested whether these artefacts, mainly bovine mandibles, functioned as sledge runners or as tools in artisanal activities such as horn, flax, and hide processing. Their results show that different uses leave distinct traces, providing a promising basis for further functional interpretations of these bone objects.

The presentation by Mélanie Ferras, published under the title *Flat and Twisting Chains: An analysis of the articulation systems of the bone pins from Chavín de Huántar (1200–500 BCE), Ancash (Peru)*, examines a unique assemblage of around 87 articulated bone pins from this Formative Andean ceremonial centre. Each pin is crafted from a single piece of bone and features a complex articulation system with interlocking links, forming two technical types: flat chains and twisting chains. Experimental tests and detailed analysis focus on the shaping and production processes of these intricate objects. The study highlights the remarkable technical skill and innovation present in this exceptional Formative Period Andean object corpus.

2.2. The study of material interactions: Implementation and interpretation

This session was devoted to research that takes a crossover approach to technical systems, by linking several materials (bone/lithic, bone/ceramic, bone/metal, bone/shell, bone/vegetal), in order to move away from the more usual single "material" study. The session aimed to better understand how the exploitation of one animal resource, regardless of its origin, conditioned the acquisition, transformation or use of another resource, and vice versa?

This session was connected to a single presentation, which, regrettably, could not take place.

2.3. From material productions to social structures and cultural traditions

In this session, the participants were encouraged to present case studies to discuss issues of use of animal resources as source of information about social actors, socio-economic and cultural systems of the past (nomadic vs. sedentary; experts vs. apprentices etc.). How can we identify the individual and/or the community behind a technical action/choice or an artifact? What criteria can be used to shed light on these aspects, based on hard animal material productions and technical procedures?

This session was the most successful, bringing together 17 presentations over a full and intensive day. Among these papers, eight are published in the present proceedings.

Jesús Tapia, Rosana Cerezo-Fernández, Rodrigo Portero, Marián Cueto, Jesus F. Jordá Pardo, and Esteban Álvarez-Fernández in their presentation, *Bone industry in the Upper Paleolithic occupations at El Cierro Cave (Ribadesella, Asturias, Spain)*, review the bone industry from Aurignacian through Gravettian and Solutrean to Magdalenian levels. They analysed tools and production waste from both antler and bone, drawing on materials from excavations conducted in the 1970s and the 2016 campaign. Their study allowed them to reconstruct different operational chains and identify periods of intensified production, particularly during the Lower Magdalenian, when the density of worked materials was highest.

Haskel J. Greenfield, in his published article *"It's the Pits": Culturally modified animal bone from an Early Neolithic pit house settlement (Blagotin) in Central Serbia*, analysed bone tools and ornaments recovered from Early Neolithic pit houses of the Starčevo culture. Their study highlights the spatial organization of different activities across the site, technological processes involved in tool manufacture, and the diversity of bone modifications. While one central pit appears to have had a ceremonial function, the analysis shows that bone tools and ornaments were widely used in everyday tasks throughout the settlement, with no evidence of specialized use for the central feature.

Selena Vitezović, in her study published *Bone manufacturing in the Late Neolithic of the Thrace region (Bulgaria)*, provides a detailed examination of long-bone tool production at Late Neolithic sites in Thrace. She documents standardized techniques for splitting, grooving, and polishing metapodials and tibiae to produce functional pointed tools, chisels, and ornamental items. The work emphasizes planned production, technological skill, and the centrality of bone tool manufacture in these prehistoric communities.

Erika Gál, Anett Osztás, Attila Kreiter, László Előd Aradi, and Melinda Vindus, in their article *An unusual toolset from Late Neolithic – Early Copper Age graves in Hungary: Preliminary results*, describe a rare set of bone and antler tools found in Lengyel and Tiszapolgár graves, including antler sticks, scapula fragments, and metapodial "hide beamers." While these items appear in male and occasionally high-status female graves, their precise function remains unclear. The authors suggest that these tools were likely common daily-use objects rather than being purely symbolic offerings, and they explore gender-related patterns and parallels across coeval sites.

Petar Zidarov and Rosica Mitkova, in their publication *Barbed points and harpoons from Chalcolithic sites (ca. 4500–4350 BC) in Upper Thrace and the Western Black Sea coast (Bulgaria)*, examine the distribution and typology of barbed points and harpoons made from bone and antler. They highlight regional patterns of use, noting some types are widespread while others are limited to specific sites. In the study they consider whether these patterns reflect functional adaptations to local environments or socially mediated practices, contributing to a broader understanding of Chalcolithic tool economies in Southeastern Europe.

Vinayak, in the article *Worked Osseous assemblage from the Iron Age of Indor Khera, Upper Ganga Plains (India)*, analyses approximately 120 tools and production debris made from bone, antler, and ivory spanning several centuries of site occupation. The study considers the potential role of these objects in pottery production and related craft activities, integrating macroscopic and microscopic analyses. The author compares these findings with similar assemblages from nearby sites such as Atranjikhera and Jakhera to understand regional technological traditions.

Henrique Sarmento Pedro, in his published study *A major economic turning point for craftspeople working with hard animal materials in Western France*, traces the transformation of crafts exploiting bone, antler, and ivory in medieval France. He shows how, by the 13th century, artisans shifted from semi-sedentary, rural production to urban workshops catering to a growing bourgeois market. This change is linked to economic expansion, commercial centralization, and the evolution of craftsmen's social status in towns.

Vuk Koldžić, in his article *Bone working in the Vinča Culture: Specialised or not?*, investigates bone working at key Vinča sites, analysing contextual data and production techniques. The study finds that bone working was integrated into everyday life, with evidence for systematic but non-specialized production. His work provides

insights into craft organization and the role of bone tools within the broader economic and social fabric of the Vinča Culture.

2.4. Technical stability and change

Historically, technical innovations have been used to illustrate past technical or conceptual breakthroughs considered relevant for defining or clarifying the major chrono-cultural phases of Prehistory. Phases of stability within technical systems, as well as the rejection of innovation (their social implications and the reasons for acceptance or rejection) still seem to be rarely discussed in concrete terms, undoubtedly because these aspects are difficult to pinpoint.

What does it mean when a group of people rejects or ignores a potential technical (or even symbolic) innovation? Does this choice reflect a voluntary/hostile distancing from novelty (rejection of knowledge that comes from a perceived "other" or strict adherence to community standards)? Is such a constrained distancing (e.g. inability to integrate and perpetuate innovation) due to lack of know-how or restricted access to certain raw materials, etc.? Can researchers distinguish between rejection and "non-knowledge" of an innovation in the archaeological record? On the other hand, technical stability can reflect social, economic and/or environmental stability, but it can also conceal the opposite when we consider the whole material culture and culture of ideas, including the nature of other technical systems (lithic, ceramic etc.). How should these technical arrhythmias be interpreted? Why does one system change and another not?

Six presentations were given in connection with this session. Among these, five are published in the present proceedings.

The presentation by María Borao Álvarez, Ana Belén Galán López, Romain Malgarini, and Jean-Marc Pétillon, published under the title *Badegoulian eyed needles: New data on morphometric and technology from the rockshelters of Fritsch and Cuzoul de Vers (France), a synthesis*, examines eyed needles from two sites in Southwest France. The authors analyse raw material acquisition, production techniques, and operational sequences, alongside morphometric variability, use-wear, and breakage patterns. Their study documents the emergence and technological development of eyed needles from the Solutrean to the Badegoulian periods, highlighting the presence of both continuity and innovation in the manufacture and use of these objects.

The presentation by Natacha Buc, Alejandro Acosta, Lucia T. Rombolá, Jay Hilsden, Lindsey Paskulin, Mirian Carbonera, Fernanda Schneider, Daniel Loponte, and Camilla Speller, published under the title *Morphological and Material Variability in Bone Harpoon Heads and Stemmed Points from the Lower Paraná Basin (Argentina) in the Late Holocene*, analyses bone artefacts from hunter-gatherer and horticulturalist groups to explore technological and social diversity in the region. Using morphological study and ZooMS analysis, the team identifies selective use of deer and camelid bones and shows that raw material choice alone cannot explain the wide morphological variability. Their results suggest that innovations in tool design reflect social differentiation and changing identities within a shared technological tradition.

Marta Blasco Martín published her presentation under the title *A synthetic review of the evolution of hard animal material crafts in a Mediterranean city: Valencia from its bones*. This paper offers a diachronic overview of bone, antler, and ivory craftsmanship in Valencia, from its Roman foundation to modern times based on finds documented through decades of urban archaeology. She explores both the continuities and innovations in production techniques and artefact types. Particular emphasis is placed on the Roman and Islamic phases in the city, which reveal rich and distinctive evidence. Her analysis highlights how these crafts reflect broader social, economic, and cultural dynamics throughout Valencia's long urban history.

In their contribution, *Neolithisation of the Lower Danube as reflected by the osseous industry*, Monica Măgărit and Pavel Mirea examine how the transition from hunter-gatherer to farming societies is reflected in bone tool production. Focusing on Early to Middle Neolithic assemblages from the Lower Danube, they note both the persistence of Mesolithic traditions and the emergence of new Neolithic types and techniques. Their analysis highlights shifts in raw material use—particularly the preference for domestic species over wild fauna—and the gradual introduction of new tool categories and manufacturing methods, offering insights into technological and cultural change during the neolithisation process.

2.5. Hard animal material industries, archaeometry and ethics: New advances?

Archaeometric methods applied to HAM have made great strides over the last ten years. This section provides an opportunity to take stock of these new approaches (invasive vs. non-invasive methods) and the real contribution of the analyses carried out (scientific together with their financial cost-benefit ratio). Following the example of the collective work undertaken for human remains from archaeological contexts, it is hoped that this session will initiate the development of an international ethical charter, under the umbrella of the WBRG, for a better (scientific and patrimonial) management of HAM industries, in order to avoid their destruction and the irreversible loss of information.

Four presentations were given in connection with this session. Among these, two are published in the present proceedings.

The presentation by Nejma Goutas, Jose Miguel Tejero, Marianne Christensen, Marta Blasco Martín, Jean-François Goret, Alexandra Legrand, Caroline Peschaux, and Isabelle Rodet-Belarbi, published under the title *Hard animal material industries, archaeometry, and ethics: Towards a collective reflection on the judi-*

cious use of analyses and sampling, serves as an introduction to the session by framing discussions on archaeometric analyses of bone and other hard animal materials. It highlighted methods such as isotopic analysis, SEM, radiocarbon dating, ZooMS, and paleogenetics, and their contributions to understanding craft practices, raw material circulation, and technological innovation. Ethical and practical challenges of invasive analyses were discussed, stressing the need for collaboration between archaeologists, analysts, and curators, and the need for international guidelines or a WBRG thematic group to ensure responsible and sustainable research on these fragile materials.

The presentation by Aude Chevallier Aude, Brad Gravina, Catherine Cretin, Pauline Rolland, and Nathalie Fourment, published under the title *Advancing while curating: Protecting archaeological heritage while furthering our understanding of the past*, focuses on managing sampling requests for hard animal material at the Musée National de Préhistoire. The authors discuss the creation of an "invasive analysis committee" in 2018 to evaluate requests for destructive tests on rare and unique artefacts, balancing conservation with research needs. Drawing on five years of experience, they highlight best practices and criteria for decision-making, reflecting the challenges posed by the recent surge in archaeometric analyses.

2.6. *« Open session »*

This session was opened to all topics related to, in one way or another, research on hard animal materials. Proposals that do not fit into one of the above sessions were welcomed here.

Ten presentations were given in connection with this session. Among these, five are published in the present proceedings.

The presentation by Claudia Sabbini and Alice Choyke, published under the title *Passing the baton: The bone tool materials from the archaeological site of Arslantepe tell Türkiye*, offers an overview of long-term excavations at Arslantepe, ongoing for over six decades. The authors focus on managing transitions between research generations, addressing challenges of methodological discontinuity and data preservation. They outline strategies to integrate past documentation with current analytical approaches, illustrated with preliminary data from Late Chalcolithic bone tools. This approach ensures continuity while transforming the changing of specialists into an opportunity for methodological renewal.

Marie Delassus, in her paper entitled *Bone carvings in late antique Egyptian furniture: From standardisation to inventiveness*, examines bone reliefs and inlays used in late antique Egyptian furniture, with particular attention to Alexandrian workshops. Her study, based on 270 decorative elements from the Rodin Museum, highlights standardized working processes adapted to bone morphology as well as variations that reveal individual creativity. These results shed light on both the technical systematization and artistic inventiveness of late antique craft production.

Ágnes Font and Márta Daróczi-Szabó offer in their contribution, entitled *Bone carvings in late antique Egyptian furniture: From standardisation to inventiveness*, a significant reassessment of the medieval ivory assemblage from the Buda Castle excavations in the Hungarian capital. Recent analyses demonstrate that many artifacts previously identified as bone are, in fact, crafted from elephant or walrus ivory. This reexamination of the actual raw materials not only refines our understanding of the materials themselves but also sheds light on the extensive trade networks that brought such prestigious resources to Central Europe. Font and Daróczi-Szabó situate these discoveries within a wider framework of technological, artistic, and cultural exchanges across medieval Europe.

Hans Christian Küchelmann, in his contribution entitled *Bone, antler and ivory artefacts in the Hanseatic maritime trade*, offers a detailed examination of the circulation and use of skeletal materials—including walrus and narwhal ivory, whalebone, and reindeer antler—within the North Atlantic networks of the Hanseatic League (15th–17th c.). Drawing on this evidence, the author highlights how these materials, traded both as raw resources and finished artefacts, illustrate the intricate connections between commerce, craftsmanship, and social relationships in early modern maritime Europe.

Manuel Altamirano, Maria Herrero-Otal, Raquel Piqué, Antoni Palomo Pérez, Anna Homs, Ruth Maicas, Rafael M. Martínez, and Francisco Martínez-Sevilla present a preliminary study of worked bone tools from the site Cueva de los Murciélagos in their contribution, *Approaches to the osseous industry from Cueva de los Murciélagos in Albuñol (Granada, Spain) and its possible relationship with plant-based technologies*. Their analysis highlights the selection of caprine and possibly bovid or red deer long bones, with the blanks obtained through diaphysis splitting or direct percussion and shaping by abrasion. Traceological observations indicate that at least some of these tools were used in the production of plant-based crafts, such as the remains of basketry preserved at the cave. This study provides rare evidence linking osseous tools directly to the manufacture of perishable materials in mesolithic and neolithic southern Iberia.

2.7. Master and doctoral student's forum

To encourage intergenerational exchange, we introduced, for the first time, an open forum dedicated to early-career researchers, including Master's and PhD students. This session did not focus on a specific theme, in order to allow as many students as possible—regardless of their university or chronological-cultural field of study—to take advantage of this space for professional discussion. The session was organised and chaired by three PhD students from the University of Paris 1: Gabriela Bravo, Natacha Caurette, and Konstantinos Chondros. It proved highly successful, featuring 14 presentations and

spanning nearly a full day. Notably, the waiver of fees for unfunded postdoctoral researchers and all students (from undergraduate to doctoral level) greatly facilitated their participation, both as speakers and as audience members. Both the idea of having a separate session for PhD and Master students as well as the "Flash" talks (cf. below) around a single concentrated subject were innovations that should be seriously considered in our opinion for future meetings. However, only four papers were published in these proceedings. We can only encourage these young researchers to publish more of the results of their research.

Konstantinos Chondros, in *A fresh look at the Thessalian Neolithic osseous tools: The study from Mandra (Northern Greece, fifth millennium cal BC)*, examines about 190 osseous artefacts from Mandra, primarily cutting-edge tools, awls, and smoothers, along with sleeves, a bipoint, and a needle. He highlights selective raw material choices, mostly from domesticated species, and structured reduction processes such as bifacial grooving and percussion. The study emphasises correlations between specific skeletal elements and tool types, as well as the technological continuity of bone working in Late Neolithic Thessaly. These findings contribute to understanding regional and chronological trends in Neolithic osseous industries.

Quentin Zarka investigates, in *The manufacture of the Aegean boar's tusk helmets: A case study from Middle Bronze Age Kolonna on Aegina (Greece)*, the production of Aegean boar's tusk helmets from the second millennium BC. He analyses raw material acquisition through hunting and trade, transformation methods, and variability in manufacturing processes. The study shows technical choices guided by raw material and desired product shapes, underlining the prestigious nature of the helmets and their social and symbolic significance in the Aegean Late Bronze Age warrior aristocracy.

Xenia Pop and Cristian Virag, in *A glimpse of the Eneolithic afterlife. Burial M30 from Urziceni-Vamă (Romania)*, present the analysis of an elk antler quiver from a Bodrogkeresztúr Culture grave. They examine conservation issues and manufacturing techniques, situating the artifact within the funerary context of a male individual, alongside copper-wire, obsidian, and boar's tusk objects. The quiver reflects both technical craftsmanship and potential religious beliefs or social status of the deceased.

Gabriela Bravo, in her contribution *Bone technology among archaic fishers, hunters, and gatherers of the northern and central coasts of Chile's semi-arid region*, examines the bone industry of middle and late archaic hunter-gatherer groups associated with the so-called "Shell Fishhook Culture." Drawing on both legacy collections and recent excavations, she analyses the technological, economic, and social dimensions of bone craftsmanship. In her study she explores the apparent cultural homogeneity observed along the semi-arid northern coasts, while also identifying signs of emerging local differentiation in lifeways and artisanal practices.

2.8. Flash communications and posters session

This session was dedicated to short presentations of news in the technical exploitation of animal bone resources (latest fieldwork or laboratory developments), invitations to take part in new collaborative projects, etc). Presentations took the form of posters or short oral communications (5 to 8 min. maximum).

The session featured four short "flash presentations" and eight posters of which only three were published in these proceedings.

Merel Spithoven, in her contribution *Archery and quiver experiments with barbed bone and antler points*, presents experiments on Mesolithic red deer and human-bone points from Doggerland and examines the efficiency of different quivers (fallow deer skin inside/outside, birch bark) and shooting methods (deer hunting, bowfishing, missed shots) to create a reference collection for use-wear analysis. Preliminary results indicate that hide quivers with hairs inside best protect arrows and reduce noise, producing use-wear on the bone projectile points similar to archaeological points. Deer-shooting tests show that both small and large barbed points make effective arrowheads, penetrating deeply, although points rarely survive more than a few shots.

Miriam Luciañez Triviño and Violeta Moreno Megías's contribution, *Sumptuary crafts from a technological perspective: Initial observations on punic ostrich eggshells from Villaricos (Southeast Iberian Peninsula) and Puig des Molins (Ibiza)*, deals with decorated ostrich eggshells using SEM to explore production techniques and decoration methods. They identify two cutting methods—peripheral sawing in Villaricos and controlled percussion in Puig des Molins—and document variation in brush sizes for polychrome decoration. SEM analysis shows no clear evidence of abrasion or polishing, suggesting the selection of naturally smooth eggshells. These differences reveal slightly divergent craft traditions reflecting local and regional influences. Their study links technical choices to Phoenician-Punic cultural identity, trade, and religious expression.

Cynthia Kromotaroeno investigates pointed bone tools from Merovingian Dorestad, distinguishing between pins and needles in her contribution, *"It Looks Fishy!" The role of bone needles and pins in fish processing at the early medieval riverine settlement of Dorestad (The Netherlands)*. Through experimental archaeology, she reproduces their use on fish and fish skins to identify use-wear patterns. Comparison with archaeological specimens suggests that some tools, often interpreted as hairpins or textile implements, were used in fish processing. The study highlights alternative functions for common bone artefacts and provides insight into the daily subsistence practices of Dorestad's inhabitants.

In conclusion, the communications presented at the 15th WBRG meeting—and the associated proceedings—highlight the remarkable richness and diversity of research on worked bone. They cover a wide range

of chronological and cultural contexts, from the Lower Paleolithic to the Early Modern period, and encompass varied geographic regions across the world. Equally notable is the methodological diversity showcased, from zooarchaeology, use-wear and paleoproteomics analyses to experimental and technological approaches, reflecting the interdisciplinary nature of the field. This breadth of topics, temporal frameworks, and analytical perspectives underlines both the vitality of current research as well as the field's continuing potential for new insights into human interactions with osseous materials.

NOTE

1. The Worked Bone Research Group (WBRG) was founded during an informal meeting of around thirty specialists at the British Museum in London in February 1997. Since June 2000, it has been an official international working group of the International Council for Archaeozoology (ICAZ; http://www.wbrg.net).