

Institution: University of Exeter
Unit of Assessment: 15 Archaeology
1. Unit context and structure, research and impact strategy

Archaeology at Exeter (UoE) is distinctively international-facing, spanning Europe, the Americas, and Central and South Asia, with additional reach into East Asia, Africa and Australia (Fig. 1). Our research is organised into three broad groupings related to bioarchaeology, material culture and landscapes. Our strategy for this REF cycle was to capitalise upon our position within the sector and institution — embedded within the Humanities yet facing the Sciences — to sustainably build capacity in theoretically informed archaeological science and museum-based research. We have expanded our Category A staff by 4.8 FTE (42.9% increase) and more than doubled our research income (£1,814,703 to £4,285,817) and PhD awards (23.8 to 47.6). This expansion evidences the success of our strategy, which was achieved against a challenging environment for archaeology departments nationally.

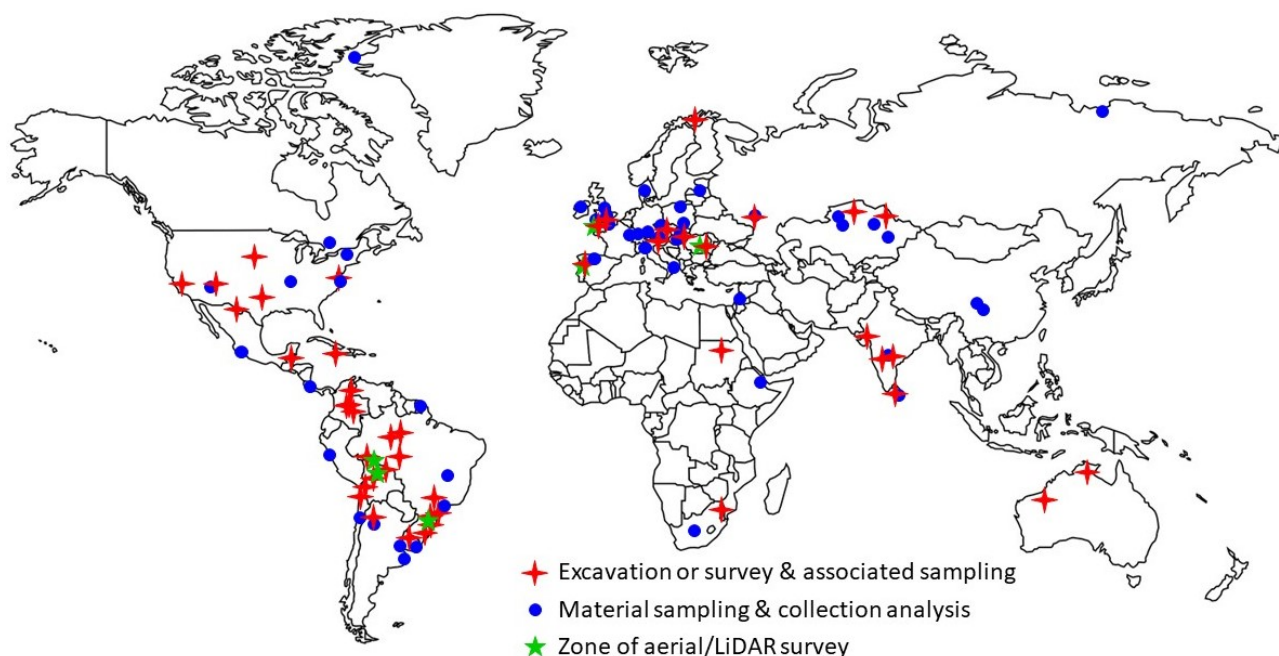


Fig. 1: Locations where our staff/PGRs undertook primary fieldwork or materials analysis during this REF period (not including honorary staff).

Our decision making is driven from the ground up via our Discipline Strategy Group, which comprises the Head of Department, the Directors of Research, Impact, PGR studies and Education, as well as two staff mentors (Academic Leads). Our Department sits within the College of Humanities which provides strategic support and investment in equipment, infrastructure, scholarships and student internships (see section 3), but also benefits from considerable interactions and additional facilities across the wider University, as actively encouraged by UoE's leadership. Building upon the results of REF2014, which positioned the Department nationally top 10 in terms of overall 4*+3* (joint 3rd) and GPA (10th), we have boosted our income by targeting a broader array of research council and charitable income sources, alumni-funding and international partnerships schemes (see section 3). We have also maintained our profile of medium-sized and smaller grants which act as springboards for further substantial bids.

Since REF2014, we have developed and extended our research groupings: **'Bioarchaeology'**, **'Material Culture and Social Agency'**; and **'Landscape Archaeology'**.

BIOARCHAEOLOGY:

During the REF period all three subfields of bioarchaeology (plants, animals, humans) have been strengthened by appointments. Recruitment of Sykes in 2018 gave us critical mass in zooarchaeology and built upon earlier bioarchaeology staff investments (McKenzie, Evis, Pryor) and expansion of key lab facilities. Bioarchaeology epitomises the growth of archaeological sciences in our Department, matching UoE's overall science strategy involving significant investment in STEM/M to address critical topics (climate change, sustainability, food security and health) while maintaining its humanities reputation. Our expertise in straddling HASS/STEM/M is encapsulated by the activities of the Centre for Human-Animal-Environment Bioarchaeology (HumAnE), established, during this REF period, and co-directed by Sykes and Outram (section 2).

Animal-plant-human relationships continue to be a major focus of Bioarchaeology. This is exemplified by **Iriarte** and colleagues' identification of a third global event of rice domestication in Amazonia (*Nature Ecology and Evolution* 2018; ERC PAST), showing that the Bolivian Amazon was a hotspot for early plant cultivation. The work demonstrates that ever since their arrival, humans have caused profound alteration to Amazonian landscapes, with lasting repercussions for habitat heterogeneity and species conservation (*Nature* 2020). **Outram's** research has included ground-breaking work on early horse herding (*Science* 2018, ERC PEGASUS) combining fieldwork, zooarchaeological analyses and ancient genomic data, and the demonstration of honeybee exploitation by Neolithic communities using lipid residue analysis (*Nature* 2015). Recent scientific-led transformations in palaeoeconomic interpretations are interrogated in his *Subsistence and Society in Prehistory* (CUP, 2019), whereas **Sykes** addresses key bio-cultural issues of human-animal interactions in *Beastly Questions* (Bloomsbury 2014). She has other major publications on ancient deer management (*STAR* 2016) and chicken husbandry (*Molecular Biology and Evolution* 2017), exploring their legacies for modern biodiversity and food security (GCRF, AHRC).

Our appointment of Palaeolithic specialist **Pryor** in 2017 gave the Bioarchaeology group greater depth with scientific expertise in hunter-gatherer palaeobotany (*Antiquity* 2020) alongside isotopic reconstruction of paleoenvironments and mobility (*J. Arch. Sci. Rep.*, *STAR* 2020). **McKenzie** published her monograph on *Life and Death in Medieval Gaelic Ireland: The Skeletons from Ballyhanna* while also exploring the relationship between literary and bioarchaeological approaches to slavery (*Interdisciplinary Science Reviews* 2018, AHRC funded). She has continued to combine bioarchaeology and medical humanities through her grant 'Care, the great human tradition: a multi-disciplinary collaborative exploration of family care across time and culture' (Wellcome Trust). Forensic archaeology and anthropology were strengthened with the hiring of **Evis** (initially as 0.5 FTE, uplifted to full time in 2019). Her monograph *Forensic Archaeology: The Application of Comparative Excavation Methods and Recording Systems* is an internationally key reference and she has continued to carry out research into forensic grave excavation (*STAR* 2016).

The creative merging of HASS-STEM/M approaches is core to all our Bioarchaeology research. For instance, our AHRC project 'Warhorse' combines Outram's expertise in equine zooarchaeology with Creighton's understanding of medieval landscape and material culture, alongside collaboration with historians (UEA) and geneticists (CNRS via the ERC PEGASUS project). Similarly, Sykes's AHRC Easter project unites zooarchaeology, morphometrics and isotope analysis with genetics (Oxford) and linguistics (Leicester). We are increasingly moving to a model of engaged transdisciplinary research to address real-world problems of human wellbeing (McKenzie), biodiversity, food security and economic sustainability (Iriarte and Sykes).

These activities dovetail with undergraduate modules and MSc programmes in Bioarchaeology and Experimental Archaeology, ensuring this research group is relevant at all levels. Within this REF period, group members have published papers in general science journals, including *Science*, *Nature*, *Nature Communications*, *Nature Plants*, *PNAS*, *Nature Ecology and Evolution*, *Cell* and *Scientific Reports*, in addition to specialist journals and authorship of monographs (CUP, Bloomsbury, Four Courts Press, Archaeopress), so as to reach a diverse readership.

MATERIAL CULTURE AND SOCIAL AGENCY:

This research group has provided leadership within the field of experimental archaeology and has notable strengths in inorganic archaeometry (including partnership with materials labs at Cranfield University), theoretically informed and interdisciplinary approaches to material culture in its landscape setting, and impactful research in modern museum presentation.

Hurcombe's monograph *Perishable Material Culture in Prehistory* (Routledge 2014) identifies the 'missing majority', exploring how resources in the landscape are seasonally exploited through 'tending the wild', whilst taking into account environmental variation. This research takes a distinctive approach to the challenge of understanding organic material culture, through experimental archaeology, inorganic traces of processing organic materials (e.g. impressions, usewear, skueomorphs). Hurcombe currently works on perishable items from Neolithic and Bronze Age Germany (THEFBO project).

Juleff carried out experimental geochemical survey in roundhouses (*J. Arch. Sci.* 2014) and continues her work on landscapes of metallurgy in Sri Lanka and India. She led the UKIERI project *Climate and Culture: Environmental contextualisation of the development of human society in Western and Central India* and Exeter's GCRF Facilitation Fund (FF) -funded *Walking Heritage into Future Cities*. **Morkot's** chapter on *The End of the Kingdom of Israel: a View from the Nile Valley* addresses the current controversy about the political geography of late-Libyan and early-Kushite Egypt, and he will continue working on external relations of Egypt, particularly from the Late Bronze Age to Roman Periods.

Lazzari looked at decentralised networks of artefact production and circulation in the southern Andes (*Cambridge Archaeological Journal* 2016, *PNAS* 2017). Examining social landscapes of connectivity, her research bridges the gap between landscape and material culture research. She hosted two international workshops 'Living with water: challenging the water insecurity paradigm in the Andes' (Exeter GCRF/FF, 2018), and the QUEX workshop 'Living pasts, open futures: developing transnational collaboration on cultural heritage, identities and landscape sustainability' (2019). **Herold's** Leverhulme Trust 'Glass Networks' project similarly combines cutting-edge archaeometry of inorganic material culture to understand material culture circulation within landscapes.

LANDSCAPE ARCHAEOLOGY:

The strategic aim of for this REF cycle was to expand beyond our long-standing strengths in wetland archaeology. Given our expertise in classical to medieval landscapes and interdisciplinary working, we identified social agency and anthropogenic landscape change as key areas for research. In addition, we have been pioneering the application of technologies and archaeological science to the study of landscapes, including GIS, geophysics, LiDAR, aerial photography and environmental reconstruction.

Rippon has taken a lead role in this research group with his major publications such as *Fields of Britannia; Kingdom, Civitas and County; Planning in the Early Medieval Landscape* (OUP, Leverhulme funded), and grants: AHRC *Manifestations of Empire; Exeter: Place in Time* (augmented by a College of Humanities PhD studentship); HLF *Understanding Landscapes*.

Creighton's research on medieval landscapes expanded into conflict archaeology through a Leverhulme-funded project on the archaeology of twelfth-century warfare, which produced two monographs: *The Anarchy* (Liverpool UP, 2016) and *Castles, Siegeworks and Settlements* (Archaeopress 2017), a theme strengthened by **Herold's** (ed.) *Fortified Settlements in Early Medieval Europe* (Oxbow 2016). Creighton, Herold and Rippon's research is complementary: Herold addresses trade networks and landscape transformation in early medieval Europe, Creighton focuses on later medieval elite landscapes through a combined archaeological-historical approach, while Rippon integrates cultural and environmental data to explore the evolution of working landscapes.

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Oltean's innovative use of LIDAR, remote sensing and GIS has provided fine-grained evidence concerning landscapes of Roman provinces. Notably her work has shed light on conquest strategies and political discourse in Roman Dacia (EU *Archeolandscapes Europe*, JRA 2017). Oltean's collaboration with **Fonte** (Marie Curie Fellow) has expanded our landscape research to Roman Iberia. Landscape Archaeology interfaces with **Iriarte's** research on prehistoric human impact on lowland South American landscapes funded by ERC Consolidator *Pre-Columbian Amazon-Scale Transformations* and AHRC-FAPESP *Je Landscapes of Southern Brazil*. His transdisciplinary work has charted unexplored regions of Amazonia, documenting earth-building societies along its entire southern rim and predicting 5 million people in pre-Columbian times (*Nature Communications* 2018); revealed the lasting repercussions of polyculture agroforestry on Amazonian Dark Earths and the so-called 'Geoglyphs' region (*PNAS* 2014, *Nature Plants* 2018); explored the role of climate in cultural developments across Amazonia (*Nature Ecology and Evolution* 2019), and investigated the human footprint on the expansion of *Araucaria* forests in southern Brazil (*Scientific Reports* 2018). **Hampson's** recent appointment adds expertise in the landscape archaeology of rock art (Routledge monograph 2016), a topic of expanding interest given Iriarte's team's recent high-profile art discoveries in Columbian Amazonia.

ONGOING STRATEGY:

We will strengthen our onward development by uniting researchers from different disciplines and backgrounds (non-HE, third sector, NGOs and communities) to explore key questions of the human past, present and future. Such ambition requires a multi-scalar strategy.

At the local level, we will capitalise upon our positioning between the arts and sciences. Building upon existing research with HASS colleagues (e.g. UKRI, Wellcome Trust and ERC-funded projects with Anthropology, Classics, History, Islamic Studies, Theology) we will facilitate mutually beneficial collaborations with STEM/M researchers (including Biosciences, Geography, Medicine and Mining Engineering). Access to powerful resources will be enabled through engagement with UoE's research institutes (section 3). Our laboratory facilities and equipment will be enhanced through strategic investment to strengthen grant applications and meet the demands of our increasingly diverse PGR community. To sustainably maintain strong PGR numbers we will position ourselves within the South, West and Wales AHRC DTP, explore collaborative initiatives with institutions in the UK and abroad, and match-fund PhDs in collaboration with external bodies with research needs (section 2). We will continue to override the research-teaching dichotomy by genuinely involving our taught students in publishable research. This policy has already paid dividends in grant capture, the delivery of research objectives and the enrichment of our research community, as well as attracting strong taught cohorts of national and international students.

Nationally, we will increase our leadership of research agendas by demonstrating how STEM/M-HASS collaboration can achieve truly impactful research (e.g. through the activities of the HumAnE Bioarchaeology Research Centre). We will nurture an outward-facing research culture that embraces international connections and transdisciplinary communities. We boast unique strength among UK HEIs in the Archaeology of the Americas alongside extensive worldwide networks. The Department aims to deepen these links with their potential for diversified grant capture, global impact and PGR recruitment.

We aim to cement our status as a beacon of impact (REF2014 ranked our impact joint 3rd nationally by 4*+3* profile). We are determined to disseminate best practice in impact and continue a culture where impact is embedded throughout the research process, rigorously evidenced, engendered through partnership-building, and valued in staffing strategies and promotions. We also value long-term, sustained impact and outreach activities extending beyond single REF periods (section 4).

FUTURE RESEARCH GROUP PLANS:

Over the coming five years, the **Bioarchaeology** group will continue to coalesce around the HumAnE Bioarchaeology Centre and push forward our agenda of conducting engaged transdisciplinary research that unites ancient and modern bio-cultural datasets to contextualise and mitigate modern global challenges. The group will work on the peopling of, and initial development

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of farming communities in the Americas, alongside research into human-animal relations and human palaeopathology. **Iriarte**, collaborating with Outram, will develop his ERC project LASTJOURNEY examining the dispersal of modern humans in South America during a time of major climate and environmental change coincident with megafaunal extinctions and plant domestication by integrating archaeology, archaeobotany, zooarchaeology, palaeoecology, ancient environmental DNA and isotope studies. Iriarte will continue collaborating with tropical ecologists and paleoecologists in UoE Geography (Newton Fund, ERC, GCRF). Through AHRC 'Warhorse', **Outram** and Creighton will continue the first evidentially holistic study of medieval warhorses in their broader social and landscape setting. This project is supported by a College of Humanities PhD studentship, extending the project into continental Europe. Outram will also extend his investigations into prehistoric herding in Central Asia through collaboration with **Pryor** related to animal herding mobility. **Sykes** will lead her new transdisciplinary Wellcome Trust grant: *From 'Feed the Birds' to 'Do Not Feed the Animals'* investigating the drivers and consequences of animal feeding for global human-animal-environmental health. We will continue to develop commercial links and expertise in forensic archaeology and anthropology. A new direction for **Evis** relates to period-specific studies of poisoning, whilst **McKenzie** will deepen her transdisciplinary investigations of human care.

Within **Material Culture and Social Agency**, **Hurcombe** will expand her research into neglected, plant-based, perishable clothing including 'not woven' textiles. She will host the International Experimental Archaeology Conference in 2021. **Lazzari** will expand her previous work on ancient social landscapes, demonstrating the need for an integrated approach to material culture circulation and landscapes of connectivity, past and present. A new direction in **Juleff's** research involves a work package entitled *Archaeological investigations on metallurgical sites in southwest China* in collaboration with a Sichuan University project aimed at understanding smelting technologies of ferrous and non-ferrous metals and associated social change. **Morkot's** ongoing research relates to the complex legacy of 19th-century tourists and travellers in the Eastern Mediterranean region, encompassing issues such as 'Egyptomania' and comparing the impact of ancient Egypt with that of the Classical world on culture in the British Isles.

Within **Landscape Archaeology**, **Oltean's** work will expand through collaboration with **Fonte's** Marie Curie FINISTERRAE project and his work on Roman occupation in Devon and Cornwall. Oltean and **Lazzari's** recently granted GCRF/FF project *'Living territories: opening pathways for sustainable communities and their cultural-natural heritage in the Andes'* combines remote sensing, GIS, material culture and landscape research, further demonstrating our collaborative and integrative capacity going forward. **Creighton** will continue to integrate human-animal relationships with landscapes of conflict (AHRC *Warhorse*). **Rippon** will extend his work on regional identity by exploring the character of smaller-scale early folk territories in the early medieval landscape. He will also investigate distinctive landscapes on the fringes of the Roman and Anglo-Saxon worlds through continued post-excavation analysis at Ipplepen (Devon) including aDNA and isotopic analyses on AD 5th- to 8th-century skeletons.

Hampson's (2018) appointment as Senior Lecturer in Heritage provides us with opportunity to further develop landscape-based heritage studies (e.g. **Rippon's** HLF *Understanding Landscapes Project*; **Juleff's** Cornish mining related *Time and Tide: Heritage on the Beach*) and expand it internationally. Archaeology at Exeter has existing expertise in community heritage, both in the UK and internationally, which complements expertise in History, Classics and Theology. Examples of this approach include **Iriarte's** *'Cultural Heritage in the Itonama Indigenous Community, Bolivian Amazon'*, **Lazzari's** *'Cultural heritage, identities and landscape sustainability in NW Argentina'* and **Juleff's** work in the Indian Subcontinent including *'Walking Heritage in Future Cities'* and post-conflict archaeology in Sri Lanka. Hampson's appointment will facilitate greater future focus and cohesion for such work.

Over the medium-term, future research funding will sustain at healthy levels given recent high-value grants awarded in 2018–20 and ongoing for several more years: e.g. € 2.5m ERC, £1.25m AHRC, £1.48m Wellcome Trust. The future funding environment is uncertain, but our international

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strengths in a diverse portfolio of research at the HASS/STEMM/M interface put us in a strong position to remain vibrant and competitive, both financially and intellectually, in the years to come.

OPEN ACCESS, ETHICS AND RESEARCH INTEGRITY:

In addition to our standard use of Exeter's open access repository (ORE) for journal papers and theses (see library, section 3), our commitment to OA is evidenced by the following indicative examples. Outram became inaugural editor-in-chief of new OA journal *Science and Technology of Archaeological Research (STAR)* in 2014. Through an institutionally funded project, 'Tangible Pasts: developing user-led heritage outputs for rural and indigenous communities', Lazzari created a digital, open access web book: <http://www.saantropologia.com.ar/territorios-ancestrales/>. Others, including Juleff and Rippon, have moved to make monographs, in addition to articles, OA, and it is standard practice for major projects to deposit data with ADS.

The College of Humanities has an Ethics Committee with departmental representation that provides advice and ethics approval on research designs. UoE has an Ethics Code and a clear Statement on Research Integrity in line with UKRI's Concordat. Training is provided on research integrity and personal data handling. Our recent research has been supported by GCRF funding and our staff are committed to the development of equitable partnerships in all areas of their research. Our staff are firmly engaged with decolonizing agendas through their work in heritage and collections (Hampson, Hurcombe, Sykes), through participatory research with indigenous peoples (e.g. Hurcombe in North America, Lazzari and Iriarte in South America) and in post-conflict contexts (e.g. Juleff in Sri Lanka).

2. People

All of our excellent people – from Professors and post-docs to lab staff and UGs – contribute to a departmental culture that focuses on developing potential and confidence: of individuals, of our discipline and in the impact of our work. We undertake mentoring at nested levels and everyone in our community plays a multi-directional role in supporting student and staff research. Our mentoring extends beyond our department with staff frequently called upon to support external scholars and research partners. This includes providing advice on applications (e.g. fellowship applicants and researcher PIs) and the management of live grants. We regularly offer free training to external researchers, for instance through the weekend workshops organized by our HumAnE Bioarchaeology Centre (Fig. 2).



Fig 2: The HumAnE Centre fish workshop in action (2019).

Unit-level environment template (REF5b)

In terms of its research community, Archaeology at UoE is a mid-sized but growing Department. Our strategy of investment in staff has seen the FTE number of Category A staff increase by 4.8 FTE between 2012/13 and 2019/20. This modest increase is designed to be sustainable and targeted strategic growth areas (see above), such as investment posts in bioarchaeology (Sykes, Evis) and heritage (Hampson, on our Penryn Campus), plus strategic retirement replacements (McKenzie, Pryor). We also currently host Fonte (Marie Skłodowska-Curie Fellow). Additionally, we capitalise upon a wider pool of archaeological expertise found in other UoAs, including Insoll and Cooper (Arab and Islamic Studies), Isaacson, Isayev, Borg and Pitts (Classics and Ancient History) and Loosely (Theology and Religion), who contribute to the research life of our discipline through project collaboration, seminars, internal peer reviewing and co-supervision of PGRs.

During this period, Harding and Bradley retired but remain active as Emeritus Professors. Pryor was appointed to maintain skills in European Prehistory, but also strategically enhances Palaeolithic Archaeology which complements ongoing human evolution work of honorary Professor Dennell (*Nature* 2018, *Science* 2018), but Pryor also adds molecular archaeology expertise, further strengthening Bioarchaeology. Sykes was a strategic professorial appointment who not only enhances Bioarchaeology through complementary zooarchaeology specialism, but also added a strong impact agenda through the creation of the HumAnE Centre and her expertise as a GCRF AHRC lead. In addition to College-funded study-leave (two 6-months slots p/a, which has seen ECR staff Evis and Pryor recently supported), Creighton, Herold, Iriarte, Outram, Rippon and Sykes have all had recent AHRC, ERC and Leverhulme grant buy-out which, from 2019/20, was pooled to create a new 0.75 FTE Education and Scholarship lecturing position, allowing staff to focus on those projects.

To facilitate **staff development**, everyone (including PDRA/Fs) has an Academic Lead. These senior staff members have established track records in securing research grants, line-managing PDRAs, bringing funded studentships, guiding PGRs to completion in four years, and writing major publications. Each Lead is responsible for mentoring 6–7 members of staff, meeting with them three times a year (one a formal personal development review). High performance in any aspect of work, including research and impact, is rewarded at various levels to non-professorial staff through bonuses under the University's 'Above and Beyond' Scheme, as well as through salary increments and promotion. Reward for professorial staff is handled through a biennial professorial salary review. For all these processes appropriate EDI checks and balances are in place.

New academic staff are mentored by their Academic Lead and undertake induction plus the PG Certificate in Academic Practice. They have reduced teaching/administration and full access to courses/support from the Staff Learning and Development team. All early career staff are the second supervisor for a research student (under the guidance of an experienced first supervisor). All colleagues are supported in submitting grant applications by Research Services, Archaeology's Director of Research and Internal Peer Review (colleagues with established grant-winning records give feedback on drafts). All 'Education and Research' job family staff receive a research allowance (usually £1000 p/a) supporting grant preparation activity, networking, fieldwork or conferences. Additional support can periodically be sought from the HoD or College Associate Dean for Research from discretionary budgets. A College-wide workload modelling tool ensures that Education and Research staff are allocated time for research. Grants with time buy-out, PGR supervision, and administrative roles are all factored in, and specific allowances protect early career staff from being over-burdened. All colleagues (including part-time staff) can apply for Study Leave, which is awarded on a strategic basis, but with EDI mechanisms to ensure fair distribution.

Post-doctoral researchers enrich our department, bringing a wealth of fresh ideas and vibrancy. Over the REF period the Department hosted 20 externally funded PDRA/Fs (discrete individuals) who in addition to their Academic Lead are supported by the University's Researcher Development Team that is responsible for our obligations to the Concordat to Support the Career Development of Researchers (e.g. through its programme of 1:1 career and professional development coaching and its 'Rising Stars' programme). Destinations of our post-docs include permanent academic positions and independent researcher fellowships, demonstrating appropriate career progression. Archaeology has additionally hosted international researchers including, for example, a CAPES

Unit-level environment template (REF5b)

(Brazil) Post-Doctoral International Fellow (Dr Rafael Milheira), a CONICET (Argentina) Post-Doctoral International Fellow (Dr Mercedes Colobig), as well as sandwich PhD students from CAPES, Brazil (Rodrigo Angeles Flores) and Universidad Nacional de Costa Rica (Maria Rojas).

Research Postgraduates contribute massively to our community, enriching our cutting-edge, curiosity-driven research. Our strategy for growing PGR numbers has succeeded, with completions doubling since REF2014 (23.8 to 47.6). Completion rates are also strong, even amongst our relatively large number of part-time students studying at distance. We have emerged from a period of sharp growth and, as we see these students complete, our number of PGRs per staff member has dropped slightly, but we have active strategies in place to maintain healthy numbers at a time when traditional studentship sources are harder to come by. Initiatives that have recently boosted PhD numbers include: a growth in matched/partner-funded PhDs (e.g. Wealden Iron Research Group; Tewkesbury Abbey Trust; National Trust, Buckland Abbey); partnership arrangements with the National Institute of Advanced Studies (Bangalore) and Cranfield University's Forensic Institute that has seen multiple split-site PhDs; strategic allocation of College of Humanities studentships to add value to research grants (e.g. one dedicated to the AHRC Warhorse project); University NERC quota studentship (Pryor); ERC grants with attached PhDs (Iriarte and Outram) and internationally funded PhDs from Brazil (CNPq and CAPES, Iriarte) and Chile and Mexico (CONICYT and CONACYT, Lazzari). Our strategy is to sustainably manage future PGR recruitment at about current levels without compromising standards or submission rates. In addition to our own students, externally based PhD students have spent time with us learning particular skills under our scheme for visiting advanced students (e.g. from Boroda, Buffalo, Masaryk, São Paulo, Sichuan Universities).

The University's Doctoral College provides a range of training opportunities including generic skills of value to early career scholars, specific guidance on PhD production, vivas and wellbeing. Students undertake annual training needs audits with supervisors which frequently lead to additional provision of Departmental workshops, a recent example being 'Statistics for Archaeologists using PAST, R and SPSS'.

PGRs who completed in this REF cycle displayed a wide range of employment destinations, indicative examples being:

- Assistant Professors at Federal University of Para (Brazil), Sichuan University (China), Yunlin University of Science and Technology (Taiwan)
- Lecturer, University of Exeter
- British Academy Postdoctoral Fellow
- Marie Skłodowska-Curie Fellow, Pompeu Fabra University
- Postdoctoral Researchers at Museum of Archaeology and Ethnology (São Paulo, Brazil), Central Natural Science Collections (ZNS, Halle-Wittenberg), University of Manchester.
- Curator of Prehistory, National Museum of Scotland
- NAGPRA Coordinator, University of Connecticut
- Zooarchaeologists at Oxford Archaeology East and Archaeology South-East
- International Enquiries, Wessex Archaeology
- Co-founder, Heritage Walk Calcutta

Undergraduates and master's students are integrated into our research culture, since it enhances their prospects as future researchers whilst augmenting our collective research power. We have a long history of involving our students in research, often in the form of participation in fieldwork or post-excavation analyses. We have recently augmented this by involving taught students in research lab meetings and encouraging dissertations that form a genuine part of research projects and might lead to publication. This is most clearly exemplified by the operation of our HumAnE Bioarchaeology research centre, which holds regular lab meetings including staff, PGR, PGT and UG students. Interest usually starts with 2nd year undergraduates, developing ideas for 3rd year dissertations. Examples include isotopic studies of animal management and movement, related to Pryor's work on mammoths, Outram's research into horse domestication and Sykes's work on translocated species. We offer many ancillary projects related to our large, funded projects (e.g. Warhorse, Easter E.g., PAST and Animal Feeding projects) and intend to increase

Unit-level environment template (REF5b)

this activity more widely across the Department, since it invigorates research culture and provides our students with enhanced skills and potential publications. This policy presents challenges of funding, since such advanced project work (e.g. LA-ICP-MS machine time, Fig 3.) carries costs not normally associated with UG work. We have successfully lobbied for increased lab budgets for student research and strategically deployed charitable/alumni funds administered by the University's Global Advancement division. The College of Humanities also supports a number of extra-curricular, paid student research internships each year, several of which we have secured (e.g. several students undertook geophysical survey around Exeter Cathedral with Creighton, others analysed aerial surveys of Romania with Oltean).



Fig 3: Third year undergraduate Sarah Barakat (on right in A, and undertaking analysis in B) presents her stable isotope project on Eneolithic horse teeth to a specialist conference held in Almaty, Kazakhstan, 2019.

Our **research community** is fostered through regular research seminars with presentations from both invited speakers and our own staff. Departmental Research Seminars are usually weekly throughout term time, and are open to all staff and students, as well as local archaeologists. They are events where different research groupings come together and ideas are cross-fertilized. We regularly host joint seminars with the Society of Antiquaries, providing a service to Fellows in the SW region, and host regular additional seminars related to our Centre for the Archaeology of the Americas, as well as workshops run by our HumAnE Bioarchaeology Centre. Further seminars of interest are hosted by the College's Centres for Medieval Studies, Connectivity in the Roman World, South Asian Research and Digital Humanities. Our PGRs/Post-Docs run their own regular series 'PG-Tips' where they practice research presentations and sometimes invite guests.

Equality, Diversity and Inclusivity: With 9 nationalities represented in the core staff and 11 in our community of Honorary Fellows, we are a diverse research community with strategies in place to further strengthen in this area. The University joined the Athena Swan Charter in June 2011 and currently holds an institutional Athena SWAN Silver Award. Both the University and the College of Humanities have Equality and Diversity Officers and a committee to provide advice, with equality/diversity issues being a compulsory part of induction. We are fully in line with the UoE's policy of narrowing the gender pay gap. Recent Professorial-level female appointment (Sykes) and separate promotion (Hurcombe) ensure a more even gender balance within the professoriate, and Herold and McKenzie were promoted to Senior Lecturers within the REF2021 period. We pride ourselves in encouraging PDRA staff to develop grant bids as PI through mentoring and peer review (e.g. Robinson, successful BA grant). The Department is currently preparing an application to Athena Swan. Staff involved in REF output selections undertook training on bias in decision

Unit-level environment template (REF5b)

making, and analysis of outputs data and evaluations have been undertaken, with adjustments made where appropriate to ensure equity.

Seminars and social events are an important part of maintaining a healthy research culture, but can present timetabling challenges, particularly in terms of ensuring inclusivity. Traditional seminar series are late in the day followed by evening socialising. We have been aware that this could exclude those with childcare needs (for example) and evening socializing venues might not suit everybody. As such, we have rescheduled our main series to an earlier time, making it more inclusive and ensured where possible that social interaction occurs within the normal departmental setting, as well as in the evening. Any single solution is unlikely to suit all, but we remain mindful of inclusivity issues.

3. Income, infrastructure and facilities

Over the review period the feel and capabilities of the Department have been transformed through the acquisition of new spaces and facilities. This generous internal investment occurred in recognition of our substantially enhanced grant capture and in support of our vision for leadership in engaged transdisciplinary research.

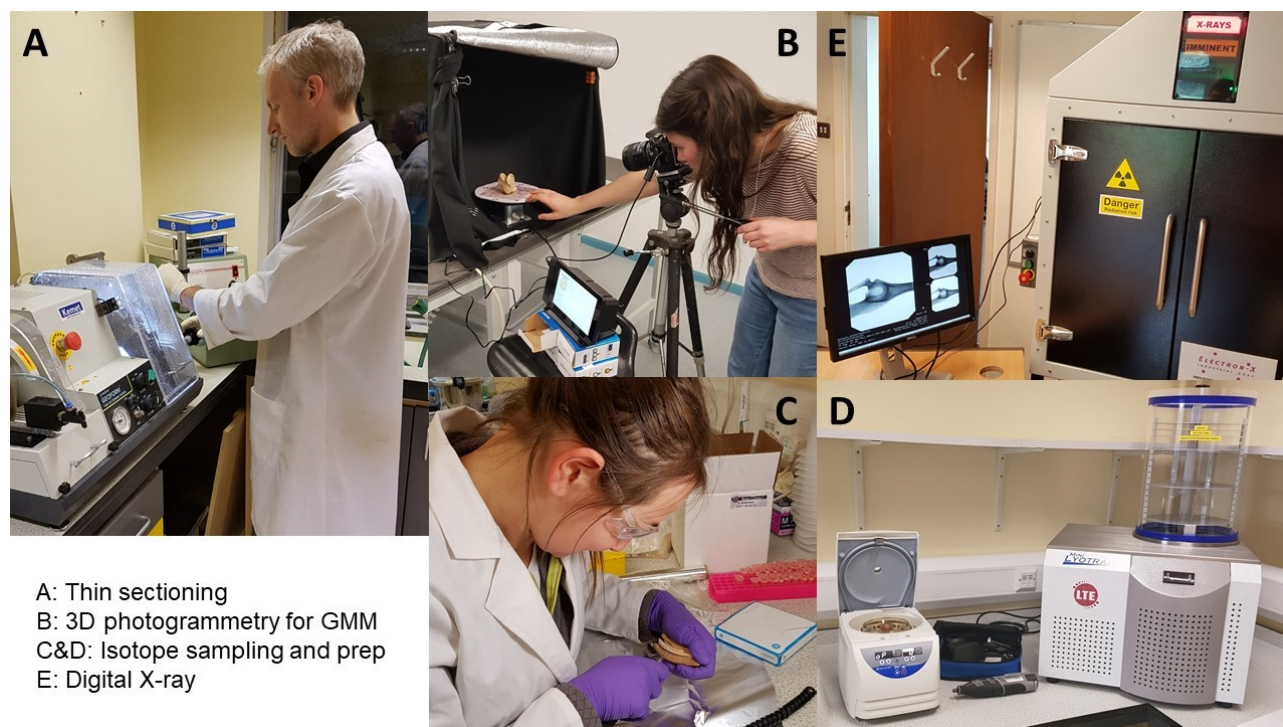
Income: During this REF period the Department has more than doubled its external research income from £1,814,703 in REF2014 to £4,285,817. We have successfully targeted diverse funding sources including ERC, AHRC, NERC, EPSRC, British Academy, Wellcome Trust, UKIERI, Newton Fund, British Museum, English Heritage, Leverhulme Trust, National Geographic Society, Heritage Lottery Fund, Society of Antiquaries, Society for Medieval Archaeology, Lower Austria Fund and the Stein-Arnold Exploration Fund. We have demonstrated particular strength with the EU. ERC ‘Consolidator’ €1.73 million, ‘Advanced’ €2.5 million and ‘Proof of Concept’ £149k grants have been awarded to Iriarte, whilst additional work packages from two externally based advanced grants, NeoMilk and PEGASUS have been brought into Exeter by Outram. We have had two Marie Skłodowska-Curie fellowships (supported by Rippon and Oltean) and EU Culture Framework funding has also underpinned the impact work of Hurcombe related to experimental archaeology, through the ‘*OpenArch Project*’, whilst the same source funded Oltean’s participation in the ‘*ArchaeoLandscapes Europe*’ project.

UKRI funding includes 9 AHRC awards: £700k (Rippon –three projects), £597k (Creighton/Outram), £388k (Iriarte), £279k (Sykes –three projects) and £10k (McKenzie). Excavations at our field school site of Ipplepen have received funding from the British Museum (£10k) and Devon County Council (£5.5k). This excavation forms a part of Rippon’s public archaeology programme of research entitled *Understanding Landscapes*, funded by HLF (see section 4). We have also undertaken contract research with Dartmoor National Park Authority, CgMs Consulting, and Medieval Settlement Research Group. Charitable Trust research income includes awards to Sykes (£1.476 million grant with £740k to Exeter) and McKenzie (Wellcome) and Herold (Leverhulme).

Infrastructure and facilities: In the REF period we have secured £425,569 of internal funding for investment in infrastructure and equipment (Figs. 4 & 5). We have created a bioarchaeology laboratory dedicated to studying human and animal bone remains and housing accompanying reference materials. Growth in that area has recently necessitated further expansion of lab space to accommodate postgraduate and research needs. We also invested in laboratory equipment for stable isotope sample preparation, thin-sectioning and polishing, digital X-ray, LiDAR, pXRF, equipment to support 3D geometric morphometrics (GMM), including high speed computers (in both staff research and PGR spaces) plus automated photogrammetry turntables, alongside renewing, expanding and updating geophysics and GPS equipment. We are currently in the process of procuring a benchtop SEM with EDX micro-probe, with matched funding from the College of Humanities to support our ERC grant.

Unit-level environment template (REF5b)

We now possess separate labs dedicated to ‘clean’ and chemical analyses, ‘dirty’ and ‘wet’ processes, microscopy, bioarchaeology, and experimental archaeology. Analytical equipment includes high-specification high- and low-power microscopes with updated imaging systems used for petrology, environmental analysis, metallurgy and usewear. We have the only European archaeobotanical laboratory with the expertise to carry out microfossil botanical analysis of phytoliths and starch grains from the Neotropics, and hold the largest Neotropical microbotanical collection in Europe.



A: Thin sectioning
 B: 3D photogrammetry for GMM
 C&D: Isotope sampling and prep
 E: Digital X-ray

Fig. 4: Selection of investments in new bioarchaeology facilities within this REF period.

Survey equipment includes integrated differential GPS and reflectorless total stations, resistivity meters (x2), Bartington gradiometers (x2), LiDAR and access to GPR, and cloud scanners. Land on campus is provided for experimental and forensic archaeology. There is a technical office that houses our dedicated lab manager and technician, alongside facilities for drawing and photography. We possess three dedicated research project rooms, and one is equipped with a large format scanner of particular use in landscape research. There are substantial reference collections for animal (mammal, birds, fish), plant and human remains, geology, archaeometallurgy, ceramics, lithics, organic material culture, and historic maps.



Fig. 5: Our LiDAR, acquired by Iriarte’s ERC Project, redeployed to scan the Monumental Mound Region of Llanos de Moxos, Bolivia.

Other key facilities in the University we have used include Geography's Sediment Research Facility and palaeoenvironmental laboratories (e.g. pollen labs, large cold room, inorganic bulk analysis facilities such as AAS and ICP-MS), and Camborne School of Mines' SEMs and world-class micro-beam facilities (QEMSCAN) for inorganic materials (e.g. soil and archaeometallurgical characterisations). Light stable isotope mass spectrometry is available in the Environment and Sustainability Institute (ESI) with whom several of our staff have affiliate status and we have been in recent discussions with our Living Systems Institute about developing ancient DNA laboratory preparation to enable use of their excellent next generation sequencing facilities. We have access to the University's High Performance Computing (HPC) and its GPU (Tesla K80) computer nodes. We have full access to the College's **Digital Humanities Lab**. This £1.2M investment has dedicated staff who advise on specialist IT applications as well as facilities for 3D scanning and printing, ultra-high-resolution photography and AV recording.

Our research is supported by two **technical staff** (one field-facing; one lab-facing), and this support has recently been boosted by an additional technician shared with Geography. Archaeology is based in the Humanities, but straddles HASS and STEM/M. In the past this created scientific technical support challenges. Within this REF period the University re-organised technical services, resulting in full access to the skills base of the wider technical services team, significantly enhancing scientific support and facilities access, whilst maintaining the benefits of College membership. The College's **administration hubs** support staff by arranging travel and logistics, whilst 'Funder Cluster Teams' assist with the provision of funding opportunity and project costings. '**Innovation, Impact and Business**' (IIB) advise on contract research, non-academic partnerships and impact. IIB provide strategic seed-corn funding for impact and translational research. Archaeology has also benefited from the University's general investment in the campus, its facilities and library, as outlined in the ILES (section 4.14). In relation to **library support**, we are assisted by 'academic liaison librarians' who are responsible for supporting research activities within particular disciplines, providing training in information literacy, collections management and deploying expert knowledge of key information resources, including the library's special collections. They deliver workshops within the researcher development programme, aimed at both PGRs and early career scholars.

Another key role of the library is maintaining of our **open access** repository, 'Open Research Exeter' (ORE), in line with the University's Open Access Policy'. ORE is the principal means by which our staff meet the Research England open access mandate, and all PhD theses are also uploaded. In addition to the UKRI OA block grant, OA publishing is further encouraged through UoE's own open access fund which facilitates those without grant support in making their work openly available.

4. Collaboration and contribution to the research base, economy and society

Exeter has added particular value to the wider research base through providing distinct leadership in transdisciplinary bioarchaeological research that fully integrates wider landscape, heritage and policy contexts. We have been a prominent academic advisor to archaeological open air and experimental centres, facilitating enhancement of professional practice. In terms of the UK's international collaborations, we are a key link-point in relation to South America and Central Asia. We endeavour to integrate impact and outreach activity into everything we do by maintaining a sustainable pipeline of activity, beyond REF-targeted case studies. Activities in this review period are indicatively illustrated below.

Impact and Public Outreach beyond Case Studies: Our research community actively engages in long-term programmes of impact and outreach as a matter of conviction, beyond single REF cycles. This is evidenced by our approach to field schools, which combine research, education, outreach and impact, as illustrated below in relation to our projects at Mitchell, South Dakota and Ippelen, Devon.

Unit-level environment template (REF5b)

We have conducted fieldwork at Mitchell Prehistoric Indian Village since 2004, undertaking month-long seasons. The site is a US National Historic Landmark site that is open to the public. It has a museum and an 'Archeodome' where visitors are able to view the ongoing excavations from a gantry and visit the laboratories where finds are processed. We organise extra activities on specific 'Archaeology Awareness' days, give lectures to the local community, provide regular interviews to local press, radio and TV, and, outside our field season, visitors can view time-lapses of the excavation and view exhibits we have helped to develop. From 2014–19 there were **72,059** visitors, including **7,814** scouts/school children. An additional role of the site is to bridge difficult cultural relations between Native and non-Native communities of the area. Our public events include Native American voices and bridge gaps through telling the story of maize agriculture in the Northern Plains, first pioneered by the inhabitants of Native Plains Villages, with their seed stock forming the base of modern agricultural production in the region.

Our long-term field project at Ipplepen multi-period settlement, Devon, always featured outreach activities, but, coupled with our extensive landscape archaeology research in the region, it led to a significant programme of public engagement (2017–20), supported by **£261,000** from HLF/NLHF plus **£75,400** from Devon CC, National Trust, Calstock PC, Teignbridge DC and British Museum. Members of the local community donated **£8,278** evidencing their positive experiences of our activities. These activities included: open days/visitor centres at Ipplepen and Calstock excavations (**9,172** visitors), places for community excavators (**251** volunteers), a public conference and exhibit at Torquay Museum (**11,690** visitors), workshops for socially disadvantaged groups (**123** attendees) and school children (**1,187**). This is a total of **23,469** face-to-face interactions, alongside copious social and mainstream media outreach activity. The project has drawn praise from local councillors, heritage leaders, headteachers, the Portable Antiquities Scheme, Devon Recovery Learning Community and Calstock Refugee Outreach Group.



Fig 6: Leo Jamelli's animated projection onto St Catherine's Almshouse, Exeter.

Indicative examples of research project outreach, beyond impact case studies, include two of McKenzie's particularly innovative projects. The AHRC-funded project, 'Literary Archaeology: Exploring the Lived Environment of the Slave' held readings in Bristol of new writing inspired by archaeological evidence about the lives of slaves in Barbados and Gran Canaria, alongside public discussions and the production of a project video. Her Wellcome Trust 'Celebrating Care' project brought together archaeology, anthropology and history to help support contemporary family

Unit-level environment template (REF5b)

carers. Their public workshop featured in *Devon Carers Magazine*, a video provided wider dissemination and, inspired by the research, a UoE Arts & Culture Fellow (commissioned local graphic artist Leo Jamelli) produced a public artwork capturing the strength and vulnerability of family carers, which was projected onto the medieval St Catherine's Almshouse in Exeter (Fig. 6).

Research projects active during the COVID-19 lockdown stepped up to enhance outreach activities which might provide some engagement and respite during a challenging time. Regular blog posts were maintained, whilst the AHRC 'Warhorse' project contributed to the Royal Armouries' online exhibition on the anniversary of the 'Field of the Cloth of Gold', and the AHRC 'Easter e.g.' project devised a children's craft activity based upon relevant items of archaeological material culture. The HLF 'Understanding Landscapes' project enlisted an army of home-based citizen scientists to analyse publicly available LiDAR data. The transformative result in discovering many new sites was widely covered by the press, including the BBC. Lazzari's research has been selected by the Argentinean government to be included in a COVID-19 educational package (book and board game) to be sent to disadvantaged households.

Our staff routinely work with **the media** to bring our work to the widest possible audiences and our research is regularly covered by newspapers and magazines. Indicatively, over a sample 12 month period (11/19–10/20), our press office recorded a minimum of 13 research stories in 2,011 items of coverage in 64 different countries. The following are selected highlights from the REF period, which reached particularly large audiences. Outram was involved in a major documentary series on equine history: *Equus: Story of the Horse*, which won Best Documentary Series at Canadian Screen Awards, and he represented the production at a special screening at UNESCO in Paris attended by its Vice-President. He also recently discussed horse domestication in multiple BBC radio appearances, including *In Our Time* with Melvyn Bragg. As its principal consultant, Iriarte's research was showcased in the Channel 4/Discovery Channel 3-part series *Jungle Mystery: Lost Kingdoms of the Amazon* (Nov/Dec 2020). PhD student, Malene Lauritsen appeared on BBC National News and other venues regarding her finding of perhaps the earliest turkey bones in Britain. Sykes and post-doc Ameen have made numerous significant media appearances related to the demonstration of early rabbits in the UK. Sykes also made an appearance in BBC's *Danny Dyer's Right Royal Family* to explain the significance of Norman deer hunting and her AHRC 'Easter e.g.' project secured an AHRC 'Arts & Humanities in Quarantine: Public Engagement Grant' (c. £20K) to produce an animated film for the BBC. Rippon appeared in ITV's *Roman Britain from the Air*.

In terms of **funding panel/college work**, Sykes chairs the GCRF 'Cultures, Behaviours and Histories of Agriculture, Food and Nutrition' and UKRI-DBT 'Addressing the Challenge of Antimicrobial Resistance in India' themes and was deputy chair of the NERC Radiocarbon Facility, on which Rippon now sits. Sykes is an ESRC mentor and also sits on the Wellcome Trust's Medical Humanities Panel and the UKRI and Strategic ODA Colleges. Creighton sits on the International Assessment Board of the Irish Research Council and Juleff on the Commonwealth Scholarships Commission Panel. Outram sat on the 2020 archaeology panel of the Dutch Research Council, whilst Herold is a panel member on the German Science Fund and received a 'Gold Standard Letter' for her services to the AHRC Peer Review College in 2019, of which Creighton, McKenzie and Outram have also been members. Our widespread international reviewing activity includes ERC, Fulbright Commission, National Geographic, ICOMOS, and Wenner-Gren, as well as research councils in Argentina, Brazil, Chile, Czechia, Hungary, Ireland, Israel, Kazakhstan, Netherlands, Panama, Poland, Portugal, Switzerland, Uruguay and USA (NSF).

Our staff have also contributed in **editorial roles**, such as Creighton having been editor of *Medieval Archaeology* and now Series Editor, Exeter Medieval Studies Series, Liverpool UP. Outram was Executive Editor of *World Archaeology* and is now editor-in-chief of *Science and Technology of Archaeological Research (STAR)*. Sykes was editor of *International Journal of Osteoarchaeology* and now for *World Archaeology*. Evis is an editor for the *Egyptian Journal of Forensic Science*, whilst Rippon sits of boards of *Landscape History* and *Agri Centuriati*, and book series for Brepols and BAR. We have **external examined** research degrees at a dozen UK

Unit-level environment template (REF5b)

Universities, and internationally at: Eotvos Lorand University (Budapest); Trinity College Dublin; University College Cork; NUI Galway; The Muséum National d'Histoire Naturelle (Paris); Antwerp University; University of New South Wales; Sydney University; University of the Basque Country; Vrije Universiteit Brussel; Babes-Bolyai University (Cluj-Napoca); Vilnius University; University of Ghent.

In **advisory capacities**, Creighton has advised ICOMOS World Heritage and sits on the British Academy Committee for the Sylloge of Coins of the British Isles and the Medieval European Coinage Projects. Evis is an Emergency Response Team Member for Blake Emergency Services and a Trustee of Cotswold Archaeology. Morkot is Vice-President of the Friends of the Petrie Museum and a Trustee of Breaking Ground Heritage. Outram has acted as external research assessor for Groningen University, Netherlands and has served on the advisory committee of the Shanghai Archaeological Forum. Sykes is on the Theoretical Roman Archaeology Advisory Panel and the British Deer Society Research Committee. **Service to learned societies** includes the election of Rippon as President of the Society for Medieval Archaeology and The Medieval Settlement Research Group. Hurcombe is on the board of EXARC and is vice-president elect of the Prehistoric Society. Morkot has served as Chair of Council of the Society for Libyan Studies. Committee memberships included Evis on ClfA Forensic Archaeology Special Interest Group, Herold on the Medieval Europe Research Community, Juleff on Historical Metallurgy Society and McKenzie on BABAO and Society for Medieval Archaeology. Lazzari was elected to the board of EAA's community for Archaeology of the Americas in Europe.

In terms of examples of **conferences and keynotes**, Herold was a Scientific Committee Member for EAA2020 and organised a session at EAA2018. Outram co-organized an international conference on the Eneolithic of Central Asia in Almaty, Kazakhstan in 2019. Our staff gave keynote addresses and invited presentations throughout the UK and internationally in Aarhus, Amersfoot, Brandenburg, Chapel Hill, Copenhagen, Dublin, Gothenburg, Hannover; Kalamazoo, Kiel, Lima, Manaus, Max Planck (Jena; Berlin; Leipzig), New Orleans, New York, Oaxaca, Paraná, Reguengos, Roscommon, Sarasota, Tampa, Toulouse, Tübingen. Our HumAnE Bioarchaeology Centre organized and ran a series of entirely **free weekend training workshops** in 2019 on GMM, fish remains, bone fracture and stable isotope research for the wider research community, attended by academics, students and professionals from UK and abroad.

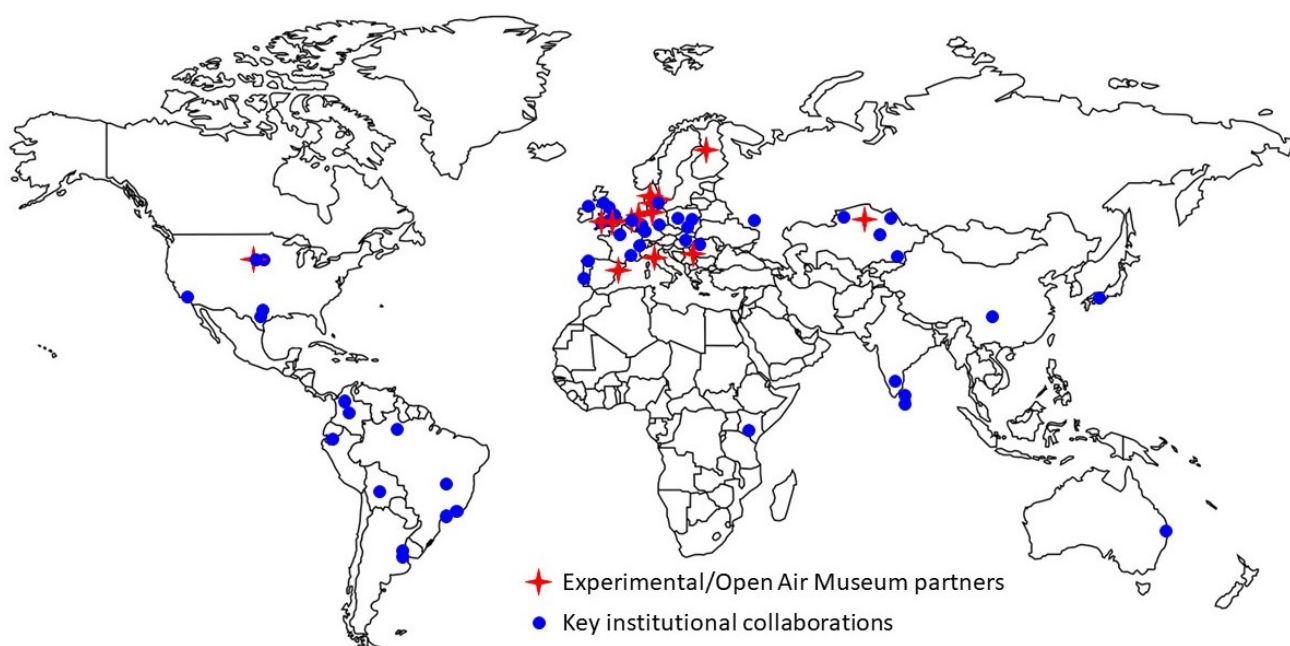


Fig 7: Key research collaborations during this REF period.

Our **Collaborations and Partnerships** are numerous (Fig. 7). In the UK we have nurtured mutually beneficial, long-term relationships with many external bodies including the British

Unit-level environment template (REF5b)

Museum, English Heritage, Historic England, Portable Antiquities Scheme, National Museum of Wales, Royal Armouries, National Trust, Royal Cornwall Museum, Plymouth Museum, Cotswold Archaeology, Sussex Archaeological Society, Wealden Iron Research Group, British Deer Society, Royal Albert Memorial Museum, Exeter Phoenix, Torquay Museum, Devon Carers and U3A. Internationally, we have actively collaborated with at least 29 Universities in 19 countries, 12 experimental/open air centres, plus: Wildlife Conservation Society and Creative Tours (Bolivia); National Institute for Amazonian Research and National Institute for Space Research (Brazil); CNRS Natural History Museum, Paris (France); Max Planck, Jena (Germany); National Institute for Advanced Studies, Bangalore; (India); International Livestock Research Institute (Kenya); Institute for Systematics and Evolution and Polish Academy of Sciences (Poland); National Museum of Transylvanian History (Romania) Kostenki State Museum Reserve (Russia); International Centre for Ethnic Studies, Colombo (Sri Lanka); International Union for the Conservation of Nature (Switzerland); Annenburg Foundation, Mitchell Indian Village Preservation Society; The Gault Site (USA).

Other Indicators of Esteem include Sykes being made a Leadership Fellow of the Annenberg Foundation (California), Rippon's *Kingdom, Civitas, and County* and *Planning in the Early Medieval Landscape* being shortlisted for the 2019 Current Archaeology's book of the year, and Outram being awarded an Honorary Doctorate by Al-Farabi Kazakh National University.