

APP32153: Seeking seasonality in the archaeological record

Check application

Status: **PENDING CHECKS**

Application

Application reference

APP32153

Application name

Seeking seasonality in the archaeological record

Applicant

Rick Schulting

Organisation

University of Oxford

Application status

Submitted

Application status:

Submitted

Seeking seasonality in the archaeological record

1. Details

Summary

The changing seasonal availability of resources has long been seen as a structuring principle of human adaptation. Alongside the direct impact on the subsistence economy and nutrition, there are often accompanying, wide-ranging social consequences in terms of the gendered division of labour, mobility and settlement patterns. Seasonal food shortages are also a common occurrence in both hunter-

gatherer and agricultural societies. While the importance of seasonality has long been acknowledged, investigating it archaeologically in any detail has proven challenging. Studies have focussed primarily on faunal and floral remains, but their interpretation is often ambiguous. The proposed project offers a new approach centred on human remains themselves (and a small number of dogs, whose faster-growing teeth will offer an even higher-resolution view of any seasonal dietary changes). Teeth grow sequentially, providing an archive of an individual's life history from infancy to early adulthood. Unlike bone, teeth do not remodel over time and so retain biochemical signals incorporated during their formation, offering a sub-annual record of changes in diet, mobility and health.

The aims of the proposed project are threefold: 1) to identify and quantify seasonal variation in the diets of prehistoric hunter-gatherers and their dogs from selected Mesolithic sites in northern Europe using sequential measurements of stable carbon ($\delta^{13}\text{C}$) and nitrogen ($\delta^{15}\text{N}$) isotopes on tooth dentine; 2) to link any seasonal changes in diet with mobility using high-resolution laser ablation measurements of strontium ($^{87}\text{Sr}/^{86}\text{Sr}$) and stable oxygen isotopes ($\delta^{18}\text{O}$) on tooth enamel; and 3) to identify metabolic stress markers in dentine and relate these to potential seasonal food shortages. Together this multi-isotope and multi-disciplinary approach provides the tools to investigate past human adaptations to seasonal climates in a more direct way than has been previously possible. This in turn will facilitate a much more nuanced understanding of past lifeways, addressing the inter-connected themes of food and health, mobility and settlement patterns, gender, inequality and resilience.

Sequential $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ isotope analysis in teeth has primarily been used to investigate weaning practices, but the method holds much more potential than this to inform on later life histories. We have already identified cyclical changes in isotopic values in human dentine that we strongly suspect relate to seasonal dietary shifts (Fig 1). We will develop models for hypothetical diets based on available faunal baselines, allowing us to predict the isotopic outcomes of different seasonally available food resources. These will then be compared with expected isotopic values for sequentially sampled teeth, taking into account different possibilities for the ca. three- to six-month time-averaged signals represented by each measurement, and making use of existing knowledge of the isotopic values of the main terrestrial and aquatic resources and their seasonal availability.

The results will be of interest to archaeologists world-wide, providing worked-through case studies illustrating the benefits of higher-resolution sequential sampling methods to address questions of seasonality that are fundamental to human adaptations. Also of interest will be the demonstration of the ability to identify metabolic stress events in ancient (and modern) human and faunal remains.

Start date

November 2024

Duration

12 months

2. Core team

Name	Role	Organisation
Rick Schulting	Project lead	University of Oxford
		University of Oxford

3. Discipline classification – primary

Application question

Please provide the primary research area of your proposal.

You must select only **one** of these research disciplines.

This information will be used for the purposes of processing your proposal and in the selection of appropriate assessors. The research disciplines are:

- archaeology
- area studies
- classics
- cultural and museum studies
- dance
- design

- development studies
- drama and theatre studies
- education
- history
- human geography
- information and communication technologies
- languages and literature
- law and legal studies
- library and information studies
- linguistics
- media
- music
- philosophy
- political science and international studies
- social anthropology
- theology, divinity and religion
- visual arts

Archaeology

4. Discipline classification – secondary

Application question

Please describe, using keywords, the research area of your proposal and where relevant the approach, time, or geographical area.

This will further help with the selection of appropriate assessors.

seasonality; stable isotopes; diet; mid-Holocene; hunter-gatherers; northern Europe

5. Vision

Application question

What are you hoping to achieve with your proposed work?

Explain how your proposed work:

- is of excellent quality and importance within or beyond the fields or areas
- has the potential to advance current understanding, or generate new knowledge, thinking or discovery within or beyond the field or area
- is timely given current trends, context, and needs
- impacts world-leading research, society, the economy, or the environment

Within the Vision section we also expect you to:

- identify the potential direct or indirect benefits and who the beneficiaries might be

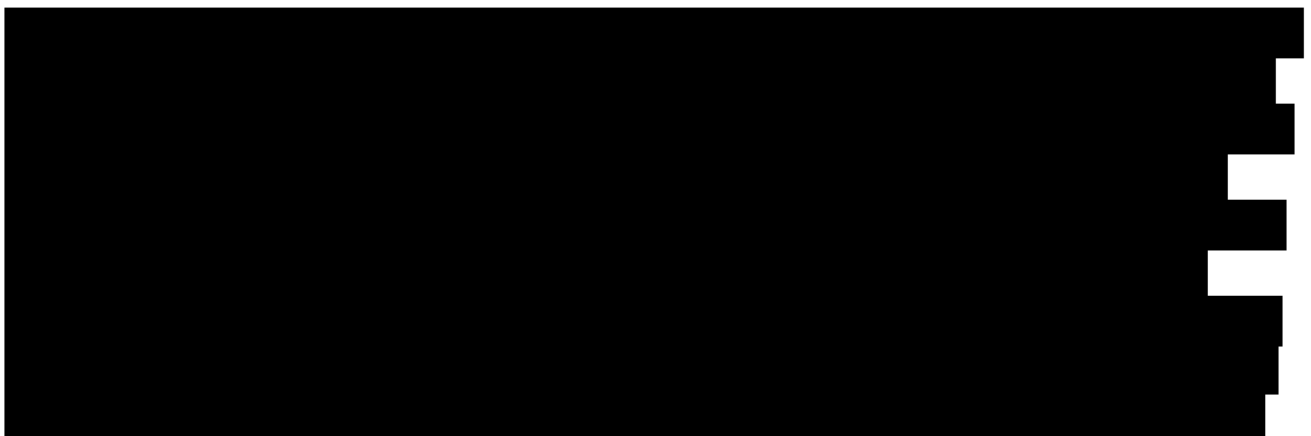
Within this section you can also demonstrate elements of your responses in visual form if relevant.

You must:

- use images sparingly and only to convey important information that cannot easily be put into words
- insert each new image onto a new line
- provide a descriptive legend for each image immediately underneath it (this counts towards your word limit)

Files must be:

- in JPEG, JPG, JPE, JFI, JIF, JFIF, PNG, GIF, BMP or WEBP format
- be smaller than 5MB



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6. Approach

Application question

How are you going to deliver your proposed work?

Explain how you have designed your approach so that it:

- is effective and appropriate to achieve your objectives
- is feasible, and comprehensively identifies any risks to delivery and how they will be managed
- uses a clearly written and transparent methodology (if applicable)
- summarises the previous work and describes how this will be built upon and progressed (if applicable)
- will maximise translation of outputs into outcomes and impacts
- describes how your, and if applicable your team's, research environment (in terms of the place and relevance to the project) will contribute to the success of the work

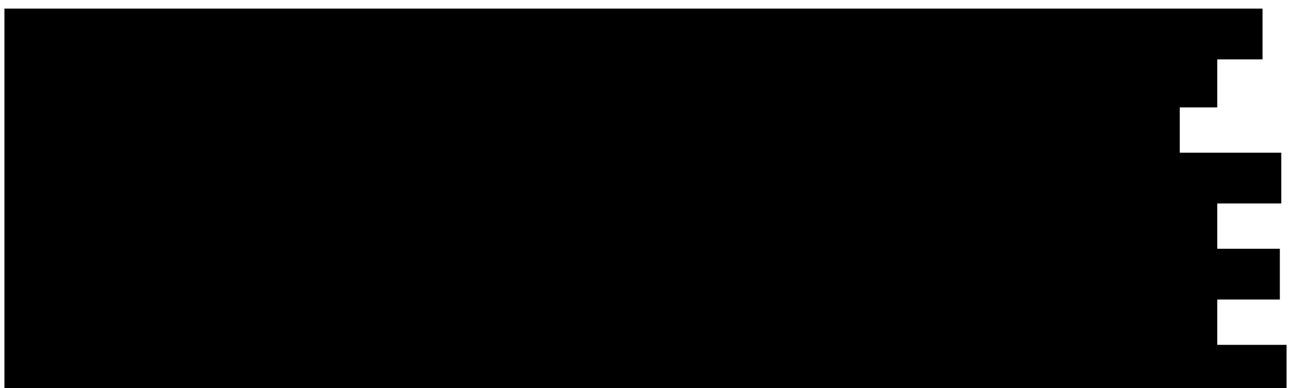
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7. Applicant and team capability to deliver

Application question

Why are you the right individual or team to successfully deliver the proposed work?

Evidence of how you, and if relevant your team, have:

- the relevant experience (appropriate to career stage) to deliver the proposed work
- the right balance of skills and expertise to cover the proposed work
- the appropriate leadership and management skills to deliver the work and your approach to develop others
- contributed to developing a positive research environment and wider community

The word count for this section is 1,500 words: 1,000 words to be used for R4RI modules and, if necessary, a further 500 words for Additions.

Use the Résumé for Research and Innovation (R4RI) format to showcase the range of relevant skills you and, if relevant, your team (project and project co-leads, researchers, technicians, specialists, partners and so on) have and how this will help deliver the proposed work. You can include individuals' specific achievements but only choose past contributions that best evidence their ability to deliver this work.

Complete this section using the R4RI module headings listed. Use each heading once and include a response for the whole team, see the [UKRI guidance on R4RI](https://www.ukri.org/apply-for-funding/before-you-apply/resume-for-research-and-innovation-r4ri-guidance/#:~:text=UKRI%20committed%20to%20adopting%20a,UKRI%20throughout%202022%20and%202023.) (<https://www.ukri.org/apply-for-funding/before-you-apply/resume-for-research-and-innovation-r4ri-guidance/#:~:text=UKRI%20committed%20to%20adopting%20a,UKRI%20throughout%202022%20and%202023.>). You should consider how to balance your answer, and emphasise where appropriate the key skills each team member brings:

- contributions to the generation of new ideas, tools, methodologies, or knowledge
- the development of others and maintenance of effective working relationships
- contributions to the wider research and innovation community
- contributions to broader research or innovation users and audiences and towards wider societal benefit

As a minimum, all named members of the Leadership Team should be discussed within this section of the form.

If references or citations are deemed appropriate, these should be included within the section's word limit. We would advise you not to include hyperlinks, as assessors are not obliged to access the information they lead to or consider it in their assessment of your application. If you are linking to web resources, to maintain the information's integrity, include persistent identifiers (such as digital object identifiers) where possible. You must not include links to web resources to extend your application.

Additions

Provide any further details relevant to your application. This section is optional and can be up to 500 words. You should not use it to describe additional skills, experiences, or outputs, but you can use it to describe any factors that provide context for the rest of your R4RI (for example, details of career breaks if you wish to disclose them).

Complete this as a narrative. Do not format it like a CV.

UK Research and Innovation (UKRI) has introduced new role types for funding opportunities being run on the new UKRI Funding Service. For full details, see [Eligibility as an individual](https://www.ukri.org/publications/roles-in-funding-applications/) (<https://www.ukri.org/publications/roles-in-funding-applications/>).

Within this section you can also demonstrate elements of your responses in visual form if relevant.

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8. Project partners

Project partner	Contact	Direct contribution	Indirect contribution
Lund University Lund, Sweden	[REDACTED]		[REDACTED]

Project partner	Contact	Direct contribution	Indirect contribution
University of Latvia Riga, Latvia	[REDACTED]		[REDACTED]
University of Alberta Edmonton, Canada	[REDACTED]		[REDACTED]

9. Project partners: letters (or emails) of support

Application question

Upload a single PDF containing the letters or emails of support from each partner you named in the Project Partner section.

Enter the words 'attachment supplied' in the text box, or if you do not have any project partners enter N/A. Each letter or email you provide should:

- confirm the partner's commitment to the project
- clearly explain the value, relevance, and possible benefits of the work to them
- describe any additional value that they bring to the project
- be no more than two sides of A4 per partner

Save letters or emails of support from each partner in a single PDF no bigger than 8MB.

Ensure you have prior agreement from project partners so that, if you are offered funding, they will support your project as indicated in the contributions template.

For audit purposes, UKRI requires formal collaboration agreements to be put in place if an award is made.

Do not provide letters of support from host and project co-leads' research organisations.



10. Ethics and responsible research and innovation (RRI)

Application question

What are the ethical or RRI implications and issues relating to the proposed work? If you do not think that the proposed work raises any ethical or RRI issues, explain why.

If you do not think that the proposed work raises any ethical or RRI issues, explain why.

Demonstrate that you have identified and evaluated:

- the relevant ethical or responsible research and innovation considerations
- how you will manage these considerations

If you are collecting or using data, identify:

- any legal and ethical considerations of collecting, releasing or storing the data including consent, confidentiality, anonymisation, security and other ethical considerations and, in particular, strategies to not preclude further re-use of data
- formal information standards with which your study will comply

Within this section you can also demonstrate elements of your responses in visual form if relevant.

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11. Resources and Cost

Total full economic costs (fEC)

£99,967

Total contribution from applying organisation(s)

£19,993.40
Total funding applied for
£79,973.60

Directly allocated

Cost categories

Category	Applied for
Staff	
Estates	
Other	

Staff breakdown

Name	Role	%FTE
Rick Schulting	Project lead	

Directly incurred

Cost categories

Category	Applied for
Staff	
Equipment	
Travel and subsistence	
Other	

Staff breakdown

Name	Role	%FTE

Indirect

Cost categories

Category	Applied for
Indirect costs	

Staff breakdown

No staff for this category

Exceptions

Cost categories

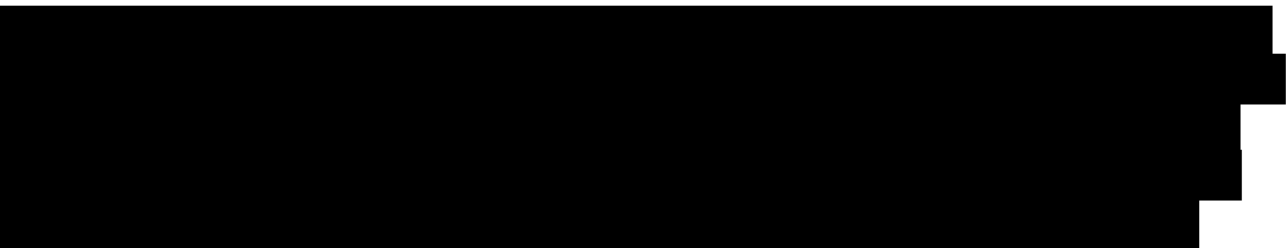
Category	Applied for
Staff	-
Equipment	-
Travel and subsistence	-
Other	-

Staff breakdown

No staff for this category



Justification of resources



[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]
