



PANEL DISCUSSION (INVITED)

Beyond Dating: Science in Egyptology

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Abstract

This panel discussion focused on the application of archaeological science to all areas of Egyptology. Throughout the discussion, panellists approached multiple aspects of this topic, from local laws and regulations to museum processes and practices, to the attitudes towards scientific approaches of researchers in the field, to the ground-breaking work being carried out by a multitude of researchers today. The panel aimed to magnify the general positivity for engaging with archaeological science seen in Egyptology at present (especially in Egyptian archaeology), as well as reiterating the benefits that further application of scientific techniques will have upon the discipline in the future.

Keywords: archaeological science, archaeometry, chronometric dating, materials analysis, bioarchaeology

ما وراء التأريخ: استخدام العلوم في علم المصريات

الملخص

تركزت هذه المناقشة حول تطبيق العلوم الأثرية في شتى مجالات علم المصريات. حيث خلال المناقشة، تطرق المتحدثون إلى نواحي متعددة من هذا الموضوع، بدءاً من القوانين واللوائح المحلية إلى الإجراءات والتدابير المتحفية إلى وجهات النظر حول النهج العلمية التي يتبعها الباحثون في المجال، ختاماً بالعمل الرائد الذي يقوم به العديد من الباحثين في الوقت الحالي. كما عملت المناقشة على إبراز إيجابية التفاعل مع العلوم الأثرية المستخدمة في علم المصريات في الوقت الحاضر (خاصة في مجال الآثار المصرية)، إلى جانب القيام بالتأكيد مجدداً على المنافع التي قد تعود على التخصص في المستقبل من زيادة تطبيق التقنيات العلمية.

الكلمات الدالة: العلوم الأثرية، أركيوميتري، تأريخ كرونومتري، تحليل المواد، علم الآثار الحيوية.

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1 1. Main Text

Science in Egyptology needs a multifaceted discussion, not just because of the myriad different approaches and techniques it can encompass, but also owing to the history and changing attitudes of Egyptology toward scientific archaeology as a discipline. Scientific methods were at the very heart of some of the earliest interdisciplinary (or at least cross/multidisciplinary) research in Egyptology, and this has been both a blessing and a curse. Ancient Egypt has held such universal fascination that it is no wonder that Libby himself, the developer of radiocarbon dating, chose to pioneer his method with Egyptian chronology (ARNOLD and LIBBY, 1949). But these initial forays into early science came at a high price: they were carried out at a time prior to the methodologies being perfected and, as a result, many things proved to be inaccurate, more nuanced than initially realised or, simply, wrong. The result has been an unfortunate and long-standing distrust of scientific methods within the Egyptology community that has never been completely dispelled. Libby made hypotheses that were subsequently proven wrong, and had to be revised (a natural part of the scientific process); but those necessary revisions came, in some circles, to overshadow future research potential with some feeling that scientific techniques could not add to or improve upon the impressive breadth and complexity of Egyptian history achieved through art history, philology and archaeology. Exacerbating this further is the fact that the development of many scientific methods, which have proved so fruitful in other archaeological regions around the world, either coincided with or followed after the exportation ban of archaeological samples in the 1980s, i.e. Antiquity Law 1983/117. Therefore, archaeological science has rarely had the chance that it has in other regions to ‘wow’ Egyptologists. The result can often be a reluctance to engage with the broad field of archaeological science as a whole, often due to a misunderstanding of what the techniques can do today, be they on museum-based materials or recently-excavated contexts in Egypt.

For this panel discussion, held as part of the launch event for *Interdisciplinary Egyptology*, the panellists and moderator wanted to combat this reluctance and the negativity they feel has been born of it. They sought to convey the feeling that they—as a group of specialists focusing on archaeological science¹—experience personally when considering archaeological science in Egyptology: positivity, optimism, and a desire to look at what can be done, rather than what cannot. In keeping with this, the focus of the panel discussion was on facilitating innovation, and pioneering *in situ*, field-based techniques, to encourage increasing dialogue between field archaeologists and archaeological scientists, and to work more readily with museum materials and with colleagues in other academic fields who have the expertise that would greatly benefit areas of Egyptological research.

The discussion began with specific questions directed to each panellist that honed in on their research expertise and interests. Mennat-Allah El Dorry (MAD) began by summarising her thoughts (which had the full support of all participants) on the obligation of archaeologists working in Egypt to carry out best practices in archaeological science today. It was agreed that Egyptologists should be engaging with the most informative and state-of-the-art techniques wherever possible and within the scope of methods available today. While it was acknowledged that not all state-of-the-art techniques are available in the field at present, when that possibility does exist, these should be fully

¹As a brief introduction to the panellists and their research in Egyptian archaeology see, for example: BRONK RAMSEY et al., 2010; COLIN et al., 2020; DEE et al., 2012; EL DORRY et al., 2019; HOOD and SCHWENNINGER, 2016; HOOD et al., 2017; KMOŠEK et al., 2018; ODLER and KMOŠEK, 2019, 2020, 2021; ODLER et al., 2021; QUILLES et al., 2013; ROWLAND, 2013; THOMPSON et al., 2005; ZAKRZEWSKI, 2015; ZAKRZEWSKI et al., 2015).

explored. The panellists agreed that it should not be considered acceptable to ignore all of archaeological science simply because not all possibilities exist in Egypt at present, and that Egyptologists rather have an obligation to contribute to the field of knowledge by actively engaging in what is available to us here and now. Furthermore, the importance of Egyptologists becoming actively involved alongside scientists with the development of innovative and field-based techniques was made clear, with more dialogue being called for between method developers and method users.

Joanne Rowland (JR) further added to this discussion by advocating fieldwork methodology that constantly keeps pace with recent developments in archaeological science. She outlined the ways in which field directors can keep abreast of the latest methodological developments, embrace single context excavation methodology, and consider how their research may be complemented by available analytical techniques. The need to combat a general reticence in adopting new solutions could and should be improved by continued dialogue with platforms such as *Interdisciplinary Egyptology*. Anita Quiles (AQ), in her capacity as director of the archaeometry laboratory at the IFAO in Cairo, also discussed the practicalities of engaging with those techniques available in Cairo, with discussions ranging from how to select, prepare and submit samples for analysis and what to expect (and what not to expect) from results. It was agreed that more scientific literacy and education should be advocated for in the interpretation and discussion of analytical results. JR stressed the importance of speaking with specialists during the planning stages of projects to realise the potential for scientific research, but also what types of samples, and sizes of samples, will work for specific types of analysis both on- and off-site; the other panellists agreed unanimously.

Amber Hood (AH) and Martin Odler (MO) joined JR and AQ to expand the conversation to include a discussion on the value of museum materials in scientific analysis; it was felt that museum materials are all too often overlooked as the valuable source of material for scientific enquiry that they are. Indeed, it was agreed that the value of working on museum material—either independently or in tandem with new field-based research—was of paramount importance to the future of Egyptology. Egyptology as a discipline must turn its attention more decidedly upon the wealth of material from international museums that it has available at its fingertips (although more detailed discussions are necessary on the benefits and limitations of using museum material in Egyptological research). The sustainability of resources is integral, and clear explanations as to what the results could contribute to wider research need to be transparent at the stage of applications for access for scientific research, especially for destructive analysis. It was also discussed how this must also go hand-in-hand with more active and engaged participation of museums to facilitate such research. MAD, with the agreement of the other panellists, noted that in general while there is usually no hesitation in engaging in destructive excavation techniques in fieldwork contexts (indeed, excavation is destructive by its very nature), destructive analysis becomes a sometimes insurmountable problem in museum contexts (cf. **OGDEN**, 2000: 172). It would be of benefit to have an open discussion as to why this cognitive dissonance exists and what can be done to lessen it in order to advance scientific research in Egyptology within the nuanced parameters in which the discipline works. In turn, it was agreed that researchers, archaeological scientists, and museum personnel must work together to bridge the gaps in knowledge and standards of practice in each other's fields that often result in miscommunications that may prevent research of benefit to Egyptology from being carried out. As an example, panellists illustrated the decreased sample size required for a number of different analytical techniques today, including but not limited to radiocarbon measurements, compared to what was needed some 20 years ago.

Conversely, panellists also discussed how some scientific analysis was being carried out on mu-

seum material that could be considered of dubious ethical standards and how a balance must also be struck going forward to both uplift scientific analysis while keeping to the standards of modern Egyptological thought and ethical practice. Sonia Zakrzewski (SZ) extended this discussion to briefly discuss the applications of bioanthropological and aDNA research in Egyptology, although, as this discussion was going to be included in a subsequent panel “Moving Forward Together”, this worthy topic was deliberately kept brief. Panellists considered the balance between the duty that we have as scientists to push the boundaries of research while still always maintaining respect for past peoples, setting high ethical practice standards to follow, and knowing when to rein research in.

Each panellist presenting their thoughts on the above topics as an introduction set the tone for the rest of the discussion. This continued to focus upon the need to work with museum material and advocate for an increase in the number of projects engaging with current analytical techniques available in Egypt today.

Panellists agreed that with regard to museum materials, it was important for researchers to demonstrate that modern scientific analysis does not always require destructive analysis, and even when it does, this does not mean destructive in the same way as it did at the time when the technique was first developed. An example is the the development of laser ablation inductively coupled mass spectrometry; when considered a suitable technique, it can now be carried out so that the holes left by sampling are basically invisible to the naked eye, with only microscopic alteration of the ablated surface. To some extent it could be argued that techniques have improved, but opinions of them have often not. It was agreed that it is the responsibility of those researchers engaged with archaeological science to change this and to champion a new updated and informed view of scientific analysis in Egyptology. As such, it was agreed that publications of the outcomes of analyses, as well as the methods and processes, should be made more readily available to the wider public; this could include blogs on museum visits, as well as publication in bulletin-style formats.

Panellists also wanted to emphasise the difference between non-destructive and non-invasive techniques, highlighting how non-invasive techniques can still actually be destructive, even if not visibly so. For example, in the case of XRF or microCT, this is artificially altering the object’s physical properties which, if it was clay, would mean luminescence dating could be problematic in the future (e.g., see [HUNTLEY et al., 2016](#)). The object may not have been altered visually, but its physical properties may have been. This of course has significant ramifications for future research; it was discussed that more comprehensive documentation of all analyses carried out on archaeological material must become routine and that it is essential to publish and make available the results of all scientific research carried out. Working in museum collections, as researchers, we routinely check the associated museum records for evidence of conservation in case it might invalidate our research or require different pre-treatments to enable accurate results. Likewise, detailed documentation regarding the exact nature of our work needs to be provided to the museum for their records by current archaeological science researchers, for the benefit of both curators and future researchers.

The discussion of destructive analysis naturally led to the discussion of when it is justified, with reference once again to the change in sample sizes needed over the years. It was agreed that, when a clear, concise, and archaeologically relevant need for analysis was demonstrated, there should generally be a willingness for such work to be carried out, even if destructive. The gatekeeping of antiquities, and the treating of artefacts purely as *objets d’art* was generally considered to be, in its own way, as destructive as physical sampling, owing to the resulting lack of progression in obtaining a deeper understanding that such analysis could inform. It was agreed that the discipline could not

grow (particularly in light of the current restrictions on sampling in-country) without more focus upon the analysis of archaeological material in museums currently available for such research. This was particularly felt to be true for those artefacts that, instead of being on display in museums, were simply kept, often indefinitely, in boxes in storage. In turn, the conversation turned to how it was also essential for Egyptologists to be aware of how frequently techniques and methodologies develop and evolve, and thus having a responsibility to keep up to date with such developments and be more receptive to engaging with scientific analysis in museum research when such opportunities present themselves. So passionate was this discussion,² that it was felt that Egyptologists have an ethical responsibility to work with this material and in turn that museums have a responsibility to allow scientific analysis to be carried out (subject to also ensuring collections remain available and suitable for future research when entirely novel techniques and scientific methods have been developed). The need for a continued dialogue on this topic was highlighted by all participants, acknowledging a need to refrain from criticism and look to how all stakeholders can work together towards the common goal of a deeper understanding of ancient Egypt through scientific analysis.

When the conversation returned to field-based analyses and techniques available in Egypt, it was discussed how there was a need for a centrally available list outlining what analytical techniques are available at present in Egypt, both with regard to *in situ*, field-based techniques (such as portable luminescence profiling) and laboratory-based techniques such as radiocarbon, GC-MS, and ICP-MS. It was felt that access to such information, as well as a complementary central repository for raw data obtained, would encourage the increased application of archaeological science in Egyptology. This has been attempted before, but never completed, so it is important that this be seen through.

Inevitably, the topic also returned to what was not currently possible, and here the panellists discussed the need to future-proof Egyptology for a time when the application of scientific techniques will be routine. It was emphasised how essential it is to think about the future of the discipline and realise that what we do in the field today has an impact on archaeology in the future. In particular, panellists discussed how it was crucial for field archaeologists, recovering new material with every field season carried out, to collect and centrally store samples for a future point when scientific analyses may be accessible in Egypt. To achieve this, it was noted that current standards in sample selection and suitable storage must be at the forefront of researchers' minds. Post-excavation protocols such as cleaning, preservation and conservation should also be considered by field archaeologists as often such actions, carried out with best intent, can unintentionally but irrevocably remove and destroy huge sources of information useful for various analytical techniques (e.g. cleaning of human or faunal teeth can lead to calculus or cementum being destroyed; the washing and cleaning of ceramics can lead to the removal of valuable data that could be used for luminescence dating or organic residue analysis; failure to collect organic-rich sediment directly associated with a burial that could be suitable for aDNA analysis). To some extent, we must also begin to think of future-proofing on an even longer timescale; we don't yet know what we don't know, so we should think about retaining material that might be of interest to scientists and Egyptologists over the next 100 years and for techniques that have yet to be developed. A central repository may prove extremely useful in this regard.

²The panellists would like to emphasise however, that they are the first to admit that this discussion was purely from the perspective of Egyptologists focused on archaeological science rather than museum curators or field archaeologists and was therefore a one-sided discussion. They welcome further debate on this topic more broadly and indeed think such continued dialogue is necessary. A future response from the museums community would be welcomed.

The conversation was brought to a close by the panellists reiterating their clear message that archaeological science needs to be elevated to a more prominent position in Egyptology; that there is an urgent need to fully explore the potential of new methodologies and how they could be applied in interdisciplinary research. The panellists felt that this should be a priority in the discipline, and is certainly crucial when applying for funding and proving state of the art research is to be undertaken. The panellists believed that although there were still broad issues that need to be prioritised and addressed, that the time was ripe for this to happen and the benefits this would have to Egyptology was something to look forward to with enthusiasm and positivity.

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