

Advancing while curating: Protecting archaeological heritage while furthering our understanding of the past

Conserver le patrimoine archéologique tout en améliorant notre compréhension du passé : une brève note

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Abstract: The florescence of archeometric techniques for analysing hard animal material (bone, teeth, ivory, antler and shell) over the last decade has led to an increase in sampling requests for objects held in the Musée National de Préhistoire's (MNP, Les Eyzies, France) collections. Often concerning rare if not unique artefacts, these requests pose sometimes complex questions as to how to best conserve archaeological heritage while advancing our understanding of past societies. In order to best respond to this dual objective, the MNP created a "invasive analysis committee" in 2018 to examine these different requests internally and, when necessary, with help from an external expert. This naturally led to significant review of how to set and assess decision-making criteria. In this short note, we share our experience in arbitrating sampling requests over the last six years.

Keywords: Curation, conservation, destructive analysis, non-destructive analysis, heritage, Palaeolithic.

Résumé : L'important développement des méthodes archéométriques appliquées aux matières dures animales au cours de cette dernière décennie a conduit à la multiplication des demandes d'analyses, plus ou moins invasives, sur les collections du musée national de Préhistoire (MNP). Concernant souvent des pièces rares voire uniques, ces demandes se situent à la croisée des différentes missions d'un musée : comment concilier ainsi conservation du patrimoine et étude des collections ?

Afin de répondre à ces enjeux, le musée national de Préhistoire s'est doté depuis 2018 d'une « commission Analyses invasives » pour examiner les différentes demandes. Une importante réflexion a ainsi débuté afin de tenter de définir des critères d'aide à la décision. Cinq ans après sa mise en place et avec une quarantaine de dossiers traités, cette note est l'occasion d'un bilan.

Conservant aujourd'hui près de 7 millions d'objets issus de plus de 2 500 sites archéologiques, le musée national de Préhistoire a été fondé par D. Peyrony au cœur de la vallée de la Vézère (Dordogne), qui livrait depuis la fin du XIX^e siècle de nombreux sites emblématiques du Paléolithique. Le musée accueille aujourd'hui entre 100 et 200 chercheurs français et étrangers chaque année, dans le cadre de projets de recherche qui impliquent fréquemment la réalisation d'analyses (par exemple ZooMS, ADN, datations radiocarbone, analyses isotopiques, etc.).

Ces analyses sont souvent qualifiées de « destructrices » mais ce terme mérite d'être précisé. En effet, cette notion varie selon les analyses considérées mais aussi, à certains égards, selon la perception des chercheurs. Toute analyse qui implique que soit retiré un morceau de la pièce archéologique et compromet donc son intégrité peut être considérée comme destructrice, même si une partie de l'échantillon ainsi obtenu est conservée après l'analyse. Pour autant, certaines techniques radiographiques réputées « non destructrices » (XRF, tomographie, microscopie électronique à balayage) peuvent potentiellement altérer la structure de la pièce et, par là, compromettre d'autres analyses futures. La distinction entre analyses « destructrices » et « non destructrices » apparaît ainsi complexe, voire trompeuse. Par conséquent, c'est une commission analyses « invasives » qui a été créée au MNP pour évaluer les demandes.

Les collections publiques d'un musée national sont, par définition, propriété de l'État, c'est-à-dire de l'ensemble des citoyens. Dans le cas du MNP, cela inclut tant les pièces archéologiques que les échantillons qui en proviennent, et même les reliquats de ces derniers

après analyse. Les conservateurs du musée ont ainsi une véritable responsabilité, tant morale que réglementaire, vis-à-vis de leurs concitoyens mais aussi des scientifiques. Ils doivent ainsi garantir la conservation des pièces dont ils ont la charge mais aussi permettre l'enrichissement des connaissances à leur sujet et la possibilité à court, moyen et long terme de poursuivre cet accroissement des connaissances. Cela signifie également que les objets devront pouvoir de nouveau faire l'objet d'analyses dans un futur plus ou moins proche. La question des analyses invasives se situe ainsi au croisement de différentes missions, parfois contradictoires à première vue, d'un musée du XXI^e siècle.

La commission Analyses invasives du MNP, créée en 2018 face à une augmentation importante des demandes de prélèvement, est composée des membres de l'équipe de conservation en charge des collections du musée. Elle peut, dans certains cas, requérir l'avis consultatif d'un expert extérieur. L'idée est de pouvoir évaluer la balance impact/bénéfice le plus objectivement possible, de manière collégiale, en toute transparence, et de garantir un traitement équitable des demandes et des laboratoires.

Pour faciliter l'examen des demandes d'échantillonnage, un formulaire standard a été créé. Les chercheurs doivent fournir des détails concernant, par exemple, les méthodes d'échantillonnage et les protocoles analytiques, la taille des échantillons, les zones d'échantillonnage, les résultats antérieurs et les taux de réussite. Les chercheurs et les laboratoires qui effectueront les analyses sont invités à signer le document afin de s'engager ensemble à garantir la traçabilité, la communication des résultats éventuels ainsi que le suivi et le retour des reliquats.

Au cours des cinq premières années de la commission (2018-2023), 47 demandes ont été traitées, ce qui représente 777 pièces, principalement des restes de faune, mais aussi quelques vestiges humains et éléments d'industrie osseuse. Les datations radiocarbone sont les plus fréquentes, suivies par les analyses isotopiques et le ZooMS. Un nombre important de demandes concerne par ailleurs au moins deux analyses conjointes.

Parmi ces demandes, 41 ont été autorisées, parfois avec des recommandations ou des demandes d'analyses préliminaires. Dans quelques cas, seule une partie de la demande a été approuvée, c'est-à-dire que le prélèvement de certaines pièces uniquement et/ou certaines analyses seulement (dans le cas de demandes multiples) ont été autorisés. L'échantillonnage a été refusé pour 12 pièces, parce qu'elles étaient jugées trop petites, trop fragiles, ou temporairement, parce que des analyses similaires étaient déjà en cours ou que des résultats ayant une incidence sur l'approbation de la demande n'étaient pas encore connus. Dans plusieurs cas, alors qu'une décision négative avait été prise en premier lieu, des discussions avec les demandeurs ont permis de trouver une solution, par exemple en déterminant une zone de prélèvement plus appropriée ou en recourant à une méthode moins invasive nécessitant un échantillon plus petit. La commission analyses invasives du MNP s'inscrit dans une démarche plus générale qui tend à mieux réglementer les analyses sur les objets patrimoniaux, à l'instar du groupe de travail PAHOCE constitué par le ministère de la Culture pour les vestiges anthropobiologiques. Le rapport qui s'est ensuivi décrit succinctement les protocoles de bonnes pratiques pour le suivi des demandes d'analyses invasives et des prélèvements sur les restes humains, mais de telles dispositions doivent encore être établies pour les objets de musée. C'est dans cet objectif que le MNP souhaite aujourd'hui partager ce retour d'expérience, dans l'optique de proposer une réflexion globale, impliquant tant les conservateurs que les chercheurs et les spécialistes des analyses. C'est en effet en travaillant tous ensemble que nous arriverons à élaborer les processus qui permettront de concilier les missions et les aspirations de chacun.

Mots-clés : préservation, conservation, analyses destructrices, analyses non-destructrices, analyses invasives, patrimoine, Paléolithique.

INTRODUCTION

Over the last decade, the florescence of new analytical techniques applied to hard animal material (bone, teeth, ivory, antler and shell) has inevitably posed new and sometimes complicated questions for the curation community. One of these issues concerns finding the balance between advancing our understanding of the past and the curation of archaeological artefacts. For the French Musée National de Préhistoire (MNP), this often concerns rare if not unique artefacts, raising issues of how to best fulfil the museum's joint mission of preserving archaeological heritage while at the same time fostering a better understanding of its collections. Paradoxically, these very same analyses can render an object unique by, for example, identifying rare species or extending the known chronology of artefact types.

In order to best respond to this dual objective, the MNP created a "invasive analysis committee" in 2018 to examine the different sampling requests internally and, when necessary, with help from external experts. This

has naturally led to a significant review of how to set decision-making criteria and evaluate requests for analysis. Here we present an assessment of what we consider the best manner of evaluating requests for destructive analyses of hard animal materials based on the arbitration of some forty cases over the last six years.

1. BACKGROUND: THE MUSÉE NATIONAL DE PRÉHISTOIRE (LES EYZIES, DORDOGNE, FRANCE)

The Musée National de Préhistoire was created by Denis Peyrony in 1913 and officially inaugurated on the 30th of September 1923. Set in the Vézère Valley of southwestern France, the museum is surrounded by numerous Palaeolithic sites, many which served to define the general chronology of prehistoric cultures in western Europe (e.g. la Madeleine, le Moustier, la Micoque). The museum houses some 7 million objects from around 2,500 archaeological sites, with almost 12,000 pieces

exposed in its permanent exhibitions. The remaining material is conserved in around 16,000 standardized boxes (60 cm×40 cm×12 cm), spread over nearly 8 km of storage space. The museum's collections are comprised of 80% lithics and around 18% faunal remains as well as a small but extremely important collection of human remains, including two near complete skeletons of Neanderthal children. The final 2% concerns bone tools, items of portable art, personal ornaments, engraved limestone blocks and metal objects. Alongside this archaeological material are several reference collections, for example, lithic raw materials or comparative faunal material, casts of hominin fossils, engraved cave walls, hearths, bone tools, etc.

Each year, the museum's research laboratory welcomes between 100 and 200 researchers from France and abroad. The MNP's collections regularly form part of large collective research projects focusing on particular periods or specific aspects of the Palaeolithic archaeological record. These projects frequently include multiple requests for different destructive analyses (e.g. ZooMs, DNA, radiocarbon dating, isotopes) concerning an array of artefact types: faunal or human remains, bone tools or elements of portable art. The variably destructive nature of these analyses inevitably poses numerous conservation questions for the 21st century museum, confronting the advancement of science and the long-term integrity of cultural heritage.

2. WHAT EXACTLY QUALIFIES AS A “DESTRUCTIVE ANALYSIS”?

At first glance the term “destructive” seems relatively clear, while in reality its “extent” varies according to both the type of analysis and, in some respects, the perception of the researchers involved. Any analysis that requires the removal of any portion of an archaeological object and hence compromises its integrity can be considered “destructive”, even if a portion of the sample is preserved after the analysis. With that said, the distinction between “destructive” and “non-destructive” is not made uniquely on the observable physical alteration of an object. For example, while radiographic techniques (i.e. XRF, CT-scans, scanning electron microscopy) appear “non-destructive” on the surface, they can potentially alter objects at the ultrastructural level, potentially compromising future analyses. Opposing “destructive” versus “non-destructive” analyses therefore introduces a somewhat misleading dichotomy in terms of an object's integrity and analytical viability after sampling. As such, we reserve the term “invasive” for any analysis that is susceptible to alter an object in a way, including alterations that are not visible to the naked eye. As a reflection of the complexity and rapid evolution of the various analytical techniques applied to osseous materials, and a degree of fluidity between destructive and non-destructive analyses, the MNP adopted an invasive analyses commission for assessing sampling requests.

3. WHY AN INVASIVE ANALYSES COMMISSION AT THE MNP?

According to French legislation, all cultural heritage in the public domain remains the immutable property of the French nation and hence its citizens. This applies both to the archaeological object and the sample, including remnant material after analysis. Consequently, those in charge of museum collections have a moral and legal responsibility to their fellow citizens, as well as the scientific community, regarding the short-, medium- and long-term curation and study of archaeological material. The question of invasive analyses therefore lies at the crossroads of the sometimes contradictory missions of a modern museum. For instance, in order to better understand a body of material or specific artefacts—archaeological, anthropological, ethnographical, zoological—a small portion is sacrificed for analysis.

The diversification and multiplication of analytical techniques applicable to hard animal materials have inevitably led to a concomitant increase in the number of requests received for sampling artefacts housed at the MNP. In most cases, these requests involve multiple analyses carried out in a specific, often predefined order on the same sample, at times involving different laboratories. This diversification is accompanied by an augmentation in the number of participants, specialists and samples involved, adding a further degree of complexity to the process.

Faced with this, the MNP created an invasive analysis commission in 2018 to assess sampling requests. Composed of multiple members of the curatorial team in charge of the museum's collections, most of whom are trained Palaeolithic archaeologists, the commission was designed to assess sampling requests and, when necessary, solicit an advisory opinion from neutral exterior expert. The goal being to assess the tradeoff between the physical deterioration of the object (i.e. sampling) and the amount of information gained as objectively and transparently as possible while guaranteeing the fair treatment of applications and laboratories.

To facilitate the consideration of sampling petitions, a standard request form was created, which asks researchers to provide details concerning, for example, sampling methods, analytical protocols, sample sizes, sampling areas, previous results and success rates. Researchers and the labs who will carry out the analyses are required to sign the document as a commitment to ensure traceability, communication of eventual results (even when negative or unsuccessful) and the monitoring and return of remnant samples.

This latter aspect is a direct consequence of several unfortunate past experiences where samples disappeared or were presumably completely destroyed without the museum being notified. Here it is worth emphasizing that both the initial samples and post-analysis remnants or aliquots remain the property of the state, meaning that all additional analyses are subject to an auxiliary request to the commission.

4. EVALUATING SAMPLING REQUESTS

Multiple criteria and contextual information are taken into consideration when evaluating sampling requests.

- Researchers are asked to clearly explain all invasive analytical techniques and conditions for sampling, any analytical hierarchy (i.e. the programming of additional analysis based on obtained results), their potential and limits, and provide information concerning sample size and weight. It is also asked that researchers anticipate future analyses to optimize sampling and avoid re-sampling, which would likely be refused in such a scenario.
- Sampling requests are to include sufficient contextual information concerning the object, site and period in question, including the results of previous analysis and any ongoing ones of a similar nature (Schadla-Hall, 2002). This helps avoid duplicate analyses and mitigate limited potential of analytical success. For example, if sufficient chronological data exists for the discovery context or if previous assays failed due to insufficient collagen preservation, additional sampling for dating or DNA analysis may be deemed unnecessary.
- Similarly, researchers are asked to provide information concerning all relevant post-excavation treatments that may impede or prohibit analyses; for example, conservation efforts using animal derived polymers or glues. Preliminary analyses on a limited sample of similar materials demonstrating the feasibility of the proposed analysis may also be encouraged, especially in cases where requests concern numerous pieces.
- An estimation of the impact of sampling on the overall integrity of the object should be provided as well as information concerning similar or identical material forming part of the same collection. In other words, the risk differs when sampling a unique object versus one of many in the same way as sampling mobiliary art or human remains compared with an indeterminate faunal fragment. Thus, in the case of rare or unique objects, evidence or arguments supporting the potential success of an analysis may be requested. This is equally in line with the museum's policy that its collections are not to serve for the development of new analytical methods or techniques.

5. SAMPLING AND TRACEABILITY

In the case of successful sampling applications, researchers are requested to

- establish a reasonable timeframe for sampling, analysis, and return of material if sampling is done outside the museum's premises;
- produce a high-resolution photograph and/or a three-dimensional model of the piece (and zone sampled) prior

to and after sampling. In certain cases, CT-scans of osseous objects may be requested to help orient sampling locations (i.e. avoid fissures or comprised areas not visible to the naked eye);

- associate the museum's inventory number with the sample and ensure that this number figures in the eventual publication of the results. This serves both for the traceability of the sample and the reproducibility of the analysis (Fox and Hawks, 2019, for a discussion concerning the traceability of the growing body of data from human DNA);
- fill out a label bearing the sample's information (date, name of sampler, type of analyses, object weight before and after sampling) that will be stored with the sampled artefact. This information will also be integrated in the museum's inventory records for traceability and safeguarding the documentation of irreplaceable archaeological remains or material culture (Giddens Teeter, 2011);
- provide any information concerning delays or problems during analysis and submit all results to the museum. This includes negative or insignificant results such as to avoid unnecessary duplicate analyses and inform the evaluation of future requests.

DISCUSSION AND CONCLUSION

In the first five years of its existence (2018-2023), the committee treated 47 requests, involving 777 pieces, primarily faunal remains alongside a much smaller number of human remains and bone tools. Radiocarbon dating was by far the most frequent analysis requested, followed by isotopes and ZooMS, and it is important to note that most requests concerned at least two different analyses.

Of the 47 requests evaluated, the committee approved 41, sometimes with certain recommendations or specifying the need for prerequisite analyses. In some cases, only certain elements of the request were approved, either for particular pieces or only specific analyses. Sampling was refused for 12 pieces, because they were deemed either too small, extremely fragile, or because similar analyses were underway or results impacting approval of the request were outstanding. In several cases, while an initial negative decision had been reached, discussions with the applicants enabled a solution to be found that involved either a more appropriate sampling location (e.g. in a pre-existing break in a bone) or the use of a less invasive method requiring a smaller sample. As mentioned in the introduction, promoting this type of reflexive dialogue ultimately contributes to better fulfilling the museum's dual mission: preserving cultural heritage while promoting its study (see also the discussion in *Papers from the Institute of Archaeology* Volume 13, Issue 1: Tite, 2002a and 2002b; Rehren 2002; Schadla-Hall, 2002; Tubb, 2002) and presentation to the larger public in the most up-to-date and informative manner possible.

The MNP's invasive analyses committee forms part of a more general trend in better regulating these types of analyses applied to heritage items at a time of spiraling competition between laboratories, researchers and students for funding and employment opportunities. All of this against the backdrop of the quest for a “buzz” that sometimes appears to supersede scientific and conservation interests. An important example of this movement for clarity is the PAHOCE report commissioned by the French Ministry of Culture. While the PAHOCE report succinctly outlines best practice protocols for the monitoring of sampling and requests for invasive analyses of human remains housed in museums or emerging from archaeological excavations, similarly strict provisions for museum objects are yet to be established.

In the absence of specific guidelines in the French Heritage Code or a document similar to the PAHOCE report¹ but concerning faunal remains (although see Páldóttir et al., 2019), osseous implements or organic artefacts, more and more French museums (e.g. the Muséum National d'Histoire Naturelle and the Musée d'Archéologie Nationale) are putting into place similar commissions to review and monitor sampling requests as a response to their growing numbers as well as the proliferation of new analytical techniques. Balancing the preservation of heritage items against the desire to increase our understanding of the past is anything but self-evident, with archaeologists and anthropologists often more sensitive to preservation and property rights. Additionally, the ever-quickenings advancements in archaeometry can at times outpace the ability of the heritage curation community to remain up to speed with the pros and cons of different analyses. This against the fact that, while it once took a consequential sample to produce a radiocarbon determination, the same can be done today with mere milligrams, and perhaps even less in the future (e.g. Fox and Hawks, 2019).

The logical next step is the broadening of discussion between the heritage curation community, specialists and those carrying out the analyses themselves, something resembling the PAHOCE workgroup but focused more specifically on material culture remains. Many researchers working directly with archaeological collections appear to grasp the non-renewable nature of the resource they study, others, particularly those carrying out the analyses, have a tendency to consider sampling a small price to pay given what can be potentially unlocked for our understanding of the human past. The “best practice” lies somewhere at the crossroads between preservation and scientific advancement, a compromise that can be best made in shared discussions between all actors involved.

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NOTE

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