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Spherical stone ‘ring’ type II, c. 9 m deep – 35 m offshore, Zakynthos (Greece).

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A Student Perspective on the Present of Archaeology: IJSRA Editorial

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STUDENTS play a fundamental role in the present and future development of any academic discipline. With their idealism, passion for improving, and fresh and innovative perspectives, they are uniquely placed to foster changes in the academic landscape, particularly concerning the visibility and relevance of their work. Archaeology is not yet economically self-sustainable. Therefore, it depends on public funding and development to maintain its research activity. In the age of publish or perish, where research and impact has to be measurable and quantified, funding availability is widening the gap between the opportunities available for student research and publication throughout the world. Some eminent researchers have argued that there may not be a need for another publication. In fact, I agree that the publishing sector is already oversaturated with low quality publications aiming to profit from the anxieties of those students in their early researching careers who, due to limited institutional support or funding, face serious limitations to present their innovative research and hypotheses to the broader academic community through an international publication. The student need and enthusiasm for an independent international publication run on a voluntary basis for and by students has been shown by the multiple messages of support and encouragement received over the past year, and by the considerable number of submissions received. We have only been able to publish less than half of the total number of submissions in this first issue. We are very positively overwhelmed by the way in which the Journal has been received. I believe that international and cooperative ventures are the way forward in a context of in-

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creasing nationalisation and politicisation of research perspectives. The academic discipline of archaeology has been maturing for over a century. The initial interests for undertaking archaeological fieldwork in order to prove metanarratives of cultural evolution and supremacy discourses, or for the antiquarian pleasure to collect and classify antiquities, are being increasingly questioned. As Trigger (2006) argues, archaeology is not a universal or self-evident activity, and, as such, it is important to be reflexive about why we are still conducting research, and for whom such research is relevant. Archaeologists may claim that their work is politically neutral, but the embodied memories of archaeological remains are symbolically imbued with political significance (Meskell, 2012). Thus, archaeology can easily become politicised – used as part of a propagandistic agenda. Archaeology is capable of legitimating certain views on the past (Alexandri, 2002); thus, by controlling its practice, a politically correct historical narrative of a nation can be constructed. At the same time, in the current context of globalisation, the control of the archaeological discipline becomes an accepted stance through the conceptualisation of a ‘national heritage’ (Özdogan, 1998). A country can assert its political independence through claims to heritage ownership: “*we study our past*”. This is what I call here the “vernacularisation of archaeological praxis”, what I see as a rising phenomenon in the twenty-first century.

Illustrative examples of this concept are the availability of state funding for excavations by local archaeologists in developing countries (China, Kazakhstan, Ukraine, Russia, Brazil, etc.). In addition, the independent presence in a certain nation-state of foreign archaeologists is increasingly being perceived, at least informally, as a potential ‘threat’, because they could challenge newly-constructed political narratives of a national past. This phenomenon is particularly relevant in post-colonial nation-states. Therefore, I would argue that this vernacularisation is a natural attempt from nation-state governments to control the internationalisation of national research throughout the world. State control is relevant in countries where heritage is ubiquitous (such as Greece, Turkey, China or South Africa, amongst many others), and it may also be initially intended to preserve the integrity of this ‘national heritage’, although this strategy is not always successful. Cuts on state funding availability (on infrastructure, bureaucracy and surveillance), derived from austerity measures (Phillips, 2012), a limited increase of new thorough scientific excavations, and a decrease in foreign academic funding due to an increase of state control and dependence for conducting excavations, are present trends in the landscape of archaeological practice. I argue that they are the central causes behind the lack of both adequate publishing of archaeological research, and the inadequate maintenance and protection of heritage sites in many countries.

Undoubtedly, the potential of archaeology to explore questions about our past and about ourselves is an attractive dimension of its practice; however, the quasi intimate and subjective nature of this enterprise should make us realise that past remains of material culture and heritage are not equally perceived by everyone. We have realised that the personal perspectives that our interpretations of the past as humans, not just as students of archaeology, at times raise complicated ethical dilemmas (C. Scarre and G. Scarre, 2006). One example is the profit-driven looting of archaeological contexts. Whereas most researchers and a large number of the public and individual citizens conceive archaeological materials as worthy of respect and consideration for their embodied memories and the past they represent, archaeological objects are frequently ascribed an economic value. This commodification of past material culture, fostered by the demand of art dealers and private collectors of antiquities, is a serious issue in the

preservation and recording of the present presence of past material culture (Proulx, 2013). The legal framework around heritage protection is not proving enough to stop organised criminal activities capable of transcending national boundaries. At the same time, the socio-economic profile of looting is changing, particularly in crisis-struck countries, such as Greece, or those facing a war/post-war context (Irak, Syria, Lybia, etc.). Some of these irregular interventions are becoming subsistence activities, given the rise in applications for metal-detector permits and the number of first-offender cases concerning their inappropriate use (*Strapped for Cash, Some Greeks Turn to Ancient Source of Wealth* 2015). Together with the decrease in state-funding for the protection of archaeological sites, the integrity of archaeological collections and, particularly, unexcavated remains in Greece are now facing serious threats. Lieutenant Monovasios (in *Strapped for Cash, Some Greeks Turn to Ancient Source of Wealth* 2015) argues that although the effects of the crisis will be gone one day, the impact that looting will have on the identities of future generations will endure. Without denying the importance of heritage, it is imperative to consider that the initial elements of the looting chain (farmers, construction workers, etc.) are facing poverty and deprivation, and looting offers them a temporary solution. I would argue that policy-makers, archaeologists and officers need to raise further awareness of the illegality of looting archaeological contexts, but also to contribute towards the resolution of the deeper issues that are causing lay people to engage in these destructive activities.

The purposeful defacing and destruction of heritage by IS and other extreme religious or political groups is a further dimension of the differential perception of the value of past material culture. Heritage can be relevant to the local population, who may demonstrate their importance frequently or occasionally, in special circumstances, when heritage items play a paramount role as embodied memories of past events worth commemorating. The appropriation of their meaning, and the destruction of the material representation of their significance, have been, throughout history, ubiquitous features in the repertoire of those using force to exert their claimed cultural and political superiority. The apparently radically different political strategies of Saddam Hussein being depicted as an Assyrian ruler, and destruction of Iraqi Assyrian heritage, conducted under the name of IS, are acts which exemplify the political exploitation of archaeology. Nevertheless, a novel feature of the globalised reality of the twenty-first century is that local destruction of heritage has become a powerful political statement at an international level, associated with the tragic loss of human lives in armed conflicts –Khaled Asaad, Syrian archaeologist in Palmyra, in memoriam–. This politicisation of heritage destruction is possible because of the intellectual historic background of democratic, late capitalist societies tends to consider archaeological remains in a universalistic sense, as if they represented the shared past of all living humans (Holtorf, 2006).

Furthermore, heritage sites represent valuable economic assets, given their potential to attract tourists (Meskell, 2002), particularly if they are famous and spectacular. IS and related organisations are not necessarily aiming to destroy the past, but to alter the socio-political shape of the present. With the destruction of sites, they are not only purposefully erasing pre-Islamic heritage and ways of experiencing life, they are also, strategically and in relatively inexpensive ways, challenging the international authority of Western societies, who established legal frameworks for the protection of heritage in armed contexts (Gerstenblith, 2009), but are not being able to enforce them. I would argue that archaeological sites are valuable provided that we accord value to the personal and collective memories that they embody and symbolise, not because of their material existence –as ruins, broken pots or burnt bones. Symbols of memory

do not need to be labelled World Heritage Sites and be made of gold, silver or marble in order to be worth destroying, or protecting. Furthermore, and given the paramount role that material culture plays in the processes of cultural self-identification, the destruction of heritage in ethnic conflicts, such as the Mostar Bridge during the Yugoslavian war (Chapman, 1994), goes beyond military strategy, as it seeks to attack the material roots of certain communities' past, as a way of ideologically destabilising them. Thus, archaeologists must engage in the communication and the sharing of knowledge in ways comprehensible for local communities and wider audiences, in order to ensure that these memories are understood, and respected.

Another thoroughly-explored example is the existence of different approaches towards ancestral human remains by indigenous people and researchers. The implementation of the Native American Graves Protection and Repatriation Act (NAGPRA), and discoveries such as Kennewick Man, have sparked relevant debates regarding the ownership and control of the narratives about the past (Bruning, 2006), further exemplifying the political dimension of archaeological practice. Archaeologists tend to consider their research relevant for broadening our understanding of the socio-economic context and the demographic history of American populations. On the other hand, indigenous communities tend to place greater emphasis on their oral histories as a reliable source of ancestral knowledge, and perceive archaeological practices as an attempt to control their heritage and sense of history. They further argue that exhumation of physical remains for scientific studies is disrespectful to their ancestors, and it could have negative impact on their descendants. These legitimate claims have to be considered by post-colonial archaeologies, who should cooperate with indigenous groups and fully engaging the communities (Hodder, 2010), listening their voices, their conceptualisations of the past, and considering the value of their traditional knowledge for a more complete interpretative framework (Wilcox, 2010; cf. for perspectives on archaeology in Africa: Pikirayi, 2015). A collaborative, respectful enterprise needs mutual commitment in order to make research an enriching learning experience for all the people involved, from the beginnings of the process of knowledge creation to publication.

Publication is a fundamental dimension of archaeological practice. Publishing is not just a record of the processes and methodologies, it frequently involves the interpretation of the embodied memories of what we excavate. Some of the most prestigious publishing brands and journals follow a traditional, subscription-based (or pay-per-view) model of publishing. This model limits the impact of the research of authors by preventing unsubscribed readers access to the contents of the articles. Besides, each article represents a very high cost to the academic community, even though most university students, and virtually everyone outside academic, will not be able to access the research. In the age of digital information, the existence of online repositories has made this model hard to justify. In addition, it preserves and even increases academic inequalities between those institutions and individuals who can afford the exorbitant subscriptions and those who cannot. Authors agree to give away their research and limit the readership of their papers because these journals are reputed brands which will look good on individual CVs. Open Access is an alternative approach. "Golden" Open Access journals follow a different, pay-per-publish, model. This profitable invention promises an increase in readership and public impact for research. In exchange, it is now the funding agencies of the author who pays the publishing costs. It is certainly a laudable movement towards the democratisation of global access to research, a for-profit compromise of traditional and Open Access approaches. Nonetheless, predatory journals have unprofessionally exploited this busi-

ness model merely to gain profit, and without the aim of furthering scholarship. Traditional publishers have been slowly embracing a mixed model in response, combining a “Golden” Open-Access policy, charging author processing fees (APF), with the subscription approach. Publishers have thus been increasing their profits, but the costs of institutional access to research of the institutions continues to increase in this way (*Open access fees hike universities’ journal bills 2015*), as they have to pay both subscription and publishing charges.

Traditional access obstacles for readers may become new limitations to authors. I would argue that authors are paying a fictitious price for a service they should not actually need. Why should authors pay large fees to publishing houses (most of which is pure profit) for making their research available to the public, when much of the peer-reviewing process these journals are credited for tends to be done mostly as free service by academics? Because they, as individual researchers, have no choice at the moment if they want their published papers to be fully available, without committing the ‘crime’ of making their research material, copyrighted by traditional publishers, open to readers. A convenient dichotomy between researchers and publishers, due to conformity, lack of knowledge or experience, is having clear consequences. Whereas authors are having increasing trouble to find ways to fund *their* research, publishers –as intermediaries–, are getting the material revenue of *their* work. The situation of the academic publishing landscape is economically unsustainable for institutions (*Harvard University says it can’t afford journal publishers’ prices 2012*), researchers, and students. Archaeologists, and researchers in general, need to join efforts to act cooperatively: peer-reviewing is already being done for free, we just need top researchers to coordinate the editorial and publishing process of the new generation of leading journals on a voluntary basis. Generosity and cooperation are the way forward to debunk a for-profit industry which is channelling research to media impact in order to furthering profits instead of advancing science and knowledge. It is going to be a long, slow and demanding process, but it promises to decisively alter the future of the academic landscape for the better.

The twenty-first century is full of opportunities for archaeology students. Increasing opportunities for mobility of students and faculty is opening a greater array of work and research possibilities, thus creating an environment which improves knowledge transference and provides access to world-class institutions. The multicultural environment of modern universities adds a further enriching dimension to the learning experience. Moreover, the development of technology has facilitated access to vast quantities of information and has fostered international collaborations between scholars. At the same time, there are some challenges to overcome. In contrast to the early years of the profession, when the number of trained archaeologists was relatively low, the number of new archaeology graduates is increasingly rising, perhaps at a faster pace than existing demand within the field. This is the case in countries, such as Spain, the US, Canada or the UK, where uncontrolled growth fostered an over-dependence of a development-led archaeological focus (Aitchison, 2009). The collapse of the real estate bubble and the sub-prime mortgage market, and the subsequent decline in the number of opportunities, both in terms of jobs and projects, revealed the instability within the field. The short-term perspective of most of the development-led archaeology companies, focused on immediate gain rather than on economic sustainability, will need rethinking if the private archaeological sector in countries such as Spain is to be reconstructed with solid foundations (Hamilakis, 2015). I argue that the solution to the problems that students are facing to find employment should not be tackled through a perspective of competition. The mentality of our society, and thus,

of most of its members, emphasises individual self-development, individual gain and individual success. Nevertheless, a forum within a cooperative approach, where students interested in improving our social reality, coming from different backgrounds, can share their ideas and discuss solutions would be a far more beneficial learning experience. The technology of the twenty-first century offers resolved people the possibility of becoming a team with the ability to make positive impacts in the field of archaeology, offering a suitable environment where to present and discuss innovative solutions to the challenges facing our discipline. I want to be part of this team, and I invite you to join us.

We are the *International Journal of Student Research in Archaeology* (IJSRA). We are the first independent, unaffiliated and markedly international journal focused exclusively on student academic research in archaeology. Our aim is to become a global reference point, a free, open-access, international forum for the exchange of excellent student scholarship in a context of constructive dialogue and inclusiveness. We are developing a platform and a methodology to ensure that this forum makes a real impact in the realm of student research in archaeology. This *Journal* seeks to enhance the academic experience of students worldwide by publishing their quality research, review articles, perspectives about the state of the field and any additional material useful for students and anyone interested in any aspect of archaeology.

This peer-reviewed *Journal* shows that young researchers have the ability to apply their knowledge in innovative and successful ways, incorporating locally relevant narratives into wider archaeological discourses, and thus addressing the issue of the isolating overfragmentation of national and corporate research agendas (Mizoguchi, 2015). We are run by students on a voluntary, not-for-profit basis. We believe that getting involved in the publication process, both in its author and editor aspects, is a great opportunity for university students to develop their writing, reviewing and publishing skills. Our *Journal* values and encourages diversity. It aims to foster global participation and to attract the submission of the best student research in archaeology, regardless of academic institution, nationality, gender, ethnicity or religion, in order to enhance international cooperation and mutual understanding. If you are interested in supporting our philosophy, please get in touch. With that said, I am proud to present you our first issue.

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Presentation of the first issue of the *International Journal of Student Research in Archaeology*

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ARCHAEOLOGISTS are relevant social agents, and they should aim to demonstrably present our work as interesting and useful. We have the social responsibility to make knowledge available for the public engage with our audience, and to reach people outside the discipline. The practical side of archaeology can be one potential scenario. As *Lilla Vonk* notes, the possibility of interacting and experiencing the past through and engagement with heritage generates fascination and activates imagination, positively impacting the well-being of dementia and arguably other mental health patients. Our discipline can provide an invaluable source of motivation for continuing healthcare in a more enjoyable and meaningful way. Another possibility for public engagement is through the presentation of both research and interpretation. *Antonio Sánchez*, in his study of Roman *viae* in Hispania, convincingly argues that archaeology is not limited to excavation and recording. The public dimension of heritage ownership demands that it should be known and respected by everyone, and museums can become a platform for this shared exploration of the significance of archaeological remains. The conservation and curation of museum pieces thus become a paramount dimension of archaeological practice due to their relevance in public presentation and heritage display as embodied materiality of historical memory. *Wael Gabo Elgat* reports the scientific methodology behind the treatment of Khedive Ismail's antique gun at the NMM-Saladin Citadel in Egypt after suffering a certain degree of decay.

The study of the past has a clear socio-political dimension in the present, both in the construction of interpretive narratives and in the process of public reception. *Arba Bekteshi* investigates the implicit intersection between archaeological interpretation and the political context in which this process takes place. Certain political regimes utilise archaeology in order to construct and present and actively manipulated vision on the past, with propagandistic purposes. Nationalist narratives tend to portray an idealised notion of a by-gone past which paradoxically embodies the anxieties and political desires of grandeur and supremacy imagined for the future of the community, and these perspectives are illustrated by the case of Illyrian numismatics in interpretations of Albanian archaeology during the communist period. Arba advocates for increasing awareness of the cultural baggage of these practices for the future of the discipline, which methodologically and theoretically should continue its move forward from a culture-historical approach to a more nuanced, post-colonial and interpretive academic land-

scape. In relation to the reception of archaeological knowledge, *Ariane Maggio* argues that identity is socially-constructed concept based on personal experiences throughout our lives. She explores how the scientific research and knowledge about biological notions, such as genetic inheritance can have a public impact in transforming or reinforcing our perspectives of relatedness as a species, decisive in the dynamics of positional relationships of humans within our socio-cultural worlds.

Human life and social organisation is not dependent on any single factor, so simple narratives about the origin and collapse of societies are, by definition, incomplete. Neither are humans doomed to fail in difficult natural environments, nor are they completely isolated from their influence. *Dylan Davis* presents in this paper a complex explanatory framework on the tetra-dimensional influence of climate. He considers the interrelation of multiple factors in the interpretation of the causes of the flourish and decline of civilisations, applied to the case of the Roman state. Instead of arguing for a single, definitive cause, he argues that environmental, economic, and socio-political contexts are presented as mutually influential in cultural change, supported by a wealth of diverse data, from palaeoenvironmental diagrams to archaeological interpretations of shipwreck patterns and the differential trade interactions between Roman communities through time.

The times where a Western white archaeologist engaged single-handedly, without assessing the influence of his own background, in the interpretation of archaeological remains are now part of the history of the discipline. The practice of archaeological research now is decidedly more inclusive and recognises the multivocality of the evidence. *Lucy Northwood* reconsiders how particularities of past local experiences need to be taken into account through a broader characterisation of their cultural context. Her inclusion of Hindu religiosity, local narratives and a critical phenomenological approach in order to achieve a more nuanced interpretation of the embodied relation between humans and their landscapes in India. *Rick Takkou* and *Sonja Dobrosky* explore the usefulness of alternative approaches to archaeological practice in challenging contexts. In their surveys, they apply post-colonial methodologies to the prehistory of the classical world, incorporating the voices and experiences of the local community of Zakynthos into the processes of knowledge production, in a more socially-engaged conceptualisation of archaeological research.

Archaeological interpretation is constantly influenced by theoretical developments in other disciplines. In addition to its long-standing relationship with anthropology, archaeology has borrowed and applied concepts from both natural sciences and humanities. *Margaret Scollan* illustrates the application of niche-construction theory for understanding the interaction between humans and their living environment. The domestication of animals and the sedentarisation of human communities represented an innovative context which fostered the development of pathogenic agents. Humans had to adapt against these pathogens by developing cultural responses to alleviate their impact. Solutions derive in new problems, so human communities and the elements of their environment are entangled in the engagement to create alternative niches in which to thrive, in an interrelated, co-adaptive process. *Vivian van Heekeren* assesses the integrative potential of Panofsky's multi-layered approach to explore the symbolism and the meaning of the elements present in the Memento Mori mosaic from Pompeii. These interdisciplinary perspectives can contribute to further enriching archaeological interpretation.

A fundamental dimension of the practice of archaeological interpretation is to reconsider previous knowledge on the basis of the evidence available. Several papers deal with reassessing claims or misconstrued narratives about the past. Colonial encounters fostered the reconsideration of notions of identity and racial purity, which I perceive them to be cultural classificatory schemes to regulate and stratify the internal hierarchies in social relations within multicultural environments. *Kelton Sheridan* specifically deals with the question about the relevance of the notion of hybridity recently posed by S. Silliman. The author argues that the notion of hybridity, not as a condition but as a process, is still relevant as a concept, insofar it reminds us humans of the reality of our inherent genetic intermixing, making irrelevant claims supporting discrimination based on supposed biological or racial grounds.

Another important type of reassessment encompasses a more nuanced understanding of the past. *Helen Rayer* challenges the traditional academic conceptualisation of the functionality of settlements in Britannia, avoiding a strong dichotomisation between civil and military in Roman times. She argues that there is an intrinsic relationship between both aspects in the nature of the organisation of social relationships within the context of the Roman presence in Britain. *Sam Hughes* explores how the shape of Irish Iron Age swords represents an adaptation of ‘global’ trends in military weaponry to localised warfare needs. He reminds that archaeological objects were functional items of daily life, rather than just typological markers in seriation sequences.

Archaeologists sometimes tend to perceive ‘cultures’ as discrete entities, and relationships between them tend to be restricted to material exchanges. *Bertie Norman* presents an ambitious comparative project exploring the influences in Homeric epic narratives of contemporary cultures, proposing the notion that the Homeric underworld could be based on real experiences and geographies. These texts were written down in the Archaic Period, but are arguably deeply rooted in Bronze Age conceptualisations of warfare and worldviews of Eastern Mediterranean societies.

Hypotheses and interpretations about the past through material remains should be assessed for their plausibility. In this issue, three authors specifically deal with methodologies for hypo”-thesis”-testing. Contemporary intensive archaeological research is characterised by the gathering of large amounts of data, which, need to be processed and interpreted. *Alix Thoeming* considers computational and mathematical procedures to render patterns understandable. She argues that programs such as the Naïve Bayes Classifier can complement intuition, knowledge and experience in the interpretation of correlations in the archaeological record. Alix applied it to the variability of decorative designs in Viking-age stone runes in order to discern whether any temporal pattern can be discerned, given that they cannot be dated through other conventional techniques. She also highlighted the usefulness of statistical analyses for testing and discarding hypotheses, or to confirm the non-existence of patterns which may have otherwise been used for seriation purposes. *Camilo Barcia García* incorporates advanced spatial methodologies, including GIS, to test hypotheses about human behaviour and the management of social space in the Palaeolithic, through the case study of the Lower Gallery of La Garma (Cantabria, Spain). Another way of testing hypotheses is through experimentation. *Amanda Gaggioli* incorporates here an additional line of evidence in support of the archaeological interpretation of functionality of early stone points in the Americas. Experimental archaeology is increasingly recognised as a source for broadening our understanding of the intricacies of the technological processes involved in the production of tools by past human communities.

We are delighted to announce that in this issue we have included two interviews with key academic archaeologists. We are grateful to Prof. Brian Fagan (UC-Santa Barbara) and Prof. Rosemary Joyce (UC-Berkeley) for accepting our invitation. We have also included in this issue reviews of archaeological conferences which are specifically oriented towards students, such as *ASA* or *NASC*. We are very grateful to the conference coordinators for their enthusiasm in collaborating with us. We have also included three other conference reviews by students (*ASAPA*, *NZAA*, *WESIPS*). These conference reviews contribute to the exploration of the international dimension of archaeological research and the opportunities available for students to get involved in the further diffusion of their research.

In the dialogue with *Prof. Fagan*, he reminds how important is understanding the historical dimension of archaeology as a discipline, bearing in mind that colonialism and the expansion of the global empires did foster research throughout the world, setting an agenda which is increasingly adapting to a post-colonial theoretical landscape. He argues that academia, particularly the US system, is too focused with testing and grading, which is “mindless nonsense and counterproductive”, but, in his view, the “total obsession in academic archaeology” is the notion of ‘publish or perish’. I think that this drive encourages shorter research projects, which may not fully explore the addressed questions. Furthermore, Prof. Fagan argues that publishing and the diffusion of archaeological knowledge should not be restricted to senior folk; “quite the contrary”. Students should contribute to the dialogues for the discipline to retain its vitality. “Without new ideas, fresh faces, and innovative perspectives, we are nothing”. This public outreach is paramount, because, although “it’s fatal to assume that everyone is interested in archaeology”, we “cannot afford to be an ivory-tower discipline divorced from the real world”. Archaeology has a fundamental contribution to make “about cultural and biological diversity, and about the nature of being human”. What is more, I think that through the long-term perspective derived from the nature of its evidence, archaeology provides a clear insight into the notion that things were different in the past, and that they can be different in the future.

Prof. Joyce explains how important is to engage students into the active learning of useful research skills, which can be applied to professional practice. Teaching therefore could be adapted to the motivations of the learners, who would explore and discuss those aspects in which they are interested the most. Moreover, with the anxiety for unpublished data in research and the inherent fieldwork limitations in terms of money and time, *Prof. Joyce* reminds how useful research sources can museum collections be for students. Museums also have a key role to play in public engagement with archaeological knowledge, and can become places in which taken-for-granted can be challenged and transformed, although these institutions should acknowledge that the information they present is “an interpretation, not a timeless truth”. *Prof. Joyce* notes that archaeological publishing needs to be updated to the context and needs of the twenty-first century: archaeologists should “create a network of knowledge production”, quicker and focused in advancing our understanding, rather than delaying publication until having the big statement in pursuit of individual recognition. We students should develop our careers as generous scholars, mindful about the consequences that our interpretations about histories have for past and present societies, explaining what are we doing through archaeological research and interact with local communities.

“I think we show a great failure of perspective to worry about [the abstract global past] when so many people have been killed, wounded, and displaced. How would I like to

solve this? Stop the wars. Stop strategic invasions. Stop drone strikes. Stop the international traffic in arms. (...) Spend less of our time pursuing big history, and more writing the textured histories of the local, the everyday, and everyone.”

—Prof. Rosemary Joyce

Prof. Joyce reminds that archaeology shows that societies can fail to meet challenges, and that “we can kill ourselves through insistence that doing the same thing will work”. I believe that archaeology can become a constant reminder that we can change and improve the current socio-historical context we are living in.

I would like to thank everyone who has engaged in all the different stages of this innovative project, particularly authors and reviewers, for their support, participation and patience. We are looking forward to continuing our role in the future, increasing the international presence of student archaeological research and practice.

Part I

ARTICLES



Archaeology's Potential for Active Engagement in Dementia Care

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Dementia is prevalent among the elderly population of Europe, and cases of dementia are expected to increase rapidly in the coming years. While dementia has severe psychological impact and social consequences for individuals, it has primarily been studied from a neuro-medical viewpoint. Understandings of the psycho-social implications of the syndrome and consequences for wellbeing and quality of life are topics that have begun to emerge only in the previous two decades. The involvement of disciplines other than those stemming from the neurological and medical fields, can enrich the lifestyle and wellbeing of dementia patients. This paper argues that archaeology can make a valuable contribution to European dementia care. It sets out a theoretical argument that builds on previous initiatives involving archaeology and heritage within a health care context. I argue that specific characteristics of archaeology make it suitable for such an involvement. I conclude that engaging in archaeology-based activities could be beneficial for the well-being of people with dementia.

Keywords: Archaeology, heritage, health care, dementia, wellbeing, quality of life.

Abstract
(In Dutch see below)

CULTURAL heritage and archaeology are attributed with great social potential, which should be developed and tapped into over the coming years. In a recent publication, the European Commission referred to cultural heritage as “a significant force for 21st century Europe ...It is being discovered by both governments and citizens as a means of improving economic performance, people’s lives and living environments” ([Getting cultural heritage to work for Europe 2015:5](#)). For the archaeological sector, social relevance is particularly gaining in importance. Social relevance is a crucial and integral part justifying archaeological practice as well as determining its significance within current societies (Boom, Dries, and Linde, [n.d.](#)). Furthermore, the Faro Convention (Council of Europe, [2005](#)) underlines the importance of public involvement with cultural heritage, connecting social and cultural development with an improvement in quality of life (Council of Europe, [2005:5–7](#)).

This last point is a particularly interesting avenue to pursue. While the Faro Convention stresses the significance of cultural heritage for society at large, there are groups within European society that could benefit more, from an involvement with cultural heritage. I would

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like to argue here that the social potential of cultural heritage, and specifically archaeology, has particular benefits for persons affected by dementia. The premise of this paper is that the cultural heritage sector could be a particularly powerful contributor to dementia care, and that it is time to gain insight into the ways in which, the cultural sector and archaeology, can actively contribute to developments within dementia care in the near future.

One of the consequences of dementia, which will be discussed further on, is the occurrence of behavioural changes in individuals that can take various psycho-social and physical shapes (such as frustration, aggression, boredom and wandering). Traditionally, care for individuals with dementia has, perhaps justifiably, primarily focused on dealing with, what was viewed as, negative behaviour and consequences in ways that can be characterized as symptom management; mood and behaviour were to be controlled, if needed by using medication (Kitwood, 1993:541; Kitwood, 1993:541). The tendency of using antipsychotic medication to counteract negative behaviour has been shifting over the past ten years, but there remains considerable room for improvement (Banerjee, 2009:39–44).

As far as scientific research is concerned, dementia has for a long time been approached from a purely medico-scientific viewpoint. Much research has focused on the prevention and neurological progress of dementia, but not on the important social and psychological implications and consequences of this condition. Meanwhile, there is a large and increasing group of people suffering from dementia, who are dealing with decreased quality of life and a poor general sense of well-being as a result of their condition and the way it is handled. This is an urgent matter, but different approaches, hailing from different fields other than the medical and neurological ones, provide promising ways to tackle this problem.

In this article, I will explore the possibility of an involvement from the archaeological and heritage sector in health care, and later more specifically in dementia care. Firstly, I will elaborate on the increasing prevalence of dementia and the implications of the condition in regards to quality of life. Subsequently, I will set out my argument building on a recent initiative that brought a heritage-based activity to different health care settings.

The demographic aging of Europe

In order for the cultural heritage sector to connect favourably with society, it is crucial to keep societal trends in mind. Currently, Europe's elderly population is steadily increasing (Grut and Zipsane, 2013:8). Demographic trends over the recent decades show the younger generation is decreasing, due to a declining number of children per family, whereas the life expectancy for the existing and elderly population is growing (Grut and Zipsane, 2013:8). Faced with these aging populations, European societies are beginning to re-think their existing economic and societal structures in answer to the challenges that accompany this demographic development (Grut and Zipsane, 2013:9). One particular challenge is that as the elderly population increases, so do the cases of dementia. In 2009, it was estimated that in Western Europe 6.98 million people are living with dementia, a number which is expected to increase to 13.44 million in 2050 (Alzheimer's Disease International, 2009:8). In response to these current demographic trends, the EU has stated that life-long learning is an important strategic tool to improve social cohesion and economic development (European Commission, 2010:12). Another important aspect and potential challenge for aging populations is their quality of life. Several initiatives throughout Europe have made use of cultural heritage to stimulate elderly people's mental health and wellbeing by providing learning and participatory activities (Grut and Zipsane, 2013:8). However, these initiatives mainly focus on the segment of the elderly population that is not affected by mental health problems, such as dementia. Initiatives that do

target individuals with this condition while addressing their quality of life through a cultural heritage approach are not widespread. This is unfortunate since, especially for this segment of the population, quality of life and the improvement thereof is an important issue. Moreover, heritage approaches to this topic show a distinctive potential which deserves further attention.

Here, it is useful to elaborate a bit further on the concept of quality of life. Quality of life is an index for the general well-being of both individuals and societies. It consists of several sub-indicators, such as health, living environment, education, leisure and social interaction. Within health care, the perceived quality of life is expressed in the so-called health-related quality of life. This health-related assessment of quality of life specifically considers how disease or disability affects the well-being of an individual (Centers for disease control and prevention, 2011). The indicators are divided into several domains. These domains vary from physical to social and environmental markers. The latter comprises the opportunities and participation in (cultural) recreation and leisure. There are currently multiple instruments in use to assess quality of life, which are often tailored to specific groups such as elderly people with dementia. Indicators can vary depending on the assessment instrument applied. No specific instrument is central to this paper, and quality of life will therefore refer to general categories that recur in multiple instruments, such as social contact and opportunities for participation in recreational activities and leisure, than to points within these categories that are more specific to particular instruments.

Dementia is an umbrella term for conditions which entail the progressive loss of cognitive functions, severe enough to interfere with a person's daily functioning. Dementia itself is not designated as a disease; but rather a cluster of symptoms that can accompany a disease such as Alzheimer's or Parkinson's disease. When caused by a disease, the process is considered to be irreversible and no clinical cure exists. There are different types of dementia, and while each type has a set of specific characteristics, the aforementioned general pathology remains similar (Alzheimer Europe, 2013). Old age is an important risk factor, and the vast majority of dementia sufferers are individuals aged over 65. Dementia can be distinguished from so-called age-associated memory impairment by the severity of cognitive decline. Age-associated memory impairment is considered as only very mild cognitive decline, which manifests itself in memory deficits – such as the forgetting of names or the placement of familiar objects. However, this does not affect an individual's ability to participate in social engagements. In comparison, cases of mild dementia do affect this ability, as dementia causes moderate cognitive decline, resulting in decreased concentration, gaps of memory concerning one's personal history, and a decreased ability to travel and handle finances. As dementia progresses individuals increasingly lose their independence, and eventually become entirely dependent on others to take care of them (Reisberg, 1983).

The progression of dementia has serious implications for the quality of life of individuals affected by the condition. It causes an increasing rate of dependency while at the same time, placing individuals at greater risk of becoming socially isolated. As the condition progresses, an individual might not be able to pursue the hobbies or activities that interested them previously, which can lead to boredom as well as physical, social and cognitive under-stimulation and isolation (Alzheimer's Association, 2013). Dementia has thus come to be described as a condition that seemingly strips away personhood, agency and social contacts, including intimate relationships as well as social confidence, causing apathy or depression in many cases (Kitwood and Bredin, 1992:274,284). Another important factor is the way dementia is handled and viewed,

Dementia and implications for quality of life

not only by those suffering from it but also by those in their immediate surroundings. Decline and loss of abilities are often strongly emphasized, which only reinforces the feeling of impairment. The consequence of these diverse factors is an increasing and significant loss of quality of life and well-being.

For a long time however quality of life has not been central to dementia research, which rather focused on the medical and neurological aspects of the condition instead of the persons suffering from dementia. This changed in 1992 when Kitwood and Bredin published a novel article presenting a person-centred approach to dementia. Kitwood and Bredin suggested that while neurological degeneration is a determinant for an individual's performance; personal psychology and social environments are also equally important influences on the progress of dementia. Most importantly, Kitwood and Bredin advocated that social interactions could be the key to improving the condition of affected persons, and may even halt the progress of their condition. He connected social activity to so-called "rementia", the regaining of formerly lost cognitive capabilities (Kitwood and Bredin, 1992:271,280). Since then, concepts like quality of life and well-being in the context of dementia have generated more attention, interestingly also from the cultural heritage and archaeology sector.

Some initiatives have already begun to explore the role cultural heritage could potentially play to improve the well-being of patients in the health sector. I will now discuss one of these initiatives in order to illustrate the potential of a heritage-based approach within health care. This specific project has shown encouraging preliminary results, which could prove particularly insightful in the context of dementia care. Furthermore, the research was conducted in several different care situations: in a hospital offering acute care, a psychiatric hospital, an elderly care home and within two neurological rehabilitation units, suggesting such an approach would be applicable within varying contexts (Ander et al., 2013:231–232).

The project in question is called "Heritage in Hospitals", an initiative that took place in the United Kingdom. The program was developed in 2008 and the results and outcomes, originating from data gathered from over 250 participants, were published in 2013 (Ander et al., 2013). Project organisers brought a box of artefacts, loaned from university museums, to an audience that had been excluded from museums due to hospitalization or long-term stays in care homes. The artefacts came from archaeological, zoological, geological and art collections and were all relatively small objects (a necessary criterion for transport) that were fit to be handled. Depending on the context of the institution, either one-to-one (in the hospital and two rehabilitation centres) or group (in the elderly care home and the psychiatric hospital) sessions were carried out, wherein participants, alongside museum professionals, handled artefacts. This project sought to gain an understanding of the therapeutic effects of a so-called "museum intervention" in health care contexts (Ander et al., 2013:230–232). Grounded theory was used to collect and analyse the data: an impact-assessment of the sessions was established by coding 51 transcribed session-recordings, and the coded data was subsequently tied to an instrument used to measure indicators of well-being (Ander et al., 2013:237–239). The key outcomes of this project have been described as "engagement processes" and "expressions of wellbeing" (Ander et al., 2013:234). The measures taken after the intervention when compared to the baseline measure (a measurement taken prior to an intervention), indicate that participants showed significant improvements in levels of well-being, expressed in increased positive emotions and decreased negative emotions. Participants stated they felt happier and

healthier after the intervention. Due to the high level of engagement participants experienced, the intervention was successful in distracting patients from the hospital surroundings.

In the context of this project, engagement was used as a concept to describe certain interactions and behaviours, indicating focus, involvement and motivation, during the sessions. Over the course of several sessions, participants linked the artefacts to personally owned objects, as well as previous knowledge and experience, while using words indicating interest, surprise, and even fascination and amazement (Ander et al., 2013:234). The session facilitated multiple facets of object engagement, such as engagement through sensory elements (touch, vision), learning about the artefacts, personal recollection or connection to the artefacts, and sense of privilege. The strong presence of engagement is interesting in this context, as many hospitalized participants were dealing with issues of anxiety, pain, uncertainty, boredom, lack of stimulation, loss of identity, and depression at the time the sessions were conducted. After the sessions, most participants indicated having an improved sense of well-being, which was expressed through improved mood, decreased anxiety and increased confidence (Ander et al., 2013:234–235). The outcomes concerning well-being were primarily articulated around distraction and stimulation, which were argued to be important factors for well-being in the context of hospitals and care homes. Indicators for well-being were the expression of positive emotions, and having a regained sense of vitality and energy; the production of new knowledge, as well as generating interest and desire to learn; and tapping into personal memories and recollections, which was connected to a renewed sense of identity (Ander et al., 2013:235–236).

This research further argued that the use of heritage artefacts, obtained from museum collections, was of fundamental importance to the increase in positive emotions experienced by participants. The reason being that cultural heritage artefacts are attributed with a certain status, since they are considered important artefacts, be it for aesthetic, material, historical or other reasons, and thus such objects are particularly well-suited for sparking interest, wonder and fascination. In addition to this, heritage objects on display in museums are (usually) not meant to be touched by visitors, which can induce a feeling of privilege in participants who are allowed to do so (Ander et al., 2013:240). Furthermore, the explicit references made by participants to the specific artefacts that were handled, can be considered an indicator that the positive results were not solely due to the attention and social interaction that the project brought to the participants.

“Heritage in Hospitals” certainly shows interesting and promising results, although more research is required to look into how long such positive effects can last. In the context of dementia care, this initiative shows some particularly compelling results. The participants of this project struggled with issues that are well known to affect persons with dementia, notably boredom, lack of stimulation, loss of identity and depression. Some of these issues can induce a state of lethargy which can seem hard to overcome. This project however showed that handling heritage objects can take individuals out of this state, if perhaps only temporarily. In addition to this, the heritage objects were shown to be strong vehicles for reminiscence, which carries a particular importance within dementia care and which will be clarified further on in this paper.

“Heritage in Hospitals” shows that the involvement of cultural heritage in the health care sector can have positive and promising outcomes. Notably the aspect of active engagement, closely linked to well-being, proved to be an important outcome, was regarded as highly pos-

The potential
archaeology

itive by the participants (Ander et al., 2013:235–236). For this reason, it is particularly interesting to look further into the potential of fields within the cultural heritage sector that could facilitate high levels of engagement. One such field is archaeology. The discipline of archaeology has a strong empirical character in addition to a vast theoretical foundation, which may make it a perfect instrument for the activation of both a physical and an intellectual level of engagement.

Archaeo-appeal

Archaeology has over the decades had a strong presence within Western popular culture. While professional archaeologists do not always seem thrilled with popular representations of archaeology and archaeologists, the enormous popularity of fictional accounts such as the Indiana Jones franchise, illustrates that archaeology appeals strongly to the general public. The immense popularity and notoriety that archaeology has garnered within pop culture and the general public, is largely due to such representations and stories, based on early adventurer-archaeologists, whose impressive finds have been widely reported in the Western media. Instead of condemning popular representations for their possible inaccuracies from a scientific point of view, it could prove more valuable to look deeper into the associations and meanings archaeology has gathered through pop culture, and to rather see how these attributes could be capitalised in initiatives of social relevance.

According to Cornelius Holtorf, archaeology oozes what he refers to as “archaeo-appeal”, a certain magic which is conveyed through the experience of archaeological practice and the imagining of the past (Holtorf, 2005:156). The association of “magic” is established and reinforced through highly romanticised representations of archaeology as treasure hunting, and the discovery of ancient, mysterious and sacred objects. As Holtorf (2005:156) notes, within the public eye archaeology has come to be associated with motifs that are very popular in pop culture in general. Archaeology embodies and combines several of these motifs, such as the use of advanced technology, unique discovery, nostalgia for ancient worlds, and exotic locations. Holtorf (2005:157) argues that participation, or a simulated participation, in archaeology could be a powerful experience that can be both entertaining and educational. Within this experience, the public could live a range of these preconceived metaphors and engage in the experience, or the dream, of investigating the past in order to come closer to it in the present (Holtorf, 2005:156–157). The latter element seems not only essential to professional archaeologists but also to the general public.

It is fundamental to consider archaeology in the context of pop culture, as the majority of the general public, who are not qualified as professional archaeologists, build their conceptions of archaeology from this imagery. In order to reach these audiences successfully, it is important to keep this cultural frame of reference in mind. Furthermore, this imagery could prove crucial for audiences such as persons affected by dementia and especially those dealing with associated negative cognitive effects such as boredom, under-stimulation and depression, since archaeology seems to possess a certain “magic” evoking wonder and amazement. These two themes are also apparent in the coded data of the “Heritage in Hospitals” initiative (Ander et al., 2013:235).

The archaeological imagination

The notion of metaphors associated with archaeology is important. Michael Shanks, an archaeologist who is engaged in exploring archaeology’s role in modern society, states that metaphors are widely used to represent conceptions of the work of archaeologists and to shape perceptions of the past (Shanks, 2012b:25, 64). Like Holtorf, Shanks observes the resonance of metaphors in the modern representation of “the” archaeologist, who he describes as a ro-

mantic figure, engaged in digging and discovering what was lost and forgotten and piecing together the clues that tell us about the past of distant civilizations. He views such metaphors as expressions of the so-called “archaeological imagination”, which he refers to as a creative impulse which exists at the heart of archaeology and the meanings that are attributed to archaeology through cultural reception (Shanks, 2012b:25). This imagination includes a range of attitudes towards remains, traces, memory, time and history. It is through the archaeological imagination that fragments of the past can be “reanimated”; the life-world behind ruins can be recreated and the people behind artefacts can spring to life once more (Shanks, 2012b:9, 25).

Shanks (2012b:17) considers this type of imagination in an unrestricted manner: not only scientific engagements with the past operate through this imaginative faculty, but so do museums, re-enactors at fairs and non-professional archaeology enthusiasts. For him, archaeological practice is not restricted to science, as it contains this highly creative component that encompasses experiential and subjective aspects of human experience (Shanks, 2012b:17). Shanks (2012b:17–18) argues that archaeology is best defined simply as working on remains of the past, which allows a myriad of engagements to be viewed as archaeology. This notion of imagination is a creative understanding of archaeology, which also takes into account creative understandings of life today, and the possibilities of change and innovation. In this understanding, archaeology is viewed as truly creative: through the aspect of imagination, interventions within individual realities can be made, connecting perceptions and cultural imagery with experiences to enhance human life. Such an understanding of archaeology truly extends its scope towards all kinds of different spheres, with which archaeology, when understood as a strictly scientific discipline, is not in contact. It opens up exciting possibilities for engagements with archaeology outside of academic settings, such as in health care contexts.

It has been noted that persons affected by mild to moderate dementia can strongly benefit from so-called Cognitive Stimulation Therapy. This type of therapy consists of interventions that offer enjoyable activities aimed at the stimulation of several cognitive faculties such as thinking, concentration, and memory. These activities usually take place in a social setting of small groups (Woods et al., 2012). Enjoyable activities are usually defined as meaningful activities, which have a deeper impact than activities that are primarily focused on passing time. Many such programs have been found to improve moods and to reduce so-called “disruptive behaviour” and thus positively impact quality of life (Teri and Logsdon, 1991:124). Therefore, engagement in enjoyable activities is extremely important for effective therapy.

Progressing dementia can result in the inability of a person to perform certain activities and pursue certain interests. Activities that were once highly enjoyable can turn into frustrating experiences. This does not mean however that engagement in activities cannot be achieved at all, especially in the context of mild to moderate dementia. What it does mean is that activities must be suitable and take this context into account. Therefore, there is a strong emphasis on activities that provide meaning and which are enjoyable and rewarding. When creating activities that aim to be enjoyable for people with dementia, there are no fixed criteria. However, activities that are currently offered tend to focus on creating meaning in the present by building on past interests and activities (Alzheimer’s Association, 2015). As a result of the person-centred approach that is taken to dementia care, activities that relate to past interests are encouraged. The underlying idea is that persons with dementia are more likely to be engaged, and thus in-

Archaeology as an
enjoyable activity

terested, in activities they previously practiced. It is however safe to assume that the majority of these persons are neither professional nor amateur archaeology enthusiasts.

But this is precisely where popular culture comes in: while archaeology may not have been actively practiced as a profession, hobby or interest by participants in the past, it is highly likely that they have been introduced to archaeology by pop culture. Furthermore, the character of these associations is arguably connected to powerful sensations of amazement, which could make archaeology particularly well-suited as an activity that could offer an “out of the ordinary” experience built on vivid imagery. In fact, it could even be an asset if participants were not previously active within archaeology, as this could increase factors of novelty and discovery, which could reinforce a feeling of excitement. In addition to this, archaeology features a set of characteristics which could provide more meaningful engagements.

Characteristics of archaeology

Archaeology engages with the past. In doing so, it combines narrative, expressed through interpretations of the past and story-telling, with a physical and active component, which can be experienced by participating in excavations and through the tactile dimension of handling finds. Moreover, archaeology is a social practice. These characteristic elements of archaeology form an excellent basis for activities specifically designed for persons with dementia.

Excavating can be a strenuous physical activity. As such, it could offer the same benefits as physical activities and different forms of exercise that are currently commonly offered in dementia care. The Alzheimer’s Society (2015) states that physical activity as part of a care program can have a positive impact on well-being, both physically and mentally. Activities can be characterized as “physical” if they cause an increased heart rate and deeper breathing. This includes sport activities, but also more day-to-day activities such as gardening. Aside from the benefits that are generally acquired through physical activities (such as a reduced risk for heart disease and high blood pressure, improved bone strength and suppleness), people with dementia could also strongly benefit from cognitive improvement that is associated with physical activity. Improving sleep could also be highly beneficial, as would other associated benefits such as the improvement of confidence, self-esteem and mood (Alzheimer’s Association, 2015).

Depending on the physical and cognitive condition of each individual, there are multiple activities that could engage people in the practice of an archaeological excavation. There are excavations that let the public participate in actual excavations, or that have a special place on-site where simulated excavation can take place. Some recent examples in The Netherlands are the “Nijmegen graaft!” (Nijmegen digs!) project that took place in 2014 ([Nijmegen graaft! 2014](#)) and the field days open to public participation organized by the municipality Oss in 2013 ([Meegraven met archeologen in Horzak 2013](#)). The project in Nijmegen included special workshops for children to introduce them to archaeological work and to allow them to make a contribution to the excavation. Adults were also invited to work alongside archaeologists. In Oss, the municipality invited local residents of Horzak to participate in an excavation taking place in their neighbourhood. These projects show that involving members of the general public in archaeological excavations is feasible and are moreover well-received by the public. The project in Nijmegen was declared a great success by the organizers and the excavation site in Oss was so well-visited that it led to an exhibition about public participation in the city hall of Oss.

However, a sudden change of environment and the physical displacement needed to get to the site of excavation might make the participation in real field digs less suitable for those in the later stages of dementia. But despite these constraints, it is still possible to be actively

involved with archaeology. In activity programs designed for children, archaeologists often make use of sandboxes to create simulated digs. Sandboxes can be places outdoors or indoors (with a few additional precautions). Moreover, it is also possible to execute the same idea, but on a smaller scale, in terraria for instance, as the “Tales from the Sea” project illustrates (Cutler, 2013). This project, initiated by Bournemouth University Dementia Institute, involved public participants by letting them dig for artefacts in terraria filled with sand. Additionally, sensory stimulation was also encouraged by object handling sessions, and by incorporating sounds and smells reminiscent of the sea into the sessions. Tactile stimulation is considered a form of cognitive development, and has been connected to improvements regarding general mood (Baker et al., 2003:471–472, 474–475). Participating in simulated digs reinforced tactile stimulation, by letting people sift through the sand and uncover objects with different textures, materials, shapes and sizes which could be touched (such as sand, pottery, beads). Drawing, or taking pictures, of such objects could possibly further reinforce this stimulation.

An added feature of excavations is their social character, and Kitwood and Bredin (1992:271, 278, 281) stressed the importance of social interaction in the context of dementia. Excavations take place in team settings, where people work together and collaborate. This would translate particularly well in an activity directed at people with dementia, who often benefit from group activities since social contact is an extremely important aspect of quality of life and an individual’s wellbeing, and is often lacking as social networks tend to decrease as the condition progresses. The activities linked to excavation are also diverse enough (e.g., digging, cleaning, photographing and drawing finds) to allow collaborative “teamwork” and offer possibilities of engagement tailored to different interests. Furthermore, the interpretation and contextualization of finds adds a level of intellectual engagement in which no physical activity is necessary and might be preferred by some participants. These elements make archaeology an activity that is suitable for a wide range of individuals with diverse interests and preferences.

Moreover, archaeology’s emphasis on human life in the past may facilitate reminiscence. Reminiscence is a term used to denote the act of recollecting past experiences and events (Alzheimer’s Society, 2015a; Alzheimer’s Society, 2015b). Reminiscence as an activity, or therapy, is frequently used in dementia care, as it emphasizes what a person still can do (remembering past events, for instance) instead of stressing the loss of cognitive functions. Furthermore, reminiscing on past activities and events that shaped individuals’ identities can have an affirmative and reassuring function for people with dementia (*Moderne dementiezorg, “Reminiscentie”* 2015). For example, archaeology’s orientation on the past might trigger recollections of personal pasts, former interests in history in school settings or of visits to archaeological landmarks. Another important dimension is the strong connection archaeology has to the social topics it studies, such as the daily-life activities of past peoples. Handling finds that bear witness to daily life activities in the past, such as cooking pots and utensils, could possibly be ‘triggers’ for the personal past and memories, which in the context of dementia could be highly valuable, since it might enhance an individual’s enjoyment of an archaeology-based activity.

I have argued that archaeology could potentially be a strong contributor to dementia Discussion. I specifically discussed the possibility of engaging in, and with, archaeology through activities that are aimed at being experienced as enjoyable and meaningful. Many potential benefits for participants with dementia have been listed, but it is also important to emphasize what can be gained from an involvement with the health care sector, or dementia care in particular, from

an archaeological approach. The key is the aforementioned social potential attributed to this field. Shanks sums up a part of what the realization of this potential could signify when saying:

Because I care, and I believe that many others share such a care and concern to identify and facilitate the creation of experiences of the past and the present that make life richer. We can bear witness to lost and forgotten pasts. We can facilitate many more people's creative involvement in making pasts their own.
—Shanks, 2012a:19

Given this potential to enrich the lives of people by bringing them in 'contact' with the past, an involvement in health care seems particularly fitting. By tapping into this, a powerful statement in terms of the social relevance of archaeology could be made. While a significant part of archaeology's relevance for society lies in the advancement of knowledge and understanding of the past and its peoples, it is crucial to realize that the discipline could effectively make an impact on individuals' lives in terms of improving well-being. This aspect is important to highlight in debates on archaeology's social relevance, and it is worthwhile to look further into this potential asset.

In such a context, it is equally important to acknowledge a fuller scope of what archaeology is and can be, for people engaging with it. As Shanks and Holtorf illustrate in their discussion of archaeological imagery, archaeology has in a way become a sort of public property and the public is increasingly engaging with archaeology as the public outreach of the field is growing. As Shanks put it: in a sense, we are all archaeologists now, and it is restrictive to understand archaeology solely as a scientific discipline (Shanks, 2012b:41–42). Such an understanding of archaeology implies a harmonization between popular culture and science. This equally means that creative engagements with archaeology will play a bigger role in the discipline, but this is not necessarily damaging to the credibility of archaeology nor does it necessarily imply a "Disneyization" (Holtorf, 2005:139,157) of the field. Instead, the scope of archaeology could be enlarged and the field could gain a deeper embeddedness in modern day society. Nonetheless, this does not mean that all levels of archaeological engagement should be mingled. Rather, it means that the definition of engaging in archaeology could be extended and that both sides of the spectrum are not mutually exclusive; archaeology may be a scientific study of the past to some, and an enjoyable activity to others, but both groups engage in archaeology.

Returning to the European Commission's statement on cultural heritage as being capable of improving people's lives ([Getting cultural heritage to work for Europe 2015:5](#)), I would argue that there are indeed indications that support this claim. In the future, it will be essential to look further into the links between cultural heritage, archaeology and well-being, in order to back up this claim with further empirical data exploring the ways engagements in cultural heritage and archaeology may correlate with an improvement in quality of life.

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Abstract (Netherlandic) *Dementie komt vaak voor bij ouderen in Europa, en naar verwachting zal het aantal gevallen van dementie sterk stijgen in de komende jaren. Er is tot op heden met name onderzoek gedaan naar dementie vanuit een neurologisch en medisch uitgangspunt, hoewel dementie ook ernstige psychologische impact en sociale consequenties heeft voor individuen. Inzichten in de psychosociale implicaties*

van dit syndroom, en de gevolgen voor welzijn en levenskwaliteit, ontstonden in de afgelopen twee decennia. Een betrekking van disciplines met een niet-neurologische of medische achtergrond kan een verrijking vormen van de wijze waarop er met dementie, en de effecten hiervan op individuen, wordt omgegaan. Dit paper betoogt dat archeologie in dit opzicht een waardevolle bijdrage kan leveren aan Europese dementie zorg. Het zet een theoretisch argument uiteen dat voortbouwt op eerdere initiatieven omtrent archeologie en erfgoed in de context van gezondheidszorg. Het argument dat ik presenteer benadrukt specifieke kenmerken van archeologie die deze discipline geschikt maken voor een dergelijke bijdrage. Ik concluder dat een deelname aan archeologische activiteiten een gunstige werking kan hebben op het welzijn van mensen met dementie.

Trefwoorden: Archeologie, erfgoed, gezondheidszorg, dementie, dementie zorg, welzijn, levenskwaliteit.

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Unearthing the Roads of Roman Hispania: Evolution of Theories, Methodologies and Value Enhancement Techniques

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Since the 1980s, the interest in bringing archaeology closer to the public has resulted in attempts to integrate different Roman roads within museums and touristic and cultural itineraries, with varying levels of coherence, historical accuracy and social reception. Despite the increasing proliferation of these projects, aimed to identify, recover and preserve these roads, their methodology was far from uniform until recently. In this paper, I briefly outline the past and current context of the study conditions of the viae, due to the shortage of general studies dedicated to the processes of excavation and research of these archaeological remains in Spain. I also try to explain the different value enhancement processes of viae for improving public understanding and appreciation of their historical relevance and socio-cultural significance.

Keywords: *Viae*, Roman road, Archaeology, Historiography, Connectivity, Infrastructure, Heritage, Value enhancement, Musealisation.

THE construction of Roman roads in Hispania began with the arrival of the first Roman troops in the late 3rd century BC, and developed, on one hand, by re-using existing roads (Silières, 2003:26) and, on the other hand, by creating new routes, in paths previously inaccessible, thanks to Roman technical advances.

During the 2nd and 1st centuries BC the *viae* were adapted and expanded in relation to the war activities developed in Hispania, according to classical authors; however, far from this simplistic view, we should mention other factors such as the improvement of the governance in new conquered territories and access to mining sites: the need for resources to supply the continuous military campaigns promoted the construction of roads towards the most important mining regions (El Bierzo, León, where the famous mines of Las Médulas are located; Tras-o-Montes, north of Portugal, and present-day Galicia, among other gold-rich areas. Also relevant were the silver mines of *Carthago Nova*, currently Cartagena, in the Murcia Region.

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road sy

Abstract
(in Spanish see below)

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The Iberian Peninsula was a territory known for its mineral wealth, as referred authors like Strabo, Pliny or Pomponius Mela (Blázquez, 1968:40–49), and this did not escape to the Roman greed; since the Second Punic War, private lessees and, after the second century BC, corporations (*publicani*) systematically exploit Hispanic mineral resources. After the definitive establishment of Roman administration, *viae* were used for political management and tax collection, which contributed to the process of acculturation labelled ‘Romanisation’. Besides, and despite the primacy of maritime trade in commodity exchange, interurban roads played an important role in the transport of products to inner regions.

Viae were conceived as *res publicae in usu publico*, that is to say, public, inalienable and costless infrastructure (Ponte, 2007:63). We must distinguish three types of roads, according to their characteristics: *viae terrenae*, paved with tamped grit; *silice stratae*, flagstoned roads, and *glarea stratae*, whose surface layer was composed of gravel. Moreover, according to its administrative features, we must differentiate among *viae publicae*, roads financed and maintained by the state; *viae militares*, funded by the military treasury and built at specific times, and *actus* and *viae privatae*, lower roads that completed the road network at regional and local level.

Since the ‘Crisis of the Third Century’, the road maintenance became a secondary priority in the Roman administration, until the fifth century, when most roads were abandoned. After the decline of the Western Roman Empire, probably some roads and bridges continued being used, due to its excellent quality; however, unnecessary items, such as roads built towards decadent cities, were abandoned. As a result, some roads now rest fossilized under successive reforms in the road network, especially during the eighteenth century, when most of the ‘Cañadas Reales’ (passages for migrating livestock) were built (Moreno, 2010:14), and other roads disappeared as communication routes, remaining as agricultural roads or even as boundaries between properties (Moreno, 2010:11).

Origin of the Roman roads’ historiography in Spain Since the sixteenth century, following a renewed interest in classical culture, some studies stressed the relevance of Roman antiquities. The first meaningful example is the work of Ambrosio de Morales *Las antigüedades de las ciudades de España que van nombradas en la Coronica*, published in 1577 (Abascal, 2012:13), which made a brief description of the Antonine Itinerary, identifying it as a ‘booklet’ used to locate roads (Morales, 1792:20–22). Although misleading when describing *viae* as exclusively military and administrative roads, it was one of the first historiographical examples of localising Roman roads using ancient sources critically, a custom not very widespread in the sixteenth century (Abascal, 2012:15). Another of these early works is the *Itinerarium Antonini Augusti et Burdigalense*, by Jerónimo Zurita, in 1600. This author not only enhanced our understanding of an important source for the study of Iberian roads, he also developed a cursory investigation of some roads quoted by this *itinerarium*. However, despite the great contribution of Zurita to the study of Roman roads, during the seventeenth century it did not change the research approaches and the theoretical landscape of the field.

The first in-depth study of Roman roads was the work of Nicolas Bergier. In the *Histoire des Grands Chemins de l'Empire Romain* (Bergier, 1622), he made a broad study of French Roman roads, combining the study of ancient texts and the analysis of archaeological remains. Bergier was able to realize a systematic and accurate analysis of the structure of the roads: ‘The gravel is always reserved to the surface of the roads; but in order to ensure that their work was lasting [...] they took care of cement, sustain and fortify the gravel below [...]’, but his study was almost unnoticed in Spain until the eighteenth and nineteenth centuries, when authors

like Manuel Fernandez de Mesa and Eduardo Saavedra used this text for their researches (J. Rodríguez, 2010:129–130). Indeed, it was Eduardo Saavedra who promoted the archaeological study of Roman roads in Spain with his work *Descripción de la vía romana entre Uxama y Augustobriga* (Saavedra, 1861), attending to the techniques used in his work, including first hand observation of the paths and comparison of existing data with ancient materials (Abásolo, 1990:7; Arias, 2002:199).

Turning now to the twentieth century, the ‘Junta Superior de Excavaciones y Antigüedades’ played a major role in the study of Roman roads, supporting the work of authors such as Antonio Blázquez and Claudio Sánchez Albornoz (among others, *Diversas longitudes de las millas romanas*, or the joint work *Vías romanas del Valle del Duero y Castilla la Nueva*). Another important author was Manuel Gómez-Moreno, who in the early years of twentieth century developed the Monumental and Artistic Catalogues of the provinces of Ávila, Salamanca, Zamora and León.

After the Civil War, independent scientific production declined. Only since the 1960s have authors like Manuel Roldán and Gonzalo Arias recovered the habit of regular work in the study of ancient road; Roldán with his work about resources for the study of *viae* (*Itineraria Hispana*) and its exhaustive study on the *Vía de la Plata* (*Iter ab Emerita Asturicam*) and Arias with his *Repertorio de Caminos de la Hispania Romana* and, above all, the impulse of the magazine *El Milenario Extravagante*. From these years, literary and scientific production has grown considerably, fostering interest about Roman roads, which, in turn, led to numerous publications about the *viae* (Blázquez, 2006; Chevallier, 1997; Moreno, 2004), such as in relation to their location (Morote, 2002; Roldán, 1971; Silières, 1990), their structure (Moreno, 2009), their related elements (Arasa, 1990; A. Rodríguez, Ferrer, and Alvarez, 2004) or their relevance in the organisation of Roman society (Pisani, 1994; Ponte, 2007).

There are several issues that may arise when identifying the Roman roads; the main identifying the roads is the confusion about the construction characteristics of the *viae* (Moreno, 2010:11–12). Researchers (Chevallier, 1997; Moreno, 2004; Moreno, 2009; Silières, 1990) have defended until recent years the assumption of the divided structure of these roads (*statumen, rudus, nucleus and summa crusta or summa dorsum*), a theory established in the eighteenth century, following a misreading of Nicolas Bergier (Chevallier, 1997:93–95). The image of the Roman roads as paved pathways transcended from academic ambits to public understanding during the nineteenth and twentieth centuries. Although in Roman engineering some sections of tracks were paved, they usually belonged to the inner city or nearby, where the surface was paved in order to avoid the discomfort produced by the dust generated by traffic. Moreover, paved sections were built in places where the gradient caused fast erosion of the surface layer, or, simply, places where the necessary raw materials, such as granite, were abundant (A. Rodríguez, Ferrer, and Alvarez, 2004:51).

For the location and identification of the Roman roads there are several useful techniques:

The first tool is remote sensing, category encompassing various traditional and modern ^{Remote Sensing} techniques, such as aerial imagery (see Fig. 1). GIS techniques have decisively contributed to both the identification of possible *viae* layouts, and the creation of map databases to provide additional and comparative information about the road system.

Historical cartography has also played a major role in associating physical features and place names in order to locate road sections; it is advisable to be wary of the 1920's and 1930's maps (Moreno, 2010:12), although some military maps from this period were made on limited areas

Cartography

and with high accuracy. Map information can also be useful for identifying place names related to road items, despite the fact that sometimes their relationship with the Roman world is based on misunderstandings during medieval times.

Prospection Another essential technique for the identification of Roman roads is prospection, which could be executed through surface analysis or aerial survey. Because of the length and the physical characteristics of our element of study, the best options when we want to recognize them are aerial survey and satellite imaging, techniques which allow us the identification of optimal locations for roads (Sillières, 1990:412), and the evidences of the *viae* by the identification of vegetation changes (Sillières, 1990:416). On the other hand, surface survey allows recognition of the visible remains of the tracks, but also, of their destroyed remains, which leave archaeological evidence in the form of infilled side ditches, scattering of building materials or remains from the gathering and transport of construction materials (Moreno, 2009:31).

Analysis of the formal conditions of the road The most useful technique for identifying *viae* is through structural analysis, by archaeologists excavation or field survey. Roman engineers used specific materials, obtained and placed in a planned way along a concrete geographical route and according to some defining technical characteristics of Roman engineering. I summarize below some of those items that allow a correct identification of Roman *viae*:



Figure 1: *Aerial photography where evidence of a very long straight section of the Via from Amiens to Senlis, in Oise Valley, France, can be appreciated. Source: Moreno (2004:147). Photograph: R. Agache (used with copyright-holder's permission).*

1. The roads were built along a longitudinal trail (i.e., avoiding tortuous paths) (Fig. 1). This can serve us as a general indicator of its chronology when we have no physical evidence of the track structure (Arasa, 2008–2009:362–363; Sillières, 1990:415), although I argue that a road should never be identified by only following this approach (Abásolo, 1990:14), and other indicators must be sought.

2. In mountainous paths, roads maintained slopes lower than 8 %, making huge constructive efforts into planning the route, for example, by designing the ascension in strategic points in order to maintain a prolonged climb and a regular slope (Abásolo, 1990:15; Moreno, 2009:21–22).
3. Interurban roads (Sillières, 1990:417) are composed of bottom layers of large stones regularized by a layer of fine materials, whereas in the upper layers strata of fine-grained ballast which function as surface layer (Fig. 2). This ballast must be tough in order to endure traffic, and quite rounded to avoid damages to the animals' hooves (Moreno, 2009:28). Alternatively, the whole structure can be constructed by superimposing and compacting fine layers, from 10 to 15 cm thick (Moreno, 2009:23), until obtaining adequate quality standards for transit.



Figure 2: Photography of the Via from Clunia to Segisamo (Castille and León), where the foundation of large limestone rocks and a surface layer of natural ballast over it can be appreciated. Source: Moreno (2004:24) (used with copyright-holder's permission).

Ancient sources

Very briefly, I present the three most important sources for Hispania, described in more detail by Roldán (1975). Other ancient sources refer to the construction of roads but do not contribute to locate them, like the Book VII of Vitruvius, references in Pliny's Natural History or poet Statius' *Silvae*. Moreover, other sources like the *Tabula Peutingeriana*, the *Itinerarium maritimum* or epigraphic documents like the *Tegula* of Valencia or the clay tablets of Astorga, either make a partial list of the roads, or they lack the geographical precision needed to make a reliable identification (Arias, 1987:3; Roldán, 1975:102–175).

1. Vicarello Goblets: They are four small silver glasses discovered in 1852, after the demolition of the thermal baths of Vicarello, formerly known as *Aquae Apollinares Novae*.

On their surface, the 104 stations on the route between *Gades* (Cádiz) and Rome are engraved, totalling 1840 miles (Benítez de Lugo et al., 2012:104).

2. *Itinerarium Provinciarum Antonini Augusti*: Also known as Antonine Itinerary, it is a compilation of notes of 372 itineraries. Of these routes, 34 are within the Iberian Peninsula. It was probably made in the third century, and it was based on travels and descriptions. (Arias, 1987:83–116; Roldán, 1975:38–101).
3. Ravenna's Cosmography: Dating from the seventh century, it was possibly based on the *Tabula Peutingeriana* and other contemporary maps, especially from the third century (Roldán, 1975:112–113). In some chapters of the books IV and V it refers to the *viae* of Hispania. Its main issue is that it does not describe ways, but lists of cities grouped by proximity.

Epigraphic evidence The study of epigraphic elements, mainly milestones, is especially useful in areas where they are frequently preserved, as northwest Spain (A. Rodríguez, Ferrer, and Alvarez, 2004:30), while on roads where their presence is poorer, as in the eastern part of the peninsula, other sources of evidence are required. The information given by milestones located on the same road can be synchronous, i.e. milestones placed at the time of construction, or diachronic, because repairing roads could lead to the erection of new milestones (Moreno, 2004:159–160).

Nonetheless, the epigraphic evidence is not restricted to milestones; there are lower markers which could indicate half miles (instead of *millia passuum* indicated by milestones), fixed directional signs at intersections, near the cities or at the stations and *mansiones*, and even elongated sticks to demarcate the layout of the road in case of snow (Moreno, 2004:161–164). Furthermore, altars dedicated to the *Lares Viales*, relatively frequent on roadways, honorary inscriptions or funerary monuments can also provide further evidence for the presence of a Roman road (A. Rodríguez, Ferrer, and Alvarez, 2004:759–766; Chevallier, 1997:73–75).

Even with all these techniques and lines of evidence, there are still two main issues with the road investigation process. The first problem is related to the interpretation of the itineraries, generated by wrong explanations made during the nineteenth century, when some scholars suggested possible itineraries for different roads (Beltrán, 1990:47) without much supporting literary or epigraphic evidence. The second problem is the confusion between Roman roads and other posterior infrastructure, such as the aforementioned ‘Cañadas Reales’. In this particular case, as previously mentioned the common mistake is to consider that all Roman roads were flagstoned or cobbled superficially, and because of this, some researchers and members of the public may still misidentify them.

Excavation process The excavation of roads does not currently follow the standard procedures of archaeological excavation and documentation, because the classical stratigraphic method is not particularly useful when studying contemporary constructive levels, not even in cases where two roads overlap (Moreno, 2009:36).

When excavating a Roman road, its structural design should be considered first (ideally during the identification process), differentiating artificial layers from the natural substrate; only after this action can the right excavation process be planned, in order to obtain the highest amount of information from the different building phases (Palomino and Martínez, 2010:49). This planning process is more appropriate than the classical stratigraphic method because the succession of layers that compose the road is a functional and artificial stratification, so the

usual archaeological excavation would only cause the destruction of the *viae* layer by layer, without obtaining information, and, in many cases, even without detecting the different construction phases of the road correctly.

To reaffirm the difficulty of applying the stratigraphic method to the excavation of *viae*, I note that it would be practically impossible to find any archaeological element over the construction layers because it would be unlikely that a worthless object had survived centuries of transit across the road, or, conversely, that no one had picked up a valuable object dropped on the road. One exception are the *clavi caligarii*, metal nails on the soles of the *caligae* (J. Rodríguez et al., 2012). These nails allow us to date with relative precision the Roman roads or, at least, differentiate them from those in which the material findings indicate later periods. Nevertheless, the hypothetical discovery of archaeological remains in the surface layers of the roads is generally of limited use, because taking this finding as a benchmark within the broad chronological range of road use can lead to a dating error or to a partial analysis. On the other hand, the few materials that could be recovered within the structure would be mixed with building materials, of unknown geographical and temporal origin (Moreno, 2009:36). Although they could provide a *post quem* date, this would not provide a precise chronology for the construction and use of the road.

Therefore, after ruling out the stratigraphic method, we identify two advisable techniques for the correct excavation and study of the roads: the first one involves obtaining transverse or longitudinal sections (Fig. 3), either through cleaning or digging, allowing the identification of the construction sequence in an easy and visual way. The second technique is the excavation of the layers by stepped sections, (Fig. 4) to differentiate them while, at the same time, gathering information about the construction process (Palomino and Martínez, 2010:49), such as tread marks of vehicles used during the construction. In this second process, the nature of the building materials must be taken into account, because this excavation will be considerably easier in the surface layers and other fine layers, than in the rocky foundations (Moreno, 2009:35).

The correct excavation of these roads provides information about its constructive methodology and its structure, and also confirms or refutes its ascription to Roman period (Moreno, 2009:33; Palomino and Martínez, 2010:72).

Archaeological excavation is not the last research phase for understanding and presenting Roman roads. To ensure that the acquired archaeological knowledge is useful, the information obtained should be presented to the public, thus creating further interest about the meaning of heritage, its importance and the need to take care of it; an appropriate procedure is through the musealisation or exhibition of the remains. However, the presentation of their remains is not commonplace yet, and the process of restoring Roman roads is not homogeneous. There are several criteria to take into consideration, in relation to the different types of *viae*. In order to illustrate them, I present three case studies, corresponding to three types of roads, with the aim of showing the particularities of each one.

‘Vías Atlánticas’ is a program designed to study, preserve and raise awareness of the *viae* XIX and XX of the Antonine Itinerary, which connected the cities of *Bracara Augusta* (Braga, Portugal) and *Asturica Augusta* (Astorga, Spain), through *Lucus Augusti* (Lugo, Spain). It also involves the creation of a joint touristic heritage site, integrating these regions. The project propose a unitary track that links these two roads, idea which, despite some criticism, is not implausible if we consider the connected structure of Roman *itinera*. The project developed in four phases:

Restoration and
musealisation project

Main roads: ‘Vías
Atlánticas’ Project (G)

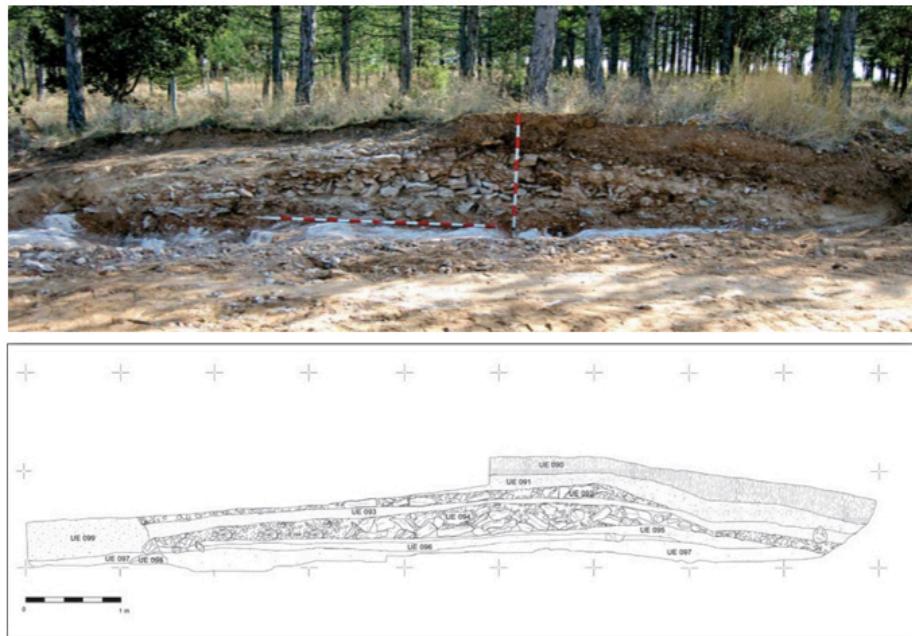


Figure 3: Photography and drawing of the archaeological work at the *Vía* from Clunia to Segisamo through a transverse cleaning of the structure. Source: Palomino and Martínez (2010:56). Photograph: Aratikos Arqueólogos, S.L. (used with copyright-holder's permission).

1. Planning: definition of the project to encourage cooperation between all the agencies involved, and to establish responsibilities, activities to be carried out, and planned schedule.
2. Archaeological interventions: demarcation of the roads' layout, inventory of archaeological and artistic elements, excavations at selected locations and additional scientific research. A source of controversy in the study of these routes is the diversity of sources: Antonine Itinerary, Ravenna Cosmography, clay tablets of Astorga (Méndez, 1996:149; A. Rodríguez, Ferrer, and Alvarez, 2004:22–30), in addition to the information obtained from archaeological elements, such as *mansiones*, milestones and *Lares Viales* altars (A. Rodríguez, Ferrer, and Alvarez, 2004). This fact, combined with the degradation of the *viae*, complicated the study process.
3. Marketing: Creation of a website (<http://viasatlanticas.depo.es/>), development of suitable materials for tourist interpretation, edition of teaching guides and organization of exhibitions, workshops and scientific publications (Fig. 5).
4. Conservation: cleaning and maintenance tasks, always under specialised counselling in order to stimulate the preservation of the paths.

Urban roads: 'Vía del Pórtico' (Sagunto, Valencian Community)

This archaeological site has been integrated in a musealisation project that includes architectural elements from the second century to medieval times. Particularly relevant is a segment of urban road, remarkable for the preserved evidence of the portico built on either side of it, and for the extraordinary level of preservation of the paving stones. During the second century,

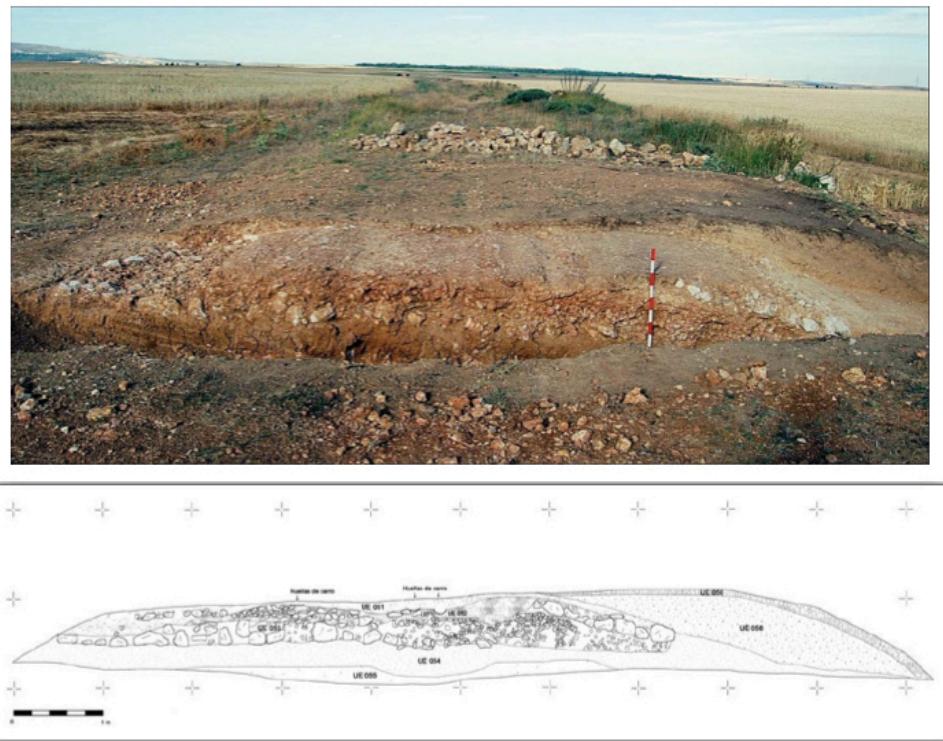


Figure 4: Photography and drawing of the archaeological work at the *Via* from *Italia* to *Hispania* through stepped sections. Source: Palomino and Martínez (2010:64). Photograph: Aratikos Arqueólogos, S.L. (used with copyright-holder's permission).

this road was the *kardo maximus* of *Saguntum*, that is to say, the main street of Sagunto; its width was between 4.10 m and 5.40 m (Melchor and Benedito, 2005a:15–17). Adding the arched sidewalk, it would have reached about 8 m in width (Fig. 6). Maybe this *strata*, or urban paved street, was connected with the *Via Augusta* outside of the city; it is even possible that the ‘*Vía del Pórtico*’ was the extension of the *Via Augusta* inside *Saguntum* (Melchor and Benedito, 2005a:15), although this assertion cannot be determined with certainty. The earliest archaeological activities were executed in 1992, when the construction of a building was planned on an abandoned plot that had previously been occupied by a football pitch. The emergence of structures during development fostered the beginning of an archaeological excavation that lasted until 1994.

By 1994, three roman rooms and several other structures damaged by medieval buildings were documented and excavated, as well a little alley which, in its western end, joined with the main road.

Between 2002 and 2004, further building development led to the expansion of the excavation area to the north, where the most outstanding findings were found, including the paved road that focuses our interest. The archaeological project was carried out through open-area excavation, where the grey limestone flagstones of the *via* were unearthed. This process was performed manually, using machinery only for the clean-up and the removal of surface layers (Melchor and Benedito, 2005b:323).

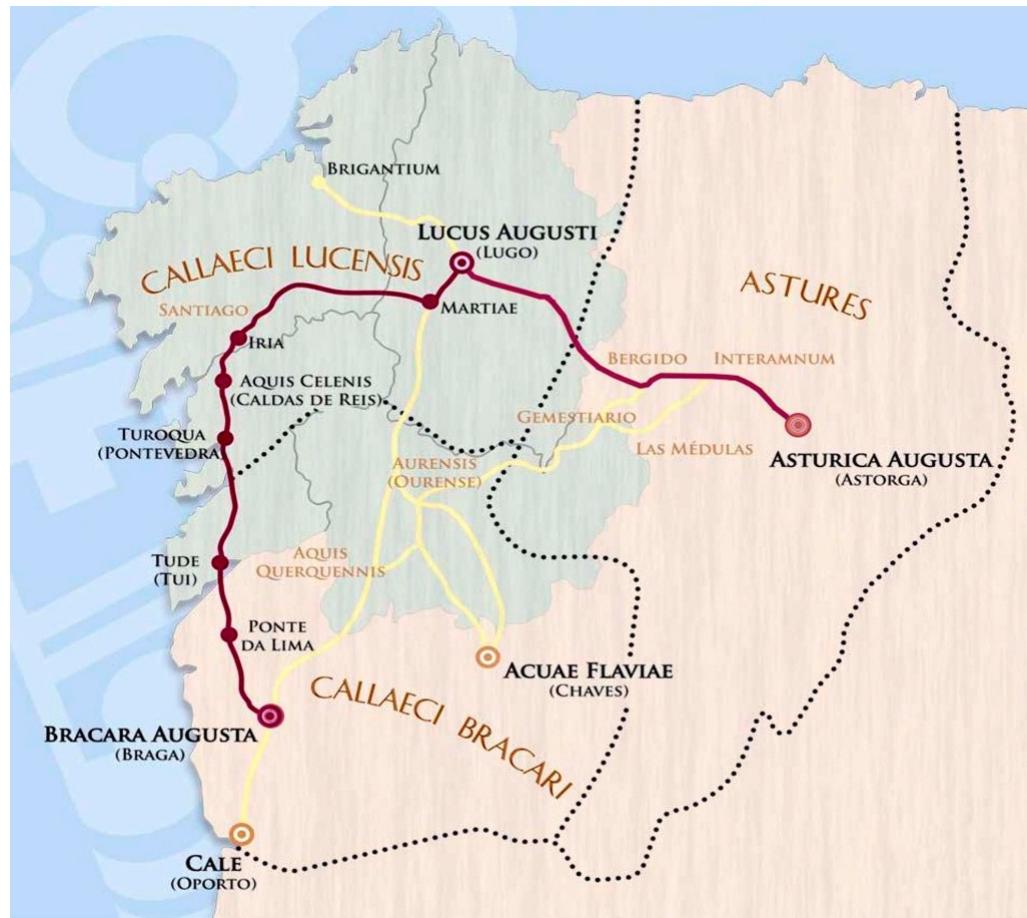


Figure 5: Official informative <http://viasatlanticas.depo.es/promocion/MAPA%20VIA%20XIX%20EPOCA%20ROMANA.jpg> of the 'Vías Atlánticas' Project.

The process of value enhancement of the 'Vía del Pórtico' started in 2006. It consisted, first, on the excavation and removal of some medieval structures, prioritising Roman infrastructure (Melchor and Benedito, 2005b:326); after which the actual valorisation began, lasting until 2013, with the provision of suitable facilities for a tour around the archaeological remains, and the installation of the necessary museological elements.

Mountain paths: Roma The third project is the Roman road of 'La Carisa', route that crosses the Cantabrian Range road of 'La Carisa', between Asturias and León. It is a *via* of about 4 m wide, with large straight sections built, in (Asturias) some cases, on embankments and, in other cases, carved on the rock (Camino and Viniegra, 2010:383; González, 2011:181).

This path, unlike some other mountain trails, can be confidently ascribed to Roman times, due to the presence of archaeological evidence in the form of epigraphic texts (milestones and altars) and bridges, such as Olloniego Bridge (González, 2011:179–180), whose dating is essential. This hypothesis is confirmed by the data obtained from the discovery and excavation of a military camp on Mount Curriechos. Its occupation period, around 25 BC, coincides with the road construction process (Camino and Viniegra, 2010:376–377; González, 2011:180).



Figure 6: Image of the road inside the *Via del Pórtico*’ Museum. Photograph: Higueras (courtesy of Sangunto City Hall, used with copyright-holder’s permission).

Furthermore, I would like to mention the archaeological excavations dedicated, exclusively, to interpret the road correctly, test the initial hypotheses and strengthen the theories derived from the data. These excavations unearthed the structure of the road, showing that their constructive disposal corresponds to the formal canons of Roman *viae terrenae*, something like dirt roads (González, 2011:180). Documentary sources also corroborate the Roman origin of ‘La Carisa’, whose construction is attributed to the general Publio Carisio, governor of the *Ulterior* province during the Cantabrian Wars, around 25 B.C. (Camino and Viniegra, 2010:377). I argue that this road was, indeed, a *vía terrena* built in the late first century B.C., that survived as a mountain pass, just like other trails across the Cantabrian Range. The principal difference with other roads is that ‘La Carisa’ was not subsequently changed, and it has retained its original construction components.

Finally, in relation to value enhancement, ‘La Carisa’ is publicised as one of the official trekking routes of Asturias. This public scheme offers historical background and details about the construction of the road, its development in Roman times and its socio-cultural significance, in addition to practical information for hikers.

First, I argue that it is inappropriate to automatically identify paved roads with Roman conclusions – Research. This association has caused numerous mistakes, sometimes even incorrect identification, in the archaeological heritage of roads and paths. Only some *viae*, with concrete features and located in certain areas, have this peculiarity, and are a minority in relation to the *viae terrenae*.

In addition, I have described some of the most important techniques for the identification and location of Roman roads. However, no single technique offers total reliability and these techniques should be combined to achieve more reliable research results. Furthermore, the excavation of a *viae* is not primarily performed using the stratigraphic method of archaeolog-

Conclusions – Valorisation of Roman roads

ical research. In contrast, stepped sections or transverse and longitudinal sections are more appropriate methodologies for the study of Roman roads.

About the enhancement of the perceived public value of *viae*, I consider that the final aim of these projects must be remembered: to offer accurate information about the Roman period, and offer it not only to academic circles through scientific publications, but also to the general public, allowing everyone to learn more about the past. I argue that musealisation projects are useful for achieving this aim.

I propose some common dimension in the process of value enhancement of Roman roads in Spain. As a preliminary step, a Master Plan should be designed, establishing work teams and activities to be undertaken, involving governments (local, regional and/or national) in the project. In addition, it is paramount to obtain funding for the development. An interesting option would be to seek sponsorships from private companies or explore further possibilities for governmental funding.

About the concrete process of enhancement, the first step is recognising the accurate location of the road. This phase will be easier if the *via* is a main interurban road, because more information about it would be available. Then, the activity should focus on archaeological excavations, in order to expose the structure of the road and confirm its origin.

The preservation of the remains is another fundamental step. With the aim of improving their legal protection, applying for heritage distinction to governmental agencies is an interesting option: the road could be included in the Heritage of Cultural Interest (BIC by its Spanish acronym) register or, at least, in the local records of archaeological sites. In the case of urban roads, usually their finding coincides with construction above the remains, so the protection of the site in the early stages of land-use planning is essential.

Finally, these projects should include a promotion plan. Initiatives such as collaboration with museums, coordination of conferences and exhibitions and on-line promotion are key factors in raising public awareness about the importance and the historical significance of these *viae*.

I highlight the benefits that recovered heritage has for local communities, society, governments and/or the economy. In rural areas, the recovery of former roads allows, for example, the adaptation of formerly unused paths for trekking or cycling, offering added value to Sport Tourism. Furthermore, in mountainous paths, the obtaining of funding for the recovery of *viae* could improve access to the landscape while increasing its protection. Finally, the revalorisation of large routes entails inter-regional collaboration, partnership that, if managed appropriately, can be mutually positive, leading to more joint projects in the future.

In urban areas, the benefits of preserving historical heritage are already well known. I would like to stress its touristic potential, especially if the main heritage assets of the city are connected and jointly managed, thereby facilitating access to these sites through delineated routes. Moreover, in urban areas, the increase of touristic elements is, in most cases, a positive factor, given that it contributes to fostering the activity of other local businesses, such as hotels, restaurants, shops, airports or taxis, among others. Nevertheless, cultural projects should be adapted to the city's touristic requirements and capacities.

Perspectives for action I briefly outline some potential future possibilities for research into Roman roads in Spain:

1. Creation of a reliable map of the roads of the Iberian Peninsula, based on the techniques discussed above, in order to prevent their destruction by construction, neglect or van-

dalism. In order to achieve this objective, ‘natural’ pathways should also be considered as areas of potential archaeological relevance.

2. Considering that the majority of Roman roads are superimposed over other ancient routes, it would be plausible the application of the same research methodology into other periods, in order to offer a more complete sequence of the development of the road system in the Iberian Peninsula. This idea would be particularly useful in value enhancement schemes, because it would allow the public appreciation of the different phases of use of the *viae*.
3. As already mentioned, the final aim of research and value enhancement is to inform about the characteristics of the *viae* and their need for protection. This goal is not trivial, because citizens are ultimately the holders of heritage and they are responsible for its preservation. Only by emphasising this fact may a civic consciousness of duty towards public heritage be achieved. The best protection for cultural assets is provided by their rightful owners, all of us.

* * *

First, I would like to thank the IJSRA team for the opportunity given, and also the assistance and the warm and kind treatment that I have received. Furthermore, I am very grateful to the several authors who have allowed me to show their images and have helped me during my research: *Aratikos Arqueólogos*, the team of the Museum of the *Vía Del Pórtico* and Isaac Moreno.

Desde los años 80, el interés por acercar la arqueología al público ha resultado en diversos intentos de integrar la presencia de calzadas romanas en museos y en rutas turísticas y culturales, con unos niveles de coherencia, fidelidad histórica y recepción social variables. A pesar del considerable incremento en el número de este tipo de proyectos con el objetivo de identificar, recuperar y conservar las calzadas, las metodologías empleadas han sido dispares hasta relativamente poco tiempo. En el presente artículo introduzco brevemente el estado de la cuestión de las condiciones de estudio de las calzadas, ya que considero que existe una cierta limitación en estudios generales que aborden la excavación e investigación de estos restos arqueológicos en España. También trataré de explicar los distintos procesos de revalorización patrimonial de las calzadas romanas, los cuales tienen por objetivo mejorar la percepción pública de la relevancia histórica y social que representan las calzadas romanas.

Acknowledgements

Abstract (Spanish)

Palabras claves: Calzadas Romanas, Arqueología, Historiografía, Conectividad, Infraestructura, Patrimonio, Revalorización, Musealización.

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Albanian Archaeology during Communism: Constructing the Illyrian Myth through Numismatics

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In this article, I argue that Albanian archaeology is in need of self-reflexivity to better interact with its findings and conclusions during the country's communist past, placing itself within the wider international map of theoretically-informed archaeological practice. Drawing on national and international critiques by Richard Hodges, Mark Petruso, Sally Martin, and others, this paper aims to deconstruct the ideological discourses behind interpretations on Illyrian numismatics in the territory of Albania, while assessing the neo-colonialist rhetoric. Past efforts of Albanian archaeologists to construct a politically dictated historicity are placed in the wider context of highly instrumentalized nationalist interpretations of the archaeological record in Europe.

Keywords: Illyrian numismatics, communism, Albanian archaeology, self-reflexivity, nationalism.

INTERPRETATIVE problems deriving from the historical development of Albanian archaeology can be compared to, and ultimately placed in the map of wider developments in 19th century Europe. Consequently, interpretative constructs in Albanian nationalist archaeological practice are considered an analytical subject in the wake of a European archaeology. Universal traits of Albanian archaeology are drawn in relation to the theoretical impediments it inherits today. I focus on interpretations of Illyrian numismatics, and provide deconstructive ground to such analysis, not to applaud a politically correct archaeology informed by a genuine postmodern perspective, but to offer a possibility for closer readings of past interpretations of Illyrian numismatics.

In this section I provide an overview of the development of archaeology in Albania and the main factors that influenced it. Apart from the political engagement that archaeology assumed since its early beginnings, I take a look at how the discipline came to bear characteristics specific to its social dimension, regional traditions and, more precisely, to the particularities of its

Abstract
(in Albanian see below)

The development of
Albanian archaeology

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practice in nation-states. While arguing that nationalism remains a contemporary characteristic of southeast Europe (Korkuti and Petruso, 1993), I refer here mainly to the limitations of archaeology during communism. Following sporadic explorations during the Napoleonic wars, the first instances of archaeological practice in Albania were a result of rivalry among the Great Powers to establish their satellites in the newly-freed Balkans of the 19th century. The Austro-Hungarian Empire conducted “the earliest study of the land, its people and linguistics, with an emphasis on the possibilities of Illyrian survival in the actual Albanian population. These initiatives were part of a wider ‘Illyrian’ phenomenon linked to the emerging national consciousness of the [...] cosmopolitan Austro-Hungarian world” (Gilkes, 2006:40). France and Italy followed with new archaeological missions to trace the Trojans of Epirus. An awareness of archaeology as a means for historical self-determination began to transpose in the Albanian context together with a perceived threat of foreign imposition on its territories, especially after the Conference of London in 1913 demarcated the country’s borders. After the establishment of a communist regime in Albania in 1946, issues such as national pride, sovereignty and political ideology, as declared by the ruling party, were at the centre of scholarly studies. Simultaneously, reproductions of Marxist discourses were a *laissez-passer* for those wishing to carry out scientific activities. The regime needed to nurse a narrative on a by-gone greatness that would simultaneously feed the propagandistic fears of capitalist invasion and inspire industrial progress, following the soviet ethnogenetic model of the 1930s (Hodges, 2004:149). Such was the influence of the communist state on Albanian archaeology that today the latter is considered a perfect research case on historical-materialist stripe (Galaty and Watkinson, 2006:8; Korkuti and Petruso, 1993:703).

The main objectives of the dictatorship were the assignment of geopolitical boundaries, the creation of a nation state, and the construction of a cultural identity. According to Veseli (2006:323), the geopolitical location of Albania within the Balkans helps explain the need to, and the importance of, constructing a national identity. Moreover, the process of nation-state formation strongly influenced the institutionalisation of Albanian archaeology. Thirdly, archaeological heritage itself has arguably been paramount in the construction and reinforcement of a national and cultural identity (Veseli, 2006). The coexistence of the discipline with the dictatorship created logical vacuums while following a precise agenda to reach preordained conclusions on Illyrian artefacts. Moreover, historical material not belonging to a specific country was vested with expedient meaning (Kohl, 1998:225).

In this section, I argue that Albanian archaeologists during communism managed to construct an interpretative and material superstructure concerning the Illyrians. In my research on institutional publications from Albanian and international archaeologists, I have encountered three main suppositions in numismatic literature concerning Illyrian numismatic chronology, trade activities, and autochthony. The history of the development of numismatics was transformed in a self-affirmation for both an isolated country and discipline. Ethnocentric interpretations on numismatics claiming that Illyrians grew toward a more complicated culture were the norm. Before dwelling further on the specific case study, it must be stated that I have taken upon interpretations of Illyrian numismatics as a single subject to reflect upon the single grand narrative portrayed during communism.

Chronology As far as absolute dating of artefacts in Albania is considered, the first examinations were undertaken only recently. The chronology used by Albanian archaeologists is floating and periodicities were devised within the country (Aliu, 1985:271). Printed symbols and mono-

grams were used to place Illyrian numismatics in analogue categories (Ceka, 1974:369). To this day, these categories are the best reference in the country (Sasianu, 1987:242). Inconsistencies arise from literature, to state that numismatic material from the fortress of Mavrove is used to “establish a compact chronology [...] of buildings and in general of the main phases of inhabitancy (trans. Dautaj, 1981:65).” The treasure at Jubica is used to establish the chronological order of Illyrian drachms (Ceka, 1971); the workshop in Dyrrah is still an unresolved chronological issue (Ceka, 1974); and the problem of chronological arranging of Illyrian cities remains unresolved (Islami, 1972; Islami, 2008).

Plenty of other numismatic interpretations from relevant archaeologists argue that Illyrians were active traders (Mano, 1986; Mano, 2006; Ceka, 1965; Ceka, 1974; Gjongecaj, 1985; Gjongecaj, 1986; Gjongecaj, 1990; Picard, 1986; Picard and Gjongecaj, 1995). Specifically, Prendi (1985:94) argues for the possibility of trade being the decisive factor in the appearance of social stratification during the late Bronze Age, around XV–XIII BC. During the V–IV centuries BC, the presence of numismatic material is attributed to the trade of a series of cities such as Thronian, Oidantion, Pelion and other unidentified ones with Apollonia, Dyrrah and Epirus (Prendi, 1974:112–113). Mano (1974) argues that different cities were specialized in different activities. Not only do “facts demonstrate coordination and collaboration in monetary activities [...], but also a coordination of trade activities that cities undertook in markets and respective areas” (trans. Mano, 1974:388). The powerful voices of Albanian archaeology, would state that “the progressive Illyrianisation process of [Dyrrah and Apollonia] in the III–II centuries BC, as well as the representation of an ever increasing number of Illyrian names on [their] coins, gives us the right to talk about this coinage [...] as an Illyrian-Greek one” (trans. Stripceviq, 1980:164).

The concept of Albanian autochthony stretched across interpretations to include a mythical materialization of Illyrian presence with special relation to their neighbours. Thus, Tzouvara-Souli (1993) used representations on coins found in Caonia to state that Epirus and Albania shared common cults. According to Waibank (1974:342), during the III–II century BC, Illyrians were bilingual, as demonstrated by their numismatic material. Further interpretations stated that shared Illyrian-Greek cults were not to be excluded (Meta, 2006:147). To reinforce statements on autochthony, the vocabulary used in Albanian academic research during communism placed Illyrians in a race of cultural evolution, according to which the latter were crystallized groups (Prendi, 1985:95), with “new concepts on the spiritual world” (trans. Aliu, 1985:271).

Contrariwise, ancient authors stated that Illyrians often stole, and were not easily influenced by neighbouring cultures (Islami and Prendi, 2002; Ceka, 1974; Anamali, 1987). They also reported that Illyrians were never at the centre of main historical events and very little was written about them (Franke, 1974:371). Due to antagonistic Illyrian behaviour “since the middle of the II century BC, and especially during the 1st century BC, Romans rendered life unbearable in Illyrian territories, which resulted in a series of revolutions” (trans. Anamali, 1987:6).

In this section, I demonstrate how arguments for a self-reflexive discipline informed by European archaeology bear the same applicability in the Albanian case, paradoxically placing the latter in the wider map of European archaeology. I also argue that after the collapse of the communist regime in Albania in the beginnings of the 1990s, archaeologists felt the need to vindicate their discipline and render justice to archaeological troves. In the wake of democracy waves through southeast Europe, Albanian archaeologists were quick to denounce the

Trade

Autochthony

Need for self-reflexivity

abuse during communism. “Many examples could be cited of professional backwardness in Albanian archaeology, of sterile polemic, and of unwillingness to make use of archaeological data from other parts of the world” (Miraj and Zeqo, 1993). Many were the professionals that understood that self-reflexivity is not a specificity of Albanian archaeology, but that archaeologists have the obligation to reflect on the nature of their subject (Gramsch, 2011:60). Reflecting on teaching processes that provide space for critical engagement in archaeology, Hamilakis (2004:287) argues that one of the possible ways to rethink the current instrumentalist pedagogy in archaeology is through the creation of spaces for critical reflection, which link experience and knowledge with subjectivity. These spaces would allow students not only to understand the social and material processes of interpretive subjectivity, but also to challenge and transform these processes and their conditions. Along these lines, Martin (2006:371) argues that a radical revaluation of Albanian archaeology has been considerably restricted due to significant limitations in the available archaeological research base and the research undertaken, which has fostered the perpetuation of politicised site interpretations, no longer of relevance. Professionals as well as their students still refer to publications made during communism (Hodges, 2004). The latter texts still provide the authority needed to pose a case study (Bintliff and Pearce, 2011:8–9), although largely untested and perhaps incorrect (Galaty and Watkinson, 2006:11). Additionally, it is possible to argue that archaeology in Albania faces slight forms of positivism, given that most of the policymaking, academic and archaeology related institutions have not gone through important phases of democratization. As Johnson (2010:45) remarks, single-method positivism masks ‘institutional intimidation’ as neutral praxis, hindering the development of science, and encourages scientism and the ‘cult of the expert’. A new awareness from Albanian archaeologists after the fall of communism is increasingly present, and international collaborations are widely favoured nowadays, but it does not suffice to reach better scientific standards and to radically transform the current academic landscape.

Although the need for a more self-reflexive discipline would largely benefit archaeology in Albania, it is imperative not to transpose a series of Western stereotypes informed by the need to replace the Stalinist model (Hodges, 2004:161). In a context of power imbalances (financial, technological, ideological), representatives of ‘imperialist’ national archaeologies (Trigger 1984 cited in Galaty and Watkinson, 2006) may use their critique of archaeological research conducted under dictatorship as support for their own interpretations (Galaty and Watkinson, 2006:13). This is particularly dangerous given the relativist approach to the past proclaimed by some post-processual archaeologists, by which all interpretations of the archaeological record might be said to be equally valid, regardless of whether they were produced during a democracy or under a dictatorship (Meskell 1998 cited in Galaty and Watkinson, 2006). These post-modern discourses (Meskell 1998 cited in Galaty and Watkinson, 2006) have to take into account that the very materiality of the archaeological record constraints the range of interpretations that can be inferred from it (Hodder, 1999:200). In 1995 Kohl and Fawcet (cited in Galaty and Watkinson, 2006) have argued, that we must, as professional archaeologists, face these ethical issues with some sense of responsibility towards the discipline.

In this paper I focused on the control that Albanian archaeology experienced during the communist regime, while serving as a propagandistic tool. I also delved on the importance of self-reflexivity in Albanian archaeology, as a need that has presented worldwide making for a universal trait of the discipline. To conclude, I argued that attempting to construct the Illyrian

myth through the use of numismatic material has led to equalizing the Illyrian archaeological culture to the Albanian human one, and rendering archaeological research a cultural historical approach (Johnson, 2010:18). The challenging deconstruction of these political narratives offers an interesting challenge for the future of the practice of archaeological research in Albania.

* * *

Në këtë artikull pohoj se arkeologjia shqiptare ka nevojë për vetë-reflektueshmëri për të ndërvepruar më mirë me gjetjet dhe përfundimet e saj gjatë të kaluarës komuniste të vendit, duke u vetëvendosur në hartën më të gjërë ndërkombëtare të praktikës arkeologjike të informuar nga teoria. Duke u bazuar te kritikat kombëtare dhe ndërkombëtare nga Richard Hodges, Mark Petruso, Sally Martin dhe të tjera, ky artikull përpigjet të dekonstruktojë diskurset ideologjike prapa interpretimeve mbi numizmatikën ilire në territorin e Shqipërisë, duke rrahir retorikën neokolonialiste. Përpjekjet e kaluara të arkeologëve shqiptarë për të ngritur një historicitet të diktuar politikisht vendosen në kontekstin më të gjërë të interpretimeve nacionaliste tejet të instrumentalizuara mbi të dhënat arkeologjike në Evropë.

Fjalë kyçë: numizmatika ilire, komunizmi, arkeologjia shqiptare, vetë-reflektueshmëri.

Abstract (Albanian)

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2–3 % Neanderthal, 5 % Denisovan, but 100 % Human: Constructing Identity from the Genetic Past

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*There has been a veritable explosion of archaeogenetic studies after the Human Genome was published in 2010. Among such studies, the sequencing of the Neanderthal genome provided new insight into human evolution and the past relationships between *Homo sapiens* and *Homo neanderthalensis*, even providing evidence for interbreeding. With an average of 2–3 % of genes considered to originate from the Neanderthal line being present in Europeans, and current estimates of up to 20 % Neanderthal contribution to the human genome, there has been a reconsideration of what makes us human. This paper presents a discussion of group and individual constructions of identity in an archaeogenetic world, using selected reactions to Neanderthal Genome Project and the Genographic Project by the general public as case studies.*

Abstract
(in French see below)

Keywords: Identity, genetics, Neanderthal, archaeogenetics, genome.

WHEN Linnaeus wrote the species definition for *Homo sapiens* in the 18th century he simply put, ‘know thyself’ as the criteria (Ritvo, 2009). Thus, the concept of identity is explicit in the study of human origins; who am I; where do I come from; what makes me who I am? Now, nearly 300 years later, genomics is influencing research agendas in the humanities, particularly in archaeology, and affecting the way we see ourselves as individuals, social groups, populations and as a species, both in regards to past and present (Zwart, 2009). In short, knowing thyself has become a multidisciplinary and highly technologically advanced field; and yet the question has not been answered fully (Pollard, 2009) Our identity as *Homo sapiens* remains unclear, we have yet to define what it is that makes us human and what separates us from our archaic ancestors. Even recently, human origins studies have been in the spotlight with the racism row over the *Homo naledi* finds (ABC News, 2015). The misinterpretation of the archaeological findings as being racist by members of the wider general audience highlights the sensitive role of archaeological material and interpretation in the construction of identity. This paper will briefly introduce the concept of identity; how it is

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constructed, expressed, and how it has been interpreted within archaeology. The concept of identity will also be discussed in regards to genetics and genome studies, and how these relate to archaeological constructs of identity through the recent genome studies of Neanderthals (and by extension Denisovans). Finally, this essay will present the reaction to the results of the Neanderthal Genome Project and the Genographic Project as case studies; to demonstrate how genomic studies of archaic and modern humans can influence the construction of individual and group identity in the present.

What (1981) defines identity as: ‘a quality that an entity possesses which is a by-product of its origin and its ability to remain distinct from other entities.’ This entity can be an individual or a population. Shared identity, or aspects thereof, can be the basis for socio-cultural groups or a national identity. Zeiler defines three broad concepts of identity: identity over possible worlds, identity as certain properties, and identity over time (Zeiler, 2007). Identity over possible worlds is the concept that identity is either the same or different over different possible worlds or universes (Zeiler, 2007). If you were born to different parents, for example, would you be you, or would you simply not exist? Identity as a sum of certain properties is the most common form of self-definition (Zeiler, 2007), the idea that I am me because of a list of properties that define me as an individual; that make me who I am. These can be properties such as hair and eye colour, gender, sexuality, education, language spoken, country of birth, ancestry or ethnicity. The final concept, identity over time, focuses on the question if an identity remains the same over time; for example that I either ascribed to the same identity in my past as I do in my future, or did not (Zeiler, 2007). In this concept, there arises the question if someone is the sum of their experiences, and therefore if their sense of identity changes with each new experience over time. Identity can be constructed from all three concepts of identity; it is flexible and it is subjective.

Identity in Archaeology Early in the history of the discipline of archaeology, in the Culture Historical period, archaeology was used to support burgeoning ideas of national identity and state formation in Europe (Meskell, 2002). Of particular importance was the use of archaeological material to bolster a national identity constructed by Nazi Germany, an identity that drew strict definitions of sameness and difference (Arnold, 1990). German archaeologist Kossinna introduced the idea that a superior human race, the Aryan race, was equivalent with the ancient Germans, thus arguing that Germany was the key to prehistory (Arnold, 1992). Since then identity in archaeology has become intrinsically linked to studies of class inequality, gender bias, sexual specificity, politics and nation, cultural heritage, and race (Fisher and Loren, 2003). With archaeology interested in the material culture and remains from past individuals and populations, archaeologists are faced with the illusion that the subjects of research, those whom identity we ascribe, are dead and buried (Meskell, 2002). Current definitions of identity coalesce around concepts of genealogy, biology, heritage, citizenship, sameness and difference (Meskell, 2002). Furthermore, the identity of living individuals, populations, and nations is in many ways still built on the archaeological knowledge of the past.

Identity in Genetics Walter Gilbert once suggested that genetic knowledge would provide us with answers to the million dollar question, “Who are we?” (Zeiler, 2007). From our increasing knowledge of genetics we know now that our genome is unique (Zeiler, 2007). It is easy to see therefore, how this uniqueness can then lend our genome to define our identity. Our genome can be used to identify us in situations where other aspects of our identity are lost or unknown, such as in mass disasters (Hartman et al., 2011). There is the question of genetic identity; are we

defined only by our genes, our base biology, or by our actions, environment and experiences? Epigenetics, wherein the expression of our genome is chemically altered by our environment and even our actions, has provided evidence that we are more than the base sum of our genes (Lock, 2015).

So while neither the genes nor collective genome determines the whole of an individual's identity, they can form a layer within a multi-layered concept of identity that includes socio-cultural aspects, environment, and the sum of an individual's life experiences (Zeiler, 2007). From a nationalistic or population identity perspective, genome studies can be ethically fraught. The issue of racism is a long standing one, with the ability to detect differences in the genome between population groups not aiding the endeavour (Carter, 2007). Particular genetic markers, can be more prevalent in particular population groups, and thus have been proposed for racial identification. On a more basic level, group identities that are formed on the basis of outward appearance, such as skin and hair colour, may be based on genomic similarities. The concepts of sameness and difference when applied to the genome may have some beneficial medical potential, but they also carry the looming shadow of application in eugenics (K. L. Garver and B. Garver, 1994).

The idea of genetic/genomic identity is of particular relevance to archaeology, with the increase in ancient DNA studies (Matisoo-Smith and Horsburgh, 2012). DNA and genome wide studies have become another tool with which archaeologists can extract information about past cultures, and the interaction of these past cultures with present (Matisoo-Smith and Horsburgh, 2012). Many people strongly identify with past cultures, as part of their personal or national identity. The information that can be obtained by the genomic study of archaeological material can be of great importance therefore, not just to archaeologists, but to a wider public audience interested in the past. One such example are the comparative genomic studies of modern human origins, in particular the Neanderthal Genome Project (Green et al., 2010) and sequencing of the Denisovan genome (Meyer et al., 2012), in an attempt to isolate what makes us unique and human.

In the archaeological study of human ancestry, there has been much debate about the correct placement of Neanderthals (and later Denisovans) in the human tree of life. It must be acknowledged that there is a plethora of species definitions in existence, and the term 'species' itself is a fluid concept even for currently living taxa (De Queiroz, 2007). Some placed Neanderthals as a separate distinct species to modern humans (for the sake of this paper, defined as genetically and anatomically modern), designating them *Homo neanderthalensis* (Harvati, 2003; White, Gowlett, and Grove, 2014). Others placed them as a human subspecies, designating them *Homo sapiens neanderthalensis* (Churchill and F. H. Smith, 2000). Arguments for one or the other stemmed from a crisis of identity, a definition of where a Neanderthal fit in regards to human identity changing based on perceived sameness and difference (Harvati, 2003). Historically, Neanderthals were considered inferior or savage in comparison to both archaic and Modern Humans (Graves, 1991; King, 1864). The fossil remains of Neanderthals were visibly different to those of Archaic and Modern Humans, with a longer face, larger nasal cavity, thick brow ridges and a very robust stocky postcranial skeleton (White, Gowlett, and Grove, 2014). Despite having a larger brain, with regards to volume, they were inferred to be less intelligent than humans due to the lack of 'behaviourally modern' artefacts associated with Neanderthal finds (Wynn and Coolidge, 2008). Finally, that they coexisted with Humans, and

Neanderthals and
Denisovans: Human or
not?

yet mysteriously went extinct, was considered to be the ultimate proof of their evolutionary inferiority (Graves, 1991).

Archaeological studies have since provided evidence to suggest Neanderthals did display behaviourally modern traits; such as caring for their sick or infirm, burying their dead with some form of ritual, engaging in symbolic self-ornamentation, and engineering tools of both stone and other material, including manufacturing pitch to haft spear points (Spikins et al., 2014; Rendu, 2014; Villa and Soriano, 2010). However, like with many aspects of archaeology, the evidence towards behavioural modernity for Neanderthals is highly debated (McGill, 2015). The discovery of a hyoid bone in a Neanderthal burial suggested that Neanderthal's might have been capable of speech, a major component of behavioural modernity, but again this was contested (Lieberman, 1993). The potential for speech would later be supported by the identification of a gene variant known as FOXP2, a gene that in humans is linked to a vital protein for language development (Krause et al., 2007). The belief that Neanderthals were in some way inferior, or 'less human' that us still persisted, due to the relative scarcity of such artefacts that could be solely linked to Neanderthals and not the Humans who coexisted in the area (Mellars, Gravina, and Bronk Ramsey, 2007).

In 2010 the first draft of the Neanderthal genome was published (Green et al., 2010). It was later followed by the sequencing of further Neanderthal individuals and the Denisovan genome in 2013 (Wang, Farina, and Li, 2013; Meyer et al., 2012; Martinón-Torres, Dennell, and Bermúdez De Castro, 2011). Comparison of the Neanderthal and Denisovan genomes indicated the two were closely related and interbreeding species, with approximately 17 % of the Neanderthal genes present in the Denisovan genome (Reich et al., 2010). Comparison of both the Neanderthal and Denisovan genomes with the Human genome, both the published reference sample and with wider living populations, indicated that there had been multiple interbreeding events between Humans, Neanderthals and Denisovans over time (Sankararaman, Mallick, et al., 2014; Sankararaman, Patterson, et al., 2012). An average of 2–3 % of the Neanderthal genome was present in individuals of European descent, and 5 % of the Denisovan genome in individuals of Asian descent (Sankararaman, Mallick, et al., 2014; Reich et al., 2010). An estimated 20 % of the genome is shared between the Neanderthal and the modern humans (Yong, 2014). Yet, no evidence was found of Neanderthal or Denisovan genes within the exclusively African individuals (Sankararaman, Patterson, et al., 2012). These results confirmed the theory that Neanderthals (and Denisovans) had interbred with humans, thus further confusing the argument of where they sat in the Hominid evolutionary tree; a separate species, or a subspecies (Mason and Short, 2011).

A strictly biological concept of the species would imply that if the two groups were able to interbreed and have fertile young to pass on their genetic legacy, then they were not reproductively isolated and therefore were the same species (White, Gowlett, and Grove, 2014). However, there was a lack of Neanderthal and Denisovan specific genes on regions of the X chromosome and in mitochondrial DNA (Serre et al., 2004). This offered an exciting possible explanation; the offspring of such a pairing were inter-species hybrids, potentially with a Neanderthal father and a human mother (Serre et al., 2004; Mason and Short, 2011). The alternative of a Neanderthal mother and a Human father might not theoretically result in children, although it has been known to occur in other species and thus cannot be truly discounted (Patterson et al., 2006). Male hybrids may have been potentially sterile (Patterson et al., 2006), and with further interbreeding of female hybrid offspring with human men, the percentage of Ne-

anderthal DNA in the genome would be further reduced (Mason and Short, 2011). Adding in natural selection against non-beneficial Neanderthal genes, and the higher variability of the human genome pool due to the later migration out of Africa, this interbreeding could account for the reduction of the Neanderthal genetic legacy to a percentage of the human genome in a fraction of the global population. However, the reduction of Neanderthal genetic material in the human genome may also be the result of population bottle necks, genetic drift, or even selective recombination events during fertilisation (Harvati and Harrison, 2007; Awadalla, Eyre-Walker, and J. M. Smith, 1999).

So the question of identity remains, if Neanderthals were supposedly inferior yet they are in part our genetic ancestors, what does that make us? Does an average of 2–6 % of the genome render you Neanderthal or does it make you inferior to those who do not have any Neanderthal or Denisovan DNA? If you have the noted Neanderthal genes that are predicted to influence adaptive skin phenotypes (Vernot and Akey, 2014), are you superior to those who do not? The following case studies discuss two separate articles which feature reactions to the possibility of having Neanderthal (and Denisovan) DNA, and how this affects construction of identity. It should be noted here that both of these case studies are not scholarly peer reviewed studies, which was intentional as it is not the aim of this article to analyse how archaeologists have constructed identity from archaeogenetic studies, but rather to provide insight into how archaeogenetic information has been interpreted by the members of the general public.

In an article published in GeneWatch, Terence Keel discusses the reactions of Christian Creationists and White Supremacists to the results of the Neanderthal Genome Project, and how both of these cultural subgroups have used the results of the project within their constructions of identity, both at the individual and shared level (Keel, 2010). The Creationists, Keel states, use the results to redraw the distinction between non-human and human, with several claiming that Neanderthals must then be fully human, despite anatomical and genetic differences. One listener of NPR's coverage of the project, Keel states, went so far as to rethink the Christian Genesis creation mythos to include the results stating:

Adam and Eve were the first cognizant humans, their two offshoots- offspring were Neanderthal son Abel, and modern or Cro-Magnan son Cain. Abel the hunter, Cain the planter. And Cain killed off his brother Abel. It's a terrible story of why there are no Neanderthals today.
—Keel, 2010

In so doing this the listener has made Genesis a fable to represent Hominid evolution, thereby adapting the genetic data into their own sense of identity as a Christian Creationist. Neanderthals are considered human while still being 'other'. They are human but they are not 'us'. The fact that there is no evidence of Neanderthal DNA in purely African populations was not addressed.

In contrast, Keel (2010) notes that the lack of Neanderthal DNA in purely African populations was a beacon for the white supremacist subgroup, which seized on the difference as a key part of their group and individual identity. Keel stated that the majority of commenters on the website www.Stormfront.org, a white supremacist blog/forum, related the Neanderthal DNA in Europeans as the reason behind their perceived supremacy and prowess over non-Europeans (Keel, 2010). Their believed physical superiority was the result of the physical strength of the Neanderthals, elevating the Neanderthals to a position of a supreme race. As one blogger stated:

Case Study: Reaction to the Neanderthal Genome Project

[As] Neanderthal genes become more inundated with other racial mixes we have been evolving backwards [sic]. It may be that in a few hundred years so little will remain of these genes that we will be inseparable from the lower form of human (i.e. blacks).

—Keel, 2010

Now it is clear that these individuals are using the genetic data from the Neanderthal Genome Project to attempt to legitimize their racist ideology, by emphasising the difference in genetic identity between a population group they view as inferior and themselves. This is much in the same vein as the use of prehistoric archaeology during the Culture Historical period by the Nazi party (Arnold, 1992). Interestingly, this runs in direct contrast to the historical perspective of Neanderthals as the inferior savage cousins to the superior humans (King, 1864).

From this historical perspective, those with Neanderthal DNA, presumably like the white supremacist bloggers, would be biologically inferior to the exclusively human DNA of African's without European ancestry. This thought also runs in direct contrast to the historical view of privileged educated men during the 18th and 19th centuries; one where hunter-gatherer societies were considered savage while European societies were considered cultured (Ellingson, 2001). It can be wondered if the perspective of Neanderthals as savage and inferior would have changed in the past if they had known what we now know; that these educated men who thought themselves superior likely shared Neanderthal DNA.

Also inherent in the quote from the white supremacist blogger is an idea of identity changing over time. The blogger posits that in a matter of a few hundred years, genetic admixture will have diluted Neanderthal DNA to the point where people of European origin will no longer be able to identify as such genetically, and therefore in this racist argument, will no longer be biologically superior to African individuals. The argument itself is abhorrent, and the use of the genome data to form a shared and individual identity from a difference based and highly racist ideology, harkens back to the spectre of the construction of national identity in Nazi ideology.

This case study focuses on a blog style news article written by Gabrielle Jonas on [iScience-Times.com](#), outlining her personal reaction to the results of her genetic contribution to the Genographic Project, run by the National Geographic (Jonas, 2014). Jonas relates that she was excited by the results which stated she was 1.10 % Neanderthal and 0.10 % Denisovan. More interesting to the discussion of individual identity however was Jonas' blunt summary of how her mother would have reacted to the news:

... I think about what my mother's response would have been to being told she was part Neanderthal. She wouldn't have entertained such a notion, not even with an R.S.V.P... As for us being part Denisovan- it would have helped if the not-so dainty fossilized pinky had been adorned by a college ring, preferably Ivy-League. —Jonas, 2014

This contrasts with the first case study, and with Jonas' personal view, wherein the potential for Neanderthal contributions in the genome was accepted into their personal construction of identity. Jonas' mother, she relates, would categorically deny being in anyway Neanderthal, it would not be part of her own constructed identity (Jonas, 2014). Like with the first case study, Jonas' mother would define her self-identity as being different and in some way better, than an imagined Neanderthal identity. Reading between the lines; here Neanderthals are viewed here as lesser savages to the superior humans. If Humans and Neanderthals were the same species, and Neanderthals were a living species, then this ideological view could be considered as racist

Case Study: An Individual Reaction to the Genographic Project

as the views of the white supremacists on [Stormfront.org](#). This is not to say that Jonas' mother is racist, rather her understanding is more likely influenced by the popular conception of the Neanderthal as a savage cave-man monster, rather than the academic perception of a human-like hominin. This understanding harkens back to the imperialist and colonial racist discourse regarding the concept of a savage; an individual that is considered less evolved than the person making the definition (Ellingson, 2001).

When Jonas' points out that her mother would be more likely to accept the knowledge that she had genes in common with the Denisovan fossil individual if that individual had been in an Ivy-League college, she is referring to the perceived difference in intelligence between Neanderthals and Humans in a tongue in cheek manner (Jonas, 2014). She would not accept being 0.10 % Denisovan because in her mind, they are intellectually inferior to humans. Accepting this into her self-constructed identity would make her feel lesser or inferior, regardless of the fact that most Europeans share Neanderthal DNA and most Asians share Denisovan DNA, and there are predicted benefits of some of the identified genes (Vernot and Akey, 2014). Neanderthal was used as a slur, a way of calling someone un-evolved, as Jonas mentions; 'despite the fun of being able to tell family members that I knew all along they were Neanderthals, the legacy of Neanderthals is not a LOL matter' (Jonas, 2014). While Jonas goes on to acknowledge the potentially beneficial aspects to the inherited aspects of Neanderthal DNA as this legacy, in popular culture the legacy of Neanderthals is one of a lesser inferior savage cousin to humanity, which led to their resulting extinction.

Identity is a highly subjective, multi-layered construct, composed of socio-cultural, environmental and biological aspects, such as genes, in addition to layers of individual and shared identities (Zeiler, 2007). Archaeology and identity have been intrinsically linked since the formation of the discipline, particularly in regards to national identity (Meskell, 2002). Genetic/Genomic identity is not simply restricted to the unique genome of an individual, but can also be used to construct group identity, particularly with regards to ethnic or racial identity through identification of particular differences between groups. However, this is ethically grey as it can lead to the support of racist ideologies (Carter, 2007). The data from the Neanderthal and Denisovan genome studies, provided evidence to support interbreeding between Humans, Neanderthals and Denisovans (Sankararaman, Patterson, et al., 2012; Sankararaman, Mallick, et al., 2014; Meyer et al., 2012). The small percentage of inherited Neanderthal and Denisovan DNA in modern humans has posited the question; if you have this DNA does it alter your perceived identity? The results thus challenged the historically constructed identity of Neanderthals and Denisovans as the lesser savage cousins of the superior modern humans. The case studies presented here similarly state an inherent perspective of individual and group superiority; one accepting the genome data as part of a constructed racial identity, with the other rejecting it on the basis of perceived inferiority. From this it is clear, that the analysis of archaeological material using genomic techniques can provide differing perspectives on identity, with regards to both the past cultural identity but also that of present living individuals.

In conclusion, genetic information, particularly that relating to human origins and the definition of what makes us human and unique, can be a minefield of sensitive issues when interpreted by the wider public. If a single gene is reported to have a beneficial effect over another, does that make those with that gene superior to those without? Does having genes that are linked to Neanderthals make you Neanderthal yourself? What percentage of genetic material do you need to have to identify as human or non-human? These are just some of the ques-

Discussion

Conclusion

tions that can arise in the search to identify what makes us human, and what makes us (as individuals) unique. There is no right answer to any of this as identity is subjective and personal. It is something that is worth considering however, when undertaking such research, and when communicating that research outside of the archaeological sphere. Thus, we need to be wary of how our work will be interpreted by the general public. Archaeologists should take the opportunity to present their findings to the general public and thus challenge long held assumptions and prejudices.

* * *

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Abstract (French) *Il y a eu une véritable explosion d'études d'archéogénétique, après la publication du génome humain en 2010. Parmi ses études, celle du séquençage du génome néandertalien nous a permis de découvrir un autre aspect de l'évolution humaine et des relations qui existaient entre l'*Homo sapiens* et l'*Homo neanderthalensis*, et nous a même permis de découvrir des preuves de croisements. On considère qu'une moyenne de 2-3 % des gènes présents chez les européens proviennent de la souche néandertaliennes et on estime actuellement que la contribution du Néandertal au génome humaine peut atteindre jusqu'à 20 %. Ceci explique pourquoi il a fallu quelque peu reconsidérer le concept d'«humain». Cet exposé présente une discussion relative aux constructions d'identité, qu'elles soient individuelles ou de groupe, dans un monde archéogénétique. Pour ce faire, certaines réactions du grand public au Projet génome de Néandertal et au Projet géographique sont choisies et développées sous la forme de d'études de cas.*

Mots clés: Identité, génétique, Néandertal, archéogénétique, génome.

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Tetra-dimensional Climate and its Effects on the Roman State: An Archaeological Analysis of the Roman Agroeconomy

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This paper examines the relationship between environmental vacillation and the success of societal institutions in the Roman Empire, specifically the economy. A detailed investigation exploring the rise of the Roman economy is undertaken through the use of archaeological and climatological evidence. Climate, as defined in this paper, consists of four parts –environmental climate, social climate, economic climate, and political climate– thus establishing the Tetra-dimensional Climate Model. The results of this study indicate a strong relationship between the rise of agriculture and the rise of maritime trade during the Roman Republic and the Roman Empire. This increase in agricultural production was largely a result of climatological stability in Europe, as well as the temporary tranquillity of the political climate following the foundation of Rome. As political and social stability vacillated throughout Rome’s years in power, economic development – especially in the agricultural sector -- also changed course.

Keywords: Classical Archaeology, Roman Economy, Maritime Trade, Environmental Archaeology, Nautical Archaeology.

BEGINNING as early as the 6th century BC, farms began to emerge throughout the Italian countryside¹. As time passed, these farms grew in size, and eventually transformed into agricultural institutions: vineyards, villas, and high-yielding production zones.² Many of these large estates were owned – or at least partially owned – by the wealthy, landowning

Abstract
(In French and Italian see below)

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¹ The Oxford Roman Economy Project, of which much of the following data is based, “addresses the fundamentals of the Roman imperial economy and analyses all major economic activities (including agriculture, trade, commerce, and extraction), utilising quantifiable bodies of archaeological and documentary evidence and placing them in the broader structural context of regional variation, distribution, size and nature of markets, supply and demand.”

² When referring to farms, villas, and estates, the following should be considered: farms are the smallest, usually referring to land run by a single family; villas (in this instance, agricultural villas) are usually owned by a wealthy individual or family and are run by servants or slaves; estates are in many ways similar to villas but generally include more farmable land.

elite of the Roman world. Some of these aristocratic Romans were senators, such as Scipio Africanus, who owned a vineyard next to his villa in Liternum, and L. Sestius, who owned villas that flourished on exporting wines throughout the Adriatic (Purcell, 1985:6, 16). However, not all wealthy landowners were members of the Senate. The rise in number of such estates coincided with an increase in trade, which can be further witnessed in the distribution of amphorae, an increase in the production of coinage, and a spike in maritime traffic, leading to higher rates of shipwrecking (Manacorda, 1978; Hopkins, 1980). A high rate of association between the emergence of large-scale agricultural production and a peak in Mediterranean trade is seen through statistical analysis of agricultural presses, shipwrecking, and coinage production.

Yet, what caused this spike in agricultural production? Surely it was more than just the appearance of large estates and the rise of the Roman landowning elite. What were the factors that allowed for this rapid expansion of the Roman agricultural sector? The various elements that permitted for an unprecedented rise in the number of farms and agricultural estates can be compiled into one category: climatological stability.

This article seeks to put forth a new definition of climate by breaking the term into four different subgroups: societal climate, economic climate, political climate, and environmental climate. Tetra-dimensional climate creates a general variable that is responsible for the success or failure of nearly every human institution in a given society. Most pivotal moments in the history of humankind can be traced back to the climatological context of the time, whether it is the societal climate, the political climate, the economic climate, or the environmental climate. Each individual variable can have effects on human society, and the more of these variables that are in oscillation, the more likely anthropological change is to occur.

Societal organisations can be easily understood when looking at systems in other aspects of the natural world. In an ecological context, every member of a society has a crucial role, and any small change can, and will, have impacts on the system as a whole. In order for the system to sustain itself, it has to be resilient, adaptive, and transformative to changing conditions (Walker et al., 2004). Forces that impact the ecology of human organisations consist of the four components of climate discussed previously, and resilience, adaptability, and transformation are essential to survival. When the climatological tetrad is favourable – agricultural production is high, economies are thriving, social tensions are low, and political systems effectively keep their citizens protected and content – then human society thrives and expands.³ However, when the tetrad is unfavourable – poor harvests; economic collapse; lack of available resources; corrupt, tyrannical, or ineffective political systems – then human society tends to fall into chaos.⁴ Granted, in some instances, societies cope in positive ways to these climatic challenges, and this anarchic outcome is avoided altogether. Nonetheless, in extreme and prolonged circumstances, civilisations tend to dissolve in the presence of such problems. The Roman Empire is no exception to this pattern, and through the use of the Tetra-dimensional Climate Model, it

³ For a good reference for the factors that encourage and inhibit the expansion of human civilisation, see Diamond (1997).

⁴ Favourable and unfavourable environmental climates can be detected archaeologically through environmental proxies, historical records, and archaeological remains. When there is evidence for massive violence, destruction, or famine, the climatological tetrad may have been in flux. At the same time, if there is evidence of prolonged residency in a region, an abundance of resources, and a myriad of building projects, then the environments were likely favourable.

is demonstrated that during periods of environmental climate change that led to agricultural failures, the economic and political sectors also began to fail. These collapses left society in a state of uncertainty.

As mentioned previously, the tetra-dimensional climate model (TDCM) consists of four components. These pieces together form one variable that is indicative of the success or failure of a given human society. Let us now break down the TDCM into its various elements.

The environmental climate is the traditional definition of climate, the influence or the environmental conditions characterising an area or a period. This is perhaps the component of TDCM that is most independent from human control in pre-industrial societies. Humans may alter the environment intentionally or unintentionally, but they cannot change weather patterns to “control” nature. As a result, the environmental climate of a region or time period generally dictates the direction that human civilisation will take, with environments favouring agricultural production being the most beneficial for human growth.

The economic climate of a group or region does not necessarily fall in line with modern economic theory. Ancient societies did not have a global economic system as we do today, and so “economics” in these instances simply refers to any occurrences of exchange between different groups. In the case of Rome, as well as many archaic societies, agricultural trade is among the first such elements of an “economy.” As a society becomes more advanced, economics may include the extraction of raw materials – such as precious metals and architectural materials including stone and marble – and widespread trading networks. When exchange between regions is constant/growing and tranquil, then the economic climate can be considered positive. If trade relations are virtually non-existent or in rapid decline, then the economic climate can be considered negative and thus a stymie to societal development.

When defining political climate, stability and governmental system type are important determinants. For example, a totalitarian dictatorship issues an oppressive political climate, which is unsuitable for societal advancement. Democratic governments, on the other hand, allow for more social development. However, if the system of government, regardless of its type, is unstable (e.g. constant coup attempts, death of a leader, succession uncertainty), then the political climate is also unfavourable for human development. Therefore, the political climate is only beneficial when the system is stable and the governmental type is tolerant of societal innovation.

The overall consensus among the masses regarding their views of the political and economic systems in place is the best way to define social climate. For example, if a group of people find their government oppressive and their rights restricted, the social climate is one of contempt and will likely lead to a revolution or rebellion against the current political regime. Likewise, if the masses are unhappy with the economic climate (due to inflation, job availability, etc.), then the social climate will also be one of unrest. If the political and economic climates are both preventing social mobility or development, then the social climate will not only be negative, but will likely turn violent.

Unlike many other theories relating to “climate”, TDCM combines multiple aspects of climate and aims to explain how human society is limited by environmental forces in addition to our own societal systems. Through the analysis of environmental proxies (e.g. dendrochronology and ice cores), a concise record of past environmental fluctuations was determined. For this study, tree-ring investigations by Büntgen et al. (2011) and in *Central Europe, 500 BC -*

2003 AD, tree ring width, Stone pine and European Larch (2011)⁵, and ice core analyses by McCormick et al. (2012) serve as the foundational data for reconstructing the environmental climate present during Rome's expansion. In order to establish the state of the economic climate, statistical and geographical data relating to shipwrecking, coinage manufacturing, and agricultural production were used, in conjunction with archaeological evidence in the form of underwater and terrestrial discoveries (shipwrecks and their cargo and agricultural production centres, respectively). This evidence, when synthesised, helps to paint a picture of economic evolution throughout the history of the Roman Republic and Roman Empire. The political and social climates are investigated primarily through historical sources and are very often reflected in the economic climate of the corresponding time period. What is noticeable is that the three anthropological aspects of the climatic tetrad (economic, social, and political climate) are intertwined, whereas the environmental climate is not necessarily reciprocally influenced in the same way.

This paper is organised in chronological order, spanning from the 6th and 7th centuries BC until the fall of Rome in the 5th and 6th centuries AD. Within this chronological order, the elements of TDCM are highlighted and exemplified through archaeometric, archaeological, and geographical evidence.

The Rise of Farms After the 6th century BC, pre-existing farms increased in size, changed ownership, and eventually transformed into massive villas and estates. Some of these land ownings were households for the elite with little to no agricultural significance. These villas can be seen as far back as the 5th century BC; yet, agricultural villas do not appear until the 3rd century BC (Terrenato, 2001:18). Originally, such large estates primarily functioned as aristocratic housing rather than lands for surplus agricultural production. Large, well-developed villas do not truly appear in abundance until the 1st century BC (Terrenato, 2001:24). Historian Appian of Alexandria stated: “[t]he rich came to cultivate vast tracts instead of single estates” (Potter, 1990:98). Although this record comes from the 2nd century AD, it also accurately describes the 2nd century BC in that during this time, villas and estates began to rise in their abundance.

Evidence for a surplus of agricultural production can be seen in the abundance of amphorae that begin to appear in the 3rd century BC. By this time (and possibly a century or so earlier), Italian wine makers began to look beyond the local market to vend their products. In Naples, amphorae production increased from the second half of the 4th century BC “due to the diffusion of Aminea grapes within the area of the bay” (Olcese, 2005:61). The fermented grape was a highly sought after commodity in antiquity because it was one of the most common sources of alcohol during this time period (Purcell, 1985:2). In addition, wine was considered to be an “exotic item” by indigenous Europeans such as the Celts and did not spoil as quickly as locally produced beverages (Dietler, 1990:383).

As far back as the 3rd millennium BC, there is evidence that wine was classified as an elite beverage, while beer remained the drink of commoners (Dietler, 2006:233). Only within Greek and Italic societies did wine become the drink of the masses. The goods of viticulturists were soon shipped by sea within transport containers (amphorae) to sites throughout the Mediterranean (Moore, 1995:9). These amphorae were based on Greek styles and

⁵ The dendrochronological study used 7,284 European oak tree samples and Alpine conifer data, in conjunction with 1,089 stone pine and 457 European larch samples from the Austrian Alps. The samples allowed Büntgen et al. (2011) to reconstruct the precipitation record for April through June and the temperature record June through August for the past 2500 years of European environmental history.

were abundantly produced in the Italian provinces of Etruria, Latium, and Campania (Woolf, 1992:285). Most of these amphorae contained wine⁶, and the Greco-Roman style amphora soon spread throughout the Mediterranean, including parts of Gaul, which formed a primary market for Italian wines (Tchernia, 2006:141; Purcell, 1985:7; Woolf, 1992:285). In addition to the Greco-Roman style amphora, another type, known as Dressel 1, also originated in Italy and later replaced the Greco-Roman style in the mid-2nd century BC (Peacock, 1977:263; Woolf, 1992:285).⁷ The increase in variety and number of amphorae throughout the Mediterranean evidences an increase in the production of wine and olive oil.⁸ Nevertheless, most viticulture was not the result of production at large villas and estates, but rather small-scale farms and vineyards run by individuals, some of whom were not members of the Roman elite (Kron, 2012:163; Purcell, 1985:7). Peasants aimed to produce surpluses because without this buffer, in a bad year, they would starve (Bowman and Wilson, 2013:22). A surplus could be stored or sold – either to a middleman or in markets known as nundinae (Storey, 2004:113).⁹ These small-scale production centres were then connected with the Italic merchant class, who coordinated the exportation of the products that were harvested (Kehoe, 2013:47; Purcell, 1985:8).

Regardless of the fact that small-scale production was at the forefront of these newly established trans-regional and trans-Mediterranean trade networks, the wealthy Italian elite soon began to consolidate their wealth in landholdings. The reasoning for this phenomenon is multifaceted. The consolidation of land appears related to a need for protection from Carthaginian forces during the Punic Wars, and the growth of a wealthy upper class seems to have led to the formation of latifundia – large estates that were run by slave labour – in Italy (Potter, 1990:98–106). During the following centuries, villas began to appear in greater and greater numbers, especially in wine-producing regions. Around the late 3rd and 2nd centuries BC, “the latifundia of the upper class became predominant in certain parts of the Italian countryside” (Moore, 1995:12). This increasing prominence of the latifundia was the result of an influx of slave labour from prisoners of war (Kay, 2014:178–179). Large groupings of estates now began to cluster around notable areas such as Campania, Latium, and Etruria, which were known for their wine production. As a result, an agro-economy began to emerge throughout the Italian peninsula. Cicero writes, “but of all the occupations from which it is possible to make money, none is better than agriculture, none more productive, none sweeter, none more worthy of a free man” (cited in Kay (2014:133)). However, economic investment was only one of the reasons for a sudden rise in the number of villas and estates throughout Italy.¹⁰ According to Nicola Terrenato (2001:29), villas became exceedingly popular due to their profits made from supplying the army during times of war, dealing real-estate, the slave trade, and selling agricultural products such as oil, wine, olives, and grapes. In addition, villas were relatively stable investments that brought with them political and social influence, thus increasing the status and “respectability” of the owner (Terrenato, 2001:29). Storey (2004:119) also states that the Roman elite became “heavily involved in commerce.” Therefore, social and political factors ac-

⁶ Campania is particularly famous for its wine production (Purcell, 1985:6).

⁷ Dressel 1 containers are considered to be the first “truly Roman” form of amphorae (Toscana, 1995:86).

⁸ Olives were a staple of the Mediterranean diet because they are a good source of edible fat. In addition, olive oil could be used in soap or to fuel lamps (Finley, 1999:31).

⁹ Nundinae provided a convenient exchange mechanism for subsistence farmers in the countryside to sell their goods (Storey, 2004:113).

¹⁰ Chapter 7, “Investment Farming and Agricultural Exploitation”, in Kay (2014) is a good resource for understanding agricultural systems in Roman Italy.

accompanied economic explanations in the rise of elite estates throughout the Italian peninsula and ubiquitously throughout the Roman Republic.

When farms and villas began to proliferate within the whole of Italy in the 6th century BC, the Etruscans were still in a phase of expansion, and a plethora of city-states existed throughout the peninsula. Coalescentium – the gradual unification of small villages into larger city-states – dominated the political scene of the time. Farms that were formed were usually fairly small in size because of the constant threat of raids from neighbouring cities. When the Roman Republic was finally founded in 509 BC, stability in the immediate region soon followed, and a larger number of farms were established. Through the use of dendrochronology, Büntgen et al. (2011) reconstructed temperature and precipitation records back to approximately 500 BC. Between 350 BC and 100 BC, temperature remains fairly stable throughout Europe, and precipitation levels rise steadily in each following century (Fig. 1). It is reasonable to assert that the rise in viticulture and olive oil production in many regions throughout Italy was, in part, due to the stable climatological conditions.

Further evidence retrieved from the tree-ring study is seen in the levels of deforestation throughout Europe over the past 2500 years. There is an unequivocal rise in the amount of felling throughout the continent, beginning around 400 BC and peaking in the 1st century BC. As is evident from the dendrochronological studies conducted by Büntgen et al. (2011:580), “onset of wetter and warmer summers is contemporaneous with the societal consolidation of new kingdoms.” The above average precipitation levels that were present from the Late Iron Age until 250 AD allowed for Celtic expansion and Roman conquest.¹¹ The pluvial conditions were complemented by increased, yet stable, temperatures. Later on, similar conditions allowed for kingdoms such as Francia – which reached its peak under Charlemagne in the 8th century – to expand its borders. Scheidel (2012:12) also states that warming conditions and increased precipitation would have had positive effects on agriculture, and thereby on population growth. Therefore, the warming conditions, coupled with increased precipitation, allowed for the creation of stable, unified societies. These kingdoms, in turn, allowed for the creation of permanent agricultural systems of small farms, some of which eventually expanded into larger villas and estates.

The Expansion of Wine was among the most desirable commodities for many of the provincial territories, and **Roman Economy** an organised commercial wine trade was established between Italy and the Roman provinces (such as Gaul) well before the Punic Wars (Kay, 2014:145; Kron, 2012:163; Purcell, 1985:7)(See Fig. 2/Map 1).¹² As mentioned previously, the greater part of this trade was dominated by small farmsteads. After Rome’s domination of Gaul, the demand for Italian wines reached new peaks. In Etruria, it appears that Cosa, a Latin colony founded in 273 BC, was one of the primary exporters of wine to the Gallic provinces¹³, as evidenced by the large quantities of kiln sites and Dressel 1 amphorae found in this region (See Fig. 3/Map 2). According to Moore (1995:51), “kilns at Albinia and Cosa are likely examples of single Republican pottery

¹¹ The average precipitation level, as calculated in *Central Europe, 500 BC - 2003 AD, tree ring width, Stone pine and European Larch* (2011), was approximately 210 mm. During Rome’s expansion around 250 BC, precipitation levels were approximately 240 mm.

¹² See Fig. 2 (Map 1) for a visual representation of this early trade between Italy and Gaul. In addition, one of the most renowned wines in Italy, and among the most prominent in antiquity, was the Faleian wine of Campania (Moore, 1995:22).

¹³ See Fig. 3(Map 2) for a geographic representation of Cosa.

workshops serving several vineyards in the region.” In Cosa, amphorae were used to store such commodities as wine. In other regions, they were also used to store olive oil and other food-stuffs, such as salted fish, dried meat, and dried fruit (Amadori et al., 2002:80). Distinguishing between regional amphorae throughout the Mediterranean is made easier by the varied geology of the region; as a result, each production site contained its own unique mineralogical characteristics (Olcese, 2005; Peacock, 1977:262). Such analyses have allowed for the determination of different production regions for varying styles of amphorae. These studies revealed that maritime trade flourished during the span of Roman conquest, and such ceramics were produced and shipped all over the Mediterranean and other parts of Europe.

With victory in the First Punic War against Carthage¹⁴ in 241 BC, the foundations for Roman naval superiority were established; this hegemony was not challenged until the Vandal conquests in the 5th century AD (Scheidel, 2009a:8). Success against Carthage, coupled with a steadily rising economy – seen in an increase in *denarii*¹⁵ (Kay, 2014:11) – seems to have led to a substantial rise in shipping disasters in the Mediterranean region (Fig. 4). This rise in shipwrecking did not occur ubiquitously throughout all areas, as regional variation is noticeable (Fig. 5/Map 3).¹⁶ Looking at the data in Figure 4, there appears to have been a major increase in the number of shipwrecks beginning around 200 BC. Although this could be the result of naval losses during the successive years of conflict, the trend continues well after the culmination of the Third Punic War in the mid-2nd century BC. During the 2nd century, Rome acquired an influx of precious metals. This lead to an increase in coinage production and “significant expansion in monetary liquidity in Italy” (Kay, 2014:2).¹⁷ Some scholars, however, still doubt that the rise in maritime incidents is an indicator of an escalation of trade throughout the Mediterranean, stating that “the distribution and chronology of shipwrecks in part reflects the level of risk to shipping rather than necessarily the scale of traffic in a particular area” (Russell, 2011:145).

Sea travel in antiquity was risky because of hazards such as piracy and precarious travelling conditions. Nevertheless, the significance of the increase in shipping tragedies from the Republican Period into the High Empire is too great to have been caused by these risk factors alone. Leidwanger (2013:3304) asserts that although storms could not always be anticipated, most navigational hazards were predictable. Furthermore, in 67 BC, the Roman government had cleared the Mediterranean of pirates, which decreased the dangers of maritime trade (Kessler and Temin, 2007:313; Wilson et al., 2012:287). Before this time, pirates were a constant concern to travellers, and for good reason; raids and attacks were “widespread and numerous” in the 1st century BC (Souza, 1999:165). Under Pompey the Great, in an effort to protect grain stores throughout the Empire, a war was waged on piracy that virtually eliminated this threat from the Mediterranean region (Adams, 2012:226; Souza, 1999).¹⁸ However, if we take hazards such as dangerous sailing conditions and piracy as major contributors to shipping losses,

¹⁴ See Fig. 3(Map 2) for a geographic representation of Carthage

¹⁵ Denarii are a denomination of silver coinage. Rome’s successes in its early years of conquest allowed for a massive influx of “booty,” taking the form of precious metals and other valuables (Kay, 2014)

¹⁶ One of the possible reasons for this regional variation is that the economic developments of each of these regions within the Mediterranean occurred at different paces and at different times. As the Roman provinces gained power and influence, shipwrecking in these areas also began to rise rapidly.

¹⁷ This allowed for “economic complexity” to develop, consisting of many trading routes (Kay, 2014:2).

¹⁸ The pirates were cleared so efficiently because of Pompey’s military prowess. According to the historians Florus and Appian, there was very little fighting, as most of the pirates were “reduced...to panic” after hearing of Pompey’s

than it is reasonable to suggest that a sudden increase in maritime traffic would correlate with an increase in accidents.

Cicero described trade conditions after 67 BC, who referred to cursus maritime (maritime trade routes) that unified the Mediterranean “as though it were a single harbour” (Adams, 2012:255). In fact, the commonality of shipping disasters has led historians to use them as markers of economic activity (Kessler and Temin, 2007:317). Based on this assumption, it is extremely likely that the increase in agricultural production in Italy and the wider Mediterranean was, at the very least, partially responsible for this rise in sea traffic (see Figures 2, 6–13/Maps 1, 4–5). In fact, Leidwanger et al. (2014) states that in many archaic societies, maritime innovation appears to represent reactions to economic or sociopolitical necessity for the conveyance of larger cargoes. It is also important to note that maritime transport was cheaper, and generally faster, than terrestrial transport (Adams, 2012:222). ¹⁹. Furthermore, Bowman and Wilson (2013:7) state, “intensification and decline of trading activity must be related in some way to stimulation, growth, and depression of agricultural production.”

As mentioned previously, villas (specifically latifundia) became prominent in the Italian countryside by the late 3rd and 2nd centuries BC. Observing the data in Figure 7, it is noticeable that around this same time, the presence of oil and wine presses began to increase. Such technology was necessary on agricultural villas, and many of these olive oil and wine presses were located on agrarian estates (Frankel, 1997:74; *Olive Oil and Wine Presses Database* 2013). ²⁰ It is also significant that the upward trend in the number of agricultural presses is correlated to the increase in shipwrecks through the 1st century AD (Fig. 8). Potential reasoning for the rise in number of oil and wine presses, and the drop in the occurrence of shipwrecking after the 1st century AD, is the prosperity of agricultural production in the Roman provinces and the safer transport of goods throughout the Empire.

In addition to the relationship between oil presses and shipwrecking, another factor of vital importance is the production of coinage. During the Late Republican Period (157–50 BC), “the supply of Roman silver coins increased enormously, perhaps tenfold, during a single century” (Hopkins, 1980:106). In addition, around this same time, the sextans (a bronze denomination) was beginning to be limited in its production and was eventually eliminated from the monetary system all together (Kay, 2014:103). ²¹ Figure 9 illustrates the rapid rise in coinage production in the 1st century BC, not only in Italy, but throughout the Roman provinces. The augmentation in the supply of coinage also alludes to a rising level of economic development throughout the Roman Republic, as well as the growing importance of the provincial territories. Figure 10 shows the relationship between oil and wine presses, shipwrecks, and the supply of coinage in the Roman Republic from 200 BC to 50 BC. This graph clearly illustrates that the increase in agriculture follows the same upwards trend as the exponential upsurge in coinage production, and shipping disasters seem to temporarily decrease, only to

reputation (Souza, 1999:169). Such accounts certainly hold biases but still speak to the widespread reputation of Pompey.

¹⁹ Experimental archaeology has shown that vessels could sail as fast as 6 knots with helpful winds, and at best 1.50–2 kn when sailing against the wind (Leidwanger, 2013:3305).

²⁰ For information regarding the different types of agricultural presses and their technological evolution, see Frankel (1997).

²¹ This suggests that prices had risen to a level that made low-denomination currencies unusable (Kay, 2014:103).

increase again. These data reveal that the establishment of more permanent agricultural facilities coincided with a spike in economic development.²²

Another factor linked to the rise of economic systems in the Roman state is amphorae production, which can be measured by the abundance of such pottery that is recovered from Mediterranean shipwrecks. The rise in the number of amphorae correlates very strongly with the rise in the number of shipwrecks, as seen in Figure 11, but not as strongly with the rise in the number of oil and wine presses. The data in Figure 12 shows that beginning as early as the 7th century BC, the number of amphorae and the number of shipwrecks rose together. When oil and wine presses came into use in the 4th century BC, all three entities rose and fell at around the same time periods. The largest number of amphorae were present in the 1st and 2nd centuries BC, coinciding with a substantial increase in coinage production. These amphorae came from all parts of the Mediterranean and parts of Europe, indicative of an extensive system of exchange that was in existence as early as the 6th and 7th centuries BC.

Archaeological investigations at Cosa also help to illustrate the interconnectivity between agricultural production and economic prosperity. Portus Cosanus (the port of Cosa) was linked with major roadways and several villas. Through this connection, Cosa seems to have reached its apex of economic development in the Late Republic (Manacorda, 1978:124). This is exemplified through the Sestius family; “during the second and early first centuries BC, the familial wine and fish product enterprise of the Sestius family directly reflected, if not influenced, the economy and well-being of Cosa” (Moore, 1995:15). The Sestius family was involved in politics and were wealthy landowners, as recorded by Livy:

In the three-hundred-and-first year after the building of Rome, was the form of government changed from that of consuls to decemvirs, as it had formerly been from regal to consular...Appius Claudius, T. Genucius, P. Sestius, L. Veturius, C. Julius, A. Manlius, P. Sulpicius, P. Curiatius, T. Romilius, and Sp. Postumius were created decemvirs
—Liv. 3.33²³

Furthermore, the Sestius family involved itself in the distribution of such products as wine (Purcell, 1985:16; Storey, 2004:119), in addition to the production of these commodities (Wilson et al., 2012:293). They also manufactured amphorae, which were stamped with the insignia “SES” to signify ownership (Will, 1979:342–344). Such amphorae are most closely associated with the city of Cosa, as it is here that the greatest numbers of SES-stamped ceramics have been found (Manacorda, 1978:129). Moreover, mineralogical testing has revealed that the clay used to make most of the SES-stamped amphorae is connected to the immediate area surrounding Cosa (Will, 1979:345).

The reason that the Sestius amphorae hold such great importance is because they have been found as cargo on sunken ships, such as the Grand Congloué wreck (180 BC)²⁴, as well as in various locations throughout Europe – primarily France and Spain (Manacorda, 1978:125–127). The Grand Congloué, discovered off the coast of Marseille, has provided over 7,000 sherds of Campanian pottery, primarily amphorae (Strauss, 2013). The widespread distribution of such specific amphorae indicates that production was for much more than local use (See 13/Map 5). The connection to the Sestius family also illustrates that by the 2nd century BC, agricultural

²² This follows the principle of “farmer power” outlined in Diamond (1997:81–88). Essentially, “farmer power” argues that agricultural prosperity is a conditio sine qua non for the development of complex social organisation.

²⁴ See Figure 3(Map 2) for a geographic representation of the Grand Congloué wreck.

production was beginning to take place under aristocrats, some of whom were politically connected to Rome.

Grain was another major agricultural product that was integral to the Roman economy. By the time of the Roman Empire, the city of Rome required an extensive supply of food imports in order to sustain its population, which is estimated by historians to be around 1 million (Kessler and Temin, 2007:315). In the early years of the Empire, the Roman state incentivised private shippers to import wheat into Rome (Kehoe, 2013:47). This practice eventually evolved into the annona, which supplied the city of Rome with a constant flow of grain. It is through the annona that politics invaded the economic sector, as “[a]ll the actors in the grain trade hailed from the upper three groups in Roman social hierarchy” (Kessler and Temin, 2007:317).²⁵ These groups included senators, equites, and wealthy freedmen and thus highlight how the Roman political elite were directly involved in certain aspects of the economy for their own benefit. This scenario also highlights the level of economic success that had been achieved by the inception of the Roman Empire. According to Scheidel (2009a:14), “Roman state formation influenced the organisation of maritime commerce by shaping demand and through direct intervention.” This idea is clearly in line with the organisation of the Roman grain trade. The Roman aristocracy was clearly not only a governing class, but a financial one as well (Adams, 2012:235), thus highlighting the indistinguishable nature of governors from the economic elite.

It is important to note that agricultural products were not the only cargo transported by sea. In addition to wine, grain, and other agricultural products, building materials, such as stone for architecture, were also shipped to the consumer by means of marine transport (Russell, 2011:150). As such, “it is clear that the quarrying, production and distribution of stone as a raw material and as finished products, need to be considered major elements of the Roman economy” (Russell, 2011:151).

Economics in the ancient world are by no means directly comparable to modern day economics. As such, modelling the Roman economy has been a source of debate among scholars (Finley, 1999; Hopkins, 1980; Storey, 2004; Woolf, 1990; Woolf, 1992). Storey (2004:126) describes the Roman economy as a “wealth-finance system” with a highly monetised economy, functioning through patrimonialism and strategies seeking individual embellishment. The Roman economic system can also be considered an example of a “Wallerstein world economy,” which is defined by Woolf (1990:44) as a unit with “multiple cultural systems” and “a single division” of labour that unites large populations over large geographical distances.

The climatic-tetrad, indubitably, had a bearing on the rise of the Roman Empire. First and foremost, a favourable environmental climate was a sine qua non for the expansion of agricultural systems in the Italian peninsula. However, without some political and social stability, these agricultural systems would not have been successful. Nonetheless, even the most stable political and social climates will not replace poor environmental conditions. Once favourable environmental climatic conditions – rising levels of precipitation and stable temperatures – disseminated throughout the Italian Peninsula, agriculture prospered throughout the whole of Italy. With these advantageous conditions, including relative stability under Rome’s domination of the peninsula, agriculture expanded rapidly, soon leading to surplus production of

²⁵ Wilson et al. (2012:289) refers to the annona as a “political tool” with the intention of securing a constant food supply.

goods, such as olive oil and wine. The success of agriculture paved the way for an agro-economy to develop, whereby Italian oil and wine were shipped to new markets. The political system that developed alongside these advancements was clearly successful, being that the economy remained prosperous even in the midst of several violent conflicts. This allowed for the diversification of social tiers and the development of a merchant class. Therefore, the climatological tetrad – environmental, economic, social, and political – was favourable, and as a result, the Roman system prevailed.

The climatological tetrad approach developed here can also explain the demise of the Roman system, following the previously described success. The environment seems to have been the primary cause of agricultural expansion and thereby the rise of the Roman economic sector; it too led to the demise of agro-economics towards the 2nd century AD. Through the analysis of primary historical documents and environmental proxies, climatological instability is highlighted beginning in the 1st century AD (see Fig. 1 and Fig. 14). McCormick et al. (2012:175) report that glacial ice core samples from Greenland indicate climatological warming from 15 BC to 40 AD, followed by cooling which resumes “with sea-ice expansion peaking c. 70 AD before renewed warming in the last years of the first century.” Although these samples are significantly distanced from southern Europe, similar temperature fluctuations are also shown in *Central Europe, 500 BC - 2003 AD, tree ring width, Stone pine and European Larch* (2011), peaking around 40 AD and then rapidly decreasing throughout the remainder of the first century (Fig. 14). The data collected by Büntgen et al., then, correspond with McCormick et al. (2012) by evidencing a short period of climatological warming followed immediately by substantial cooling, which is attributed by McCormick et al. to retreating Alpine glaciers (Büntgen et al., 2011; *Central Europe, 500 BC - 2003 AD, tree ring width, Stone pine and European Larch* 2011; McCormick et al., 2012:175–180). The congruency between these two proxies indicates not only an oscillation in European climate, but also a change in the global environment. What is clear from the proxy data is that the climatological stability that allowed for the establishment of permanent agricultural centres in the early Republic had, by the 1st century AD, grown unpredictable.

European agricultural production was adversely affected by these unstable environmental conditions based on the declining number of agricultural presses for olive oil and wine that were in use from the 2nd century AD onward (Fig. 15). When comparing this data with Figure 7, it is clear that the empire as a whole did not suffer agriculturally. Although it took several hundred years to virtually eliminate large-scale agricultural production in Europe – specifically the production of olive oil and wine – the data reveal that when challenged with prolonged environmental stresses, “cultures can shift to lower subsistence levels by reducing social complexity, abandoning urban centres, and reorganising systems of supply and production” (deMenocal, 2001:672). In the case of the Roman Empire, the need for additional resources pushed the empire into wars of conquest. As the empire grew, the economy became not only based in agricultural production, but the extraction of precious metals and other resources.

With an economy based on multiple products, coinage production became highly important. According to Kehoe (2013:49), one of the most significant contributions made by the Roman state in terms of its economy was to “develop and maintain a stable currency system.” When resources became scarce, coinage was reduced in its precious metal content²⁶, which

Using the TDCM to explain the End of Roman Prosperity

²⁶ Under Nero, the denarius was reduced from 98 % to 93 % silver content (Tainter, 2014:204).

debased the currency value (Hichner, 2009:281; Hopkins, 1980:123–124; Ponting, 2009:274–275; Tainter, 2014:204). Gradual reduction in silver content kept the economy out of trouble, but under Marcus Aurelius, the silver content was reduced much more significantly, from 88 % to 78 % (Hichner, 2009:282). Undermining the economy eventually led to prolonged civil war, and by the time these conflicts had subsided, the empire was monetarily drained. This illustrates the interconnectivity of the four prongs of the TDCM in that a poor economic climate resulted in poor social and political climates. The Roman example is supported by one of Tainter (2014:208)'s elements of sustainability: “A society or other institution can be destroyed by the cost of sustaining itself.”²⁷

Additionally, beginning in the mid-3rd century AD, solar activity indicates cooling (Fig. 16), and the proxy data in general show a trend towards a drier environmental climate throughout Europe (McCormick et al., 2012:185). Drought not only disturbed agricultural production, and therefore the economic sector, but also brought about a period of social and political turmoil, manifested in barbarian invasion. When precipitation then increased in the 4th century AD, the Western Roman Empire recovered under Constantine and Valentinian (Büntgen et al., 2011:580).

As this paper has shown, prolonged periods of environmental instability cause the individual systems of civilisation to fall into disarray, usually beginning with agricultural production. Scheidel (2012:12) declares, “[t]he significance of climate for the evolution of the Roman Empire and its economic basis must not be underrated...there can be little doubt that climate history ought to occupy a much more central role in the study of the Roman economy than it has done so far.” In most ancient societies, agrarianism was the basis of the economy, and the Roman Empire was no exception. The 3rd century AD also saw several volcanic eruptions that occurred in the span of 50 years. McCormick et al. (2012:186) believes that these phenomena had the ability to interrupt harvests, thus exasperating the extant tense political, military and economic crises. Hopkins (1980:123), too, agrees that “the mid-third century was almost certainly a period of economic depression.” Furthermore, beginning in the mid-2nd century AD, “the best harvests became substantially more infrequent and the worse ones more common” (McCormick et al., 2012:189). Thus, agricultural failure, coupled with political and military strife, intensified the crises by adding an economic catastrophe to the list of Rome’s problems.

It is necessary to note that the whole of the Roman Empire during the second and third centuries was not in agricultural or economic decline. In fact, when European agricultural production began to fall (as noted in the decrease in oil and wine presses), the agricultural production elsewhere remained stable and actually increased (Fig. 17). There are many reasons for this occurrence, but one in particular that deserves attention is the rise of provincial production centres. Although provincial wines did not seem to thrive in Italian markets, they did out-compete Italian wines in the provinces themselves (Woolf, 1992:289). The African provinces seem to have increased their prosperity in the 4th century AD. Sites with multiple agricultural presses attest to a massive level of large-scale “cash-crop” agricultural investment (Bowman and Wilson, 2013:19). Although agricultural and economic crises that occurred in Europe were not directly caused by this competition, but rather the environmental and po-

²⁷In Scheidel (2009b), Scheidel discusses multiple archaeological proxies to track economic growth in the Roman Empire. This includes lead pollution caused by mining, shipwrecks, and meat consumption (through animal remains), among other evidence. He comes to the conclusion that the Roman economic system follows the Malthusian model of unsustainable economic growth.

litical situations mentioned previously, the impact of provincial markets in the Italian trade network likely played a small part in Europe's economic depression. During Hadrian's reign in the early 2nd century AD, more wine was being produced in Italy than ever before (Purcell, 1985:19). According to Tchernia (2006:147), the competition of the vineyards on the Tyrrhenian coast came from within Italy and not from the provinces. Therefore, the decline in Italian agriculture, and European agriculture as a whole, was not likely to have been primarily caused by provincial competition.

The first goal of this paper was to highlight the profound impact of climate, in all of its forms, on the Roman State. Human civilisation is affected, much like any other system, by outside forces. Within the context of climate, societies are affected by four distinct components: environmental climate, social climate, economic climate, and political climate. When these variables are beneficial to societal development, then civilisation thrives. When these variables are unpredictable and hamper development, then societal organisations tend to decay and fall into disarray. This may lead to the formation of smaller scale state organisation, or in some instances, complete abandonment of an area.

When viewing the rise of Rome through this lens, it becomes clear that with favourable environmental conditions, permanent agricultural institutions, such as farms and small villas, began to appear throughout the Italian peninsula. This eventually led to a surplus of agricultural produce, which allowed for the formation of societal structures with an agriculturally based economy. As the economy grew, the Roman state began to expand, and new markets began to emerge for Italian products. Overseas trade grew rapidly, which is seen in an increase in shipwrecking beginning in the 3rd and 2nd centuries BC. In Rome's scenario, the climatic tetrad was beneficial when precipitation levels rose and temperature levels rose and stabilised. This allowed for agricultural production to spike into surplus, which in turn brought about a relatively stable economic climate. With this half of the TDCM being complimentary for Roman society, political expansion and social tranquillity soon ensued, thus creating a climatic tetrad that could foster Roman expansion.

However, at the beginning of the 1st century AD, environmental conditions became less stable, and environmental fluctuations led to agricultural failures in Italy. These environmental phenomena were not limited to Italy alone, and soon the entirety of Europe was engulfed in economic strife. This quickly led to political and social instability, and soon, the Roman Empire began a downward spiral. Maritime trade dropped rapidly, and the agricultural and merchant economies faced recession. This economic depression soon affected the majority of the empire, as many essential goods could not be shipped due to an extremely limited supply and a lack of transport funds. This continued until the collapse of the empire in the 5th century AD. Thus, it appears that the TDCM holds true for Rome's decline as well in that the climatological flux that decimated agriculture severely affected the Roman economy and led to political and social pandemonium.

The second goal of this paper was to show how the rise of farms and agricultural estates in Italy led to the expansion of the Roman economy. The presence of wine amphorae on shipwrecks, along with the increasing number of olive oil and wine presses, indicates that an increase in agriculture resulted in the development and expansion of an agrarian economy in the Roman Republic based on viticulture and olive oil production. As time went on, wealthy landowners began to develop estates, some of which were used primarily for agricultural production. In the 2nd century BC, an unequivocal connection is present between agriculture,

Conclusion

maritime trade, and the increase in coinage production throughout the Roman Republic. These connections clearly demonstrate how the appearance of large numbers of agricultural institutions coincided with a rise in Rome's economic hegemony.

* * *

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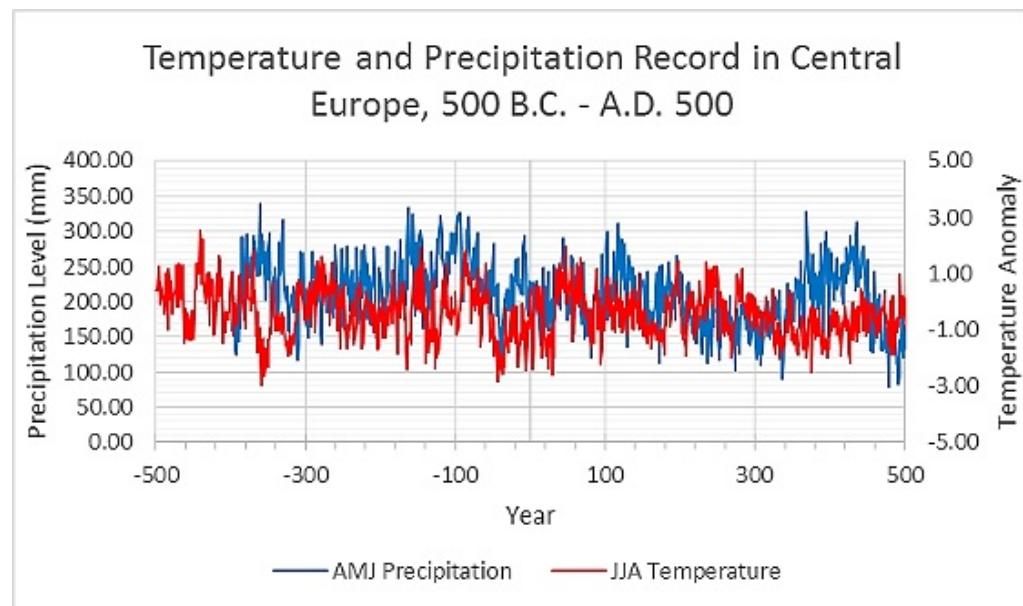


Figure 1: Shows the April, May, June precipitation levels (AMJ) and the June, July, August temperature anomalies (JJA) between 500 BC and 500 AD. (Data source: [Central Europe, 500 BC - 2003 AD, tree ring width, Stone pine and European Larch \(2011\)](#); National Climatic Data Center, <https://www.ncdc.noaa.gov/paleo/study/10394>, by author).

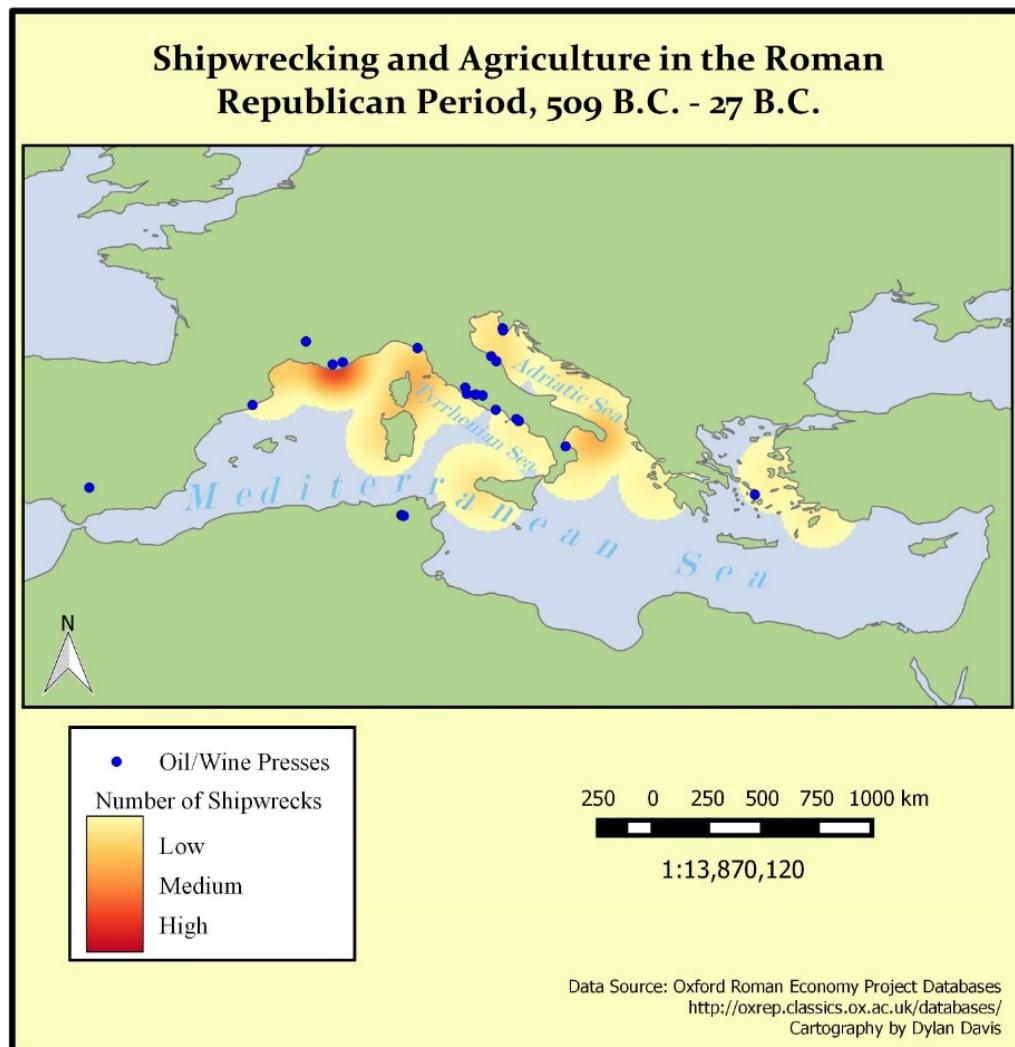


Figure 2: (Map 1) Shows the extent of maritime activity throughout the entirety of the Roman Republican Period. Note that the highest level of shipping activity seems to occur in the south of modern day France (Gaul during Roman times), by the author.

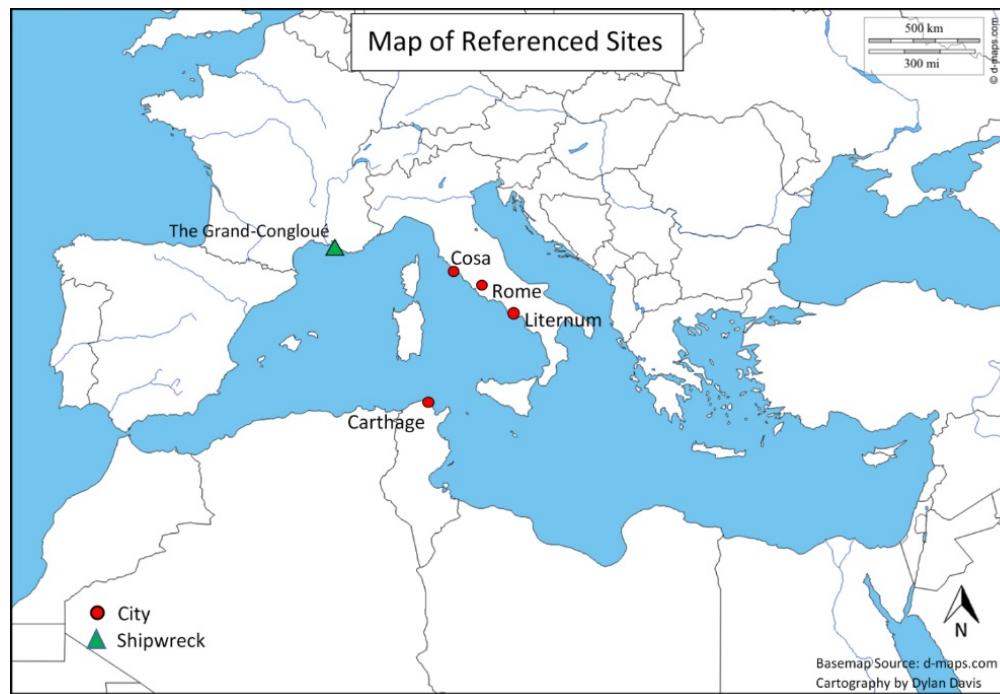


Figure 3: (Map 2) Shows all archaeological sites and locations specifically mentioned throughout the paper, by the author.

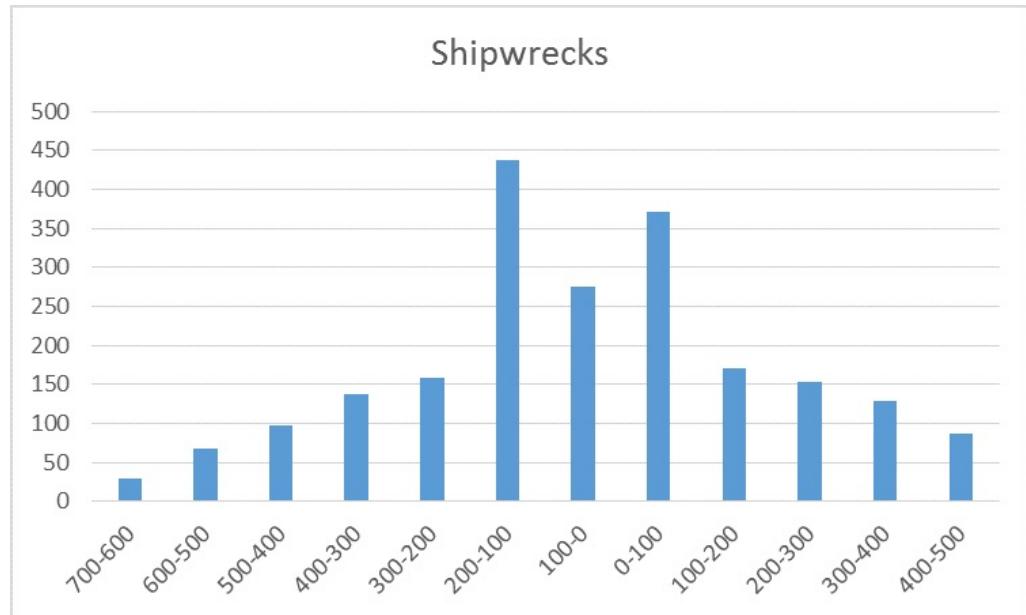


Figure 4: Timeline of Shipwrecks in the Mediterranean from 700 BC– 500 AD (Data Source: The Oxford Roman Economy Project), by the author.

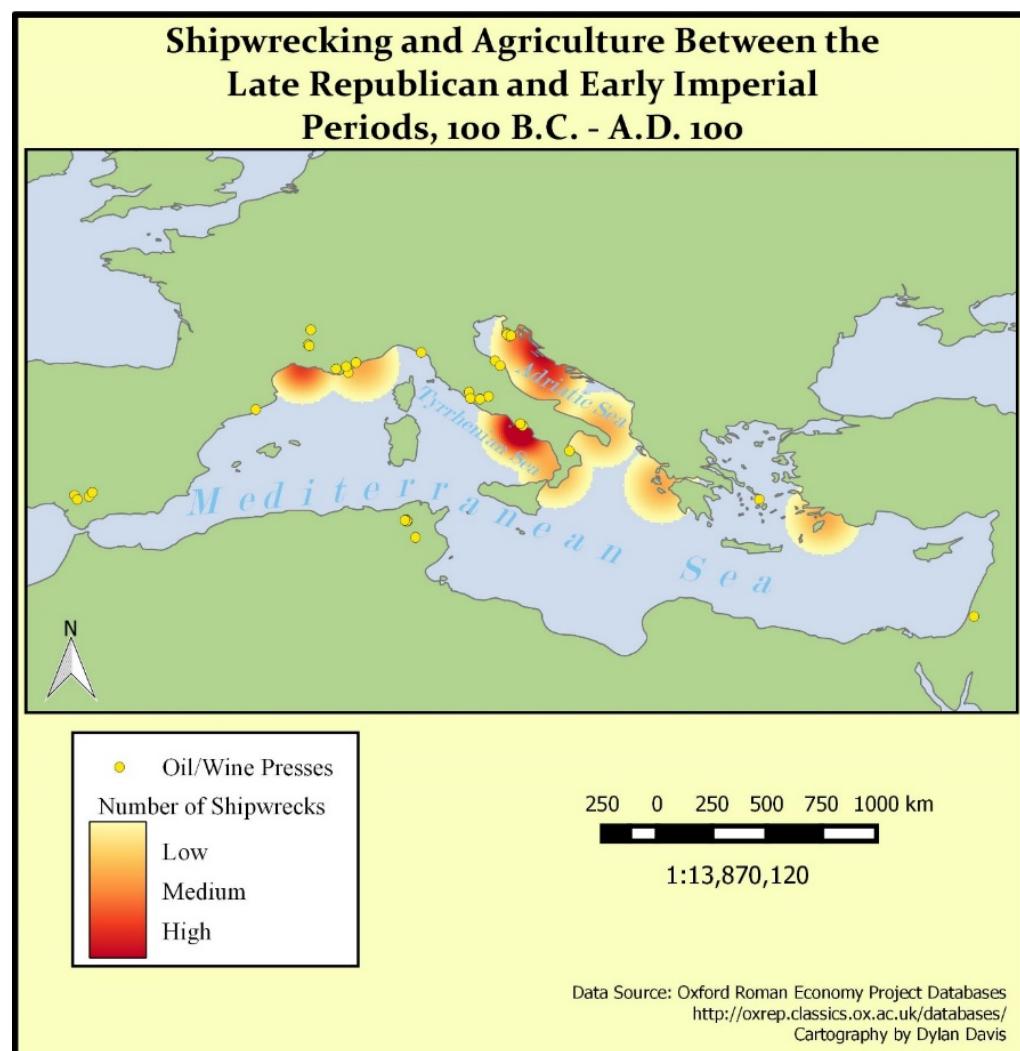


Figure 5: (Map 3) Shows the maritime activity that occurs during the transition from the Republic to the Imperial Period. Note the high levels of shipping disasters in southern Italy and modern day Croatia (in the Adriatic). In addition, Gaul continues to maintain high maritime activity.

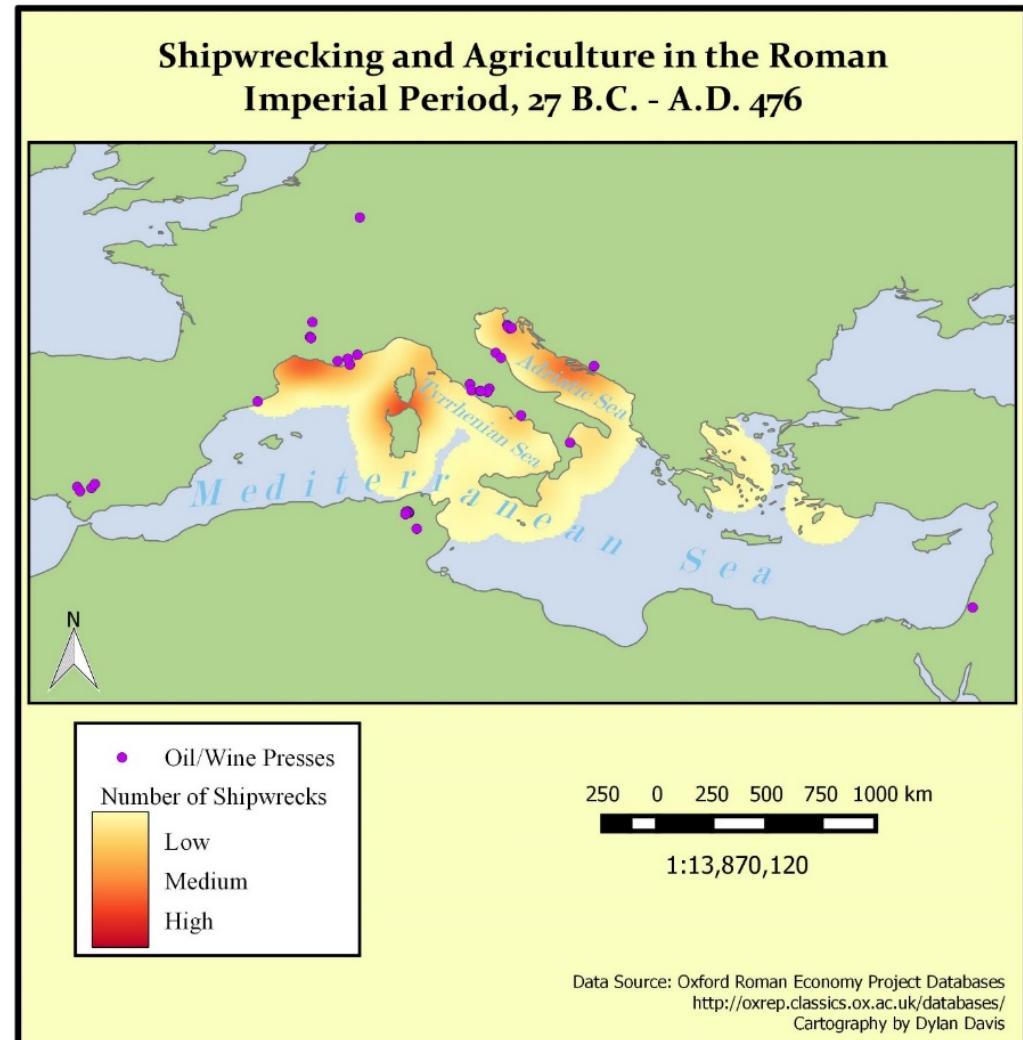


Figure 6: (Map 4) Shows maritime activity throughout the entirety of the Roman Imperial Period. Gaul remains highly active along with the islands of Sardinia and Corsica, as well as the Adriatic region, by the author.

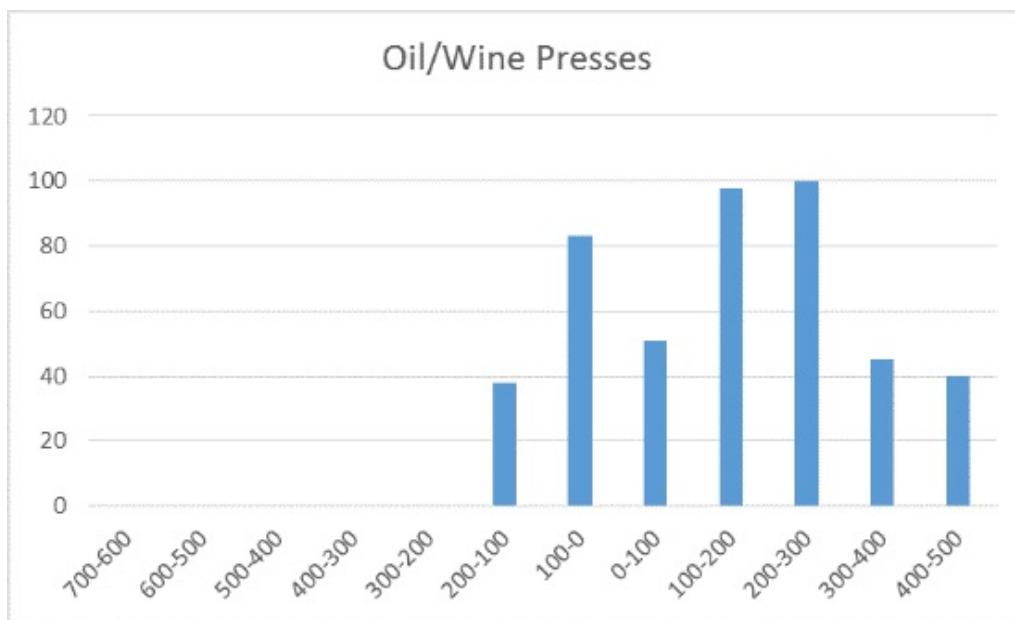


Figure 7: *Timeline of Olive Oil and Wine Presses from 700 BC – 500 AD (Data Source: the Oxford Roman Economy Project Databases), by the author.*

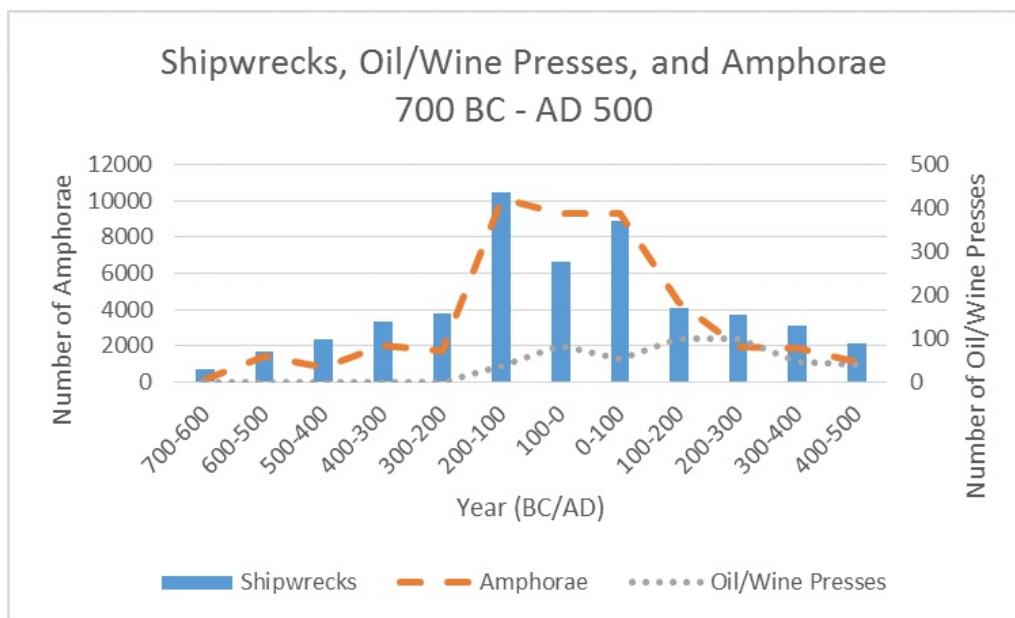


Figure 8: *The number of shipwrecks and the number of olive oil and wine presses from 400 BC – AD 500. (Data Source: the Oxford Roman Economy Project Databases), by the author.*

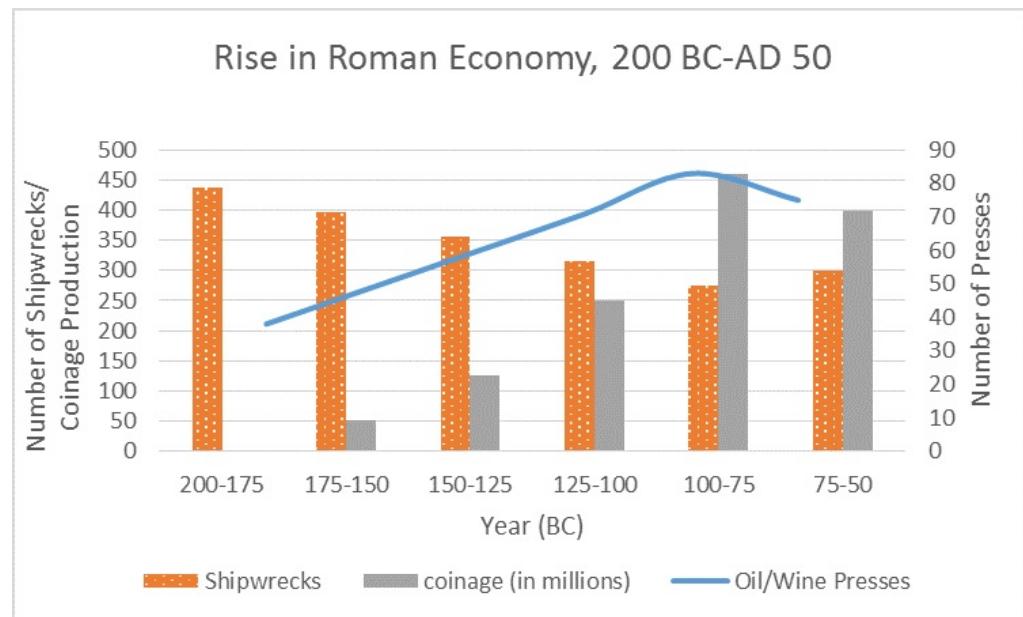


Figure 9: Shows the increase in shipwrecks, oil and wine presses, and coinage production from 200 BC – 50 BC. Data Source: the Oxford Roman Economy Project Databases and Hopkins (1980), by the author.

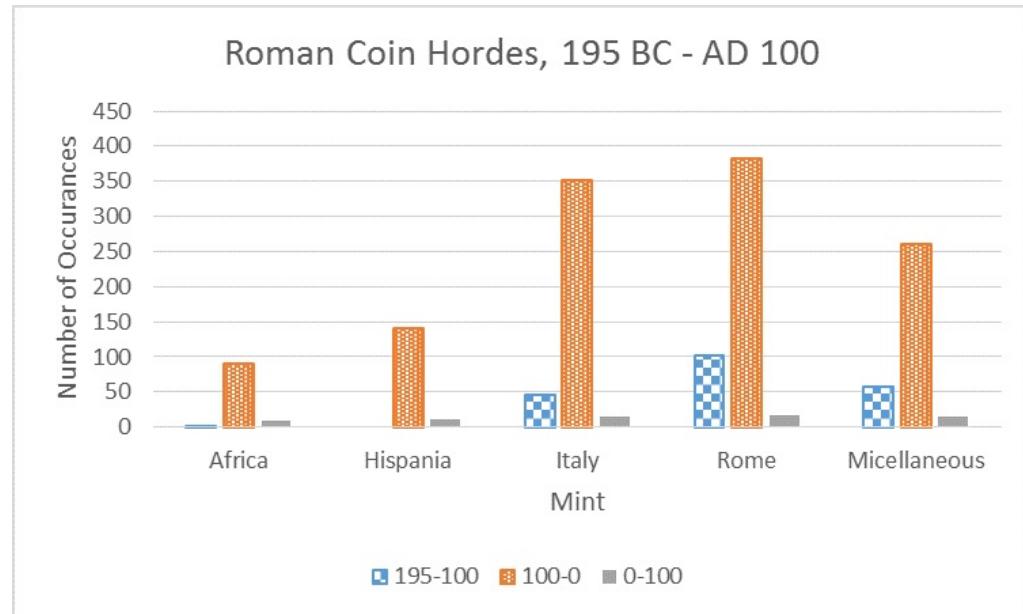


Figure 10: Shows the level of coinage production throughout Roman territory from 195 BC – 100 AD, based on coin hordes that have been recovered. The data show a peak in coinage production in the 1st century BC. (Data from [Coin hoards of the Roman Republic Online, version X \(2013\)](#)), by the author.

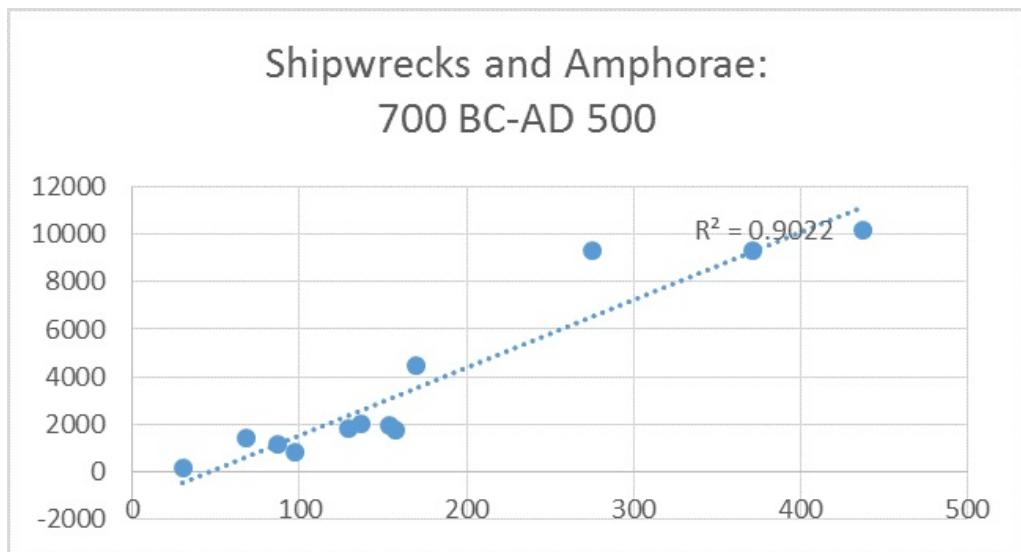


Figure 11: Shows the rise in the number of shipwrecks and amphorae between 700 BC and AD 500. There is a very strong correlation ($r = 0.95$) between these two variables, suggesting a strong association. (Data Source: the Oxford Roman Economy Project Databases), by the author.

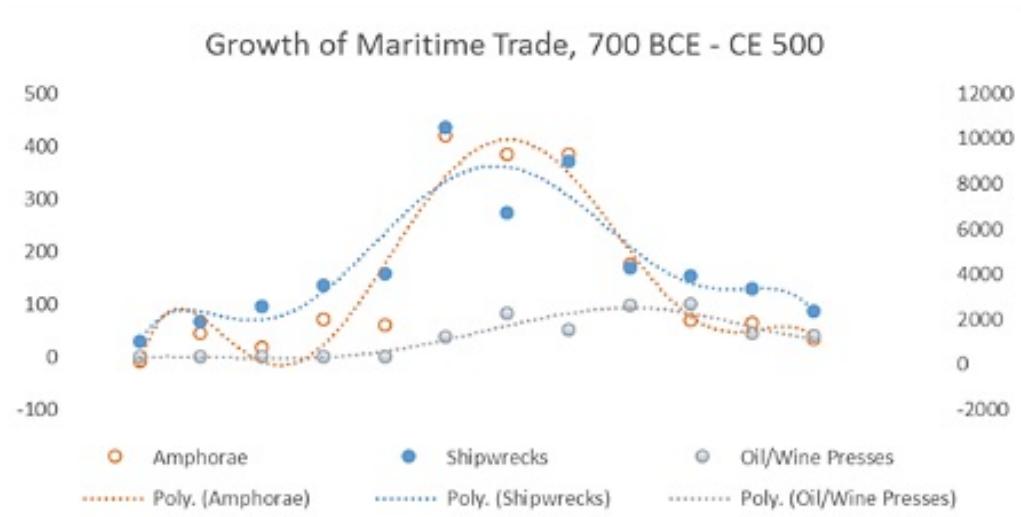


Figure 12: Shows the rise in the number of shipwrecks, oil and wine presses, and amphorae between 700 BC and 500 AD (Data Source: the Oxford Roman Economy Project Databases), by the author.

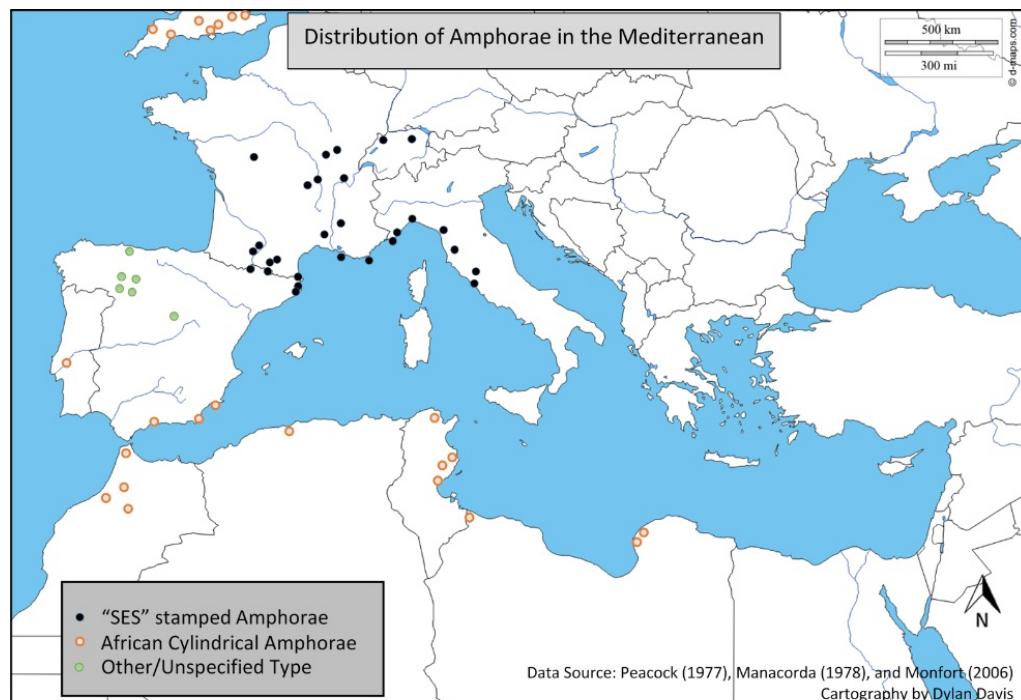


Figure 13: (Map 5) Shows the distribution of the Sestius (SES) amphorae as well as African amphorae throughout the Mediterranean region. Notice that SES amphorae disseminated throughout Western Europe (specifically Gaul). African amphorae made it all the way into Britain. After Peacock (1977), Manacorda (1978), and Monfort (2006), by the author.

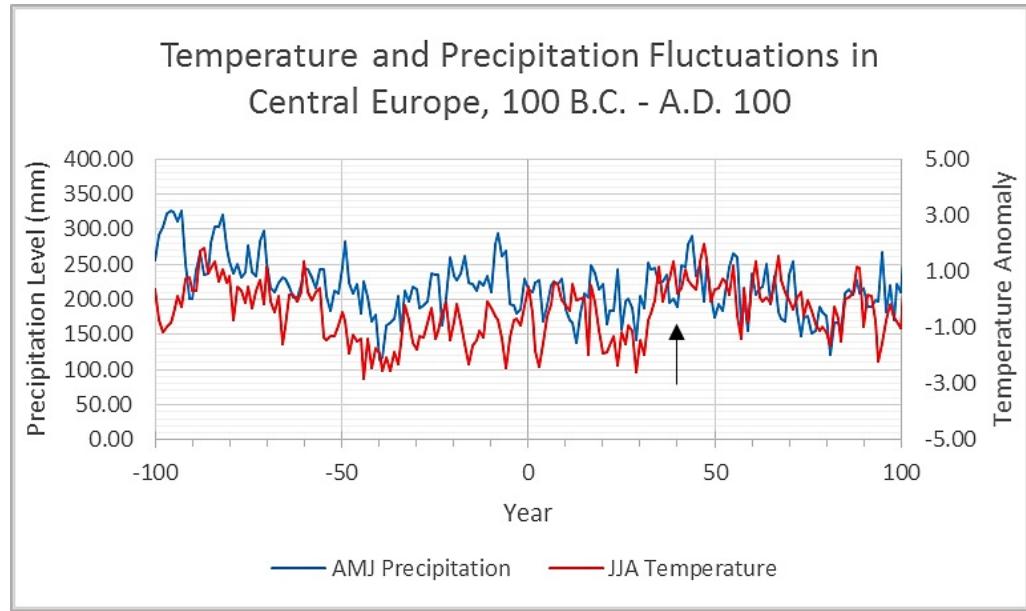


Figure 14: Notice the gradual decrease in temperature and precipitation throughout the first half of the 1st century BC and the increase in temperature and precipitation throughout the second half of the 1st century BC. The rapid warming that peaks around 40 AD (highlighted by the arrow) is clearly noticeable. (Data source: [Central Europe, 500 BC - 2003 AD, tree ring width, Stone pine and European Larch \(2011\)](#); National Climatic Data Center, <https://www.ncdc.noaa.gov/paleo/study/10394>), by the author.

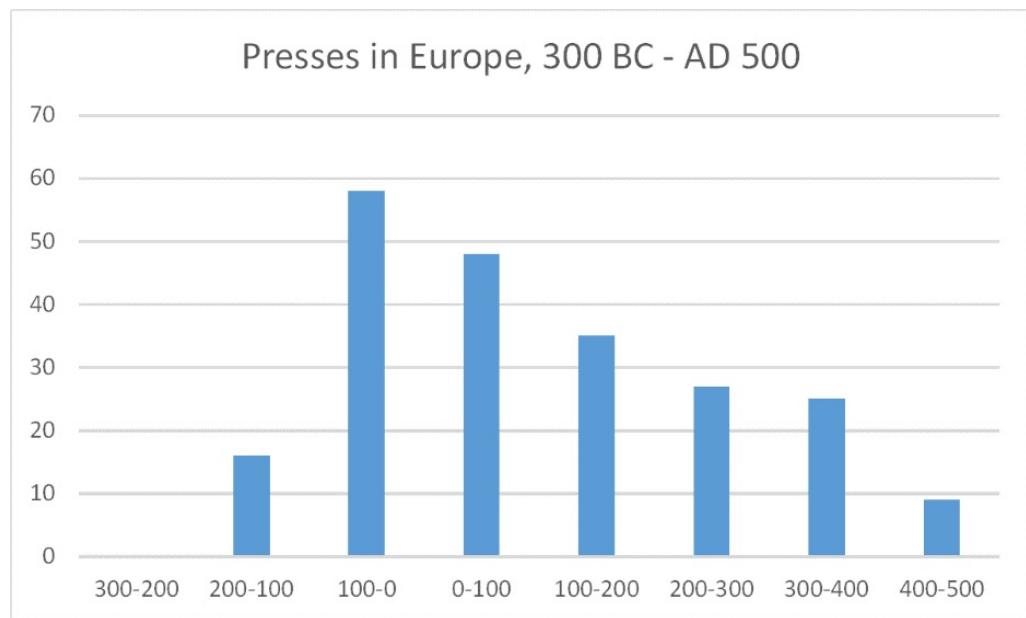


Figure 15: Shows the number of olive oil and wine presses that were in use in the European parts of the Roman Republic/Empire from 200 BC – 500 AD. These presses were located in Croatia, France, Greece, Italy, Portugal, and Spain. (Data from Oxford Roman Economy Databases), by the author.

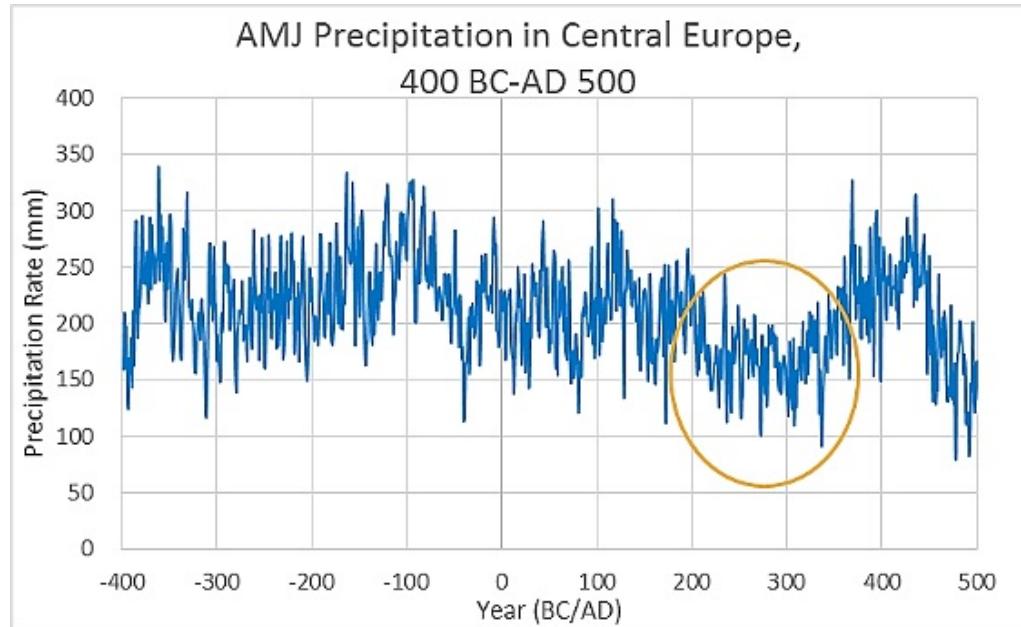


Figure 16: Shows the April, May, June (AMJ) precipitation record in Central Europe from 400 BC – AD 500. The orange oval highlights the distinctive drying that occurs during the 2nd century AD (Data Source: [Central Europe, 500 BC - 2003 AD, tree ring width, Stone pine and European Larch \(2011\)](#); National Climatic Data Center, <https://www.ncdc.noaa.gov/paleo/study/10394>), by the author.

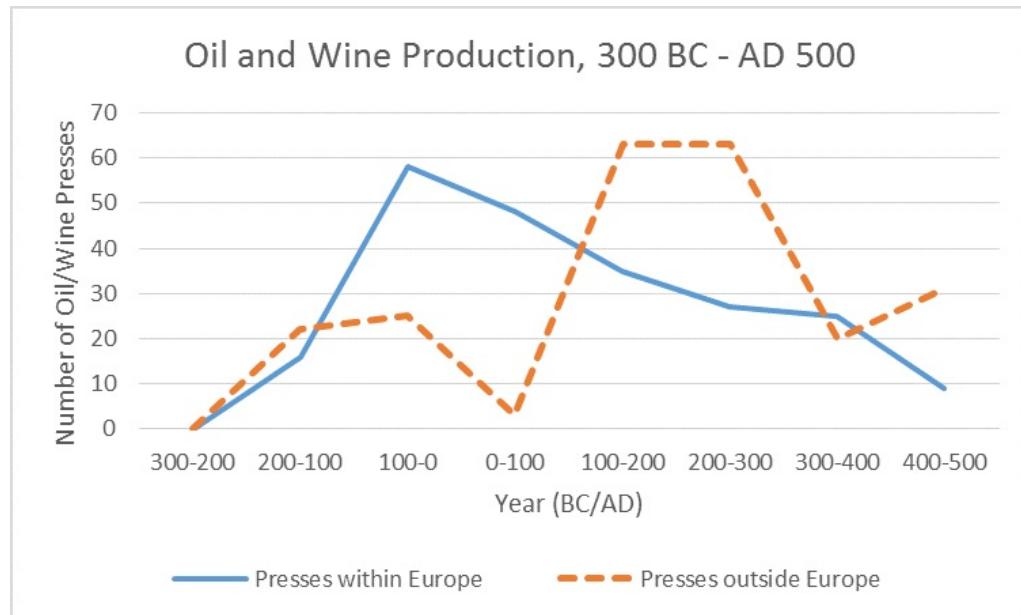


Figure 17: Shows the number of olive oil and wine presses in use within and outside of Europe. Notice the drop in the number of presses in Europe beginning in the 1st century, but the rise outside of Europe by the second century. While Europe is in a state of decline, the rest of the empire prospers, until the 3rd and 4th centuries. (Data Source: the Oxford Roman Economy Project Databases), by the author.

Questo articolo esamina la relazione tra l'oscillazione del record ambientale e il successo delle istituzioni sociali nell'Impero Romano, in particolare l'economia. Attraverso un'indagine dettagliata l'ascesa dell'economia romana viene esplorata attraverso l'uso di evidenze archeologiche e climatologiche. Il clima, come definito in questa articolo, consiste di quattro parti – clima ambientale, clima sociale, clima economico e clima politico – stabilendo così un modello climatico tetra-dimensionale. I risultati di questo studio indicano una forte relazione tra l'aumento dell'agricoltura e l'aumento del commercio marittimo durante la Repubblica romana e l'Impero Romano. Questo aumento nella produzione agricola è risultato in gran parte da una stabilità climatica in Europa, così come la temporanea tranquillità del clima politico a seguito della Fondazione di Roma. Nel corso dell'egemonia di Roma, così come la stabilità politica e sociale hanno conosciuto momenti di instabilità, lo sviluppo economico – soprattutto nel settore agricolo – ha cambiato corso.

Parole chiave: Archeologia Classica, Economia Romana, Commercio Marittimo, Archeologia Ambientale, Archeologia Nautica.

Abstract (Italian)

Cet article examine la relation entre les fluctuations dans l'environnement et le succès des institutions sociales dans l'Empire romain, plus précisément l'économie. Une étude détaillée, explorant la montée de l'économie romaine, est entreprise par l'utilisation de preuves archéologiques et climatologiques. La notion de climatologie, telle qu'on définit dans le présent document, se compose de quatre parties-climat environnement, climat social, climat économique et climat politique – établissant ainsi le modèle climatique tétra dimensionnel. Les résultats de cette étude indiquent une relation forte entre l'essor de l'agriculture et l'essor du commerce maritime au cours de la République romaine et de l'Empire romain. Cette augmentation de la production agricole a été en grande partie un résultat de la stabilité climatologique en Europe, ainsi que de la tranquillité temporaire du climat politique après la fondation de Rome. Comme la stabilité politique et sociale a oscillé tout au long des années de Rome au pouvoir, le développement économique – en particulier dans le secteur agricole – a également changé de cours.

Mots clés: Archéologie Classique, L'économie Romaine, Le Commerce Maritime, Archéologie de L'environnement, Archéologie Nautique.

Abstract (French)

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Sacred Bodies in Sacred Spaces: Investigating whether western body theory is a valuable tool for interpreting Hindu ritual space

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Western constructs of the mind and body duality have left archaeologists inadequately equipped to appreciate Hindu sacred spaces and bodily practices. As a result, a great deal of the archaeological literature that concerns Hinduism is often based on a political or architectural framework, which bypasses personal devotion and the ritual practices that are fundamental to Hindu religious beliefs. In order to overcome this limitation in archaeological theory, it is proposed that Hindu bodily practices need to be removed from western understandings of the body and placed within their own theological context. Looking to other disciplines for sources of knowledge will not only enrich archaeological accounts of ritual landscapes, but will also provide a more nuanced and reflexive view of Hindu ritual practices.

Abstract

Keywords: South Asia, mind and body theory, phenomenology, social archaeology, Hindu theology.

WESTERN theory has not only limited archaeological understandings of the body, but also the embodied relationships with material culture and ritual landscapes that are intrinsic to religious bodily practice (Hamilakis, 2002; Insoll, 2004). Contemporary sociological and philosophical understandings of the body (Bourdieu, 1977; Foucault, 1977) have influenced archaeologists to interpret past bodies as a tool, that are often used to visually reconstruct narratives of economy, power and gender (Barrett, 1994; Shanks and C. Tilley, 1987). As a result, many archaeological explanations of religious practices and identity have become rigid through the application of a purely western interpretation (Edwards, 2005; Insoll, 2004). However, this article proposes that a multi-disciplinary approach, which draws on theological and archaeological knowledge, can provide an alternative understanding of lived and embodied experiences. Through a close examination of how western body theory differs from Hindu theological ideas of the divine body, this article will examine the relationship between

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Hindu cosmology and archaeological landscapes. Using the Babri Masjid as a case study this paper will demonstrate how a more nuanced and holistic approach can grant archaeologists the opportunity to appreciate the depth of contemporary and past Hindu experience me with the text. You can copy/paste the text of the article. After that try to compile it and see whether you receive errors.

A history of approach Western intellectualism has been preoccupied with studying the products of the mind, and in turn, the mind's authority over the body (Butler, 1990; Shilling, 1993; Shilling, 2008). French philosopher, Michael Foucault, was enormously influential in how the body was approached in academic discussion. Foucault envisioned that bodies are a construction of a historically dominant episteme that govern how individuals live their lives (Boric and Robb, 2008; Foucault, 1977). In one of his earlier publications, Discipline and Punishment, Foucault (1977) argues that the body is seen as a passive tool of control, and that constant surveillance of our actions forces us to internalise norms of social behaviour. Foucault stated that our bodies are repressed by our mind, and argues that; Our Society is one not of spectacle, but of surveillance... It is not that the beautiful totality of the individual is amputated, repressed, altered by our social order, it is rather that the individual is carefully fabricated in it, according to a whole technique of forces and bodies (Foucault, 1977:217). Foucault's pivotal research sparked academic discussions that began to see how the mind fabricated 'normal' ideas about the body (Meskell, 1996; Wylie, 1992). Cranny-Francis (1995:6) stated that an isolated focus on the mind has created fixed ideas of the 'normal body', the idea that the body is not only male, but also middle-class, heterosexual and from an Anglo cultural background. A critical reassessment of mind theory saw that not only had society engraved an idea of how our minds are superior to our bodies, but also how academia had readily accepted the Cartesian duality of the mind and body (Meskell, 1998; Yates, 1993).

Western theoretical discussions of the mind and body duality have continued to be at the forefront of feminist critiques of western academia. Initially, feminist theorists used Foucault's idea of surveillance to argue that the female body has been constructed as the lesser, inferior tool of the male mind (Butler, 1990). Cranny-Francis (1995:1) states that female's roles are not natural, but are culturally constructed and are therefore subject to critique and change. This idea became the basis for the sex-gender distinction, which highlights the idea of gender as a social construction that is mapped and inscribed onto the physical body (Cranny-Francis, 1995:2). Feminist critiques of mind and body theory not only highlight the impact of Foucault's work, but also how easily academia has accepted the 'normal body' without question. However, in more recent years, third wave feminist approaches have begun to break down the binary constraints of Foucauldian theory by challenging the idea that women belong to a homogenous group (Butler, 1993). For example, Wylie (1992:59) states "Feminists can no longer assume substantial commonalities in the power held, exercised, or suffered by women as women." This idea sought to place bodies, particularly female bodies, in a theoretical realm that broke the constraints of Cartesian and Foucauldian understandings of the body. As a result, archaeological theorists have begun to approach these unasked questions, and have critically evaluated how social 'norms' have influenced archaeological method and theory (Insoll, 2007; Yates, 1993). Boric and Robb (2008:4) point out that the acceptance of the mind and body duality has created an idea of 'the body as artefact' and the body as a 'scene of display'. Across the board, western humanities scholarship has been dominated by ideas of what it

means to have a body rather than the repercussions of the mind and body duality (Shilling, 2008:146).

Archaeology often draws on a wide range of philosophical and epistemological theoretical traditions in order to establish past theories of body, space and culture (Low, 2003:16). The ‘normal body’ has in turn become a large part of how archaeologists interpret burials and sacred landscapes. Archaeological investigations of past bodies are often based on a semiotic approach, where material culture will be interpreted as a direct expression of identity wealth and gender (Barrett, 1994; Shanks and C. Tilley, 1987). The ‘normal body’ has been translated as the ‘inscriptive body’ and is “mainly approached as an objectified entity in physical biological anthropological studies, or, as the dead body of mortuary studies, as an index of social organization, or as a focus of symbolism” (Joyce, 2005:151). Archaeological investigations of the body have often determined that the ‘inscriptive body’ can be read and that associated material culture is a symbolic of how that particular body lived. For example, Lee (2000:114) investigated burial textiles in order to interpret gender in Minoan burials, in her research she states “the essential components of dress...emit constant, complex, social messages that would have been intended by the wearer and understandable by the viewer”. Lee (2000) case study is an example of the ‘inscriptive body,’ where the body is interpreted as public domain, and a ‘tool’ that is used to express social position, both in life and in death. Although the ‘inscriptive body’ has allowed archaeologists to trace patterns of accumulative wealth, social identity and gender in archaeological societies, the method will often take a two dimensional approach to understanding the past (Meskell, 1996). The ‘inscriptive body’ is based upon the social construction of the ‘normal body’, which in turn means archaeologists will often reflect their own habitus on to past communities (Bourdieu, 1977; Comaroff and Comaroff, 1989).

Over the last thirty years, an increase in academic discussions of the western mind and body duality has started to further influence the methods that archaeologists use to interpret past bodies and communities. Archaeologists are beginning to borrow theoretical frameworks from other disciplines in order to explain phenomena within the archaeological record. At the forefront of this development is phenomenology, an approach that is concerned with embodied experiences of archaeological landscapes (Copeland, 2009; C. Y. Tilley, 1994). Phenomenology was developed by German philosopher, Edmund Husserl, as a direct criticism toward mathematical and scientific explanations of nature and lived experience (Allsobrook, 2014:321). In archaeology, phenomenological approaches were adapted as a way of moving away from semiotic understandings of the body, and to deconstruct the dualistic ‘normal body’ in archaeological theory (Bruck, 2005:65). Phenomenological archaeology moved away from the ‘inscriptive body’ and began to seek understanding of the phenomena of the ‘lived body’. Joyce (2005:139) states that “analysis of the production and experience of lived bodies in the past through the juxtaposition of traces of bodily practices, idealized representation and evidence of the effects of habitual gestures, postures and consumption practices on the corporeal body” allowed archaeologists to move away from two dimensional understandings of the mind and body dualism. Post-processualists have criticised the ‘inscribed body’ and argue that the orthodox model limits past bodies to an object of public site (Grosz, 1994; Joyce, 2005; C. Y. Tilley, 1994). In archaeology, phenomenology became an escape from orthodox models of the ‘body as artefact’ that allowed them to move toward more holistic interpretations of past bodies.

Phenomenological and social archaeological approaches have particularly strengthened our understanding of how past communities experienced cosmic landscapes (Meskell and Preucel, 2007; C. Y. Tilley, 1994). Archaeologists have not only noted the material and architectural properties of sacred landscapes, but have also started to explain how landscapes themselves can shape the lived experiences of past bodies. Ashmore (2010:199) describes ceremonial landscapes as an arrangement of specific features where the cosmos is situated on earth, and where ritualised movements between landscape features evoke and reinforce understandings of cosmic order. In this regard, theoretical understandings of the body are less focused on representation and symbolism, and instead on how people lived and experienced cosmic order through their surrounding landscapes. Phenomenological archaeology has however been met with criticism. For example, Fleming (2006:271) questions if phenomenological archaeologists can detach themselves as the 'observer of past communities'. In regards to cosmic landscapes, it is possible that archaeologists use personal embodied experiences of the cosmos to explain how past communities experienced the sacred. This matter has been particularly questionable in Hindu India, where sacred landscapes have been interpreted as political and symbolic (Fritz, 1986; Mack, 2004; Sinopoli, 2010). Phenomenology has improved how archaeologists look at sacred landscapes, but these archaeological interpretations will often lack the narratives that are available to them in Hindu theology.

In her 2010 article, Echoes of Empire: Vijayanagara and Historical Memory, Vijayanagara as Historical Memory, Sinopoli looked at architecture for information on the construction of an imperial identity within the 14th century southern Indian empire Vijayanagara (Fig. 11). Archaeologists will often look at architecture to interpret not only information about the social, political and economic organization of past societies, but also about how social organisation was constructed by the ruling elite (Renfrew and Bahn, 2012:222). Sinopoli (2010) argues that Vijayanagara is a sacred landscape, and that the sacred architecture is an amalgam of Islamic, Vedic and local Hindu styles. Although the kings themselves affiliated themselves with The Ramayana, they also followed the Vaishnava sect, which was associated with a monotheistic god who had power over the land and legitimised their right to rule. However, public temples were dedicated to the Vedic goddess Pampa, and Valmiki's The Ramayana – a volume of Sanskrit epic poems – was a large part of temple architecture and worship. Sinopoli (2010:457) argues that the elite put aside their own religious affiliation in order to pay homage to the religious beliefs of the people. Although Sinopoli (2010) makes references to the theological aspects of Indian life, she notes that religion was manipulated by the elite in order to legitimise their right to rule. Sinopoli (2010) outlines a political understanding of Vijayanagara that does not reference how the civic centre was in fact experienced as a cosmic landscape. Although architectural and power based understandings of past Hindu society have been successful in their depiction of the past (Fritz, 1986; Mack, 2004; Sinopoli, 2010), there has not yet been enough research that maximizes the potential of past Hindu narratives. Archaeologists have often favoured systematic understandings of Hindu landscapes, without engaging with the theological narratives that are available to them (Sugandhi and Morrison, 2011). Hindu landscapes are often underrepresented and misunderstood because of the western dualistic understanding of the mind and body relationship.

Hindu theological understandings of the body are important to reach a multi-dimensional understanding of Hindu cosmic landscapes, it is important to consider Hindu theological understandings of the body. Western body theory is not universal, and perspectives of the body are interchangeable according to different religious

Figure 1: *Map of India*

and cultural communities. In Hinduism, body theory is shaped by theological ideas of divine embodiment (Beck, 1976). The gods are present in all aspects of Hindu life, and are often depicted in village temples, family homes and on the roadside. These images – most often called murtis – are one of the few ways in which the divine become manifest in Hindu daily life. Although the divine is thought of as a formless, bodiless, and absolute being, the divine can also transcend into an earthly form. The idea that the divine are formless, and that they

have form, happily co-exists in Hindu religious theory (Smith, 1989:211). In Hindu traditions, the principle underlying divine embodiment stems from the idea of the avatara – meaning descent – and underlines the descent of a god into the world. This theology was formulated in the Bhagavadgita, where the avatar of Vishnu was said to “create myself ... [and] take on existence from eon to eon, for the rescue of the good and the destruction of evil” (Buitenen, 1981:87). The fluidity of Hindu ideas of the divine, mean that the gods can remain tangible and otherworldly whilst frequently transcending into the physical human realm.

In turn, Hindu ideas of the divine mean that Hindu body theory, and perspectives of the self, are entirely different from its western counterpart. For example, western theory considers the mind and body to be entirely separate, whilst in Hinduism there is no distinction between the mind and the body. Like the divine body, the Hindu body can take on multiple forms so that it can move easily between the physical and cosmic realms. The earliest example of the Hindu mind and body as multiple is documented in the Upanishads, a collection of philosophical Vedic scriptures which discuss the fundamentals of Hindu theology (Patrick, 1998:33). In the Upanishads, the atman – one’s inner essence – and the Brahman – meaning both the creator and the essence of the universe – are thought to be the same transcendent being (Staal, 1993:61). One of the core teachings of Hinduism, is the atman-brahman relationship, the act of joining one’s inner essence with the wider cosmos, through acts of dharma (practice) and karma (action). The human body is therefore believed to have both subtle and gross dimensions and the relationship between the human body and the ritual body is ultimately limitless (Holdrege, 2007). Therefore, there is no distinction between the mind and the body, as both work in unison and allow the body and the cosmos to intertwine on a daily basis. Hindu body theories are heavily based on theological ideas of divine embodiment and are therefore entirely separate from western ideas of a mind and body duality.

Hindu body theory has heavily influenced the way that Hindu communities experience sacred landscapes. The fluidity between the Hindu mind and body means that the divine can transcend into the world at any time. This is most evident in sacred landscapes, where Hindus will go to experience the divine. Beck (1976:214) states that in temple worship, the individual joins with and even becomes identical to the cosmos itself. For this reason, Hindu communities will go on pilgrimage, or visit sacred landscapes so that their atman may merge with the cosmic brahman. Hindu temples will be architecturally designed to maximise the transcendence of the divine into the physical world. For example, the temple foundation of Madurai, an archaeological city in Tamil Nadu, was designed as a replica of the cosmos, so that worshippers could come and experience the earthly dwelling of the divine (Beck, 1976:236). The fact that the Hindu body engages with the cosmic has often been overlooked by western theorists, and most particularly by archaeologists. The engagement of the human body and divine body in sacred landscapes has either been misinterpreted or misunderstood as ‘Hindu bodily narcissism’ (Smith, 1989:55). In turn, this means that archaeological interpretations of sacred Hindu landscapes have taken on either a predominantly political or symbolic format (Fritz, 1986; Mack, 2004; Sinopoli, 2010). If archaeologists wish to interpret sacred Hindu landscapes, then it is essential that they begin to engage with the rich narratives that are available to them.

Case study: Using Hindu theology to understand the conflict surrounding the Babri Masjid

Using Hindu theology will not only help archaeologists to interpret sacred landscapes, but also to understand the intrinsic relationship between the contemporary Hindu community and temple architecture. Archaeology has been used as a tool in the religious and political conflict of the Babri Masjid-RamJanmabhumi temple in the Tamil

city, Ayodhya (Fig.11). The Babri Masjid was erected during the reign of the first Mughal emperor, Babar, and has been a place for Muslim worship from the mid-1500s to 1949 (Rao, 1994:156). However, Hindu nationalists who claimed the Babri Masjid was constructed on the ruins of a Hindu temple contend the mosque, and argue that Muslim nationalists purposefully destroyed Rama's temple. The Babri Masjid has been the subject of conflict between Muslim and Hindu Indian communities, who each lay claim to the sacred and political elements of the temple. It is important to note here that both sides of the opposition have religious connections to the temple, and have each employed archaeological methods in order to argue their case, but for the purpose of this paper I will discuss the Hindu cosmic relationships with the RamJanmabhumi. The RamJanmabhumi is considered by Hindus to be the birthplace of King Rama, the protagonist and avatara of Vishnu in Valmiki's sanskrit epic, The Ramayana. The Ramayana did not originate as a religious text, but as an orally transmitted discourse on correct ethical, social and political conduct (Thapar, 1991:141). Thapar (1991:143) states that because of this, the Ramayana cannot be placed in a specific time period because the epics were a part of an ongoing tradition that saw them transform from bardic literature to religious scripture in the hands of the brahman elite. Although this makes the Ramayana hard to place archaeologically, the relationship between Ayodhya and Hindu theology is deeply imprinted. As Rama is the avatara of Vishnu, The Ramajanmabhumi is therefore the birthplace and political legacy of both Rama and Vishnu. As a Hindu sacred landscape, worshippers will visit the Ramajanmabhumi to experience not only Rama, but also the earthly dwelling of Vishnu.

There is no empirical evidence that the Babri Masjid was ever built on the ruins of a Rama temple (Bhattacharya, 1991:122). Both Hindus and Muslims have turned to textual and scientific evidence in order to validate their political claims to the sacred space (Rao, 1994:156). Archaeology has been employed by both sides, both of which have used the social science as a means of attaining empirical evidence that claims political authority over the temple. At the forefront of the archaeological debate has been B. B. Lal, the retired Director General of the Archaeological Survey project and head of the 'Archaeology of the Ramayana' sites project (Barber, 2006:148). Lal (2001:119-123) argued that 'brick built bases' and 'fourteen non-Islamic black basalt pillars' predated the Babri Masjid and were of Hindu origin. Lal interpreted the evidence with a Hindu perspective, which was met with criticism from Ram Sharma, who argued that the recovery of glazed Islamic pottery from above and below the temple foundations, suggests that the 'brick built bases' had collapsed by the time the mosque was constructed (Sharma, 2001:132-134). The conflict at Babri Masjid - Ramjanmabhumi not only shows how systematic archaeological evidence can be used as 'evidence' in support of a political agenda, but also of how archaeological investigations have separated the temple from its embodied connections with the cosmic realm. The archaeological concern with empirical evidence has over ruled any religious claims of embodied experience with the temple. In Hindu theology, emphasis is placed on orthopraxy rather than on orthodoxy, which means that the Ramjanmabhumi is an important place to practice dharma (Staal, 1993:70). Unlike many western religious traditions, Hindus regard the practice of dharma and karma with higher value than religious scripture or scientific evidence. The tendency for archaeology to confront religious and political conflict with empirical evidence often means that the religious narrative becomes neglected or lost.

Unlike western culture, Hindu theology has multiple explanations and manifests for the body, which can be placed in both a divine and physical realm (Holdrege, 2007). Whilst heav-

Avenues for the future

ily documented in religion studies and historical accounts of Hindu bodily worship (Beck, 1976; Smith, 1989; Staal, 1993), archaeological research is yet to explore the transcendence of the Hindu physical body into the cosmic realm. Insoll (2004:155) argues that narratives of religious experience in archaeology are underrepresented, merely because religion is often considered to be a side note with less importance than studies of society, economics and human migration. However, religious experience can provide a detailed retelling of how people experienced both the physical and cosmological world on a daily basis (Edwards, 2005; Hamilakis, 2002; Insoll, 2004). Although heavily critiqued (Fleming, 2006), phenomenological approaches in archaeology highlight that there is a significant gap between human experience and physical landscapes. Phenomenological anthropologists have stated that phenomenology is able to “stress the indeterminate, unarticulated and unbounded nature of experience, which can flow into new meanings and different cultural dynamics” (Knibbe and Versteeg, 2008:50). Phenomenologists do however, need to establish themselves as the observer, and need to take a critical position that allows them to acknowledge both the scientific and embodied experiences of sacred landscapes. Similarly, social archaeological approaches have attempted to bring embodied experiences of landscape into archaeological narratives. For example, Meskell (1996), Meskell (1998), and Meskell (2000) argues that in order to understand embodied experiences of landscape and material culture, archaeologists need to disregard Foucauldian top-down approaches and turn to methodologies that are multi-disciplinary and culturally sensitive. Through her advocacy for social archaeological perspectives, Meskell (1996), Meskell (1998), and Meskell (2000) argues that archaeologists need to examine archaeological data in its own cultural context, and to refrain from projecting western classifications and body theory on to the human past. In regards to future approaches, Atalay states that archaeologists must “advocate for a collaborative approach that blends the strength of western archaeological science with the knowledge and epistemologies of Indigenous people....We must begin to explore ways of moving beyond posturings that pit science against religion” (Atalay, 2006:301-302). Systematic archaeological methods should be used in conjunction with theological narratives in order to provide a richer and more detailed perspective of the archaeological record.

Hindu communities bring an alternative perspective to how people see and experience sacred and cosmic landscapes. Western and Hindu theory places the body in completely different contexts, and highlight how communities can see and experience the world in very different ways. Archaeologists have often overlooked these differences, and have provided interpretations based on their own social biases or western interests (Sugandhi and Morrison, 2011). If archaeologists are to engage with religious narratives, or past accounts of embodied experience, then it is essential that they employ multi-disciplinary methodologies. For instance, removing Hindu religious practices from binary western interpretations will provide a more reflexive and holistic understanding of past religious practices (Insoll, 2004; Insoll, 2007). Overall, Hindu bodily experience remains underrepresented in the archaeological record, but there is promising potential to improve how archaeologists approach religious landscapes and material culture. In order to move forward, it is proposed that a more nuanced and reflexive view of archaeological landscapes is required before archaeologists can fully understand Hindu ritual space.

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A Discourse on the Archaeological History of Zakynthos: Alternative Approaches

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The archaeology on Zakynthos is sparse compared to that of the other Ionian Islands. This is due to a variety of circumstances - a lack of regional archaeological research and the archaeological record in Greek see below on the island showing a high degree of fragmentation and destruction due to a combination of war, seismic activity, and intensive land use or development, which has resulted in the loss of an unknown number of sites and/or artifacts. As a result of this loss, archaeological projects on the island of Zakynthos have produced an array of predominantly survey-based inquiries, which have been insufficient in ascertaining a comprehensive prehistoric interpretation of the Island. This paper explores the archaeological history of the island and presents preliminary fieldwork; completed in support of DPhil research scheduled for 2016, and conducted by the authors in August of 2015, on the coastal region of Katastari, Zakynthos (Greece). In addition, this paper responds to the

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difficult archaeological terrain on the island by exploring the potentials of a new community inclusive methodology for the region.

Keywords: Zakynthos; Katastari; Survey; Oral History; Prehistory; Landscape archaeology.

ZAKYNTHOS, a small island in Greece, has received a great deal less archeological consideration historically than the other Ionian islands Ithaki and Kephallonia, and the adjacent western Peloponnese. To some degree, this may be the consequence of the way that Zakynthos is identifiably specified by Homer in the Iliad and the Odyssey as a major aspect of Odysseus' domain (Van Wijngaarden, Kourtessi-Philippakis, and Pieters, 2013). A great deal of the archeological examination on the Ionian islands has been impelled on by the quest for Homeric Ithaca (Souyoudzouglo-Haywood, 1999:9). During the 18th, 19th and early 20th centuries, interest in Homeric Greece manifested itself into archaeological projects aiming to find Homeric points of interest. For example, Schliemann, the finder of Troy, first attempted to locate Odysseus' palace before setting out to find Troy. He and many others excavated 'Homeric' regions of Ithaki and Kephallonia (the two closest islands to Zakynthos) searching for the famed palace. Since Zakynthos had already been distinguished in ancient literature, it could not be Odysseus' Ithaca and has, thusly, received less archeological consideration. Additionally, not very many visible archeological remains are obvious on the island. War and the combined influence of tectonics and eustasy contributed to forming the contemporary landscape. This paper presents an alternative, community-inclusive methodology, inspired by post-colonial critiques, to aid in the navigation and interpretation of this difficult archaeological history and terrain. The article focuses the application of this methodology through a discussion of the authors' preliminary fieldwork conducted in August of 2015, where two potential archaeological sites were discovered in the coastal region of Katastari.

Archaeological History Archaeological research on the island has produced an array of predominantly survey-based inquiries. From these previous works, evidence suggests a significant Prehistoric presence on the island. The findings of Riemann (1879), Benton and Lorimer (1933), Zapfe (1937), Sordinas (1970), Agallopoulou (1973), and most recently the Zakynthos Archaeology Project (2006–2013) directed by Sotiriou and Van Wijngaarden, have shaped our current understanding of the prehistoric occupation on the island. Other archaeologists have established the existence of a significant Hellenistic-Roman occupation (Daux, 1958; Mylonas, 1991; Kalligas, 1993; Arapoyianni, 1991; Arapoyianni, 1992). The focus of this paper is on the prehistoric archaeological finds.

Sylvia Benton's fieldwork, conducted in 1931–1932, expanded upon the work of Riemann (1879) and Schmidt (1899). She identified three Bronze Age sites on the island through the discovery of several surficial artifacts during her survey: an obsidian blade found on Cape Gerakini, Mycenaean style terracotta disks, and several Mycenaean pottery sherds and human skeletal remains found around a Tholos tomb near Akrotiri. Benton returned to the Alikanas-Akrotiri area the following year (1933–1934) with archaeologist, Hilda Lorimer where they found remnants of a Mycenaean house (Benton and Lorimer, 1933). These finds were never fully published and the artifacts taken were destroyed in an earthquake. Sordinas (1970) surveyed the island between 1965 and 1966 and discovered several Paleolithic sites indicated by scattered lithics and pottery. Interestingly the only full-scale excavation of a pre-historic site was conducted by Agallopoulou (1973), who excavated 14 Mycenaean tombs in an ancient cemetery in the village of Kambi located 30 km north of the town of Zakynthos. To date, the

cemetery at Kambi remains the only archaeological site on Zakynthos that has been systematically excavated and fully published.

Currently, the work of the Zakynthos Archaeology Project, spearheaded by Van Wijngaarden, has synthesized this previous research and identified three larger research areas in which intensive survey and small-scale test excavations have been conducted. This has resulted in the discovery of thousands of prehistoric lithics and pottery sherds. A complete report of these finds has yet to be published as of the date of this publication. However, preliminary reports have been made available and have proved to begin to fill the archaeological gap in the known data record.

The island has been colonised a myriad times since c.1500 BC, including by the Peloponnesians in 431 BC, Phillip II of Macedon in 217 BC and the Romans a few years later in 214 BC. After the Romans, came the Byzantines, who defended the island against the Visigoths and the Huns in 395 AD. Years later and after much plundering and looting, Zakynthos was the victim of barbarian attack yet again – in 549 AD when the Visigoths, under Totilas, overran the island. The island suffered further attacks almost every year, mainly tormented by the Saracen pirates of Crete. By the time of the second crusade, in 1147 AD, Zakynthos was captured by the Venetian fleet of Domenico Michelo. The next 300 years consisted of ownership changes analogous to a game of musical chairs with the seat of power being transferred from the Venetians to the Neapolitans and then to the Florentines. This cycle of ownership continued until the Ottoman Turks decimated the island in 1480 AD. Two occurrences of Veneto-Turkish wars, three outbreaks of the black plague and unabated pirating of Zakynthian shores had left the islands rich archaeological heritage in a dire state by the time the British arrived in 1814 AD – either by the dismantling of ancient structures in order to reuse material for newer structures or fortification of older structures, or by pure destruction by invading armies and pirates, usually manifested by fire.

The seismic activity and eustasy suffered by Zakynthos has been constant and consistent since the Middle Pleistocene (Zelilidis et al., 1998:400). In the period from 25,000 to 4,000 BC the sea level has fluctuated between 120–20 m below present level and, consequently, the landmass of Zakynthos was greater than it is today. Effectively, this means any early Mesolithic (8300–6000 BC) or Neolithic (6000–3200 BC) coastal settlements are now underwater (Ferentinos et al., 2012:2172). Even though Zakynthos probably was attached to Kefalonia and Ithaki during parts of the Pleistocene, the group of islands remained insular and detached from the Greek mainland. Moreover, geological research indicates that the peninsula of Vasilikos was detached from the rest of Zakynthos and constituted a separate island until the end of the Bronze Age (Lambeck and Purcell, 2005). The evidence of Paleolithic stone tools and Bronze Age pottery and lithics indicates that the island had a constant human presence from the Middle Paleolithic onwards (Kourtesi-Philippakis, 1999:286). Nevertheless, the lack of stratigraphic deposits on the island make it difficult to assess these finds in a secure chronological framework. In all cases, the lithics and pottery have been found at open-air (surficial) sites or in off-site (back dirt) material. Further, in the region of Katastari, where there are some deposits of earth that are deep enough to be quantified in stratigraphic layers, farmers have worked this land for hundreds of years cultivating olives (*Olea europaea*) and grapes (*Vitis vinifer*) – the island's largest exports. This has created a percolation of unearthed artifacts that have lost their stratigraphic context in the archaeological record and can only be dated via morphological similarities in regional pottery design (seriation). Certainly, the archaeological

Fragmentation of the Archaeological Record Explained



Figure 1: *Map of Zakynthos* (Van Wijngaarden, Kourtessi-Philippakis, and Pieters, 2013:128).

terrain of Zakynthos is complicated and fragmented, which calls archaeologists to continue to push methodological boundaries to meet these needs.

New Methodology Archaeological studies of ancient Greece seem an unlikely candidate for post-colonial critiques. Arguably, all archaeology in the 21st century is of a post-colonial context and as such, to a certain extent, merits this lens. Previous approaches in the region often disenfranchised local communities from participating in the archaeological interpretation and heritage of the island by ignoring locally derived knowledge. Local communities have internalised a distinct historical understanding of past archaeologists and their projects. Particularly Sylvia Benton, who has become a local legend, and was not received well by the inhabitants nor was she impressed with their responses to her project (Benton and Lorimer, 1933:213). Although post-colonial

critiques have emerged out of a response to colonial nations and their dealings and interpretations of Indigenous peoples (their sacred sites and material culture), the ancient material heritage of Zakynthos is not immune from contemporary local understandings of collective history and identity.

Landscapes are not static nor do they exist in a temporal vacuum. A post-colonial approach to archaeology in this region would value local understandings of landscape and ancient material heritage. For example, during our preliminary fieldwork in August 2015 we ascertained from several local people the belief that prehistoric occupation on the island was heavily connected to the other Ionian islands via seafaring. Current island commerce and activities have most likely been projected onto the ancient past. However, it is notable that archaeologists have not adequately studied the ancient seascapes in the region. This is peculiar considering the fact that Zakynthos has remained insular from the Greek mainland and the other Ionian islands for many thousands of years before the Paleolithic, which means the presence of early humans at Zakynthos during Palaeolithic times must have involved some type of seafaring (Ferentinos et al., 2012). Local folklore and contemporary identity construction in relation to ancient heritage provides inspiration to these complex archaeological landscapes. This is no doubt due to the keen observations of local people who live and work those same landscapes and seascapes of earlier ancient inhabitants. This intimate, intuitive acquaintance with Zakynthos is unique to local people and should not be taken for granted.

Oral history and community-inclusive approaches to archaeological study (community archaeology) have emerged partly as a direct methodological response to post-colonial criticism (Smith, 2005; Hill, 2011; McNiven and Russell, 2005; Lyons, 2013; Lavin and Volpe, 2013). Due to its difficult archaeological terrain, produced in part by locals working the land and sea, it is critical to archaeological projects in this region that a more profound historical understanding of the more recent relationship between archaeological sites and local inhabitants be mapped and explored. This would take form in a community-inclusive methodology that relies on oral history. Our approach aims to discuss and record as much information as possible from local residents about the archaeology that took place on the island in the past. Our primary queries are as follows: First, we seek to record information about potential sites, both those that have been undisturbed and those that are known to be destroyed. These sites would be mapped and those that are still viable would be surveyed. Second, we would aim to access and document artifacts that local people have procured from their private lands and if possible, determine an approximate provenance. Third, we would seek to involve the community in the telling of the island's ancient history, recording the local folklore. Gazin-Schwartz and Holtorf wrote,

Folklore may also be valuable if we want to know how these memories influenced the creation, preservation and destruction of monuments in landscapes.

—Gazin-Schwartz and Holtorf, 1999:15

The elements of this approach are both conceptual and methodological. This has both ethical and practical value. The practical value lies within the local intimate knowledge of the sea and land. Locals working the land are familiar with potential archaeological sites, and have discovered and housed artifacts from the region. Holm has adopted a similar stance, calling for 'interdisciplinarity' when working with local farmers in Cairns. She writes,

Archaeology claims to be a discipline that emphasises interdisciplinary approaches. Perhaps our interdisciplinary approaches should include listening to the local experts, those who know every stone and mound on their farm and in the forest.

—Holm, 1999:227

This methodology would ease the process of compliance with Greek heritage legislation; aiding in the protection and preservation of privately held objects that are currently undocumented and unknown to the Ministry of Culture. This paper does not seek to go into an in-depth exploration of Greek heritage law, which is complex and should be considered on a case-to-case basis. However, a brief overview in relation to this methodology will follow. Generally, the law seeks to criminalise habitual looters, traffickers, and those individuals conducting illegal excavations and dealing in black market antiquities (Kaliampetsos, 2008). It is our belief, through our preliminary fieldwork, that predominantly, local people are finding and housing various artifacts discovered while walking and working their lands, and do not fall into the criminalised categories discussed previously. In most cases, the law requires that the state be the sole owner (possessor) of the artifact. However, an additional stipulation allows for there to be a “holder”, or an individual who cares for and houses the artifact - provided that they can adequately safeguard the artifact and make it available for the service of specialists who acquire a permit for study. The individual, or “holder”, is issued a holder’s permit and is allowed to keep and house the artifact (Kaliampetsos, 2008). Through our approach we would aid community members who house artifacts in obtaining holder’s permits. As archaeological professionals this interaction would not only work to add to the corpus of artifacts associated with Zakynthos, but would ensure their safe keeping by helping community members provide the artifacts with appropriate preservation and storage measures.

This inclusive methodology, inspired by post-colonial critiques and approaches improves upon the current model that tends to focus solely on survey and purely foreign academic interpretations of the islands material heritage. Using this methodology during our preliminary fieldwork, we identified two potential sites in the coastal region of Katastari, recorded several artifacts housed in private collections, and procured interesting interpretations of the islands ancient history. We argue that a shift in focus towards incorporating local communities and their understanding of the islands archaeological heritage is a necessary and critical companion to further archaeological research in the region. At its very least, it will provide leads to potential sites and artifacts and at most produce a fluid, non-binary reading of the island’s archaeological history.

Preliminary Fieldwork

Preliminary fieldwork, consisting of a two-week search for sites that warrant further research, has established that archaeological folklore is deeply imbued in the Zakynthian landscape. Mapping and exploring these local understandings is as critical to a cohesive archaeological inquiry in the region as survey and excavation are. In addition, the cataloguing and locating of various artifacts that have been removed from private land and kept in local homes will aid in filling the lacunae that exist in the archaeological record in the region.

We utilised this inclusive methodology by meeting with local people and asking them questions. Those who seemed interested in the islands cultural heritage directed our queries into some meaningful folklore explanations (usually to do with Homeric Greece and Odyssean kingdoms) and potential leads. For example, we engaged a local sea life photographer and a local historian. The sea life photographer told us of some rumours he had heard from fisherman of the area – that their nets would sometimes get caught if they trawled an area close to



Figure 2: Possible underwater paved path or port related breakwater site, - 8.50 m deep and 20 m off shore. Photo taken by the author, directly facing north.

Alykes-Akrotiri bay. We assessed that lead by free diving every day for two to three hours up to depths of 10m. Eventually we found something of interest in the form of what seemed to be cobbled stones not to dissimilar from modern day ‘crazy paving slabs’ (see Fig. 2). Our first instincts were that this was part of a port site that now lays submerged and that what we were seeing was the breakwater section of the port.

Following the cobbled section in Figure 2 directly north for about 15m led us to a wider and more complicated section, stretching out horizontally as far as the visibility allowed us to see (perhaps 20 m either side). This section revealed circular ring shaped carved pieces of stone (See Fig. 3). These rings protruded from the seabed and stand out in the natural marine environment as man-made. Perfectly spherical to the eye and a diameter of roughly 1.50 m, we wondered whether these were Bronze Age stone anchors, but after coming across a better candidate for a stone anchor complete with rope wear (see Fig. 4), we soon started to ask questions like “why would one waste time and resources carving a perfectly spherical anchor, and why are there so many in one location? Was this some type of anchorage site?”

Pragmatically, there is no reason for a perfectly circular anchor – smooth and rounded surfaces allow for less friction on the seabed. However, it is possible that, under the marine growth attached to the stone, these rings are not perfectly circular and only appear to be so. With further research the exact dimensions can be fleshed out. So what are they? Since we counted nearly forty ‘rings’ around the entire site, we assessed the possibility that these had some function as mooring postholes but could not find other instances of Bronze Age mooring postholes



Figure 3: Two spherical stone ‘rings’, c.8.50 m deep – 35 m offshore (photo taken by author).

in this region. Although at this stage of the research we cannot be entirely sure of what we have found, we are inclined to believe that what we have recorded are stone ring anchors.

After closer inspection of the ‘rings’ an issue with the anchorage/mooring station theory arose. There are in fact two typologies of ‘ring’ within this site, roughly split equally, 50/50, in terms of numbers of each type. The two types of ‘ring’ are found interspersed in the same locations and at similar depths. ‘Ring’ type II (see Figs. 5 & 6), is much more intricate in design and at first glance almost seems to be part of a much more grandiose site.

The sides of ‘ring’ type II have been delicately carved, which we can see from the photos but also by gently running ones fingers across the grooves in the stone. We have considered the possibility that ‘ring’ type II are the remnants of stone column bases. There is no doubt that aesthetics played a part in the making of this stone piece but, alas, at this preliminary stage we are currently not sure of its function.

Indeed, this potential site is very interesting considering the fact that the last time it was above sea level was some 4,000–6,000 years ago (Flemming, 2014) and the mystery surrounding the two types of spherical ‘rings’. Furthermore, the existence of a terrestrial site c.100 m away and 120 m high on a hill aptly named ‘Pyrgo’, which can be translated as tower, overhanging and overlooking the possible port site, which begs the question: “are these two sites linked in some way?”

Earlier in this section we mentioned a local historian we had encountered who was willing to help us garner ‘local knowledge’. The historian showed us his private collections from areas of the island he has visited and privately studied. Amongst his private collection were fragments



Figure 4: Stone anchor, c. 9.50 m deep – 40 m offshore (photo taken by author).



Figure 5: Spherical stone 'ring' type II, c. 9 m deep – 35 m offshore (photo taken by author).

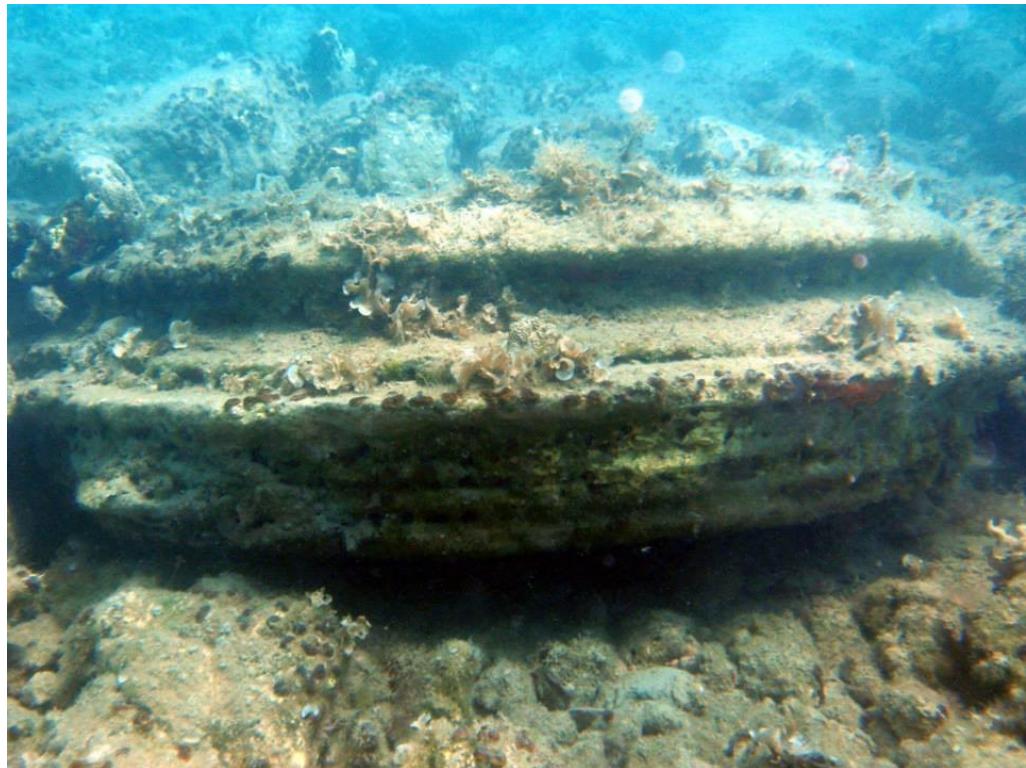


Figure 6: *Spherical stone 'ring' type II side view, c.10 m deep – 40 m offshore (photo taken by author).*

of a Mycenaean terracotta stirrup jar, c.1200 BC. When asked where he had found the jar he told us of a hill perhaps only 100m away from the port site we had been visiting daily and directly overlooking it from a position of altitude. After some hours hiking we encountered a folklore favourite of the island – ‘Odysseus’ throne’, which is a rough stone seat made up of three different layers of stone and, amongst locals, historically associated with Odysseus. More important than the supposed ‘throne’ was the fact that it seemed to be flanked by a row of six rectangular 2 m long stone slabs swallowed by the endless groves of olive trees (see Fig 7; 9).

We hypothesize that the terrestrial site is either the roofing slabs of a Mycenaean tomb or the foundation remnants of some type of building. The Mycenaean tomb implications further arose during the course of researching for this paper. Agallopoulou (1973)’s tomb finds in the region of Keri were described as slabs of rock resting parallel with each other, and Benton and Lorimer (1933) describes a different tomb find, “Near Mariais I saw a well preserved tomb, cut in soft psammitis (chalk) and roofed with five slabs, found in 1926. It is about 2 meters long..,” (Benton and Lorimer, 1933:21). Figures 7 and 9 show six slabs laid out together on the top of a c.120 m hill overlooking what we believe to be a Bronze Age, or later, anchorage/port site. At this point any explanations attempting to link the two sites would be purely conjecture and more research needs to be conducted before any solid conclusions can be made. However, phenomenological approaches to these two sites beg a significant connection (especially if the date ranges turn out to be similar) as the port site is easily seen from the terrestrial hill site. It is almost as if the ‘throne’ looks over the harbor and the adjacent island.



Figure 7: *Six slabs laid together, viewed at a vertical angle and with first slab broken into two pieces and third slab missing just under half of its length (photo taken by author).*



Figure 8: *Perfectly circular hole found on the side of one of the six slabs (photo taken by author).*



Figure 9: *Cross section of parallel slabs resting on a type of sandy/chalky bed (photo taken by author).*

Conclusion

The island's archaeological record thus far suggests heavy Mycenaean use. Benton and Lorimer (1933)'s discovery of Mycenaean houses and Agallopoulou (1973)'s discovery of a Mycenaean cemetery further validates this connection. We know little about where Mycenaean anchorages and harbours were, or how they were used (Tartaron, 2013:1) and although much attention has been devoted to long-distance 'international' connections with the states, empires, and emporia of the eastern Mediterranean, comparatively little consideration has been extended to networks of maritime relations operating at a regional or micro scale. After recording and conserving, this type of question, indeed, lends itself to the scope of further research.

Planning for further research at the site is currently underway. We plan to return to both sites in order to survey the areas with more precision and completeness. For the underwater site the goal is to create a 3D photogrammetric mosaic of the seabed for a clearer and holistic view of the site, because for the moment, we are not sure how far out the port site extends itself into the sea. The terrestrial site is much more complicated in that the land is privately owned, and survey permits may be harder to obtain from the Hellenic Ministry of Culture because of this fact. We aim to have some agreement with the landowner in place and in time for a research start date of late next summer.

The colourful and complicated history of Zakynthos presents interesting archaeological questions and problems. Community-inclusive methods have proven to be successful in overcoming some of these hurdles by providing new insights to the islands' unique ancient landscape and the historical insight of local islanders. From fishermen's tales of net snagging to local inhabitants' long-lived tales of Odyssean/ Mycenaean kingdoms, certainly, continuous

in-depth exploration of the island is critical to produce a clearer understanding of ancient occupation in the region. Due to substantial archaeological fragmentation, this investigation includes gaining a deeper sense of the local communities interaction with the ancient heritage of the island; researching knowledge of known sites (both intact and destroyed), locating artifacts held in private collections, and recording local folklore. The two potential sites presented in this paper merit further research, and may prove to be connected. The difficult archaeological terrain of Zakynthos requires archaeologists to produce a full arsenal of tools, theories, and methods to illuminate the island's past.

Η αρχαιολογία της Ζακύνθου είναι αξιώσιμη σε σχέση με εκείνη των άλλων Ιόνιων Νήσων. Αυτό οφείλεται σε μια ποικιλία περιστάσεων - την έλλειψη αρχαιολογικής έρευνας και τον ψηλό βαθμό καταστροφής που οφείλεται σε ένα συνδυασμό πολέμου, σεισμική δραστηριότητας, καθάρισης και εντατική χρήση της γης για ανάπτυξη, η οποία έχει ως αποτέλεσμα την απώλεια ενός άγνωστου αριθμού αρχαιολογικών τόπων και έχει τέχνης. Ως αποτέλεσμα αυτής της απώλειας, τα αρχαιολογικά έχγα στο νησί της Ζακύνθου έχουν δημιουργηθεί μια σειρά από ασκήσεις επί χάρτου, οι οποίες έχουν αναπαριχθεί ανεπαρκής για την εξαναγκισθεί μια ολοκληρωμένης προϊστορικής εξμηνείας του νησιού. Η παρούσα έρευνα εστειάζει στην αρχαιολογική ιστορία του νησιού και παρουσιάζει αποτελέσματα έρευνας. Η έρευνα έχει την υποστήριξη της έρευνας DPhil για το έτος 2016, και πραγματοποιήθηκε τον Αύγουστο του 2015 από συγγραφείς στην παραδαλάσσα περιοχή του Καταστατίου της Ζακύνθου (Ελλάδα). Επιπλέον, αυτό το έγγραφο αποτελεί μια απάντηση για την δύσκολη αρχαιολογική ζώνη του νησιού με τη διερεύνηση των δυνατοτήτων μιας νέας κονότητας χωρίς αποκλεισμούς στην μεθοδολογία έρευνας για την περιοχή.

λέξεις-κλειδιά: Ζάκυνθος, Καταστάτη, Έρευνα, Προφορική Ιστορία, Προϊστορία, Τοπική αρχαιολογία.

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Domestication and Infectious Diseases: Evidence For Human Cultural Niche Construction

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Niche construction is the modification of an organism's environment that results in the evolutionary (biological) and/or cultural (anthropological) change of the organism. This paper explores the rise of pathogenic disease in Southwest Asia during the Neolithic period (~10000 to 4500–2000 BC) through the lens of niche construction. Humans constructed a new environmental niche when they domesticated animals, which resulted in the rise and spread of various deadly pathogens due to increase in human population size and animal-human proximity. In order to combat this spread of disease, humans responded by making cultural changes to prevent disease, such as new sanitation measures. The human population also began to evolve in order to counteract disease. Co-evolutionary dynamics developed between humans, animals, and pathogens, which are ongoing to this day.

Keywords: Niche construction, Co-evolutionary dynamics, Domestication, Infectious disease, Neolithic.

NICHE construction theory (NCT) highlights the ability of organisms to change environments through their activities and choices, thus acting as co-directors in their own and other species' evolution (Odling-Smee, Laland, and Feldman, 2003:2). Unlike natural selection and genetic inheritance theories, which emphasize that the environment introduces pressures to which organisms eventually adapt via genetic mutation, niche construction theory stresses that organisms play an active role in adapting to their environments (Laland and O'Brien, 2010:304). For example, animals can create nests, dams, paths, and webs, plants can chemically alter their environments, and humans can wear clothes and build fires and shelters. NCT is sometimes referred to as "triple-inheritance," because it involves genetic, cultural and ecological inheritance (Odling-Smee, Laland, and Feldman, 1996:643; Odling-Smee, Laland, and Feldman, 2003:251).

Abstract
(in Spanish see b)

Niche constructio

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Niche construction can introduce selective pressures into an ecosystem to which future generations are exposed (Laland, Odling-Smee, and Feldman, 2000:135). This ecological inheritance means that generations of organisms inherit both ancestral genes and modified environments. Resulting selective pressures not only affect the organism making the changes, but also other organisms that live in that environment. Niche construction is a major form of connectivity between biota, and is a source of co-evolutionary interactions (Odling-Smee, Laland, and Feldman, 2003:201). In traditional co-evolutionary theory, selection on one species triggers selection on the other without either organism triggering the change. This is illustrated in the statement: as human genes evolve to counteract infecting pathogens, pathogens evolve means by which to overcome these defenses. In this example, both groups undergo natural selection, with neither having an active role in how the genes evolve. However, niche construction theory emphasizes that the trigger can be due to an organism's agency. For example, as humans develop vaccines to boost immunity to pathogens, pathogens evolve to overcome these defenses. In this example, humans use their agency to develop protection from disease.

Humans are particularly effective niche constructors because of their ability to learn and culturally transmit knowledge and skills in order to devise efficient problem solutions (Richerson and Boyd, 2005). Archaeologists and anthropologists have long acknowledged human agency and its relationship with human environments. NCT provides a framework for bringing together anthropological and archaeological perspectives on human culture and society with biological perspectives on the selection of human genes. In certain instances, NCT can explain the lack of direct relationships between human allele frequencies and selective environments. For example, by developing fire and clothing, humans adapted to colder environments without having a significant change in gene expression (Laland, Odling-Smee, and Myles, 2010:140–141). In other cases, it explains how selective pressures on various genes could be the result of cultural activities. For example, the spread of dairy farming resulted in the selection of the allele responsible for lactose absorption (Burger et al., 2007:3738; Feldman and Cavalli-Sforza, 1989; Holden and Mace, 1997).

Research aims

This paper aims to describe the domestication of animals, particularly in Southwest Asia, during the Neolithic (~10000 to 4500–2000 BC) and its subsequent effects on human culture and genetics through the framework of niche construction theory (Fig. 1). NCT is an ideal framework for exploring the effects of animal domestication because domestication is neither easily defined as biological mutualism nor cultural phenomenon. Instead, it is a combination of biological symbiotic relationships and the human capacity to effect behavioural change through learning (Zeder, 2006c:111–115). The domestication of animals initiated a major change in the human environment when large groups of animals began to live in close proximity to humans. A major result of domestication was the introduction of new pathogens into the human population. These pathogens and their associated diseases set new gene-culture co-evolutionary dynamics in motion, resulting in genetic changes in humans, animals and pathogens: for example, the ongoing “arms race” of resistance and anti-resistance between people and microbes (Boni and Feldman, 2005). Furthermore, human learning and observation led to new behaviours to prevent, counteract, and/or contain disease.

Animal domestication It is argued that domestication is one of the most important events in human history, as it had far-reaching consequences into food production, the rise of civilizations, and global demography (Diamond, 2002:700). As humans adopted sedentary, farming lifestyles, they began to domesticate groups of animals in settlement centres, resulting in an unprecedented

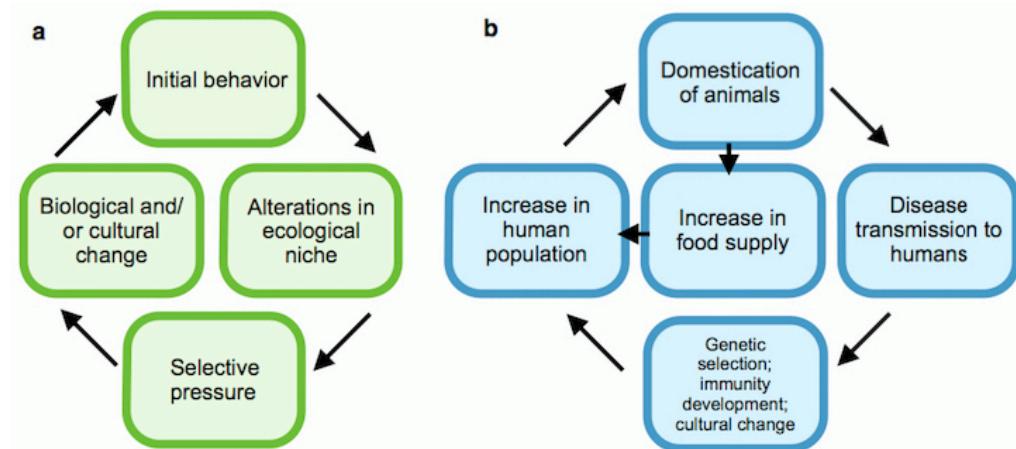


Figure 1: *a* Steps of niche construction, by author. Initial behavior leads to a change in an environmental niche, resulting in selective pressure for the biological or cultural change of an organism. In an unstable niche, changes result in further alterations of environment and the cycle continues (Rowley-Conwy and Layton, 2011).

b Representation of niche construction initiated with the domestication of animals.

proximity between large groups of animals and humans. Why humans began to domesticate animals is a complicated question, and the answers vary from the influence of changing climates to differences in resource availability (Zeder, 2006c:111–115). Smith (2007:189–190) argues that macroevolutionary forces did not directly cause domestication, but rather caused humans to intensify their niche construction efforts. Animal domestication itself likely occurred as part of broader environmental altering projects based on knowledge of local flora and fauna (Zeder, 2006c:111–115). These actions were not spontaneous or anomalous, but rather purposeful decisions to manage or alter an environment. As specific reasons for domestication differed around the globe, NCT provides a general universal context for domestication, relevant across a diverse range of geographies and cultures (Smith, 2007:1993–195).

Differing environmental factors and animal characteristics resulted in domestication. In recent scholarship, archaeologists have shifted from morphological and genetic markers as primary indicators of domestication in favour of a broader approach including investigations of palaeopathology and palaeodiet (Makarewicz and Tuross, 2012; Pearson et al., 2007) along with more traditional methodologies such as osteological measuring and analysis of kill-off patterns. Domestication occurred at different times in different places, but the following discussion will provide a general sense of its occurrence at the onset of the Neolithic in Southwest Asia. Increasing amounts of human refuse attracted wild dogs to settlements about 12,000 years ago, resulting in closer contact with humans and a reduction in aggression. In the archaeological record, reduced aggression is marked by shorter snouts, and crowding and size reduction in teeth (Moray, 1994:341, 343–344). Large stores of food and waste may have also attracted disease-bearing rodents (Linseele, Van Neer, and Hendricks, 2007:2087). When wild cats began to feed on the rats and mice plaguing agricultural settlements, humans encouraged their presence in order to protect stored food (Linseele, Van Neer, and Hendricks, 2007:2087). Like dog domestication, cat domestication is also evident through a reduction in size and aggression.

However, the most likely candidates for domestication were large terrestrial herbivores and omnivores (Diamond, 2002:702). Management of sheep, cattle, and goats began in the Levant around 9000–7000 BC. Domestication was most possible when animals lived in fixed-membership, male-hierarchical herds, were diurnal, were non-territorial and non-migratory, and had the potential to breed in captivity (Diamond, 2002:702; Rowley-Conwy and Layton, 2011:856). This explains why animals such as gazelle and deer were incompatible with domestication. Human herd management is evident in shifts in the age and sex composition of faunal assemblages. For example, by 9,000 years ago, goat herds in the Zagros mountains were characterized in the hallmark demographics of meat production: a majority of adult breeding females with a few adult males (Zeder, 2006b:201; Zeder, 2006a:187).

Disease and population size in the pre-Neolithic

Infectious pathogens require a population of a certain size in order to survive and spread (Armelagos and Harper, 2005:113; Armelagos and Cohen, 1984; McNeill, 1976). A group of hunter-gatherers was not likely to increase over 100 people (Armelagos and Dewey, 1970:272), and thus, was not capable of sustaining infectious pathogens. Palaeolithic diseases were relatively benign as to best utilize their small host population (Pearce-Duvet, 2006:37), and the parasites associated with them can be detected in the archaeological record through the study of human coprolites and pelvic soil from burials, among other contexts (Mitchell, 2013). Parasites can be characterised into two classes: heirloom species and souvenir species. Heirloom species are those parasites which evolved with anthropoids and continued to infect *Homo sapiens*, such as head and body lice, pinworms, and yaws (Armelagos and Harper, 2005:114; Cockburn, 1971:47–48). Souvenir species are those that humans accidentally picked up during the course of daily activity through insect or animal bites or consumption of contaminated meat, but whose primary hosts were not human. These include sleeping sickness, tetanus, scrub typhus, trichinosis, and schistosomiasis (Armelagos, Goodman, and Jacobs, 1991:15). Thus, humans were not getting sick due to construction of novel niches, but instead through accidental entry into a generalised multi-host zoonotic system.

It was formerly believed that the low population size during the Palaeolithic and Mesolithic was due to high mortality from infectious disease, but a large body of data has now debunked this theory (Angel, 1984; Armelagos, Goodman, and Jacobs, 1991:13; Armelagos and McArdle, 1975:60; Armelagos, 1990:127). Fertility and mortality rates must be balanced in order for a population to remain a small size (Armelagos and Harper, 2005:113). Hunter-gatherer populations had a low fertility rate for several reasons. Firstly, hunter-gatherer children needed to be carried for approximately the first four years of life, which forced women to space births every four years (Lee, 1980:325–326). Furthermore, a diet of wild foods and a mobile lifestyle resulted in low body fat levels that could have limited fertility (Wilmsen, 1989). Additionally, Dunbar (1993) theorised that neocortex size and the evolution of language affected the ability of peoples to maintain relationships between groups of a certain size, suggesting that low population size may also have been due to an inability to maintain groups larger than approximately 100 individuals.

The rise of infectious disease in the Neolithic depended on two separate results of domestication: the creation of much denser human populations and the increase in frequency of disease transmission (Diamond, 2002:703–704). When humans domesticated animals and encouraged growth of herds, this along with plant domestication resulted in a larger food source capable of supporting a growing population. Sedentary lifestyle meant that women could reduce the amount of time between child-bearing and were more likely to have body fat levels

necessary for reproduction (Lee, 1980:333; Wilmsen, 1989). Even though the rise of infectious disease caused greater mortality, disease struck mostly the very old and very young, or the non-reproducing members of the population. Those that survived to adulthood most likely had developed immunity to common pathogens, and thus the reproducing part of the population remained relatively stable (Armelagos, Goodman, and Jacobs, 1991:18). Increasing the fertility rate over the mortality rate resulted in population expansion. For example, it is estimated the Neolithic settlements of Catalhöyük, Turkey had a population at least over 1,000 by 7000 BC which could have grown to approximately 10,000, and the population of Talianki, Ukraine was approximately 15,000–30,000 by 3800 BC (Hodder, 2011; Kohl, 2009).

Human groups thus became an adequate size to host infectious disease, regardless of the effect of disease on mortality levels. For example, phylogeny studies of the deadliest strain of malaria, *Plasmodium falciparum*, and of the microbe responsible for human tuberculosis, *Mycobacterium tuberculosis*, indicate that both pathogens had specialised for human hosts before the emergence of domestication (Pearce-Duvet, 2006:373–374). However, urbanisation resulted in the conditions for them to spread and sustain disease transmission. The oldest archeologically identified case of tuberculosis was recorded at the Neolithic site of Atlit-Yam, Israel; dating to approximately 7000 BC, researchers claim it was one of the first villages in Southwest Asia with evidence of agriculture and animal domestication (Hershkovitz et al., 2008). *Shigella* or dysentery also originated as a human disease prior to the Neolithic, but did not become a major issue until crowded environments resulted in contaminated drinking water (Diamond, 1987:119).

Before humans had gathered into large groups, some herd animals already had the population size necessary to sustain bacteria and viruses. Disease transmission became more likely as these herds were kept nearer to areas of habitation (Armelagos and Dewey, 1970:273). This close contact with animals resulted in them becoming both direct sources of disease and indirect sources of wildlife diseases (Fig 2) (Pearce-Duvet, 2006:370; Daszak, Cunningham, and Hyatt, 2000:446). Contact with milk, hair, animal dust, or faeces could result in anthrax, Q fever, brucellosis, tuberculosis, and *Toxoplasma gondii* (Armelagos and Dewey, 1970:273; Sibley et al., 2009:2750)). Furthermore, studies have demonstrated that the specialised human pathogens responsible for measles, pertussis, smallpox, and tuberculosis cause similar immune responses when experimentally infected in mammalian models (Norrbjörn, Sheshberadaran, and McCollough, 1985; Arico, Gross, and Smida, 1987), suggesting that human and animal diseases are similar in nature.

Phylogenetic sequencing has further improved the understanding of the origins of infectious disease. For example, measles derived from rinderpest, which afflicts ruminants, and is related to canine distemper virus (Westover and Hughes, 2001). Although the pathogen causing human pertussis, *Bordetella pertussis*, is a specialised human strain, the disease can also be caused by *B. parapertussis* or *B. bronchiseptica*, which are two generalised strains affecting sheep, horses, dogs, cats and rabbits (Porter, Connor, and Donachie, 1994:259). Although the origins of smallpox are still debated, one possible explanation of this specialised human pathogen is that it derived from a similar rodent strain of the virus that was indirectly transmitted to humans from infected cows (Pulford, Meyer, and Ulaeto, 2002; Gubser et al., 2004:115–116).

Human populations would have been additionally vulnerable to these new infectious diseases due to poor nutrition and health. In the late Palaeolithic, humans further broadened their diets to include more small game and various plants in order to reduce the risk of a rela-

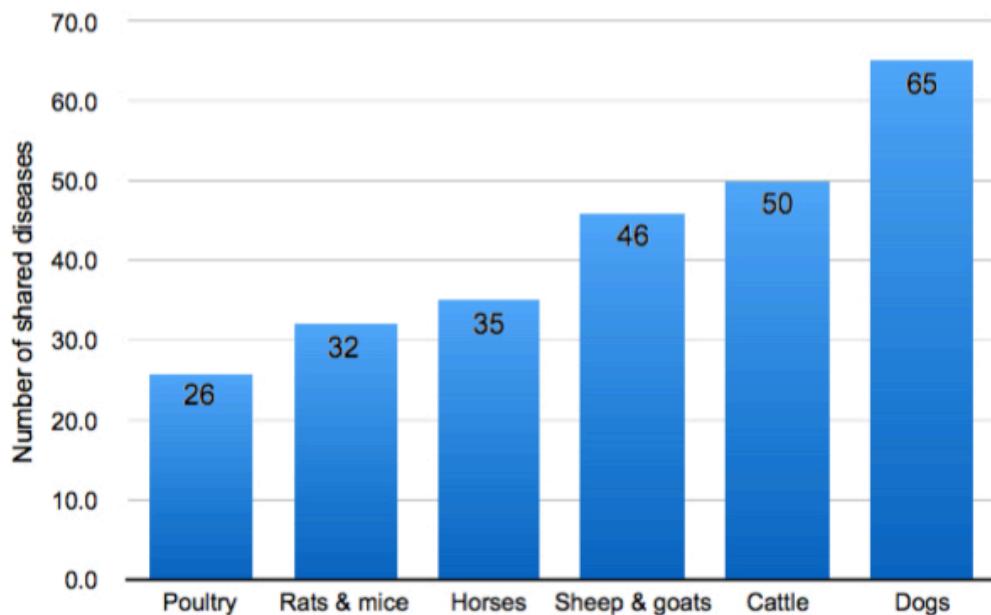


Figure 2: *Number of diseases that humans share with domestic animals, by author.* Note that overlaps exist in the data, since several types of pathogens afflict multiple species. Also, note that as relative degree of intimacy (contact) with animal increases, so too do shared pathogens. This data supports the idea that many human pathogens were transmitted from close contact with domestic animals (McNeill, 1976; Hull, 1963).

tively unpredictable food supply (Stiner, 2001:6993–6994; Stiner, 2002:25–26). Eating different foods protected from reliability on a single food source, thus limiting the possibility of starvation or malnutrition. The rise of agriculture and domestication reduced the types of food available, limiting most diets to staple crops and livestock. In addition to greater likelihood of starvation if crop failure occurred, major starches, such as maize, rice and wheat, offer little vitamins or nutrients (Larsen, 1995). Poor health is evident from skeletal assemblages. Average height decreased by about five inches for males and females from the Palaeolithic to Neolithic, and enamel defects indicative of malnutrition, anaemia, bone lesions, and degenerative conditions like arthritis increased (Armelagos and Cohen, 1984). Since malnutrition contributes to disease susceptibility (Diamond, 1987:119; Cohen, 2000), infectious diseases were even more likely to affect the growing human population during the Neolithic.

Effect of domesticated animals in the Palaeolithic would have provided little protection against new infectious diseases (Armelagos and Harper, 2005:115), so gene adaptations and evolution of immune system mechanisms would have been necessary. As the population was larger than ever before, there was greater genetic heterogeneity, which resulted in the greater probability of developing novel mutant genes to protect from disease (Armelagos and Dewey, 1970:273). As contact between pathogens and humans increased and continued, the virulence of the pathogens decreased as individuals developed immunity and populations developed resistance (R. Dubos and J. Dubos, 1975; Motulsky, 1960). Population resistance could have occurred relatively quickly, as the rate of gene selection for humans can be as little as 500 years or approximately 25 generations (Kingsolver et al., 2001:253–255). There is evidence that individ-

uals were developing increased immunity to diseases. Unlike a population of hunter-gatherer Natufians (10500–8300 BC, ~200n) from the southern Levant, a population of pre-pottery Neolithic skeletons (8300–5500 BC, ~200n) from the same region had a significantly greater amount of bone lesions, suggesting not only a greater amount of inflammatory disease, but also an immune response to it (Fig. 3) (Eshed et al., 2010:128). Lesions would not have had time to develop if an individual was killed quickly from a disease, and thus they suggest a degree of disease resistance (Wood et al., 1992). As individuals acquired immunity, the population as a whole began to acquire resistance.

The classic genetic examples of adaptation to disease are sickle cell trait, thalassemia, and glucose-6-phosphate dehydrogenase (G6PD) deficiency, which all protect against malaria. Plasmodium infect and reproduce in red blood cells, and each of these genetic mutations alters the environment of the red blood cell, making it unsuitable for pathogen development (Balter, 2005:235; Durham, 1991). However, these traits are usually the most beneficial when a person is heterozygous for them, or has one mutated allele to compliment one normal allele in a homologous chromosome pair. Homozygosity, or two mutated alleles, results in other health issues, such as anaemia and sickle cell disease. Another example of human gene evolution in response to disease is a mutation of the CCR5 gene. Shown to protect against modern-day AIDS, this mutation may have been selected in populations due to its ability to protect from smallpox (Balter, 2005:235). Mutations in MHC molecules, which are involved with the immune system's recognition of pathogens, may have also led to protection from malaria and other infectious diseases (Hill, 2001:2038). The diseases that arose from animal domestication did not only alter human genomes and populations, but also affected the evolutionary history of the animals and disease-causing microbes. For example, taenid worms infecting humans derived from those that had felids and hyenas as definitive hosts and bovids as intermediate hosts (Hoberg et al., 2001:785–786). Phylogenetics demonstrates that after the domestication of animals, close contact with humans resulted in cattle and pigs becoming intermediate hosts of taenid worms (Pearce-Duvet, 2006:376; Schmidt and Roberts, 1989). Furthermore, evidence demonstrates that pathogens may be able to shift rapidly between generalist and specialist strategies when host conditions are in flux due to the rapid generational turnover of microbes (Wolinsky et al., 1996:539). Generalised animal pathogens evolved to become specialised for human hosts when they came into contact with the large, vulnerable human population. Furthermore, as human populations developed resistance, pathogens evolved to combat these resistant genes, resulting in the on-going relationship

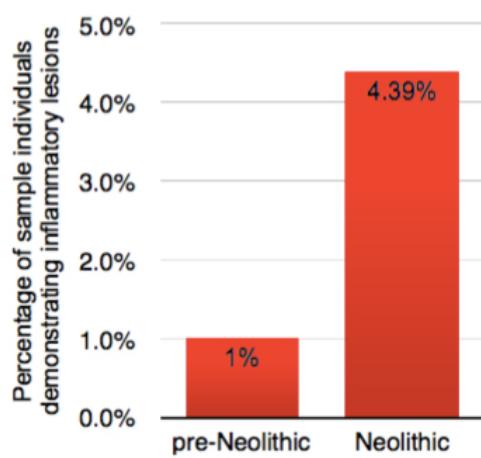


Figure 3: *Prevalence of inflammatory bone lesions in pre-Neolithic and Neolithic populations, by author. Difference is significant (one-tailed Fisher's exact test, df = 1, P = 0.033). Data and calculations sourced from Eshed et al., 2010.*

between human resistance and bacterial anti-resistance. Thus, the domestication of animals resulted in a co-evolutionary dynamic between humans, animals, and pathogens.

Human cultural solutions Adaptive lag is a term in ecology that refers to the time lapse between a change in selection pressure and the evolutionary response that results (Laland and Brown, 2006:98). Cultural niche construction delays adaptive lag by presenting solutions to problems through behavioural modifications. The rise of infectious diseases altered the niche originally created when humans began to domesticate animals, and in turn, humans created cultural solutions for the disease problem. In the archaeological record, sewer systems, wells, and latrines are the most easily identifiable forms of evidence to suggest sanitary measures. The Indian late Neolithic site of Mohenjo-Daro (2500 BC) had an advanced sewage system of covered ducts and drainage canals (Mughal, 2011:121) and there is evidence of drainage systems and primitive “toilets” in the Orkney settlement of Skara Brae (3100–2500 BC) as well (Gordon-Childe and Clarke, 1983). Such evidence suggests that humans had determined the benefits of separating wastes from the living environment.

Although archaeological evidence of other disease solutions from the Neolithic period is scarce, a discussion of solutions later in history may suggest measures taken by the populations first facing infectious disease. As Douglas (1966:3) states, no one can be sure when the ideas of pollution and impurity first developed. There are many laws of sanitation and quarantine in the Bible. In Deuteronomy (23:12-14), it is advised to wash oneself after touching pus or blood and to deposit waste outside of the main living area. Also, quarantine of individuals with leprosy or other skin afflictions is advised (Leviticus, 13:1-59). Perhaps earlier peoples also determined that avoidance of a diseased person or animals may be protective. Overall, it is likely that through observation of the effects of new pathogens, humans began to develop solutions in order to combat or prevent rise and spread of disease.

Conclusion The aim of this paper is to use niche construction theory to explore how animal domestication in Southwest Asia during the Neolithic period brought about a new disease-scape. Niche construction theory emphasizes that organisms can change their environments and co-direct their own and other species' evolution. This differs from conventional co-evolutionary theory, which stresses that the environment changes the organisms, not the other way around. Throughout human history, we have altered our environments to suite our needs, leading to selective pressures that changed the gene pools of both our population and the populations of other species.

Reasons for animal domestication differed between regions and periods. In general, domestication was not spontaneous, but rather the outcome of a series of purposeful decisions regarding environmental management. NCT allowed for a complete analysis of animal domestication as it accounts for both the biological change of domesticated animals and the cultural change that occurred when domesticates became a part of the human environment. The proximity of animals to humans introduced new pathogens into the human population. These pathogens were able to spread due to the growing size of the human population, which had grown due to increased food sources and a sedentary lifestyle. Furthermore, factors such as animal herds having been big enough to host pathogens prior to domestication and poor nutrition accounted for additional vulnerability of human populations during the Neolithic.

The rise of infectious disease in human populations set off a series of co-evolutionary interactions between humans, animal, and microbes. Humans that survived to adulthood may have developed immunity to certain diseases. As the human population was larger than ever

before, greater genetic heterogeneity resulted in the development of population resistance to disease. Furthermore, the genetic landscapes of animals and pathogens were altered as well. Domesticated animals became new intermediary hosts of different pathogens such as taenid worms, and pathogens themselves evolved to infect different hosts or specialised for human hosts. In addition to evolutionary changes, humans attempted to prevent or contain disease through cultural constructs such as various sanitation measures. Figure 1b provides a summary of the argument of this paper, depicting that animal domestication led to the rise of infectious disease, which in turn led to evolutionary and cultural changes in human populations.

NCT brings together both biological phenomena and cultural practice in its explanations of events. Because of this, it would be a valuable tool in explaining various archaeological contexts, as human history is as much a story about the choices of people as it is a story of changing genes and populations. This theory could be used as a foundation to explain other archaeological queries regarding disease throughout time, such as the social and biological effects of the medieval Black Death, the devastation of Native American tribes upon European arrival to the Americas, the 19th century cholera outbreaks, or even the modern-day AIDS pandemic. Humans are still evolving, adapting, and creating new niches, and with every new niche, comes a new set of effects that will alter our genetic and cultural future.

La construcción de nichos es la modificación del ambiente de un organismo que resulta en el cambio evolutivo (biológico) y/o cultural (antropológico) del organismo. En este artículo se explora el aumento de enfermedades patógenas en el Suroeste de Asia durante el Neolítico (~10000 to 4500–2000 a. C.) a través de la perspectiva de la construcción de nichos. Los humanos construyeron un nuevo nicho ecológico cuando domesticaron a los animales, lo cual dio como resultado el aumento y dispersión de varios patógenos mortíferos, debido al incremento de la población humana y la proximidad entre hombres y animales. Para combatir y prevenir la dispersión de enfermedades, los humanos han respondido mediante cambios culturales, como la aplicación de nuevas medidas sanitarias. De igual manera, la población humana también comenzó a evolucionar para contrarrestar las enfermedades, desarrollándose dinámicas co-evolutivas entre seres humanos, animales y patógenos, las cuales continúan presentes en la actualidad.

Abstract (Spanish)

Palabras claves: Construcción de nichos, dinámicas co-evolutivas, domesticación, enfermedades infecciosas, Neolítico

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A Method and an Object: An Art Historical Approach Applied to the 'Memento-Mori' Mosaic from Pompeii, Italy

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Roman objects and art has been a source of fruitful discussion between scholars, and has led to the development of subsequent theories. Traditional research has been influenced for instance by Winckelmann and the Kopienkritik. These theories have been useful in understanding Roman art, but lack an objective approach. In 1939, Erwin Panofsky published his book Studies in Iconology. He introduced a three-levelled approach for structured iconographical analyses of Renaissance art. This article investigates the application of Panofsky's three-levelled approach to a Roman Memento-Mori mosaic to see whether it is useful for understanding archaeological objects. The aim is to develop a multidisciplinary, contextualised visual analysis of the object with a crossover of techniques between archaeology and art history, in order to assess its suitability for the interpretation of past material culture

Keywords: Erwin Panofsky, Pompeii, Mosaic, Memento Mori, Roman art, Iconography, Iconology.

ART has played an important role in the development of archaeology as a discipline, because many items of material culture have been preserved and recovered due to their aesthetic qualities. The associations with the term art are various and depend on cultural backgrounds, different ages, and critical attitudes (La Rocca, 2010:309–310). Objects don't have a single meaning fixed in a moment of time. The interpretation of the viewer would have been influenced by the intellectual, social, and political background, especially in the absence of explanatory texts as is now practiced in most museums (Rose, 2010:49). By exploring archaeological objects through iconographical analysis, it is possible to obtain new insights in the worldviews of ancient societies. In 1939, Erwin Panofsky published his book Studies in Iconology. Even though this book was written for Renaissance period art, its approach remains applicable across periods, an approach focused on the intrinsic meaning of art. In this

Abstract
(in Italian see below)

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study, Panofsky defined a distinction between meaning and form by a three-levelled approach, applying it to Renaissance period art.

The meaning of objects are subject to reinterpretation by new generations of scholars, as argued by Rose (2010:71), to be discussed in this paper. The paper focuses on the utility of Panofsky's approach for interpreting Roman objects. Is this approach helpful for understanding the iconography of a Roman object? To find the answer, this method will be applied to the 'Memento Mori' mosaic from Pompeii, Italy. The case study that has been chosen is a complicated piece with many different elements. Even though Panofsky's approach is an older method, it could still prove to be relevant for iconographical analysis. In this article I briefly introduce the relationship between art and archaeology, followed by an explanation of how Panofsky's method works and how it could be applied. I then present the analysis of the case study, described in several sections, each one discussing a different part of the 'Memento Mori' (reminders of death) mosaic. Finally, I conclude with a discussion on the applicability of the approach to the interpretation of art objects.

History of Visual Culture in Art and Archaeology

Before Panofsky's method can be applied to the case study used in this paper, it is important to mention other influential approaches to visual culture in archaeology. This is done in order to demonstrate the difference Panofsky's approach. Generally, scholars refer to Winckelmann as the 'father' of art history. He published his book *Geschichte der Kunst des Alterthums* ('*History of Art of Antiquity*') in 1764, containing a chronological schema for plotting the development of ancient art, and identifying four main stages within this schema (Beard and Henderson, 2001:68–69). These four periods are the 'Older Style', 'High Style', 'Beautiful Style', and the 'Style of the Imitators'. According to Beard and Henderson (2001) it is possible to trace back all art history to Winckelmann's basic schema.

The Kopienkritik theory, practiced since the nineteenth century, labelled Roman art as "free" copies of lost Greek originals. German scholars, led by Heinrich Brunn, tried to reconstruct the lost Greek originals by comparing photographs with the existing sculptural copies. The Kopienkritik theory is mainly based on statues, but might have also influenced the interpretation of other art forms within the Roman context (Perry, 2005; Gazda, 2002:4–6). This approach was followed by the Idealplastik theory, introduced by German scholars in the 1970's. Thereafter, the three forms - interpretation, imitation, and emulation - made their appearance. These were followed by postmodern reformulations from the 1980's onwards (Gazda, 2002:7–9). There is a heated debate amongst scholars around the originality of the Roman artistic culture (La Rocca, 2010). Roman art seems to be derived from the supreme Greek counterpart. It is also argued that Roman art lacks any coherent line of evolution, and that it has strongly been influenced by geographic inflection, so much so that it does not consist of an autonomous artistic language (La Rocca, 2010:344–345). According to Perry (2005), there are three aesthetic concepts that apply to and influence Roman art. The first concept is decorum, which required that works of art be bespoke to their specific contexts. This could be in an architectural, social, or thematic way. Decorum is contrary to the Kopienkritik theory, as the resulting pieces of art comprise a much more varied corpus than exact copies could provide. This then suggests that the Roman understanding of artistic imitation is different. The next concept is the aesthetic of eclecticism, which allowed an artist to introduce a new innovative idea to fit in the tradition of decorum. The last concept, phantasia, represents the artistic visualisation. The representations of gods and heroes were not produced by 'copying' another artwork, but by the reproduction of a vision that the artist had in mind (Perry, 2005).

Notably, there is much debate regarding these theories with an ongoing search for alternative theories (Gazda, 2002:16).

In this article I explore the applicability of Panofsky's approach to Roman objects. This three-levelled method by Panofsky (1939) for an iconological analysis is divided in the following sections: The first level is to determine the primary or natural subject matter. This level deals with the identification of pure forms, such as lines and colours, or natural objects, such as humans, animals, and plants. A description for these forms, is the world of artistic motifs, and the enumeration of these motifs would be a pre-iconographical description of the object. The second level consists of the interpretation of the motifs, and is also referred to as the conventional level. What do the motifs, or combinations of motifs, represent? According to Panofsky, there is a connection with themes or concepts and how they are manifested in images, stories, and allegories. Within this level the step has been made to go from a pre-iconographical description to an iconographical analysis (Panofsky, 1939:5–7). The final level is the intrinsic meaning or content. At this level, analysis focuses on the interpretation of the object, to come to an iconography, or a deeper sense of understanding in regard to the art object. According to Panofsky (Panofsky, 1939), this is only possible if the first and second level are executed correctly.

Although it seems that there are three independent levels in this method, in the end they merge into each other, a dynamic process allowing the interpretation of the work as a whole (Panofsky, 1939:17). With this approach, Panofsky developed a method to study art on a more objective level, as interpretation is often strongly influenced by cultural backgrounds. Panofsky was also honoured for this approach by other scholars, for instance Lavin, who argued that Panofsky's ideas were innovative and novel. Panofsky in the world of art history, created a space for a humanistic discipline (Lavin, 1995:6). As Lavin (1995) statement reveals, Panofsky's approach was relevant beyond art of the Renaissance period. From an archaeological point of view, there is a problem in applying Panofsky's approach to the study of objects. The approach can give scholars an insight into the iconography, but it does not yield information about the context or how objects were used or experienced. For archaeologists the context information is just as important as the meaning of the object. However, these two aspects can at times complement as well as explain the other. Panofsky's method takes a different perspective on the understanding of art in general, and therefore can also provide archaeologists with a different perspective on Classical art. In the following section I apply this method to a Roman object, in order assess whether the method can contribute to a better understanding of the iconography, and the meaning of the piece.

The 'Memento Mori' mosaic (Fig. 1) was excavated in 1874 in Pompeii. It was found in the Conceria (I 5, 2 room H) where the mosaic was placed in the summer triclinium, as a table adornment, with open walls to the peristyle. This house was part of a tannery, but there is evidence that the house dates to an earlier phase than the tannery itself (Baldassarre and al., 1990:185) or (Mau, 1874:273). The size of the mosaic is 41×47 cm, meaning it is small but very delicate. It is made of cuboid tesserae and set in mortar. For preservation it has been taken to the Museo archeologico Nazionale di Napoli where it has been dated between 40 AD and 60 AD (Sogliano, 1874:9). The dining room or triclinium was named after the three rectangular couches, which were located around the sides of the room. Dinners were important in Roman social life. Dinners, as an event, were not only for the meeting of friends, but were also important for creating political alliances and as a display of status (Ellis, 1991:119). Accord-

Iconology by Panofsky

Case Study



Figure 1: *Memento Mori* mosaic, in the Museo archeologico Nazionale di Napoli (Creative Commons License)

ing to Kondoleon (1991:105–106) it is possible to reconstruct the cultural context of mosaics based on their themes, arrangements, and their placements within the Roman house. This mosaic belongs to the so called emblemata, which were primarily placed in triclinia, peristyles, and gardens. They were carefully positioned to attract the attention of guests as centrepieces (Stewart, 2004:97).

The domestic display of widely known cultural motifs was a privilege and a duty. The message of this decoration depended on the realistic portrayal of these events, and at times, revealed facets of Roman social matters. The compositions of mosaics became codified in time. Artists had to rely on their vision for the execution of the artwork, but their perception and creation could have been influenced by what they witnessed, such as funerals executed as spectacles or festivals. Especially funerals of a grand scale, which often contained an element of entertainment, where the audience was not only present to show their last respects, but also to be impressed and inspired (Kondoleon, 1991:112; Hope, 2009:89). The Roman calendar contained several festivals dedicated to the cult of the dead. An example is the Parentalia, a festival that took place in February and was dedicated to the commemoration of the ancestors. Other festivals are the Rosalia and Lemuria (Erasto, 2012:123–124). The cult of the dead was part of Roman life. Panofsky (1939) mentions that, although there are different levels in his method, they become entangled, allowing the analyst to interpret the object as a whole. To make a clear visual analysis the object has been divided in four segments: the first segment, dominated by the head of the triangle; the second segments, the area dominated by the forms supporting the triangle on either side; the third segment, the central area dominated by the skull; and the fourth segment, the area under the skull. The first and second level of these segments is discussed in the next section. In the end of this paper the final interpretation, or as is mentioned by Panofsky as intrinsic meaning, of all the segments will be given. The different figures of the mosaic are portrayed on a background with several shades of blue and surrounded with a black line. At the bottom there are yellowish shadows visible. The artist of the mosaic creates depth by the use of colours.

The first segment is visible at the top where a triangle is made out of two beams with a supporting beam in-between, with metal cappings and bolts visible. This triangle is supported on the right and left side. There is a line hanging from the middle of the triangle. This triangle represents a libella, which is a craftsman's tool. This is one of the oldest technical measuring instruments, and known to be used by the Egyptians. The carpenter's square, is a present version of this tool. When the libella was used in combination with a plumb line the craftsman was able to draw straight lines and perpendiculars (Cuomo, 2007:84). Instead of hanging a piece of lead from the plumb line, there is a skull hanging from the carpenter's square.

The second segment contains two elements, one on the left and one to the right, each supporting the triangle. The left side of the mosaic is damaged, but much of it is still visible. The left part, supporting the triangle, is a pole with diagonal stripes. Extra decoration is visible around this pole. At the top it looks like a white ribbon and at the bottom a reddish purple, most likely purpura, fabric are tied together with a strap or rope. On the right side, where the triangle is also supported, it looks like a wooden branch rather than a pole. It is decorated with something brown hanging from the branch, this might represent a bag. There is also yellow fabric hanging from the branch, and it looks damaged or torn. It seems that both these fabrics are tied together like dresses. The purpura fabric is draped in the shape of a dress around a sceptre. The damaged part of the mosaic with the white ribbon is interpreted by scholars as a

Visual Analysis: First and Second Level

crown. The purpure dress, sceptre, and crown together represent the rich and noble people. On the right side the libella is supported by a stick, travelling cloak and satchel. This side represents the poor people. Both sides represent the worldly goods which are taken away by death (Cuomo, 2007:99–100; Sogliano, 1874:9).

The third segment is visible in the centre of the mosaic. The line from the triangle is connected with this round, white with black object which is a skull. This skull is not true to nature in representing a human skull, and is possibly crafted after the skull of a monkey or other cranially-similar animal. However, the whole composition of the mosaic deals with a human aspect, so it is most likely that the skull represents a human skull and visualises death (Cuomo, 2007:99). The afterlife was important in the Roman worldview. The disposal of the body had to be done in the right way following strict rituals, otherwise the soul of the departed would not achieve rest. Cremation became the dominant rite in the 1st century BC until the 2nd century AD. A reason for this trend, as suggested by ancient commentators, is that people feared that non-cremated bodies might be exhumed or abused (Hope, 2009:80–82). This mosaic was made mid-1st century BC, so therefore, it was unlikely that the skull depiction was modelled after a real human skull, as there were no human skull available due to cremation trends at this time.

The fourth segment, at the bottom of the mosaic, depicts two figures. There is a round object, which could represent a wheel. On top of this object there are two brightly ellipse forms with a white connection. This could be the representation of a butterfly or a dragonfly. However, it is more likely that this is a depiction of a wheel and a butterfly. In the Roman world the butterfly was a representation for the sensitive soul who left the earth (Sogliano, 1874:9). The wheel means the wheel of fortune (Cuomo, 2007:99).

Visual Analysis: Third Level This mosaic is part of the Roman worldview on death. The *Carpe Diem* or ‘Seize the Day’ and Final Interpretation theme took a central place in the Roman society. Death and feasting were closely connected to the rite of passage. This association is visible in the ‘Memento Mori’ mosaic and the context in which it was found. However, there are also other examples, for instance the silver cups with dancing skeletons from Villa Boscoreale. Another example, from Pompeii, is a black and white mosaic from the House of the Faun, which depicts a skeleton carrying wine jugs, dated to the 1st century AD. This type of imagery should not be seen in a sombre or serious way. The depictions carry a certain playfulness, in which the imagery suggests an acceptance of death (Hope, 2009:25–27, 85–87). It may also be the case that these objects were not used in a ritual manner. Rather it can be seen as a hymn to life, and the incorporation of death in daily life. Even though death and feasting have a strong connection, it does not mean the ‘Memento Mori’ must have served a funerary purpose.

Hope (2009) also mentions that the afterlife for the Romans was important; although, there was not a consensus about what it looked like, how to reach it, and what was exactly important about it. This makes the ‘Memento Mori’ mosaic an opinion on death, and what was important for the afterlife. The piece shows the rich and the poor are equal in death. At this point social status was no longer important. It appears that one’s soul and fortune are the most important, because they are connected with the skull and hanging from the plumb line. It might even be possible that one’s soul and luck balance out what kind of afterlife one can receive. The Roman worldview on death can also be seen in a larger context: the cult of the dead. Drinking and eating was part of the rituals around funerals. There were food offerings for the dead, but also banquets after funerals to honour the dead and celebrate life (Erasmo, 2012:121–

123). Although these rituals were important to the Romans, it does not seem that there was a connection between this mosaic and funerary rituals because of the context in which it was found. The eat-and-drink theme was a common imagery at funerary monuments in the 1st century AD, but these were almost never depicted with decaying bodies or skeletons. The image of the deceased shows them alive, non-skeletal and sometimes reclining as if at a feast (Hope, 2009:38).

The imagery of the ‘Memento Mori’ mosaic is not unique, as mentioned by Cuomo (2007:99–100). In the area of Campania a bronze weight from a steelyard was found dating from the same period as the mosaic. This weight is in the shape of a skull with a butterfly on top. Because there are more objects with the same visual depictions it is more likely that this combination of features had a special role in Roman society and their worldview at this time. This is also supported by Perry (2005) who argues that decorum explains the repeated use of certain visual concepts in Roman art.

The context of the ‘Memento Mori’ mosaic is well known as it was a table adornment in a triclinium in a house in Pompeii. It was dated by the Museo archeologico Nazionale di Napoli to between 40 AD and 60 AD. This case study shows that it is possible to use the three-levelled approach of Panofsky (1939) in an iconographic analysis of a Roman archaeological object. The ‘Memento Mori’ is a small piece, but it contains elements with intrinsic meaning. The mosaic is a vision on death; the rich and the poor are equal, the soul is leaving the ‘sphere of life’, and the wheel represents fate. A likely scenario is that it served as a part of the Carpe Diem worldview as suggested by Hope (2009). To come to this content it is useful to follow the levels offered by Panofsky. In the case of a simpler piece, it might not be necessary to use this method. Panofsky’s approach can assist in the analysis of more complex object pieces; but because of the exclusion of the context, it cannot give all the answers for archaeologists. However, this method can give guidance within analysis, to overcome the bias between 21st century thinking and that of the time the object is produced. This approach can connect the structure (worldview) of an ancient society to an expression of that worldview in the form of an object. The interaction between the object and viewer might be reached by following the levels, in order to come to meaning.

Why the mosaic was placed on a dining table remains unclear. The visual meaning of the mosaic is explainable through Panofsky’s method, but it does reveal anything about why it was placed in this particular context. This problem was already suggested in section three and in this case study the iconography cannot explain the context. Do we actually know that it was used as a dining table or is it just an assumption based on what others have already interpreted? The meaning of an object in its context is equally important to iconographical detail, because context can change the meaning. Perhaps, the answer can be found in a combination of an object-centred approach to agency and how it affects human actions as argued by Gosden (2005:196–197). Gosden mentions that the crucial context for an object, is the presence of other objects of the same style. Maybe a future study with comparable objects, for instance, the silver cups from Villa Boscoreale, can give an answer on the combination of context and meaning of an object. It is important to explore archaeological objects through iconographical analysis, as they can give new insights into ancient societies’ worldviews. Iconographical analysis is often strongly influenced by the social and cultural background of the executor, which creates an extra bias. Through this three-levelled method, objects can be interpreted in an impartial way. It has to be taken into account that an object is the opinion of a craftsman or a

Discussion and Conclusion

client and it does not have to represent a general idea. Archaeologists work with objects in context, and the combination of this context and the interpretation of the visual culture are paramount for a better understanding. Panofsky's method can be used well for the iconographical analysis of an object, but cannot tell archaeologists anything about context. Therefore, a misleading interpretation could be made, if only Panofsky's method is used for the analysis of archaeological objects. A multidisciplinary approach, combining Panofsky's approach with the contextual information derived from archaeological analysis will greatly benefit the analysis of archaeological objects.

* * *

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Abstract (Italian) L'arte e gli oggetti romani sono stati fonte di produttiva discussione tra gli accademici, e questo ha portato allo sviluppo di successive teorie in merito. La ricerca tradizionale è stata influenzata, per esempio, da Winckelmann e dalla Kopienkritik. Queste teorie sono state utili nel comprendere l'arte romana, mancando però di un approccio oggettivo. Nel 1939 Erwin Panofsky ha pubblicato il volume *Studies in Iconology* introducendo un approccio a tre livelli per l'analisi delle strutture iconografiche dell'arte Rinascimentale. Questo articolo esamina l'applicazione dell'approccio a tre livelli di Panofsky al mosaico romano *Memento-Mori* al fine di evidenziare se esiste una sua utilità nel comprendere le evidenze archeologiche. Lo scopo è quello di sviluppare una analisi visuale, multidisciplinare, contestualizzata dell'oggetto in esame utilizzando tecniche pertinenti e all'ambito archeologico e all'ambito della storia dell'arte, al fine di evidenziare la sua compatibilità per l'interpretazione della cultura materiale del passato.

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A Case for Hybridity

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In this paper, I explore the use of hybridity as a concept in archaeology and anthropology, specifically drawing on Homi Bhabha's formulations. Through examining different discourses on the subject, I analyse how authors have used or misused this term. I then deconstruct what Bhabha means by hybridity and argue that hybridity is still a very relevant and necessary concept because of the ways in which it affects people's lives today. I discuss examples of contexts in which hybridity is more apparent and where putting the term to use would prove useful. Finally, I conclude the paper with an answer to the question, "Is it time to move away from hybridity?"

Keywords: hybridity, colonialism, Homi Bhabha, third space, mimicry, cultural affiliation, NAG-PRA.

THE concept of hybridity has a long and complex history. It began as a negative reference to the biological mixing of humans, but today, redefined by postcolonial theorist Homi Bhabha, hybridity is a complex and powerful term that, if used as intended by Bhabha, could change the ways in which individuals view and interact with each other. In order to demonstrate that this concept is worth closer examination, I discuss the criticisms surrounding Bhabha's use of this approach. To further explain the complexity of hybridity, I analyse the different ways in which authors have misused the term and then demonstrate some of the contexts in which hybridity is more obvious. The emphasis on the word 'more' is important because, as this paper argues, hybridity is a constant process that is always in motion.

By understanding the important contexts that have significant political and social ramifications for individuals today, the reader will be able to see the impact the use of hybridity could have. In a recent paper, Silliman (2014) suggested it might be time to move away from the notion of 'hybridity'. I will conclude this article with an answer to Silliman's question of whether or not the concept of 'hybridity' should be abandoned.

Most commonly, as borrowed from biology, hybridity is defined as a mixture of two or more essential entities that produce a new product. Hybridity as Homi Bhabha discusses it is much more complex and nuanced. However, his writings are often inaccessible and difficult to decipher, perhaps leading to unintended interpretations of his theory. While Bhabha discusses

Abstract

Discourse on Hybridity

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hybridity in specifically colonial encounters, his concept can be applied to many and perhaps all anthropological and archaeological contexts. Authors that use hybridity usually do not approach it as a process, but instead focus on the points of origins of the new hybrid subject (Deagan, 2013:267). That is, they essentialise cultures or pick out the strands of each culture that may be associated with the new product. In doing so, these authors are further promoting the idea of ‘original’ and ‘pure’ entities that somehow mixed together and created something new, a hybrid. The problem with this is that hybrids are made up of already hybrid antecedents because, as I further argue, it is impossible to access an antecedent to hybridity.

Some authors interpret the interactions that went into creating the hybrid as reflective of social choices (Deagan, 2013) and (Silliman, 2009). While in many cases this may be true, hybridisation is not always a choice but rather an unintended but inevitable outcome of cultural encounters and continual cultural reproduction. For example, Kathleen Deagan, in her chapter “Hybridity, Identity, and Archaeological Practice,” treats the Catholic and Native elements present in a Muchik burial found at Morrope, in the Lambayeque province of Peru, as discrete entities (Deagan, 2013:267). She does not incorporate these two cultural traditions into the larger scale of a long-term process, reinforcing the notion that cultures are pure, discrete entities. In doing so, she does not take into account the complex histories of change within cultures. It is important to recognise that all cultures are constantly undergoing change and that no culture has remained the same since its inception. Furthermore, Deagan does not cite Bhabha. If one is going to use “hybridity,” one needs also to understand how it has evolved in the framework of postcolonial theory. The term hybrid has a different connotation today than it did when it was first employed in colonial and racial contexts. While the concept cannot escape the loaded baggage of its history, Bhabha’s reformulation makes the process of hybridisation central to postcolonial theory situations.

Stephen Silliman has suggested that archaeologists study hybrid objects in the short term in keeping with traditional archaeological training (Silliman, 2014). Since hybridisation is a constant process with no beginning or end, preparing archaeologists to understand and interpret change at sites over the long-term would prove useful (Lightfoot, 1995). This would mean archaeologists need to examine a site, not just at a single period, but contextualised within a larger temporal framework. Accepting that hybridisation is a process that has always existed and will continue to exist is critical to changing perspectives on the concept of “culture.”

In his most recent article, Silliman restates that hybridity deserves a requiem since it is “poised to ultimately fail as anything truly useful for archaeologists” (Silliman, 2015:14). He argues that the concept fails to recognise “cultural trajectories” by creating “durable hybrids” (Silliman, 2015:14). With this phrase, Silliman sums up the issues with academic uses of hybridity. However, it is not necessarily the term that is at fault, but rather the ways in which scholars have put it to use. Silliman does not seem to consider the impressive potential of the concept when utilised as Bhabha intends it because he is overthinking hybridity and looking for an end point rather than seeing hybridity as an ongoing process. Just as there is no beginning, there is no end. The hybrid may “well be a function of our own over-wrought classification schemes” (Silliman, 2015:14) because, as he himself notes, there is an “overreliance on origins instead of practices” (Silliman, 2015:8) and a desire to fix time in a continuing process of change. If used as Bhabha conceptualises it, hybridity could act as a general framework for understanding cultural change and for undermining power structures based on the imaginary and damaging idea of cultural purity. It is not a method of classification, but rather a notion of processual change.

Silliman states, “if everything ends up being hybridity, then it is unlikely that the term or concept will have any use to archaeology” (Silliman, 2013:489). Silliman (2015) raises questions such as: What is not a hybrid?, Is hybridity a quality or a state?, and When does something stop being a hybrid? While these questions are important to consider with respect to hybridity, the term does not necessarily become irrelevant to archaeological contexts because of the lack of an answer. Understanding that all cultures are products of entangled cultural interactions is critical to re-interpreting views that there are no “pure” antecedents” (Silliman, 2013:489). Bhabha’s notion of hybridity can set up a framework for interpreting archaeological sites in a more processual way. Incorporating the notion that a culture is a combination of many factors could prove beneficial to archaeologists because it would eliminate possible essentialising interpretations. Essentialising cultures proves to be problematic because it “reduce[s] complex heterogeneous structures to a supposed inner truth or essence” (Liebmann, 2008:73).

When discussing Bhabha’s hybridity, the notion of mimicry is often explained as being a physical outcome of the concept of hybridity. Mimicry is the “desire for a reformed, recognisable Other” (Bhabha, 1994:122), often in a colonial context. The colonised subject looks and acts the same as the colonisers, yet there is something fundamentally different that will never fully permit them to fit; they are “the same, but not quite” (Bhabha, 1994:122).

In her book *Imperial Leather: Race, Gender, and Sexuality in the Colonial Conquest*, McClintock discusses different colonial relations and their effects on individuals. In one section, McClintock critiques both Luce Irigaray’s writings on gender mimicry and Bhabha’s ideas on colonial ambivalence. She argues that both are somewhat limited in their discussions of each topic. Irigaray, for example, writes, “...women learn to mimic femininity as a social mask” (McClintock, 1995:62). McClintock believes that in the process of her discussion, Irigaray reinforces the gender binaries she is attempting to break down. Additionally, McClintock claims that Irigaray neglects to analyse the way in which men themselves strategically use gender masquerade. She goes on to criticise Bhabha, saying he focuses only on mimicry with respect to men and fails to adequately explore the gendered interactions of mimicry (McClintock, 1995:62). McClintock’s approach to hybridity reflects the belief that you cannot separate race, class, and gender because they are already irreducibly hybrid and intersectional. An anthropological focus exclusively on race would risk becoming an essentialist approach which, as McClintock (1995:62) points out, is the opposite of Bhabha’s conceptualisation of hybridity. McClintock’s incorporation of gender and class factors into hybridity arguably breaks down essentialist views of individuals in favour of a more nuanced approach. Bhabha, in fact, does not pay much attention to these components. However, Bhabha’s concept of hybridity is designed to serve as a general, holistic approach to human interaction that is not divided into categories of race, class and gender (Bhabha, 1994). He is not essentialising because he does not discuss gender and class; instead, he is setting up a broad framework within which scholars can work by focusing on cultural encounters in general and dealing with culture as a whole. This framework is one where the notion of hybridity is commonly accepted and incorporated into cultural perspectives on a daily basis.

Hybridity, as used in postcolonial theory, is much different than its use in the colonial era. Robert Young, for example, discusses the history of the term in Colonial Desire, arguing that within the colonial context, the term hybridity was strongly tied to the biological interbreeding of cultures (Young, 1995:6). During this era, different races were often considered to be differ-

ent species with their own cultures and customs, leading to colonial anxieties concerning the intermixing of species and what that would do to the ‘pure’ white race (Young, 1995:6). Authors speculated about what would become of the mixed offspring—Could they reproduce? Would they degrade through time (Young, 1995:8)? The idea of pure races continued into the twentieth century with the writing of Mein Kampf, perhaps the culmination of racial ignorance (Young, 1995:8). With such a tumultuous history, it is understandable why authors would decide not to use the term. However, Bhabha’s re-structuration of the concept is important in its development towards the state it is in today.

Hybridity and Bhabha’s notion of hybridity is indeed complex, and he writes about it in messy and complicated ways. The hybrid is unquestionably created from cultural interactions and other cultural dynamics that are not always reflective of power relations. According to Bhabha, when one culture dominates another, a space of translation, or “third space,” opens up (Bhabha, 1994:53). The hybrid emerges in this space. The concept of a third space is useful in conceptualising the hybrid because it reinforces that the hybrid is entirely different from either of its constituents and therefore must be discussed from a new perspective. Bhabha postulates that a hybrid is “neither one nor the other” (Bhabha, 1994:49), meaning that once the hybrid is created, it can no longer be described in terms of the cultures from which it originated. It is something entirely new. For this reason, Bhabha emphasises studying the hybrid in terms of how it functions in this new space instead of focusing on its origins. Moving away from focusing on the contributors to the hybrid attempts to move past the essentialisation of what cannot be essential entities: namely culture, identity, and practice.

Deconstructing essentialist attitudes is the foundation of hybridity. Essentialism, or viewing something as pure and unchanging, is virtually impossible in terms of culture because “there is nothing essential or stable about cultural, ethnic, or natural traditions” (Voss and Allen, 2008:5). Since the intermixing and changing of a culture is constant, argues Bhabha, there can be no essential, static culture (Bhabha, 1994:52). Recognising that hybridisation is a continual process that is always operating will aid in rectifying the ways in which scholarly analysis homogenises cultural groups. Employing hybridity can help to elucidate the subtle differences between groups. Bhabha explains that the third space “displaces histories that constitute it and sets up new structures of authority” (Rutherford, 1990:211). Bhabha focuses on what emerges from the hybrid space as opposed to what went into creating the hybrid. It seems as though the hybrid has been stigmatised in the past because of “the intervention of otherness” (Rutherford, 1990:211), in which the hybrid is often fetishised and viewed negatively, leading to domination and exploitation. The concept of Bhabha’s hybridity is basic but, at the same time, complex in its nuances. In 1998, based on an essay that contained convoluted sentences, Bhabha was awarded second place in the Bad Writing Contest created by the journal Philosophy and Literature, which placed his work under the category of “demanding” (Smith, 1999). In “When Ideas Get Lost in Bad Writing”, New York Times writer Dinitia Smith proposed that perhaps scholars are “making themselves irrelevant” by using incomprehensible language and sentence structure in their writing. Admittedly, it takes multiple read-throughs to understand Bhabha, which may deter some from reading his work entirely. He could be more straightforward in his presentation of challenging topics.

Defending his work, Bhabha explained in an interview that the parts of his work that are harder to understand are those in which he is “trying to think in a futuristic kind of way” (Mitchell, 1995:82). He admitted that his writing is worse when he has not completely worked

through an idea and is looking to spark a discussion. While this is an interesting deconstruction of traditional academic writing styles, his ideas get lost in the translation and interpretation of his work. Bhabha also addressed the interpretation of his work. His assertions are not supposed to be simply accepted and followed exactly. Instead, he produces “theoretical work [that] should in the fullest sense be open to translation” (Mitchell, 1995:82). However, while individuals should be allowed to interpret his work freely, Bhabha has a responsibility to his readers to write more clearly, particularly given the potential usefulness of his ideas. Hybridity is not just a theoretical idea; the identification of a hybrid has real political and social repercussions today, as I discuss. As academics use the term ‘hybrid’ in their writings, these consequences must be at the forefront of their minds. At the same time, using Bhabha’s notion of hybridity will only be beneficial if people understand that it is not just some people that are hybrid, but all.

As Bhabha (1994:52) argues, hybridity is a constant, never-ending process. But while it may be omnipresent, there are places where it is more apparent and, because of its political and social implications, where people are forced to engage with it, particularly in contexts where the hybrid has the potential to threaten the dominant culture with ambivalence and the ability to have feet in multiple worlds (Anzaldúa, 1987:77). Those identifying as hybrid create anxiety even today because they defy the traditional ideas of imposed, discrete categories.

The space of translation becomes more obvious when exchanges of power are involved. Conversion of Indians was an important goal of the British colonial project in India (Bhabha, 1994). While some Indians complied with many of the British missionaries’ teachings and converted to Christianity, it was a new type of Christianity, one with Indian conditions. They refused to take the sacrament and questioned, “How can the word of God come from the flesh-eating mouths of the English?” (Bhabha, 1994:166). In this case, Bhabha argues, the Indians were using their “powers of hybridity” (Bhabha, 1994:167) to maintain their religious ideologies in modified form. In this space, power relations become strained, creating an immense amount of anxiety amongst the colonisers. This is where mimicry becomes more apparent. Bhabha often views mimicry as having the power of subversion. The “mimic man”, as he calls it, can serve as a “class of interpreters” (Bhabha, 1994:124) between the colonised and the colonisers because they inhabit both worlds. In this third space, mimic men are a destabilising force that provokes anxiety on the part of the colonisers. The power of the hybrid is demonstrated here: the native population knows the British want them to become Christian, but however willing the natives are to accept this change, there are some beliefs they cannot give up. Their power of negotiation can be seen as a subversive act towards the coloniser.

In *Borderlands: La Frontera*, Gloria Anzaldúa presents the border between Mexico and Texas as a liminal zone where there are political ramifications for hybridity. Anzaldúa poetically and personally describes these borderlands as “the lifeblood of two worlds merging to form a third country” (Anzaldúa, 1987:3). This ‘third country’, similar to Bhabha’s third space, is where the hybrid emerges, along with the conflicts surrounding the feared power of the hybrid. The anxieties of the dominant group, in this case white America, become tangible as the border between Texas and Mexico becomes a literal warzone (Anzaldúa, 1987:11) where people have to fight to survive. The ways in which American corporations interact with people living in these border towns contribute to the confusion surrounding their existence.

Anzaldúa’s book provides insights into what it means to identify as hybrid today. She brings to life Bhabha’s notion of the third space and its importance. Hybridity is not just a theory;

it is a reality. Power relations are the key factors in these borderlands. Because white America does not have to fight to survive in these illegitimate places, this culture is less concerned about what happens within them. Since “the only ‘legitimate’ inhabitants are those in power, the whites and those who align themselves with whites,” (Anzaldúa, 1987:3-4), this creates difficulties for the hybrid population regarding questions of identity. Bhabha’s hybrid theory aids in understanding the realities of daily life for the hybrid population. The cultural practices that emerge from this space cannot be traditionally categorised because they are something entirely different, enabling people to adapt to in-between situations. Acknowledging this will prove to be more effective in understanding the new hybrid culture rather than trying to pick out the antecedent cultures that contributed to it. How the hybrid functions in the future is what matters. In the case of the Mexico-Texas borderlands, the people who identify as hybrids are stuck between acceptance in their own group and rejection in the greater America. Anzaldúa’s book is thus useful in grounding the theory of hybridity in actual reality.

The mestizaje population, or the individuals that identify as descendants of Natives, Spanish, and Mexicans (Anzaldúa, 1987:5), may be widely acknowledged as existing, but since they are not American citizens, they have no legal or human rights in the context of the United States. It is because they have no rights that they are brutally taken advantage of. Major corporations exploit workers for long hours, minimal pay, and no benefits (Anzaldúa, 1987:12). Women are sexually assaulted, but, as with most of the other workers, they cannot speak English and therefore cannot look for help (Anzaldúa, 1987). Mostly, these abuses go undocumented (Anzaldúa, 1987).

Anzaldúa’s call for more mediators (Anzaldúa, 1987:78) is exactly right. But while she is looking for ways to remedy the exploitation of those living in the third space, she is herself making it exclusive. As a queer female of mixed-race, she can “walk out of one culture and into another” (Anzaldúa, 1987:77), which allows her to relate to multiple cultures. But what does that mean for the rest of us who feel this issue is of the utmost importance and, while we may not have experienced it first-hand, want to fix the current situation? That being said, Anzaldúa highlights an important area that most of America is familiar with but does not have to deal with, where people easily fall through the cracks. This is where hybridity will lead to “a massive uprooting of dualistic thinking” (Anzaldúa, 1987:80), thus changing the core way we view others. In this context, the concept of hybridity would have to be understood by the larger dominant population in order to benefit the marginalised population. Ideally, if the greater part of America utilised the notion of hybridisation, the lives of those inhabiting the borderlands would radically change.

The Real Effects Hybridity Has Today Whether called ‘hybridity’ or not, this idea plays an active role in people’s lives. While hybridisation has been a constant product of cultures encountering and interacting with one another, it has not always been unintentional. Active hybridisation was a tool used by colonists in the hopes of resetting the population to its default of Spanish or white (Warren, 1998:42). By intermixing with indigenous people, the Spanish thought they could dilute or eliminate authentic indigenous cultural customs in favour of Spanish practices. As natives became biologically less ‘native,’ it was thought they would simultaneously become more culturally Spanish.

Today, authenticity is a key factor governments use to determine the legitimacy of an indigenous group. To be seen as authentic, groups are forced to conform to traditional and often obsolete standards of what it means to be indigenous. Designating a group as ‘hybrid’

and therefore ‘untraditional’ or ‘inauthentic’ may result in a denial of rights. When hybrid becomes synonymous with inauthentic, it can be detrimental to native groups because they then, by definition, lack the continuity said to be a requirement of indigeneity. Some scholars avoid the term hybrid for this reason. Here, Bhabha’s notion of hybridity as a universal process becomes powerful because it helps break down notions of authenticity and purity. No group has stayed the same throughout time because all groups are hybrid and continuing to hybridise.

Matthew Liebmann uses hybridity to address identities today as he works with resolving issues of repatriation. The Native American Graves Protection and Repatriation Act manages the repatriation of human remains, sacred objects, and cultural patrimony of objects to Native Americans in the United States. Repatriation can only occur if a tribe is recognised by the federal government and demonstrates a cultural affiliation with the items (Liebmann, 2008:74). Cultural affiliation is defined as “a relationship of shared group identity which can be reasonably traced historically or prehistorically” between a present day Native group and an earlier group (Liebmann, 2008:75). This is a double edged-sword for indigenous identity. If a group admits they have changed in the past five centuries, they are denied recognition because they are not authentic. If they assert they have not changed, then the group is playing into the dominant group’s socially constructed notions of what it means to be Native, succumbing to yet another instance in which the “colonisers fix an identity to the colonised” (Anzaldúa, 1987:77). Forcing Native Americans to legitimise their existence in terms of what the dominant culture defines as indigenous is a double standard and demonstrates a lack of understanding of cultural change. The dominant culture’s demand that modern indigenous people portray themselves as unchanged before the arrival of the Spanish revitalises historical stereotypes. With the arrival of the Spanish, Native culture changed forever and became irreversibly less Native. Bhabha’s concept of hybridity, however, emphasises that all cultures have been changing throughout time. If both the dominant group and the indigenous group have changed culturally, the drive for contemporary Native groups to homogenise themselves with their past would be significantly reduced. As Bhabha puts it, “the first principle is always in the space of secondariness” (Mitchell, 1995:83).

In Guatemala, hybridity has been used to enact violence against people who identify as Maya (Warren, 1998:6). During the 1980s, the government attempted to create a unified nation of Guatemala by suppressing any expression of Maya identity. Archaeology and its discourse surrounding the Maya became a weapon to target indigenous groups and support the notion that “true Maya culture consists of those features surviving from the precontact period” (Fischer and Brown, 1996:13). In response, indigenous groups employed ‘strategic essentialism’ (Spivak, 1990:11-13) in order to gain political recognition, working within the structure that was marginalising them and using it to their advantage. Again, the utilisation of Bhabha’s hybridity here would be beneficial because it nullifies the idea that a pure race is possible, thus negating the hierarchical power structures that are in place.

In a talk last October, Stephen Silliman asked the question, “Is it time to move away from hybridity?” (Silliman, 2014). He asserted that hybridity may void all uses in relation to culture because it is being used too freely. While Silliman is right that hybridity is being used too freely, the issue lies in scholars misunderstanding of how it can be used effectively. Deagan, Silliman, and Young all present cases in which the term ‘hybridity’ is not used in the way it was defined by Bhabha. Deagan fails to analyse Catholic and Native interactions as a process and

Is It Really Time To
Away From Hybridit

neglects to interpret the site in terms of the third space (Deagan, 2013:267). McClintock raises the idea that Bhabha himself has negated his own notion of hybridity by focusing on culture and failing to discuss hybridity in terms of gender and class. Bhabha has reduced something, which, according to McClintock, as a hybrid cannot be separated from both class and gender (McClintock, 1995:62). While Silliman believes that hybridity “would never be applicable in cases of cultural continuity... [it can] only be used for cultural change” (Silliman, 2013:489), the process of hybridisation is continuous because all cultures are constantly changing.

Silliman raised many concerns surrounding the use of the term hybridity, concluding his talk with the question of whether hybridity deserved a “revision or a requiem” (Silliman, 2014). To this I answer that Bhabha’s work deserves a second, or maybe third and fourth, reading. Silliman did not propose an alternative to hybridity. If we abandon this notion, what will fill its gap? As presented in the cases above, hybridity is a daily reality for individuals in Guatemala, at the border of Texas and Mexico, and those most impacted by NAGPRA. To treat cultural groups as essential entities rather than as hybrids obscures the fact that these individuals are constantly adjusting to new influences as they interact with a dominant culture that is itself changing.

The absence of hybridity would potentially lead to the return of colonial binaries and traditional views of essentialism. The three cases cited above serve to demonstrate that Bhabha’s culture theory is based in day-to-day realities for many marginalised groups. Turning away from trying to understand hybridity is not doing justice to many individuals who have historically been subjected to prejudice.

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Are ‘Small Towns’ Always Towns? A Classification of Roman Civil Settlements in Northern Britain

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This article aims to challenge the so-called “military zone” and settlement patterns in Northern Britain during Roman times by redefining the term “small towns” and reconsidering the available archaeological data on this area. This work draws up a general state of the available knowledge on this subject, and identifies weaknesses and difficulties involved in this kind of study. It also provides a new look on the classification of Roman “small towns” in Britain, and attempts to offer new perspectives and/or better approaches to explain and understand settlement patterns at the northern extent of the Empire.

Keywords: Roman Empire, Britannia, small towns, civil settlements, military vici, settlement patterns.

RESEARCH on urban planning and on the different forms of settlements in the ancient world, particularly productive since the 1960s, has experienced a considerable and renewed interest in recent decades (Petit and Mangin, 1994:227–228). The study of settlement patterns in the various provinces that conform the Roman Empire is under development, and the recognition of a large range of forms of settlements has allowed the identification of a category of sites labelled “small towns” (Rodwell and Rowley, 1975; cf. Todd, 1970; Wacher, 1995). Today, the research interest on small towns is being expressed by the growing number of publications (Blagg and King, 1984; Favory, 2012; James and Millett, 2001; R. F. J. Jones, 1991) and by extensive, systematic and methodologically thorough excavations. The archaeological data has thus considerably expanded. However, their holistic interpretation is frequently hampered by limited access to, or even lack of, field reports and other publications. The study of these civil settlements and their networks is paramount for understanding territorial organisation, and contributes to a better identification of the size of urban structures, and to estimate the influence of settlements on a local and regional level (Mangin, 1986:19).

The present article focuses on the different types of civilian settlements, best known as “small towns”, in Northern Britain, throughout Roman occupation, i.e. between the late 1st

Abstract
(in French see below)

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and early 5th century AD. More precisely, the study area comprises the territories south of Hadrian's Wall and north of the Antonine Wall. The choice of this case study relies on the need for a reassessment of available archaeological data for this region: the current vision on the distribution of these small towns seems inaccurate: several types of settlements are not taken into consideration, and research is partitioned between "small towns", with purely urban character, and "military vici" associated with Roman forts (Mattingly, 2006; e.g. Sommer, 1984; Wacher, 1995). The aim of this article is to question the "military zone", situated in the north of the province and thought to be very little urbanised and occupied by civilians, and the "civil zone", located in the south, with an extremely dense network of cities and small towns (cf. Haverfield, 1912:3–5; B. Jones and Mattingly, 1990).

Available archaeological data from field reports, monographs and general studies has been analysed, and fifty-nine potential sites feature evidence of civil occupation, such as building remains, artefacts and inscriptions (Fig. 3). The information available for these sites is reviewed and classified into a typological table, in order to identify land use and settlement networks during Roman times. The first part of this paper presents the general framework of the study and identifies the principal issues related to the different terminologies. The second part briefly explores the sites under study and examines their origins and development, their distribution, morphology, and functions. The third part attempts to organise these civil settlements and suggests a restitution of land use during Roman times in order to offer new perspectives and some better approaches to explain settlement patterns and territorial dynamics at the extreme north of the Roman Empire.

"Small towns" and "vici"  The incorporation of Britain into the Roman Empire led to the development of a particular settlement network in the region. The range of settlement types in northern Britain is immense: different types of sites are observed, with a multitude of sizes, origins, morphologies, and functions (Fig. 2). Some settlements present urban or semi-urban characteristics, and are well developed, with a sizeable population, and evidence for industrial and/or commercial activities. Others were more agricultural in character, defined as farming communities or rural villages (Hingley, 1989; James and Millett, 2001; R. F. J. Jones, 1991; Wacher, 1995). Two main categories of sites emerge from research in the study area: the "small towns" and the "military vici" (Rodwell and Rowley, 1975; Sommer, 1984; Sommer, 2006; Wacher, 1995). This section reviews these various categories of settlements and their attributes, and the problems inherent to this classificatory scheme.

Small towns  The term "small towns" refers to a form of settlement, subordinated to a *civitas* capital. This expression is not sufficient to understand and describe Roman settlements, since it only encompasses cities and town with urban character and eludes all those whose functions were exclusively rural, like villages and hamlets (Favory, 2012; Rivet, 1975; Smith, 1987; Todd, 1970; Wacher, 1995). Although the term "urban" appears as a qualifier for "city" or "town" sites, it has experienced a rather broad definition in archaeological practice, and scholars tend not to give specific definitions regarding the word "urban" (Renfrew, 2008:29). There are several unifying features, common in all definitions: an extensive settlement size occupied permanently with evidence of internal organization and social distinction in the architecture; a suggested administrative significance; a large diversity of political and social buildings and institutions; a high level of economic activity, with some industrial productions in specialized areas; the possession of a market or fair functions, connected most of the time to an important road, river or sea, etc. (Renfrew, 2008:29). On the contrary, non-urban settlements indicate sites which, by

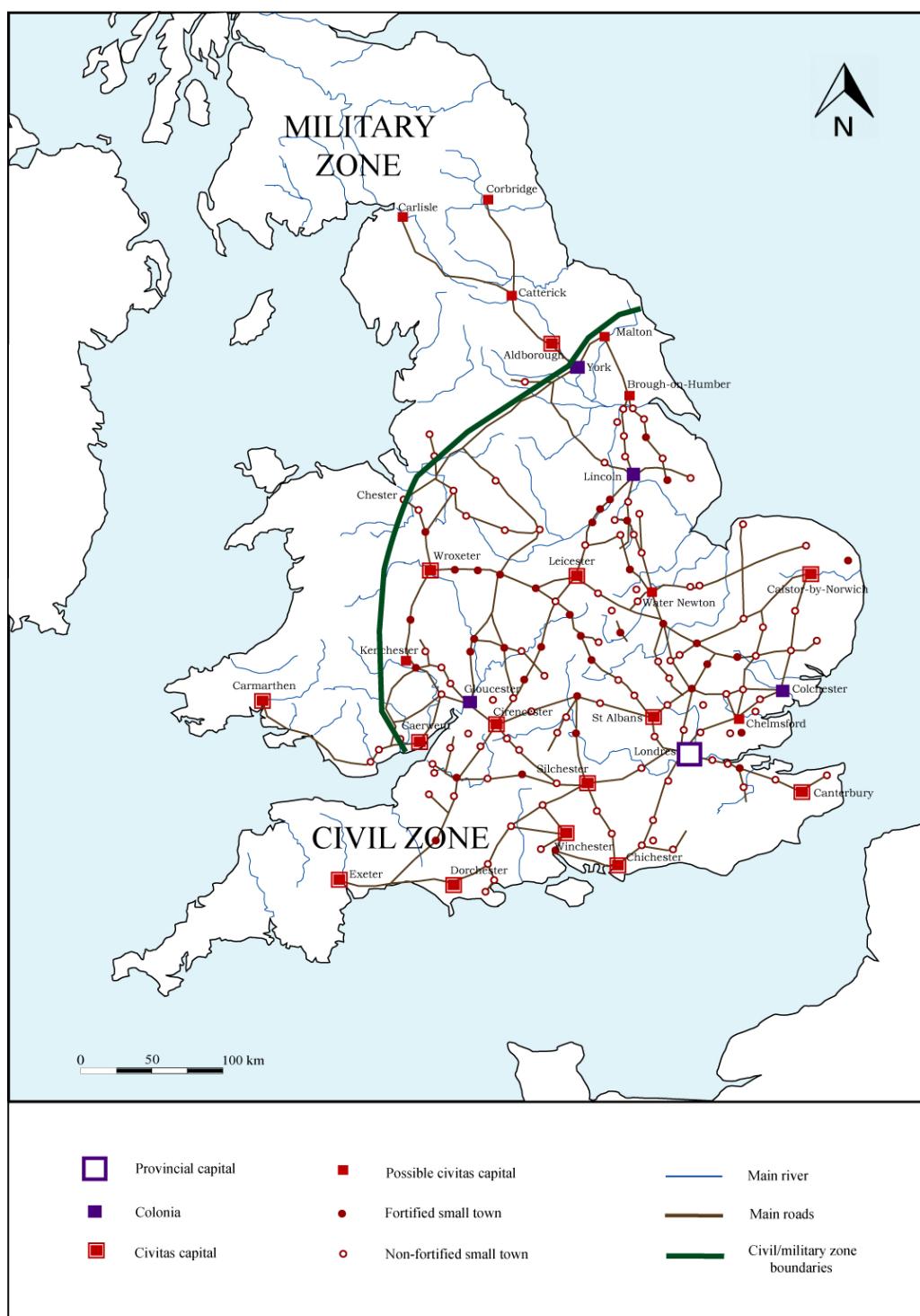


Figure 1: *Distribution of towns and "small towns" according to current research. Illustration made by the author.*

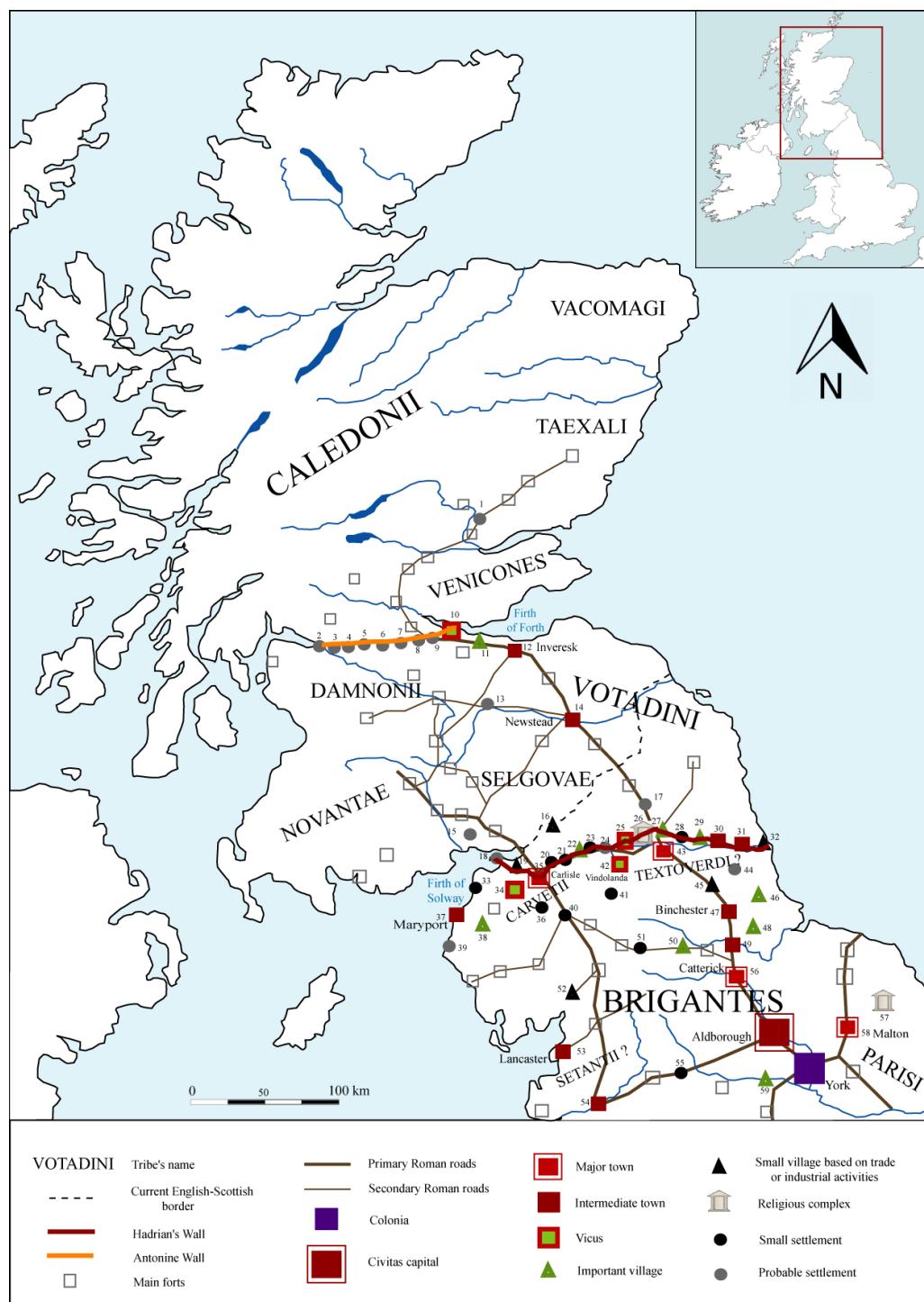


Figure 2: General map of Roman towns and civil settlements in Northern Britain. Illustration made by the author.

their activity or extend, do not possess the characteristics of urban settlements. There are several types, which can vary in size: villas, non-villa settlements that include single farms, small hamlets (two or three farms), large hamlets (four to six farms) and finally villages that embrace seven farms or more (Hingley, 1989:76). These non-urban sites are some form of nucleated settlements (except villas and single farmsteads), involving a community and subordinated to a *civitas*. I argue that these non-urban sites should be further considered in analyses of settlement patterns, given that both hamlets and small villages were quite common features of the inhabited landscape of Britannia (cf. Hingley, 1989; Hanley, 2000).

At the Oxford conference held in 1975 on the theme of the small towns of Roman Britain, Rodwell and Rowley (1975:1) defined a “small town” in these terms:

If we remove at one end of the settlement-scale *coloniae*, *municipia* and *civitas* capitals, and at one other end of the scale, villas, farmsteads and small villages which occupy an area of only a few hectares, we are left with a substantial residue of sites to which terms like “small town”, “minor town” and “large village” have been applied.

—Rodwell and Rowley, 1975:1

Moreover, as Rivet stressed at the same conference, the term “small” is misleading as it is not a question of size in any classification since some settlements, better called “subordinate town” or “minor town” according to him, can exceed in size some major cities and *civitas* capitals (Rivet, 1975:111). In addition, Malcolm Todd (1970:115) asks a vital question for an important reflection on terminology issues:

The first problem to be encountered is one of terminology, for the minor settlements are by no means a homogeneous group. The portmanteau term ‘small towns’, under which they are commonly considered, often in the same context as the large urban centres, seems immediately to beg a vital question. To what extent were any of these settlements towns?

—Todd, 1970:115

In France, archaeologists use the term, *agglomération secondaire*, to talk about this type of settlements. It is also a very neutral and globalizing expression, encompassing sites with urban character, echoing Rodwell and Rowley’s definition, but which also includes small villages and hamlets into the range of nucleated settlements (Mangin, 1986:18). As such, it may be preferable to use more neutral terms such as “minor settlements” or “civil settlements” rather than “small towns”, more consistent with the archaeological reality.

Civil settlements near military forts are usually associated with the name of *canabae* or military *vici*. Many epigraphic evidences mention these two Latin terms in the Roman world, which causes some complications (for this debate, see Tarpin, 2002). Most of the settlements in northern Britain are called *vici* in English literature (cf. Salway, 1965; Sommer, 1984; Sommer, 2006). This term is now the subject of many debates about its definition, nature and characteristics (Tarpin, 2002). However, most evidence of the use of this word comes from civilian contexts, so it seems dangerous to use it as a generic term for several types of realities (Favory, 2012:42–43; Tarpin, 2002).

Military vici

No Latin author used the term *vicus* to refer to settlements near forts or in a military context (Birley, 2009; Tarpin, 2002). The Latin references discussing the multiple meanings of the term *vicus* are usually found in the writings of Caesar (*De Bello Gallico* I, 5), Varro (*De Lingua Latina* V, 160), Festus (*De Significatione Verborum* XIX) and Isodore of Seville (*Etymologiae* XV, 2), among others. But this term should not be considered as some sort of settlement

Nº	Site	Localisation	Latin name	Settlement type
1	Cargill	Perth & Kinross, Scotland	<i>Hatton</i> ?	Probable settlement
2	Old Kilpatrick	West Dunbartonshire, Scotland	<i>Clotagenium</i> ?	Probable settlement
3	Bearrsden	East Dunbartonshire, Scotland	?	Probable settlement
4	Balmuildy	Glasgow, Scotland	?	Probable settlement
5	Cadder	East Dunbartonshire, Scotland	?	Probable settlement
6	Croy Hill	North Lanarkshire, Scotland	?	Probable settlement
7	Castlecary	Stirlingshire, Scotland	?	Probable settlement
8	Camelon	Stirlingshire, Scotland	?	Probable settlement
9	Mumrills	Falkirk, Scotland	?	Probable settlement
10	Cariden	West Lothian, Scotland	<i>Veluniate</i>	Vicus
11	Cramond	City of Edinburgh, Scotland	?	Important village
12	Inveresk	Midlothian, Scotland	?	Intermediate town
13	Easter Happrow	Scottish Borders, Scotland	?	Probable settlement
14	Newstead	Scottish Borders, Scotland	<i>Trimontium</i>	Intermediate town
15	Birrens	Dumfries & Galloway, Scotland	<i>Blatobulgium</i>	Probable settlement
16	Netherby	Cumbria, England	<i>Castra Exploratum</i>	Small village
17	Risingham	Northumberland, England	<i>Habitancum</i>	Probable settlement
18	Bowness-on-Solway	Cumbria, England	<i>Maia</i>	Probable settlement
19	Burgh-by-Sands	Cumbria, England	<i>Aballava</i>	Small village
20	Stanwix	Cumbria, England	<i>Petriana</i>	Minor settlement
21	Castlesteads	Cumbria, England	<i>Camboglana</i>	Minor settlement
22	Birdoswald	Cumbria, England	<i>Banna</i>	Important village
23	Carvoran	Northumberland, England	<i>Magna</i>	Minor settlement
24	Great Chesters	Northumberland, England	<i>Aesica</i>	Probable settlement
25	Housesteads	Northumberland, England	<i>Vercovicium</i>	Vicus
26	Carrawburgh	Northumberland, England	<i>Brocalitia</i>	Religious complexe
27	Chesters	Northumberland, England	<i>Cilurnum</i>	Important village
28	Halton Chesters	Northumberland, England	<i>Onnum</i>	Minor settlement
29	Rudchester	Northumberland, England	<i>Vindobala</i>	Important village
30	Benwell	Tyne & Wear, England	<i>Condercum</i>	Intermediate town
31	Wallsend	Tyne & Wear, England	<i>Segedunum</i>	Intermediate town
32	South Shields	Tyne & Wear, England	<i>Arbeia</i>	Small village
33	Beckfoot	Cumbria, England	<i>Bibra</i>	Minor settlement
34	Wigton (Old Carlisle)	Cumbria, England	<i>Maglona</i>	Vicus
35	Carlisle	Cumbria, England	<i>Luguvalium</i>	Major town
36	Old Penrith	Cumbria, England	<i>Voreda</i>	Minor settlement
37	Maryport	Cumbria, England	<i>Alauna Carvetiorum</i>	Intermediate town
38	Papcastle	Cumbria, England	<i>Derventio (Carvetiorum)</i>	Important village
39	Moresby	Cumbria, England	<i>Gabrosentum</i>	Probable settlement
40	Brougham	Cumbria, England	<i>Brocavum</i>	Minor settlement
41	Whitley Castle	Northumberland, England	<i>Epiacum</i>	Minor settlement
42	Chesterholm	Northumberland, England	<i>Vindolanda</i>	Vicus
43	Corbridge	Northumberland, England	<i>Corstopitum</i>	Major town
44	Chester-le-Street	Durham, England	<i>Concangis</i>	Probable settlement
45	Lanchester	Durham, England	<i>Longovicium</i>	Small village
46	Sedgefield	Durham, England	?	Important village
47	Binchester	Durham, England	<i>Vinovium</i>	Intermediate town
48	Faverdale	Durham, England	?	Important village
49	Piercebridge	Durham, England	?	Intermediate town
50	Greta Bridge	Durham, England	?	Important village
51	Bowes	Durham, England	<i>Lavatris</i>	Minor settlement
52	Watercrook	Cumbria, England	<i>Altavana</i>	Small village
53	Lancaster	Cumbria, England	<i>Calunium</i> ?	Intermediate town
54	Ribchester	Cumbria, England	<i>Bremetenacum Veteranorum</i>	Intermediate town
55	Ilkley	West Yorkshire, England	<i>Verbeia</i>	Minor settlement
56	Catterick	North Yorkshire, England	<i>Cataractonium</i>	Major town
57	West Heslerton	North Yorkshire, England		Religious complexe
58	Malton	North Yorkshire, England	<i>Derventio (Brigantum)</i>	Major town
59	Newton Kyme	North Yorkshire, England	?	Important village

Figure 3: List of sites under study

with a very different status or an urban neighbourhood (Leveau, 2002:10); instead, it can be almost unanimously applied to any settlement, particularly those relating to structures adjacent to a Roman fort or military structures. Nevertheless, as Birley (2009:19) emphasized, this term could have been applied to a civil settlement associated with a fort, whose legal status was special, or to define a very specific geographical area that was not under the military authority during a period of time. This was likely the case at Vindolanda (RIB:1700). Therefore, it seems misleading to designate all forms of settlements as a *vicus*, or a military *vicus*, if no inscription mentions it.

Very few studies have been conducted on this type of settlements and they are not included in the various works on “small towns” (e.g. B. Jones and Mattingly, 1990; Todd, 1970; Wacher, 1995). Although they are not “urban sites”, *vici* belong to a type of civil settlement, with their own origins, morphologies, functions and chronologies. These sites do not appear on any general map regarding “small towns” (e.g. B. Jones and Mattingly, 1990:156) since they are not considered as purely “urban” in character. In a comparison between the distribution maps of nucleated settlements within the province of Britannia, the contrast between the North and South is quite striking (see Fig. 1).

Thus, the current vision of the distribution of small towns in Northern Britain during Roman times seems inaccurate. Whereas the southern regions appear actually more urbanised, with a dense network of cities and small towns, the north is not deprived of civilian infrastructures and minor settlements. Following Branigan (1980:8), I would argue that some “*vici*” could be considered as some forms of primary urban development.

In the northern part of the province, it is accepted that the vast majority of “small towns” have grown in connection with the military activities and the progress of Roman troops (B. Burnham and Wacher, 1990:9). These settlements follow defence systems and the layout of various campaigns from the end of the 1st century AD. The development of these settlements in urban centres depends on multiple factors such as economic or cultural expansion, related to trade or crafts for instance, or the presence of an important religious centre (B. Burnham and Wacher, 1990:9; Frere, 1975:5–6). However, discussions remain focused on the importance of military activities in the setting of Roman settlements, at the expense of economic, cultural, or chronological aspect (for this debate, see B. Burnham and Wacher, 1990:7–8). A few sites from a military context, nonetheless, became developed enough to achieve a high status or an urban form, such as Carlisle (McCarthy, 2002), Corbridge (Bishop and Dore, 1988; Hodgson, 2008) and Malton (Wenham, 1974; P. R. Wilson, 2006).

It is considered at present that at least a third of identified “small towns” are known to have developed from or near a pre-conquest Iron Age site, mainly in the south-eastern part of the province (Wacher, 1995:20). The main forms of settlements that characterise the north of England and Scotland in prehistoric times are generally identified as fortified farms, isolated from each other, brochs –Scottish drystone hollow-walled structures– or souterrains –underground structures– (B. Jones and Mattingly, 1990:61). Therefore, these societies with a more dispersed settlement pattern have not developed into many major centres, with some exceptions. The settlement of Newstead, built near a Roman fort and the hillfort of Eildon Hill North, is one of the examples of civilian settlement that grew in the presence of an Iron Age administrative centre (Hunter and Keppie, 2012).

There are also some cases where settlements show no prehistoric origin or no relation to any Roman military presence. This could reflect a spontaneous development by some Romans or

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diversity of development,
internal morphology and
functions – Origins and
development

some indigenous community, as illustrated by the site of Sedgefield (*East Park Sedgefield. Co Durham. Geophysical Surveys 2005-09 2010*) and Faverdale (Proctor, 2012) in the *Brigantes* territory, a so-called ‘Celtic’ tribe settled in northern England. These unplanned developments can be explained by the presence of major communication routes or the presence of raw materials that would allow the installation of a community developing around industrial commercial or administrative activities (Frere, 1975:5–6). However, their origins are more complicated to understand since they do not appear to be the result of a deliberate act of foundation (R. F. J. Jones, 1991:55).

The formation of the northern “small town” network in Britannia can be explained by several factors. Areas of high concentration of settlements tend to be the most militarised places: the two walls (the Hadrian and Antonine Walls), the defensive line across the Firth of Forth, the area called “Western Sea Defences” on the Solway Firth, and along two major roads linking the northern and southern parts of the province, mainly in the east on Dere Street. The road network (prehistoric tracks still in use until the creation of new Roman roads) and maritime and/or inland waterways are also deciding factors when creating a settlement (Mattingly, 2006:256). The study of town’s morphology and street network allows to highlight the roles of some roads, rivers or streams in the development of settlements (Petit and Mangin, 1994:203). The most important of these roads is Dere Street, crossing the entire northern part of the province between *Eboracum* (York) and *Veluniate* (Carriiden). Another major pathway is the Stanegate, stretching from *Luguvalium* (Carlisle) to *Corstopitum* (Corbridge). The various constraints and benefits of the physical environment of the region can also highlight some concentrations or deserted areas. Finally, the political context, leading to the redistribution of some parts of the province, and new socio-economic conditions had a considerable influence on the development of urban centres or minor settlements (Branigan, 1980:11; B. Burnham and Wacher, 1990:12).

Internal morphology The total expansion of civil occupation on these sites is generally poorly understood due to the lack of extensive research. However, it is possible to deduce it from various elements such as the presence of fortifications or by geophysical surveys. Catterick is a particularly well-known example where a wide ditch had surrounded the main area of occupation at the end of the 3rd century AD, covering a surface of approximately 6 ha (Hartley and Fitts, 1988:57). Thereby, we can organize the fifty-nine “small towns” under study into three categories according to their estimated total area:

1. Large settlements whose area exceeds 20 ha, such as Carlisle, Corbridge, Sedgefield, or Malton (see Fig. 1-6). Their full extension is generally not known but some appear to exceed in size several civitas capitals.
2. Eighteen sites of medium size, between 10 and 20 ha are actually known, such as Inveresk, Newstead, Birdoswald, Housesteads and Vindolanda.
3. Finally, the remaining settlements, thirty-five, are smaller than 10 ha. These are, in most cases, sites whose occupation is relatively short or whose economic influence is modest or only local.

The development of a Roman civil settlement in the northern part of the province is generally linear, alongside a main axis (B. C. Burnham, 1994:234–235; Sommer, 2006:97). More

sophisticated plans could emerge from this type of extension by adding new parallel or perpendicular streets to the main axis, as seen in Birdoswald (Biggins and Taylor, 1999:100) and Chesters (St Joseph, 1951:52). Sometimes, civil settlements could also grow at road junctions, or near a river crossing such as Newstead (Hunter and Keppie, 2012). It is however important to emphasize the small number of grid plans, at Catterick (P. R. Wilson, 2002a; P. R. Wilson, 2002b) and Malton (Wenham, 1974) for instance. These few examples of internal street planning, probably introduced from the beginning of the occupation, contrast with the haphazard plans and spontaneous developments on most sites.

The vast majority of buildings found in the settlements under study are simple timber or stone structures, generally rectangular in shape, called “strip-buildings” or “strip-houses” (B. C. Burnham, 1994:232). Their size can vary significantly, but most structures are relatively large, sometimes exceeding 50 m² (Osborn, 2006:66). Some probably had several pieces for the practice of trade or industrial activities: it is most likely the case in Maryport for some large structures (Biggins and Taylor, 2004b:128), for example. Some houses also have a room in front of the building, suggesting the installation of a portico, as is seen at Housesteads for instance (Osborn, 2006:67). It is also possible to find more complex and elaborate structures, as shown in the example of the “Town House” in Malton (Wenham, 1974:37). However, regardless of the growing interest in Roman settlements, internal buildings have rarely drawn attention, despite the abundance of information available concerning the types and methods of construction and the use of different materials (B. Burnham, 1988:35).

Alongside these residential buildings, many types of buildings with various functions can be encountered:

- *Official buildings* such as administrative buildings, are rare. No civic centre has been found at the present time and a single structure found at Carlisle could be likened to a potential forum (McCarthy, 2002:76).
- *Buildings with economic responsibilities* can be identified in various settlements. Houses themselves have craft or trade related functions as seen above, through the presence of workshops at the front of some buildings. Some marketplaces are also possible: at Birdoswald (Biggins and Taylor, 2004a:176) and Newstead (Hunter and Keppie, 2012:84) for example.
- *Religious and cultural places* have also been identified. The most common and distinctive places of worship are so-called Romano-Celtic temples, with square and octagonal plans (B. Burnham, 1988:53). Entertainment buildings such as possible theatres and amphitheatres can also be found in this part of the province, but these are extremely rare (see for instance Neighbour, 2007).
- *Public amenities* can also be seen but more difficult to identify: street network is evident on many sites, sewers are reported, bridges, and fords are also attested. Water supply is difficult to define but on many cases, wells are the only visible remains.

It is clear that many settlements owe their origin and prosperity to some predominant functions (administrative, religious or economic). Most sites have also been able to acquire one or more new functions over time, resulting from their geographical position, requests generated by the civilians and the army, or from various territorial policies (Mattingly, 2006:289–290).

A variety of functions

The most represented activities on all settlements are related to economy, regardless of the degree of development of these sites. The first forms of these activities are linked to agricultural exploitation, raw materials, and industrial production (Sommer, 1984:34–35). These primary and secondary sectors are almost omnipresent on all sites. The archaeological evidence from thirty sites confirmed agro-pastoral activities and/or exploitation of natural resources (stone, wood etc.). Forty sites also reveal activities related to the production of manufactured objects (see Fig. 1–6). Only one inscription mentioned craftsmanship: a goldsmith at Malton (RIB:712).

The main industrial activities represented in the archaeological record are related to pottery and metal production (see Fig. 1–6). Other activities, far less represented and more widely dispersed throughout settlements, can also be found: manufacture of woollen clothing, leather and textile, wood, bone or stone manufactures, etc. (Clack and Haselgrove, 1982:148; Sommer, 1984:35; for the example of a workshop of Roman sculptures at Carlisle, see McCarthy, 2002:90). The relationship between a fort and a surrounding settlement was a partnership; the fort's garrison provided a demand and the civilians supplied the goods and services required (Bidwell, 2007:85). Therefore, they were centres for industry and trade (on a modest scale), including land, sea and river trade, acting as sources and markets for goods. Evidence of workshops, marketplaces and possible port remains can be encountered in this part of the province and the Vindolanda tablets give us precious information on both imported and exported goods (Bowman, 2008; Osborn, 2006:69).

Few settlements had a purely religious function. Only five sites possessed one or more places of worship. Religious buildings are similar to small temples or shrines of Romano-Celtic traditions. It is also important to note that these structures were generally not monumental and were relatively small in size. Some exceptions can be found at Corbridge (Hodgson, 2010) and Carlisle (McCarthy, 2002:83). Only two religious complexes were identified: Carrawburgh (D. J. Breeze, 1972) and West Heslerton (Halkon, 2013), which seemed to be of small dimensions.

Finally, the close link between the settlements and forts makes it difficult to understand the internal organization of these sites (Sommer, 1984:22). However, particular status is attested in a few cases. The executive power could be represented by some elected leaders referred as *magistri vici* (found at Old Carlisle; RIB:899) or by some magistrates or imperial officers such as *curatrices vicanorum* at Vindolanda (RIB:1700). Administrative functions are well highlighted in some sites by epigraphic mentions, but also thanks to the presence of *cursus publicus* buildings (relay points and transportation service of the Roman Empire) found at Chesters for example (Hodgson, 2009).

The reconsideration of the available archaeological evidence carried out above can be synthesised in a general typological table covering all sites under study (Fig. 1–6), allowed to classify the settlements into different categories. Three main categories stand out clearly: settlements with urban features, transitional sites between major towns and small rural villages, and lastly, some very small agglomerations with apparently little influence on the surrounding landscape.

The first category consists of some settlements with urban character and several dynamic sites, which include two subcategories: major towns and intermediate towns/*vici*.

- *Major towns* have a pronounced urban character, a major extension, multiple functions and infrastructures, and their status could change over time to rise to the rank of a civitas capital ((at Carlisle; RIB:933). This category includes only four of the sites under study:

Carlisle, Corbridge, Catterick and Malton. These towns had a considerable influence on a regional scale and a large extension; the area they covered is generally exceeding 20 ha. They also had a particularly pronounced urban character, usually shown through grid plans, architectural forms and a large variety of public infrastructures (Bishop and Dore, 1988; McCarthy, 2002; P. R. Wilson, 2002a; P. R. Wilson, 2002b; P. R. Wilson, 2006).

- *Intermediate towns and vici* (as mentioned on inscriptions) are dynamic settlements of a relative importance, with multiple functions and some public amenities. Thirteen settlements are gathered in this category: Inveresk, Newstead, Benwell, Wallsend, Maryport, Binchester, Piercebridge, Lancaster, Ribchester, and four *vici*: Carriden, Houses-teads, Old Carlisle and Vindolanda. These sites, except perhaps Piercebridge (Cool and Mason, 2008) during its first years of occupation, are mainly related to military activity. They are dynamic and attractive centres in the network north of the province, which survived a century or two, sometimes three in some cases. Their extension is generally smaller than major towns, extending mainly from 10–20 ha. In most cases, these civil settlements do not have monuments characterising a Roman city such as *forum*, temples, or entertainment structures. The major difference between these sites and major towns is the internal organisation that follows a more linear development around a main axis rather than a grid plan (Birley, 2009; Crow, 2004; Osborn, 2006; Sommer, 1984; Sommer, 2006; R. Wilson, 1997). Many functions are also present, but they are less diversified: several types of industrial production and economic activities may have been conducted on multiple sites although they are rarely identified simultaneously. Official and religious functions may also be present but are more discrete.

Secondly, we can distinguish many sites which make the transition from major towns to small rural villages. This category includes important villages, small villages axed on one commercial or productive activity and religious complexes:

- *Important villages*, whose surface is sometimes considerable, but do not feature any official or public buildings (except for some rare cases). These settlements have a smaller influence on the territory and primary and secondary sectors prevailed. These are above all economic centres whose extension can sometimes be even larger than some *civitas* or towns, at Sedgefield for example (B. C. Burnham, 2007:264). They are mainly characterised by the preponderance of agricultural and small scale industrial activities and their very modest civil architecture. They usually have an internal layout based on a linear extension along a main road and around which some streets could be added (see e.g. Hodgson, 2009; Proctor, 2012; Sommer, 1984; Sommer, 2006; Wilmott, 2001). These villages are: Cramond, Birdoswald, Chesters, Rudchester, Papcastle, Sedgefield, Faverdale, Greta Bridge, and Newton Kyme.
- *Small villages axed on one productive or commercial activity*, whose expansion is even further reduced, usually display a single dominant economic function (trade or crafts). These are mainly Netherby and South Shields (Cleary, 1997; M. Snape, Bidwell, and Stobbs, 2010) for the commercial function, and Burgh-by-Sands, Lanchester and Watercrook (D. Breeze and Wolliscroft, 2009; Potter, 1979) for industrial activities. However, it is important to note that the distribution of these sites in a particular category

may seem arbitrary when the lack of large-scale excavations did not identify traces of any other activities.

- At last, in this second category, we found the *religious complexes* where the unique function is one of religious significance. These settlements usually have several temples or shrines, and are places of pilgrimages. Only two sites can be identified as such in the area under study: Carrawburgh (M. E. Snape, 1994) and West Heslerton (Powlesland, 1998). The internal organisation of these settlements is poorly understood and their distribution does not seem to follow any particular model.

Finally, the last types of settlements on the area are very small agglomerations with low influence on the territory, comprising minor and probable settlements.

- *Minor or small settlements* are similar to present villages and hamlets, with only some agro-pastoral functions and a very local influence. Their size is very small, never exceeding 5 or 10 ha. No public structures are found within these sites. Domestic buildings are very simple and the use of stone is rarely attested, except for some foundations. We can find in this category: Stanwix, Castlesteads, Carvoran, HaltonChesters, Beckfoot, Old Penrith, Brougham, Whitley Castle, Bowes, and Ilkley (see for instance Casey and Hoffmann, 1998:121; Hodgson, 2009:124–127).
- *Probable settlements* are sites where lack of information (see Fig. 1-6) and/or excavations do not allow their secure identification or classification in any of the categories set out above. There are seventeen of these cases in the corpus of sites under study: Cargill, Old Kilpatrick, Bearsden, Balmuildy, Cadder, Croy Hill, Castlecary, Camelon, Mumrills, Easter Happrew, Birrens, Risingham, Bowness-on-Solway, Great Chesters, Moresby, and Chester-le-Street. They are largely found in the north of the survey area, in Scotland, and mainly along the Antonine Wall.

It is hard to define whether the discovered buildings represent civil buildings or military annexes, since the nature of the remains is poorly understood in the absence of large-scale excavations. Moreover, other sites have not been selected in this study because of limited available data. This is particularly the case at Auchendavy, Bar Hill on the Antonine Wall, or Ravenglass, Kirkby Thore and Ambleside, south of the Hadrian Wall. Such withdrawal is due to incomplete data or remaining elements that can accurately certify the possible presence of a civilian settlement. At Auchendavy for example, only two engraved stones may refer to civilians: a fifteen years old child (RIB:2182) and a woman (RIB:2183), which is not sufficient in absence of any other elements indicating a possible settlement.

Conclusion This study, conducted on the so-called Roman “small towns” in northern Britain, gives an overview of current knowledge on the subject and identify the principal difficulties associated with the study of settlement patterns, starting with the terminology itself. The first significant conclusion is the considerable imbalance of knowledge and data availability across the study area. The scarcity of archaeological evidence from some sites, areas or topics, does not enable to transcribe accurately the organisation of Roman civil settlements in northern Britain. Terminological issues in English literature between “small towns” and “military *vici*” makes it very complex to understand networks of civil settlements, particularly in the northern regions of

the province, which are usually regarded as purely military areas. Moreover, in the rural landscape, non-villa settlements are rarely considered for archaeological investigation, as Hingley (1991:76) pointed out; thus, rural settlement patterns are poorly understood. We need to conduct intensive studies on a number of individual areas in order to have a better insight into settlement hierarchy.

Nevertheless, after considering a comprehensive sample of civil settlements in this study, located in a supposedly military context, and the “small towns”, seen as purely civilian population centres, it is possible to observe certain similarities in their origins, forms, and functions. I argue that the current picture of town distribution in northern Britain is inaccurate and incomplete, since some types of settlements are systematically not taken into account. Indeed, as argued by R. F. J. Jones (1991:76), where lays the demarcation between villages and small towns? Even though the southern regions appear as more urbanised, with a dense network of cities and “small towns”, the northern part of the province is not deprived of civilian infrastructure or population centres. The separation between a “military zone” in the north and a “civil zone” in the south appears therefore incorrect, at least from this perspective. The settlements encountered in northern Britain are indeed closely linked to military activities. However, they are part of a type of civil settlements that needs to be contextualised on a broader scale, because, the vast majority of sites in the south of the province are equally associated to various military activities or defence structures. Then, why did a division between equivalent settlements forms and patterns, only different because of development inequalities, occur? The portray of a strong military presence in the northern part of the province, frequently mentioned in ancient sources, could help explain the disparities between the interpretation of the north as more rural, and the south, more urbanised and rapidly demilitarised (Mattingly, 2006:291).

The division between civil and military zones seems therefore imprecise, since no less than fifty-nine sites with various forms, functions, and statuses were studied over the entire area. It is a dense, organised and hierarchical network that does not differ significantly from the southern one, except in the fact that it is less urbanised. Therefore, I argue that the term “small town” should be replaced by a more neutral term, such as “minor settlement” or “civil settlement” to refer to all forms of nucleated establishments, ranging from the largest Roman town subordinated to a *civitas* capital to a small hamlet consisting of few individuals. Finally, it is important to recall once again the difficulty of such studies, caused by lack of archaeological data and by the need to agree on a clear and unanimous terminology. There is therefore a growing need to break away from previous works to review the available data and an obligation to undertake further studies on a regional scale. Millett (2001:66) argued that we need to rethink some of the questions about urban and rural societies as our approaches were almost completely dominated by military questions. We need to reconsider the different categories we use to describe the sites and what characterised or constituted Roman urbanism. Many *vici* have to be considered as “towns” as he explains:

These sites played a key role in parts of the province and many of us would not draw a far less firm distinction between army and civilians than their separate treatments suggest.
—Millett, 2001:64

New lines of research also need to be developed or completed, particularly on settlements distribution and morphology, urban-rural relations, the changing pattern of land use or the role of the Roman army in promoting or retarding the urban process (B. Burnham, Collis, et al.,

2001:74–75). Lastly, it is important to remember that the interaction between Romans and local populations or the impact of the Roman administration on Iron Age organisation are questions that should also be addressed, since these can help us to understand the formation of the civil settlement network during Roman times.

* * *

Abstract (French) *Ce jeu de cette étude est de remettre en question la military zone et les modalités d'implantation des Romains dans la partie nord de la Grande-Bretagne en redéfinissant le terme small town (ou agglomération secondaire) et en reconSIDérant les données archéologiques disponibles pour cette aire géographique. Ce travail dresse un bilan général de nos connaissances actuelles sur le sujet et identifie les faiblesses et diverses difficultés que comporte l'étude des réseaux d'habitats groupés. Il livre également un nouveau regard sur les agglomérations secondaires en Bretagne romaine et tente de proposer de nouvelles perspectives ou approches afin de comprendre les modalités d'implantation et l'occupation du sol à l'extrême nord de l'empire romain.*

	1 - Cargill	2 - Old Kilpatrick	3 - Bearsden	4 - Balmuildy	5 - Cadzow	6 - Croy Hill	7 - Castlecary	8 - Camelon	9 - Murnricks	10 - Carriden
Geographical situation	At communication routes junction	x	-	-	-	-	-	-	-	x
	On Roman road(s)	x	-	-	-	-	-	-	-	x
	At river crossing	x	x	-	x	x	-	x	-	x
	On a defensiv structure (wall, etc.)	-	x	x	x	x	x	x	x	-
	Lowland/valley	x	x	x	-	x	-	x	x	x
Origin and chronology	Hill	-	-	-	x	-	x	-	-	-
	Iron-Age occupation	-	-	-	-	-	-	-	-	-
	Occupation linked to military activities	x	x	x	x	x	x	x	x	x
	Spontaneous development	-	-	-	-	-	-	-	-	-
	Period of occupation									
Expansion	Less than a century	x	x	x	x	x	x	x	x	-
	A century or more	-	-	-	-	-	-	-	-	x
	About two centuries	-	-	-	-	-	-	-	-	-
	About three centuries	-	-	-	-	-	-	-	-	-
Internal organisation	Known minimum size (hectares)	?	?	?	?	?	?	?	?	6
	Estimated total surface									
	Less than 10 ha	x	x	x	x	x	x	x	x	-
	From 10 to 20 ha	-	-	-	-	-	-	-	-	x
Monuments and public buildings	More than 20 ha	-	-	-	-	-	-	-	-	-
	Street planning	?	?	-	?	-	?	-	x	-
	Major roads	-	x	?	-	?	x	-	x	-
	Differentiated districts	?	-	-	-	x	-	-	-	-
	Cemetery	?	-	-	-	-	-	-	-	-
Economic diversity and commercial activities	Sewers	-	-	-	-	-	-	-	-	-
	Centralised organisation (forum / basilica)	-	-	-	-	-	-	-	-	-
	Possible administrative buildings	-	-	-	-	-	-	-	-	-
	Temple(s) with indigenous plan	-	-	-	-	-	-	-	-	-
	Temple(s) with classic or mixed plan	-	-	-	-	-	-	-	-	-
	Shrine	-	-	-	-	-	-	-	-	-
	Theatre/amphitheatre	-	-	-	-	-	-	-	-	-
	Mansio/mutatio	-	-	-	-	-	-	x	-	-
	Baths	?	x	x	x	x	?	?	x	-
Domestic and public architecture	Aqueduct	-	-	-	-	-	-	-	-	x
	Bridge/ford	?	-	-	-	-	-	-	-	-
	Agro-pastoral activities	-	?	-	?	?	x	-	?	-
	Raw materials exploitation	-	-	-	-	-	-	-	-	-
	Pottery industry	-	-	-	?	-	-	-	-	-
	Metal industry	-	-	-	-	-	?	-	-	-
	Wood, bone or stone industry	-	-	-	-	-	?	-	-	-
	Textile manufacture	-	-	-	-	-	-	-	-	-
	Butchery, bakery, etc.	-	-	-	-	-	-	-	-	-
Inscriptions	Evidence of unidentified activities	-	-	-	x	-	x	-	x	-
	Storage structures	-	-	-	-	-	-	-	-	-
	Shops	?	-	-	-	-	-	-	-	x
	Market place	-	-	-	-	-	-	-	-	-
	River/sea port	?	?	-	-	-	-	-	-	?
	Timber architecture	x	x	x	x	x	x	x	x	x
	Stone architecture	-	-	x	x	x	-	x	x	-
	Hypocaust	-	x	x	x	x	-	x	-	x
	Basement	-	-	-	-	-	-	-	-	-
	Mosaic / painting / marble	-	-	-	-	-	-	-	-	-
	Latrines	-	-	-	-	-	-	-	-	-
	Fortifications	-	x	x	x	x	-	x	x	x
	Sculptures	-	-	-	-	-	-	-	-	-
	Funerary inscriptions	-	-	-	-	-	-	-	1	-
	Religious inscriptions	-	1	-	2	1	3	9	-	2
	Official inscriptions	-	4	-	4	2	4	2	1	-
	Milestones	-	-	-	-	-	-	-	-	-
	Others	-	-	-	-	-	-	-	-	-
	Total	0	5	0	6	3	7	11	1	3
										2

Table 1: General typological table of civil settlements. Table made by the author.

	11 - Cramond	12 - Inveresk	13 - Easter Happrew	14 - Newstead	15 - Birrens	16 - Netherby	17 - Risingham	18 - Bowness-on-S.	19 - Burgh-by-S.	20 - Stanwix
Geographical situation										
At communication routes junction	-	X	-	X	X	X	X	X	X	X
On Roman road(s)	-	X	-	X	-	X	X	X	X	X
At river crossing	X	X	X	X	X	X	X	X	X	X
On a defensiv structure (wall, etc.)	-	-	-	-	-	-	-	X	X	X
Lowland/valley	X	-	X	-	X	X	X	X	X	-
Hill	-	X	-	X	-	-	-	-	-	X
Origin and chronology										
Iron-Age occupation	-	X	-	X	-	-	-	-	-	-
Occupation linked to military activities	X	X	X	X	X	X	X	X	X	X
Spontaneous development	-	-	-	-	-	-	-	-	-	-
Period of occupation										
Less than a century	-	X	X	-	X	-	-	-	-	-
A century or more	-	-	-	X	-	-	-	-	-	X
About two centuries	X	-	-	-	-	-	X	X	X	-
About three centuries	-	-	-	-	-	X	-	-	-	-
Expansion										
Known minimum size (hectares)	?	10	?	16	?	?	?	?	?	?
Estimated total surface										
Less than 10 ha	-	-	X	-	X	X	X	X	X	X
From 10 to 20 ha	X	X	-	X	-	-	-	-	-	-
More than 20 ha	-	-	-	-	-	-	-	-	-	-
Internal organisation										
Street planning	X	X	-	X	X	X	-	-	X	-
Major roads	X	X	-	-	X	-	-	X	X	X
Differentiated districts	X	X	-	X	-	-	-	-	-	-
Cemetery	-	X	-	X	-	X	-	-	-	-
Sewers	X	-	-	-	-	-	-	-	X	-
Monuments and public buildings										
Centralised organisation (forum / basilica)	-	-	-	-	-	-	-	-	-	-
Possible administrative buildings	-	-	-	-	-	-	-	-	-	-
Temple(s) with indigenous plan	-	-	-	-	-	-	-	-	-	-
Temple(s) with classic or mixed plan	-	-	-	-	-	X	-	-	-	-
Shrine	-	-	-	-	-	-	-	-	-	-
Theatre/amphitheatre	-	X	-	X	-	-	-	-	-	-
Mansio/mutatio	?	X	X	-	X	-	-	-	-	-
Baths	?	X	X	X	-	X	-	X	X	-
Aqueduct	-	X	-	X	-	-	-	-	-	-
Bridge/ford	-	-	-	X	-	-	-	-	-	-
Economic diversity and commercial activities										
Agro-pastoral activities	X	X	-	X	-	-	-	-	?	?
Raw materials exploitation	-	X	-	X	-	-	-	-	-	-
Pottery industry	X	X	-	X	-	-	-	-	-	X
Metal industry	X	X	-	X	-	-	-	-	X	-
Wood, bone or stone industry	-	-	-	?	-	-	-	-	-	-
Textile manufacture	-	-	-	?	-	-	-	-	-	-
Butchery, bakery, etc.	-	-	-	X	-	-	-	-	-	-
Evidence of unidentified activities	X	-	X	-	X	X	-	-	X	X
Storage structures	?	-	-	?	-	X	-	-	X	-
Shops	-	X	-	X	-	-	-	-	-	-
Market place	?	-	-	?	-	-	-	-	-	-
River/sea port	?	X	-	X	-	X	-	X	-	-
Domestic and public architecture										
Timber architecture	X	X	X	X	X	X	-	X	X	X
Stone architecture	X	X	-	X	X	X	X	X	X	X
Hypocaust	-	X	-	X	-	X	-	X	X	-
Basement	-	X	-	?	-	-	-	-	-	-
Mosaic / painting / marble	-	?	-	?	-	-	-	-	-	-
Latrines	-	-	-	-	-	-	-	-	-	-
Fortifications	X	X	X	X	X	-	X	-	-	-
Sculptures	-	X	-	-	-	-	-	-	-	-
Inscriptions										
Funerary inscriptions	-	-	-	6	1	1	16	-	3	2
Religious inscriptions	3	1	-	-	19	9	28	3	8	2
Official inscriptions	1	2	-	-	5	9	12	1	-	2
Milestones	-	-	-	-	-	-	-	-	-	-
Others	1	-	-	-	1	1	-	2	-	-
Total	5	3	0	6	26	20	56	6	11	6

Table 2: General typological table of civil settlements. Table made by the author.

	21 - Castlessteads	22 - Birdoswald	23 - Carvoran	24 - Great Chesters	25 - Housesteads	26 - Carrawburgh	27 - Chesters	28 - Halton Chesters	29 - Rudchester	30 - Benwell
Geographical situation	At communication routes junction	X	X	-	X	-	-	X	-	-
	On Roman road(s)	X	X	X	X	X	X	X	X	X
	At river crossing	X	X	-	X	-	-	X	-	-
	On a defensiv structure (wall, etc.)	X	X	X	X	X	X	X	X	X
	Lowland/valley	-	-	X	X	-	-	X	-	X
Origin and chronology	Hill	X	X	-	-	X	X	-	X	-
	Iron-Age occupation	-	-	-	-	-	-	-	-	-
	Occupation linked to military activities	X	X	X	X	X	X	X	X	X
	Spontaneous development	-	-	-	-	-	-	-	-	-
	Period of occupation									
Expansion	Less than a century	-	-	-	-	-	-	-	-	-
	A century or more	X	-	X	X	-	X	X	X	-
	About two centuries	-	X	-		X	-	-	X	X
	About three centuries	-	-	-	-	-	-	-	-	-
Internal organisation	Known minimum size (hectares)	?	?	?	?	?	?	15	?	?
	Estimated total surface									
	Less than 10 ha	X	-	X	X	-	X	-	X	X
	From 10 to 20 ha	-	X	-	-	X	-	X	-	-
	More than 20 ha	-	-	-	-	-	-	-	-	-
Monuments and public buildings	Street planning	X	X	X	?	X	?	X	?	?
	Major roads	X	X	X	-	X	X	X	?	X
	Differentiated districts	-	?	-		-	-	?	-	-
	Cemetery	-	X	-	X	X	-	X	-	-
	Sewers	-	-	-	-	-	-	-	-	-
Economic diversity and commercial activities	Centralised organisation (forum / basilica)	-	-	-	-	-	-	-	-	-
	Possible administrative buildings	-	-	-	-	X	-	?	-	-
	Temple(s) with indigenous plan	-	-	-	-	X	X	-	-	-
	Temple(s) with classic or mixed plan	-	-	-	-	X	X	-	-	X
	Shrine	-	-	-	-	-	-	-	-	-
Domestic and public architecture	Theatre/amphitheatre	-	-	-	-	-	-	-	-	-
	Mansio/mutatio	-	?	X	-	X	-	X	-	X
	Baths	-	?	?	X	X	-	X	?	X
	Aqueduct	-	-	-	X	-	-	?	-	-
	Bridge/ford	-	-	-	-	-	-	X	-	-
Inscriptions	Agro-pastoral activities	X	X	-	-	X	-	X	-	X
	Raw materials exploitation	-	-	-	-	X	-	-	-	-
	Pottery industry	-	-	-	-	X	-	-	-	-
	Metal industry	-	X	-	-	?	-	-	-	-
	Wood, bone or stone industry	-	-	-	-	-	-	-	-	-
	Textile manufacture	-	-	-	-	-	-	-	-	-
	Butchery, bakery, etc.	-	-	-	-	X	-	-	-	X
	Evidence of unidentified activities	X	X	X	X	X	-	X	X	X
	Storage structures	-	X	-	-	-	-	-	-	-
	Shops	-	X	X	-	X	-	X	-	X
	Market place	-	X	-	-	-	-	-	-	-
	River/sea port	-	-	-	-	-	-	-	-	-
	Timber architecture	X	X	X	X	X	X	X	X	X
	Stone architecture	X	X	X	X	X	X	X	X	X
	Hypocaust	-	-	-	X	X	-	X	-	X
	Basement	-	-	-	-	-	-	-	-	-
	Mosaic / painting / marble	-	-	-	-	-	-	-	-	-
	Latrines	-	-	-	-	-	-	-	-	-
	Fortifications	-	-	-	-	-	-	-	-	-
	Sculptures	-	-	-	X	X	X	-	-	X
	Funerary inscriptions	4	4	9	7	6	6	4	3	2
	Religious inscriptions	20	44	34	11	34	31	12	3	4
	Official inscriptions	6	10	18	6	10	9	9	7	5
	Milestones	-	-	-	-	-	-	-	-	-
	Others	3	4	8	6	5	2	17	2	1
	Total	33	62	69	31	55	48	42	15	11
										27

Table 3: General typological table of civil settlements. Table made by the author.

	31 - Wallsend	32 - South Shields	33 - Beckfoot	34 - Old Carlisle	35 - Carlisle	36 - Old Penrith	37 - Maryport	38 - Papcastle	39 - Moresby	40 - Brougham
Geographical situation										
At communication routes junction	x	x	-	-	x	-	-	x	-	x
On Roman road(s)	x	x	-	-	x	-	-	x	-	x
At river crossing	x	x	x	x	x	x	x	x	-	x
On a defensiv structure (wall, etc.)	x	-	x	-	-	-	x	-	x	-
Lowland/valley	x	x	x	-	x	-	x	x	x	x
Hill	-	-	-	x	-	x	-	-	-	-
Origin and chronology										
Iron-Age occupation	-	-	-	-	-	-	-	-	-	-
Occupation linked to military activities	x	x	x	x	x	x	x	x	x	x
Spontaneous development	-	-	-	-	-	-	-	-	-	-
Period of occupation										
Less than a century	-	-	-	-	-	-	-	-	-	-
A century or more	-	-	-	x	-	-	-	-	-	-
About two centuries	x	-	x	-	-	x	x	x	x	x
About three centuries	-	x	-	-	x	-	-	-	-	-
Expansion										
Known minimum size (hectares)	?	?	?	?	32	?	16	23	?	?
Estimated total surface										
Less than 10 ha	x	x	x	-	-	x	-	-	x	x
From 10 to 20 ha	-	-	-	x	-	-	x	-	-	-
More than 20 ha	-	-	-	-	x	-	-	x	-	-
Internal organisation										
Street planning	x	?	?	x	x	?	x	x	?	?
Major roads	x	x	x	x	x	x	x	x	?	x
Differentiated districts	?	-	-	?	x	-	?	x	-	-
Cemetery	-	x	x	-	x	x	x	?	-	-
Sewers	-	-	-	-	?	-	-	-	-	-
Monuments and public buildings										
Centralised organisation (forum / basilica)	-	-	-	-	?	-	-	-	-	-
Possible administrative buildings	-	-	-	?	x	-	x	-	-	-
Temple(s) with indigenous plan	x	-	-	?	?	-	x	-	-	-
Temple(s) with classic or mixed plan	-	-	-	?	?	-	x	-	?	-
Shrine	-	-	-	-	-	-	-	-	-	-
Theatre/amphitheatre	-	-	-	-	?	-	-	?	-	-
Mansio/mutatio	x	-	-	x	x	-	x	x	-	-
Baths	x	?	-	x	x	x	x	?	-	-
Aqueduct	-	-	-	x	x	x	-	-	-	-
Bridge/ford	-	-	-	-	-	-	-	-	-	-
Economic diversity and commercial activities										
Agro-pastoral activities	?	x	-	x	x	x	x	x	-	x
Raw materials exploitation	-	-	-	x	?	-	?	-	-	-
Pottery industry	x	?	-	?	x	-	x	-	-	-
Metal industry	-	?	-	?	x	-	x	-	-	-
Wood, bone or stone industry	-	-	-	-	?	-	?	-	-	-
Textile manufacture	-	-	-	-	?	-	?	-	-	-
Butchery, bakery, etc.	-	-	-	-	x	-	?	-	-	-
Evidence of unidentified activities	x	x	x	x	x	x	x	x	-	x
Storage structures	-	x	-	?	x	-	x	x	-	-
Shops	x	x	-	-	x	-	x	x	-	?
Market place	x	x	-	?	x	-	?	?	-	-
River/sea port	-	x	-	-	?	-	?	-	-	-
Domestic and public architecture										
Timber architecture	x	x	x	x	x	x	x	x	x	x
Stone architecture	x	x	?	x	x	x	x	x	x	x
Hypocaust	x	?	-	-	x	x	x	-	-	-
Basement	-	-	-	-	-	-	-	-	-	-
Mosaic / painting / marble	-	-	-	-	x	-	-	-	-	-
Latrines	-	-	-	-	?	-	-	-	-	-
Fortifications	x	-	-	-	x	-	-	-	-	-
Sculptures	x	-	-	-	x	-	x	-	x	-
Inscriptions										
Funerary inscriptions	-	5	-	7	8	9	14	-	2	4
Religious inscriptions	6	8	-	19	11	14	42	2	2	10
Official inscriptions	6	2	1	1	2	3	7	2	5	2
Milestones	-	-	-	-	-	-	-	-	-	-
Others	-	5	-	-	-	3	10	-	1	1
Total		12	20	1	27	21	29	73	4	10
										17

Table 4: General typological table of civil settlements. Table made by the author.

	41 - Whitley Castle	42 - Vindolanda	43 - Corbridge	44 - Chester-le-Street	45 - Lanchester	46 - Sedgefield	47 - Binchester	48 - Faverdale	49 - Piercebridge	50 - Greta Bridge	
Geographical situation	At communication routes junction	X	-	X	-	-	-	X	X	X	-
	On Roman road(s)	X	X	X	X	X	-	X	-	X	-
	At river crossing	X	-	X	-	-	-	X	X	X	X
	On a defensiv structure (wall, etc.)	-	-	-	-	-	-	-	-	-	-
	Lowland/valley	X	-	X	X	-	X	X	X	X	X
Origin and chronology	Hill	-	X	-	-	X	-	-	-	-	-
	Iron-Age occupation	-	-	-	-	-	-	-	?	?	-
	Occupation linked to military activities	X	X	X	X	X	-	X	-	X	X
	Spontaneous development	-	-	-	-	-	X	-	X	?	-
	Period of occupation										
Expansion	Less than a century	-	-	-	-	-	X	-	-	-	-
	A century or more	-	-	-	-	-	-	-	-	-	-
	About two centuries	X	-	-	-	X	-	-	-	-	X
	About three centuries	-	X	X	X	-	-	X	X	X	-
Internal organisation	Known minimum size (hectares)	?	10	20	?	?	30	5	10	5	?
	Estimated total surface										
	Less than 10 ha	X	-	-	-	X	-	-	-	-	-
	From 10 to 20 ha	-	X	-	X	-	-	X	X	X	X
	More than 20 ha	-	-	X	-	-	X	-	-	-	-
Monuments and public buildings	Street planning	X	X	X	?	X	X	X	X	X	?
	Major roads	X	X	X	X	X	X	X	X	X	-
	Differentiated districts	-	X	X	-	-	X	?	-	?	?
	Cemetery	-	X	X	-	X	?	?	-	X	-
	Sewers	-	X	?	-	-	-	-	-	-	-
Economic diversity and commercial activities	Centralised organisation (forum / basilica)	-	-	?	-	-	-	-	-	-	-
	Possible administrative buildings	-	?	X	-	-	-	-	-	-	-
	Temple(s) with indigenous plan	-	X	-	-	-	-	-	-	-	-
	Temple(s) with classic or mixed plan	-	X	X	-	-	-	X	-	-	-
	Shrine	-	-	-	-	-	-	-	-	-	-
	Theatre/amphitheatre	-	-	-	-	-	-	-	-	-	-
	Mansio/mutatio	-	X	X	-	-	-	-	-	X	-
	Baths	X	X	X	-	?	-	X	-	X	?
	Aqueduct	-	X	X	-	X	-	-	-	-	-
	Bridge/ford	-	-	-	-	-	-	-	-	X	-
Domestic and public architecture	Agro-pastoral activities	X	X	X	-	X	X	X	X	X	X
	Raw materials exploitation	-	X	?	-	-	X	-	?	-	-
	Pottery industry	-	X	-	-	-	X	-	-	X	-
	Metal industry	-	X	X	-	X	?	?	X	X	X
	Wood, bone or stone industry	-	X	?	-	-	-	-	?	-	-
	Textile manufacture	-	X	?	-	-	-	-	?	-	-
	Butchery, bakery, etc.	-	X	X	-	-	-	X	?	-	-
	Evidence of unidentified activities	X	-	X	X	X	X	X	X	X	X
	Storage structures	-	X	X	-	-	X	X	X	-	-
	Shops	-	X	X	-	?	?	X	-	X	X
Inscriptions	Market place	-	-	?	?	-	X	-	?	-	-
	River/sea port	-	-	-	-	-	-	-	-	-	-
	Timber architecture	X	X	X	X	X	X	X	X	X	X
	Stone architecture	X	X	X	X	X	-	X	X	X	X
	Hypocaust	X	X	X	-	-	-	X	X	X	-
	Basement	-	-	-	-	-	-	-	-	-	-
	Mosaic / painting / marble	-	-	X	-	-	-	X	X	X	-
	Latrines	-	-	X	-	-	-	-	-	-	-
	Fortifications	-	-	X	-	-	-	-	-	-	-
	Sculptures	-	X	X	-	-	-	X	-	-	-
	Funerary inscriptions	-	6	14	-	1	-	1	-	1	4
	Religious inscriptions	4	24	23	6	19	-	9	-	4	3
	Official inscriptions	4	10	27	2	6	-	3	-	2	2
	Milestones	-	-	-	-	-	-	-	-	-	-
	Others	-	7	13	-	1	-	-	-	-	-
	Total	8	47	77	8	27	0	13	0	7	9

Table 5: General typological table of civil settlements. Table made by the author.

		51 - Bowes	52 - Watercrook	53 - Lancaster	54 - Ribchester	55 - Ilkley	56 - Catterick	57 - West Heslerton	58 - Malton	59 - Newton Kyme
Geographical situation	At communication routes junction	X	-	-	X	X	X	-	X	-
	On Roman road(s)	X	-	-	X	X	X	-	X	-
	At river crossing	X	X	X	X	X	X	X	X	X
	On a defensiv structure (wall, etc.)	-	-	-	-	-	-	-	-	-
	Lowland/valley	X	X	-	X	X	X	X	X	X
Origin and chronology	Hill	-	-	X	-	-	-	-	-	-
	Iron-Age occupation	-	-	-	-	-	-	X	-	-
	Occupation linked to military activities	X	X	X	X	X	X	-	X	X
	Spontaneous development	-	-	-	-	-	-	-	-	-
	Period of occupation									
Expansion	Less than a century	-	-	-	-	-	-	X	-	-
	A century or more	-	-	-	-	-	-	-	-	-
	About two centuries	-	X	X	-	X	-	-	-	X
	About three centuries	X	-	-	X	-	X	-	X	-
Internal organisation	Known minimum size (hectares)	?	?	?	?	?	6	?	?	15
	Estimated total surface									
	Less than 10 ha	X	X	-	-	X	-	X	-	-
	From 10 to 20 ha	-	-	X	X	-	X	-	-	-
	More than 20 ha	-	-	-	-	-	-	-	X	X
Monuments and public buildings	Street planning	?	-	X	X	-	X	-	X	X
	Major roads	X	X	X	X	X	X	-	X	X
	Differentiated districts	-	-	?	-	-	X	X	X	-
	Cemetery	-	-	X	X	X	?	-	X	X
	Sewers	X	-	-	-	-	-	-	?	-
Economic diversity and commercial activities	Centralised organisation (forum / basilica)	-	-	-	-	-	-	-	-	-
	Possible administrative buildings	-	-	-	?	-	X	-	X	-
	Temple(s) with indigenous plan	-	-	-	-	-	-	-	-	-
	Temple(s) with classic or mixed plan	X	-	-	X	-	X	X	X	?
	Shrine	-	-	-	-	-	-	X	-	-
	Theatre/amphitheatre	-	-	-	-	-	-	?	X	-
	Mansio/mutatio	-	-	X	?	-	X	X	X	-
	Baths	-	X	X	X	-	X	-	X	-
	Aqueduct	-	-	-	-	-	X	-	X	-
	Bridge/ford	-	-	?	-	-	X	-	X	-
Domestic and public architecture	Agro-pastoral activities	?	?	X	X	-	X	-	X	X
	Raw materials exploitation	-	-	X	-	-	?	-	?	-
	Pottery industry	-	-	-	-	-	X	-	X	-
	Metal industry	-	X	-	X	-	X	-	X	-
	Wood, bone or stone industry	-	-	-	-	-	-	-	-	-
	Textile manufacture	-	-	-	X	-	X	-	X	-
	Butchery, bakery, etc.	-	-	-	-	-	X	X	X	-
	Evidence of unidentified activities	X	X	X	X	X	-	X	-	X
	Storage structures	-	-	-	-	-	X	X	X	-
	Shops	?	-	-	X	?	X	X	X	-
Inscriptions	Market place	-	-	?	?	-	?	-	?	-
	River/sea port	-	-	-	?	-	-	-	-	?
	Timber architecture	X	X	X	X	X	X	X	X	X
	Stone architecture	X	X	X	X	X	X	X	X	X
	Hypocaust	-	X	X	X	-	X	-	X	-
	Basement	-	-	-	-	-	-	-	-	-
	Mosaic / painting / marble	-	-	-	-	-	X	-	X	-
	Latrines	-	-	-	-	-	-	-	X	-
	Fortifications	-	-	-	X	-	X	-	X	-
	Sculptures	X	-	-	-	-	X	X	X	-
	Funerary inscriptions	-	1	1	3	2	-	-	3	-
	Religious inscriptions	8	2	4	4	2	3	-	3	-
	Official inscriptions	4	-	2	6	2	-	-	1	-
	Milestones	-	-	3	-	-	-	-	-	-
	Others	-	-	2	3	-	2	-	3	-
	Total	12	3	12	16	6	5	0	10	0

Table 6: General typological table of civil settlements. Table made by the author.

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“In my sword I trust”. A Reassessment of Irish Iron Age Swords With a Focus on Their Potential Use in Battle

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Irish Iron Age swords are remarkable in terms of their short length compared to their contemporaries in La Tène Britain and Continental Europe, a feature that has led to speculation that they were primarily stabbing weapons or a ceremonial object not intended for fighting. This research incorporates previously published swords with new material from a survey of Irish museum databases to examine the swords in terms of blade morphology and dimension to infer their possible use in battle. The study shows that the majority of swords from the period (c. 700 BC – c. 400 AD), both La Tène and sub-Roman, have features of stabbing weapons used for fighting on foot. This is at odds with the nature of weaponry found elsewhere in La Tène Europe, and highlights an insular development in Ireland during the period. Through two case studies, this analysis also shows that in interacting with the outside world, conscious choices may have been made when it came to importing weapons and ideas. By clarifying the suggestions made in other works about the uses of these swords, this article looks at the swords from a new dimension, one that also relates these weapons to the nature of warfare and society in Iron Age Ireland.

Abstract
(In French see below)

... But because of the frequency of blows,
the majority of spears shattered and they
then engaged each other with swords.

Diodorus Siculus, 15.86.2

THE swords of the Irish Iron Age (c. 700 BC – c. 400 AD; fig. 1) are unique in terms of their remarkably short stature. They range from 37.50–57.90 cm in length, almost half the average of their British or Continental La Tène contemporaries (which range from 60 cm to over 1 m). Research has been limited by both the low number of examples (currently less than 40) and single/antiquarian nature of the finds, with only one sword from a dated context.

Previous research on Irish Iron Age swords (Rynne, 1982; Raftery, 1983) mainly focused on swords of La Tène type and on the creation of typologies, linking the Irish swords to

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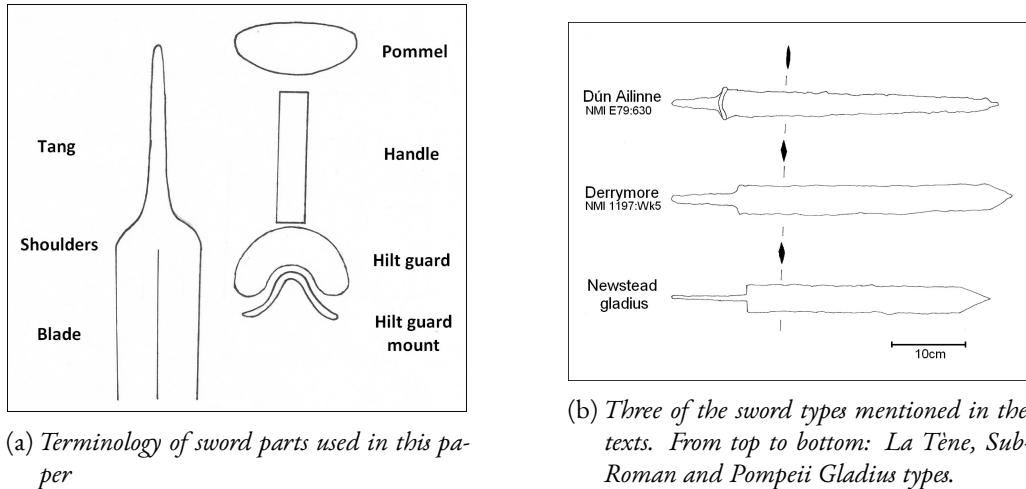


Figure 2: Terminology and sword types.

the chronology of continental La Tène material. They excluded other types, such as the so-called ‘sub-Roman’ ones. Raftery’s catalogue (1983) provides a typology comprising two main groups: La Tène 1 and 2. La Tène 1 consists of those swords with metal hilt-guards (fig. 2a). Type 2 is made up of two subgroups: swords with skeuomorphic representations of the metal hilt-guard (type 2A, known from only two examples), while those without falling into type 2b (Raftery, 1983:83–106). Raftery suggests that type 1 swords derive from the Middle La Tène style after De Navarro and gives the 3rd century BC as a possible date for their origins in Ireland (De Navarro, 1972; Raftery, 1983:83).

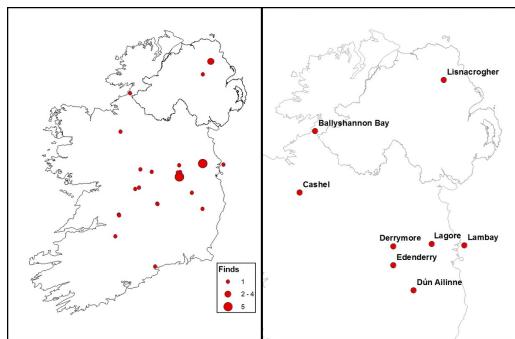


Figure 1: Distribution of Iron Age swords in Ireland and main sites mentioned in the text

Rynne’s 1982 essay provides an overview of both the general European La Tène sword typology and of how Irish swords fit into this system on the basis of factors such as hilt-guard, hilt-guard mount and blade morphology as well as blade cross-section (fig. 3). Rynne’s typology defines 4 types of La Tène sword: A, B, C (all of which would be grouped into Raftery’s type 1) and Ultimate (corresponding to Raftery’s type 2). This progression also includes the ‘sub-roman’ type that he dates to the 4th–5th centuries (Rynne, 1982:95).

Both Raftery and Rynne suggest that the earliest Irish La Tène swords derive from the Middle La Tène style after De Navarro. Giving the 3rd century BC as a possible date for their origins in Ireland (De Navarro, 1972; Rynne, 1982; Raftery, 1983:83). Both these classifications are, however, problematic. Both rely on hilt-guard morphology to provide a relative chronology – which is in keeping with approaches to La Tène swords elsewhere in Europe (e.g. De Navarro, 1972; Stead, 2006) – but many swords in Ireland are found without hilt fittings. Rynne’s blade-type progression has also been thrown into question by the dating of the Dún Ailinne sword (see fig. 2b): it would be classified as type

A (3rd/2nd centuries BC) but it comes from a context dated to the 1st century AD (Johnston, 2007:88 sq.). As Raftery’s La Tène typology is broader and lacks the chronological issues of Rynne’s, I have chosen to use it to classify the swords which I examined in the museum and that are not included in his catalogue (Raftery, 1983) (see appendix 1).

Other than the typological work described above, metallurgical analysis on six Irish Iron Age swords was carried out by Scott (1990) as part of a wider analysis of early ironworking in Ireland. This analysis reveals that there was an entire spectrum of metalworking quality when it came to sword manufacture. Some would have been an “ineffective weapon” (Scott, 1990:125), while others, such as an example from Lisnacrogher, Co Antrim, were finely made with a skill that matched that of the decorated bronze scabbards found with them (Scott, 1990:65). The research presented here considers various aspects of these weapons in order to question how the Irish Iron Age sword may have functioned in battle. Previous works have speculated as to the possible applications of this weapon. Raftery (1989:121) suggests that stabbing is the main use these weapons would have had.

It has also been put forward that such weapons may not have been intended for use in battle, and that warfare may have been “... a ritual farce” (Waddell, 2000:304). Pleiner

(1993) brings together morphological, metallurgical as well as written evidence for Iron Age swords in Europe to discuss an overarching ‘Celtic’ sword and fighting style: one of long slashing swords. He assumes this fighting style must have survived longer in Ireland; the island having never been subdued by Rome (Pleiner, 1993:165) but this suggestion does not take into account the uniquely short length of Irish swords. Since the last comprehensive catalogue of these artefacts was carried out in 1983 as part of Raftery’s Catalogue, later works such as *The Celtic Sword* and Mallory’s *The Origins of the Irish* were consulted to focus on compiling a list of any discovered after the creation of Raftery’s Catalogue. Apart from Scott’s 1990 metallurgical study that revealed two swords, information about the number of IA swords in Ireland was usually a statement that they numbered c. 30 (e.g. Mallory, 2013:180).

In order to bridge this gap in numbers I contacted the National Museum of Ireland and the Ulster Museum in Belfast. Through a survey of the National Museum’s topographical files the number of swords under study was brought up to 38. All relevant swords in the Ulster Museum were recorded in the Catalogue; however, a fragment of a sword that had been lodged in its scabbard had since been removed. Work on the swords from this period has also concentrated almost entirely on swords of La Tène type, however, this study also includes five swords

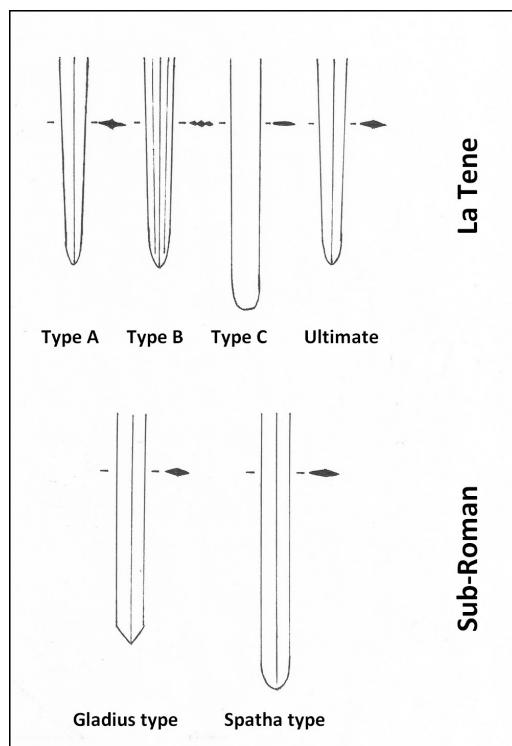


Figure 3: Rynne’s typology of Iron Age swords (after Rynne, 1976)

The Swords

of so-called “sub-Roman” type. The reasons for this inclusion will be discussed in more detail below.

As mentioned above, this project differs from previous studies in that it includes the so-called “sub-Roman” swords, traditionally excluded from the corpus of Irish material. However, recent research has led to the acceptance of Romano-British and other non-La Tène material as being an integral part of the Irish Iron age (for a more in-depth discussion on the treatment of “intrusive” material during the Irish Iron Age see Cahill Wilson, 2014:22 sqq.). Rynne (1982:95) considers these ‘sub-Roman’ swords to have appeared in Ireland in the 4th/5th centuries AD, when Irish colonies were set up in Wales.

This was based on the general assumption that there was no interaction with the Roman Empire during the first four centuries AD. However the work of the Late Iron Age and Early ‘Roman’ Ireland Project has shown that there was indeed contact during this period (Cahill Wilson, 2014:esp. chapters 7–8), and this provides the basis for the inclusion of ‘sub-Roman’ material into the present analysis. The assemblage under study consists of 38 swords in varying states of preservation. Of these 38 swords, 25 are of La Tène type, 5 of sub-Roman type and 8 could not be classified (see appendix 1). I shall now briefly present some of the most significant – and well-documented - swords under study. The sword from Dún Ailinne, Co Kildare, is unique in that is the only known Irish La Tène sword from a dated context. Until the time of this study it was also the only sword known to have an iron rather than copper alloy hilt-guard mount (Johnston, 2007:88 sq.).

During my visit to the National Museum however, I identified a similar hilt-guard on the sword NMI 1989:86 (appendix 1). The sword was found against the side of a palisade trench and it is suggested that it was a foundational deposit for the ‘Mauve’ phase structure, dated to the 1st century AD (Johnston, 2007:89). There is also the possibility this was a votive deposit in the trench, although this would be an unusual circumstance for such an offering (Johnston, 2007:89). The anthropoid sword hilt from Ballyshannon bay in Co. Donegal (fig. 4) belongs to a small subgroup of La Tène swords found all across Europe. This type is named after the configuration of the one-piece bronze or iron hilt into a stylized human body. There are anywhere up to 90 examples of these swords in Europe ranging from Early to Late La Tène periods (O’Brien, 2009:193). Their blades measure between 29 cm and 55 cm. Unlike the parallel-sided longer La Tène swords mentioned above, these swords generally taper to a point across their entire length. Within the typology of these swords the Ballyshannon hilt is categorized as type G, dating to c. 150 BC – AD 50 (O’Brien, 2009:193). It is also noted that the closest parallels for the Irish example are from southern France and it is almost certainly imported (O’Brien, 2009:193; Raftery, 1994:143; Cahill Wilson, 2014:25). In general, because of its shorter blade, this type is often interpreted as having a primarily ceremonial or ritual function, with its potential as a weapon being doubted (Pleiner, 1993:69; Lejars, 2007:160).

The final group of swords that need to be reviewed here are the examples of sub-Roman type from Lagore Crannóg, Co Meath. The crannóg itself is said to have been occupied between the 7th and 10th centuries, a date that the excavator based on chronological information provided by early medieval records known as the Annals rather than on scientific methods (Hencken, 1950:6). This dating has since then been questioned and his chronology of the site, especially of the early layers, has been challenged on several occasions (e.g. Lynn, 1985–1986; Cahill Wilson, 2010:77 sqq.). The human remains recovered from the site of the crannóg have now been dated and a group of them belong to the Bronze and to the Iron Age, provid-

ing evidence for a significant prehistoric horizon at Lagore (Carty and Gleeson, 2013:32 sqq.); see also Gugliemi (2014), for a reassessment of the Roman and Iron Age material at Lagore). Two swords are noted by Hencken to have affinities with the Roman *gladius* and *spatha* types (Hencken, 1950:91; sword numbers 0002:Wk002 and 0003:Wk003, appendix 1) and research by the Discovery Programme’s Late Iron Age and ‘Roman’ Ireland project has found a parallel between the longer ‘*spatha*’ from Lagore (0002:Wk002) and Roman swords from the Danish site of Illerup Ådal (Cahill Wilson, 2014:28). Unfortunately, the Lagore examples are antiquarian finds and the context of their deposition is unknown. The rest of the swords under study are single finds with limited or no information regarding their contexts from which they were recovered. The most extreme case is the one from Cashel, Co. Sligo which was found in “the thatch of a derelict cottage” (Raftery, 1983:92).

For the present research, it is the blade morphology and especially the cross section that are the main focus of analysis. By examining their dimensions, their relation to contemporary swords from Britain and the Continent and discussing their place in relation to the rest of the Irish Iron Age ‘warrior panoply’, some light can be shed on the way in which Irish Iron Age swords may have been used as weapons. Blade morphologies have an effect on the way the blade behaves in combat and can allow us to make inferences about the fighting techniques the weapon was constructed to suit. Of the 38 swords in the assemblage under study, only 31 were preserved well enough so that the cross-section could be identified. Irish Iron Age swords can be divided into four groups based on their cross section morphology (table 1): lozenge, midrib, lenticular and grooved/expanded-edge midrib (fig. 5).

The largest group of swords by cross-section type are those swords with a lozenge (or diamond) shaped cross-section. Lozenge shaped cross-sections have the effect of stiffening and strengthening the blade, a quality that increases in importance the longer the blade (Inall, 2009:106): Inall considers lozenge shaped cross-sections as imparting less strength than midribs. However, it is noted by Oakeshott (1960) that in the 13th century AD, European longswords developed thick lozenge shaped profiles. This was in response to the evolution of better plate armour at the time, which required a thrusting rather than cutting blow to defeat (Oakeshott, 1960:301). We can imagine that the thicker the diamond, the more rigidity it would impart to the blade, although only experimental study would reveal its relative merits. In total, eleven of the thirty-one swords where cross-sections can be determined are of the lozenge-shaped type. The next largest group of swords are those with a lenticular cross-section.

The sword as a weapon



Figure 4: *Anthropomorphic handle from Ballyshannon Bay* © Hughes 2015

Museum number	Find site	Total surviving length	Length of blade	Max. Width of blade	Blade cross section
NMI. W4	Ballinderry, Co Westmeath	57.9cm	46.45cm	2.8cm	expanded edge midrib
UCMAE. M. C. 99. 300	Edenderry, Co Offaly	41cm	29cm	4.3cm	expanded edge midrib
NMI. 1989:86	"Off Cullenagh". Ballyvally, Co. Clare	45.2cm	35cm	3.8cm	expanded edge midrib. Poss
NMI. 1984:240	R. Shannon, Hillquarter, Westmeath	57.3cm	46.2cm	3.9cm	expanded edge midrib. Poss
E79:630	Dún Ailinne, Co. Kildare	45.4cm	39cm	6.4cm	lenticular
NMI W.234	Ballykilmurry Bog, Co Wicklow	51cm	37.5cm	4.3cm	lenticular
NMI	Unknown	48cm	36.2cm	3.6cm	lenticular
NMI Wk. 24	R. Nore. Kildrinagh, Co. Laois	20.1cm	12.4cm	2.9cm	lenticular
NMI 1989:103	Ballyvally, Co. Tipperary	27.4cm	27.4cm	2.1cm	lenticular
NMI 8377: Wk:10	R. Shannon, Keelodge ford, Co. Galway	44.7cm	28.5cm	3.6cm	lenticular
UM A12184	Unknown	54.1cm	41cm	3.1cm	lenticular
NMI Wk:003	Lagore, Dunshauglin, Co. Meath	40.7cm	31cm	2.9cm	lenticular
Number Unknown	"The old course of the Boyne", Russellswood, Co. Kildare	54.5cm	N/A	N/A	lenticular. Poss
UM B3/B5	Lisnacrogher, Co Antrim	Approx 44cm	N/A	N/A	lozenge
NMI. 1934:190	R. Shannon, Killaloe. Co Clare	33cm	29cm	4.2cm	lozenge
NMI. F.690	Lough Gur, Co Limerick	34.8cm	26.2cm	3.4cm	lozenge
UCMAE. M. C. 99. 301	Edenderry, Co Offaly	42.8cm	32cm	2.6cm	lozenge
UCMAE. M. C. 99. 305	Edenderry, Co Offaly	49.8cm	37cm	3cm	lozenge
NMI. 1958: 56	Cashel, Co Sligo	47.8cm	37.3cm	3cm	lozenge
NMI Wk.18	R. Shannon, Banagher, Co Offaly	27.6cm	N/A	2.2cm	lozenge
UCMAE. M.C. 99.292	Edenderry, Co Offaly	33.4cm	N/A	3.6cm	lozenge
NMI. W.14	R. Shannon	14.9cm	N/A	2.9cm	lozenge
NMI. Wk:10	Kildrinagh, Co. Laois	51.7cm	38.9cm	3.3cm	lozenge
NMI 1197: Wk:5	R. Deel, Derrymore, Co. Westmeath	47.7cm	37.5cm	4.5cm	lozenge
UM 167-1949	R. Bann, Toome Co Antrim	15.3cm	N/A	2.9cm	lozenge. Poss.
UM B2	Lisnacrogher, Co Antrim	56.5cm	47.7cm	3.6cm	Midrib
BM 80	Lisnacrogher, Co Antrim	50.4cm	37.5cm	4.2cm	midrib
NMI 1989:36	Harristown, Co. Meath	43.4cm	29.2cm	3.2cm	midrib
NMI 1999:140	Sheean, Co. Kildare	49.5cm	37cm	3.5cm	Midrib
NMI 0184 Wk:060	Lagore, Dunshauglin, Co. Meath	36.6cm	28cm	2.6cm	Midrib
NMI R114	Lagore, Dunshauglin, Co. Meath	41.2cm	36.6cm	2.4cm	Mixed: double ribbed in lower half of blade and lenticular in upper part

Table 1: *Cross sections of swords under study (when preserved)*

This type of blade provides the least amount of rigidity and while it could be considered an indication of poor construction, it does impart an advantage when using the blade as a cutting weapon (Inall, 2009:106). In experiments with Aegean Bronze Age swords, it was noted by Molloy (2008:124) that the presence of a central ridge was an encumbrance when cutting. The advantage that this lack of upstanding features provides when cutting makes the sword a less effective thrusting weapon, a fact noted by Oakeshott (1960:54 sqq.) in relation to later continental La Tène swords. Seven out of thirty-one swords with identifiable cross-sections were lenticular. It is also interesting to note that where the sword was mostly intact, it can be seen that La Tène swords with this type of cross section are among the longest of the type. Swords with a midrib number four out of the thirty-one swords under study.

As mentioned above, Inall considers this to be the strongest type of blade section in terms of ability to resist impact on end of a blade, such as when using a weapon for thrusting attacks (Inall, 2009:106). This is at the expense of the blade becoming less effective at cutting. The smallest group of swords with an identifiable cross-section type are those with expanded edges and a midrib. In British La Tène swords this is considered a later development (Stead, 2006:9) and is rare in La Tène swords overall (Pleiner, 1993:61). This design offers the strength of the midrib while also allowing the removal of some material, creating a lighter blade. The length of the blade is also an important factor when considering how a weapon was used. A short sword necessarily requires one to be close to their opponent, while a longer sword requires more distance. Additionally, when using a cutting or slashing attack the optimal point of impact is the final third of the blade, meaning enough distance to allow this must be maintained (Inall, 2009:104 sq.).

The short stature of Irish Iron Age swords has led to the suggestion that they were a stabbing and thrusting, rather than cutting or slashing, weapon (Raftery, 1989:121; Raftery, 1994:142). Although it should be noted that it is rare for a weapon to be designed purely for one type of attacking motion (Clements, 2007:168 sqq.). Furthermore, unlike their continental counterparts, which do vary in length over time (for a detailed study c.f. Brunaux, 2004:50 sqq.; Lejars, 2007:159–161), the Irish swords do not show such a pattern (see fig. 6).

I believe that we can strengthen the argument that the Irish weapons were indeed intended as a thrust-and-cut weapon, rather than a cut-and-thrust weapon as many of the longer continental La Tène swords appear to be. Apart from length and the large proportion of Irish swords with a cross-section that lends itself to resisting pressure when thrusting, other features that indicate a weapon designed for thrusting are present in these swords. The first is the point. Almost all the swords under study, where the point of the blade was not broken, culminate in a fine point. The only exceptions are the sword described by Henken (1950:92) as originating from “...the old course of the Boyne” and possibly the sword UCMAE 99.300, from

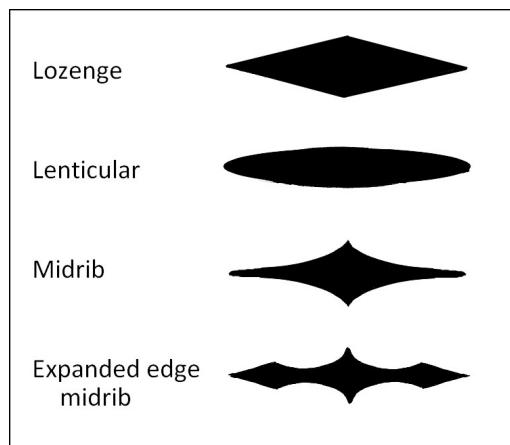


Figure 5: *Blade cross-sections found in Irish Iron Age swords*

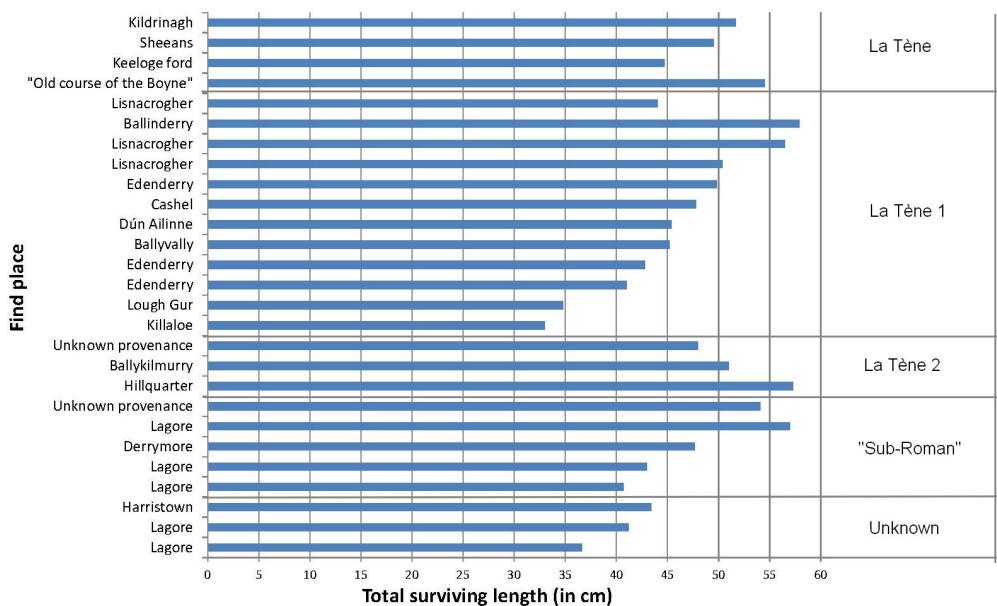


Figure 6: Length of complete swords in study

Edenderry, Co. Offaly: both have rounded points. However, it is interesting to note that in the case of the sword from the old course of the Boyne it is among the longest examples of a La Tène sword from Ireland at 54.70 cm (Hencken, 1950:92; Rynne, 1982:93; Raftery, 1983:91). Two of the Sub- Roman Swords from Lagore also appear to have had rounded points and they will be discussed below. When we compare these swords to their contemporaries, we see that on the continent, there was a continuous shift towards long swords that does not appear to have been present in the Irish material.

Continental swords from La Tène I can range from 50–70 cm and by La Tène III measuring 80–90 cm with examples reaching lengths of 1.01 m in length (Pleiner, 1993; Stead, Flouest, and Rigby, 2006:84, 264, 272, 293, 296; Lejars, 2007:159–161). Brunaux (2004:50 sq.) describes the morphology of early continental La Tène swords as infantry weapons perhaps used for dueling. However, Middle La Tène continental sword design favours the blade over the point and being used from a position of height, such as a chariot or from horseback. This type of usage is also supported by the appearance in the archaeological record of sword-chains, which held the weapon in an advantageous position for riding when not in use. This situation is mirrored in Britain, where the short type i swords evolve from 65.50 cm maximum to type v examples that can exceed 85 cm (Stead, 2006:8 sq.). The longest swords from La Tène III can feature the expanded-edge with central midrib in order to add strength, however most are lenticular in section and there are examples of weapons over a metre in length with a lenticular cross-section. Later long swords also develop a more rounded point. All these features are indicative of a weapon intended for slashing and cutting (Stead, 2006:8; Lejars, 2007:160). Though this evolution toward long slashing swords is present in both continental and British swords, Lejars (2007:160) stresses that shorter swords (c. 65 cm) were in use concurrently with the longer type, particularly from the 3rd century BC onwards.

In his view this probably represents the differing equipment of cavalry and infantry. The Sub-Roman category of swords relate to their continental counterparts in a different way to the La Tène types. The swords in this study are by no means a representative sample of this type but some information about their use and origins will be discussed here. The two Roman military swords influence these types: the *gladius*, the short, thrusting sword of the Republican and early imperial infantry, and the *spatha*, the long slashing weapon of the cavalry. The *spatha* eventually superseded the *gladius* in the infantryman’s arsenal as the Roman military changed format between the late 2nd and early 3rd century AD (Stephenson, 1999:61; Southern, 2007:212 sq.). The ‘Pompeii’ type *gladius* is the sword that closely matches two of the swords under study. In comparison to La Tène swords, this type is defined by ‘squared off’ shoulders where the blade meets the tang, they have a strong lozenge-shaped section and the blade edges are parallel before narrowing to a triangular point (see fig. 2b). Unlike Irish La Tène swords, ‘Irish gladii’ are well within the typical size range for their continental relatives, which is between 36.70 cm and 59 cm (Lang, 1988:200; Coulston, 2007:37).

The sub-Roman sword from Derrymore is 47.70 cm long, for example, and the *gladius* from the fort of Newstead in Britain is 43.10 cm long (see fig. 2b for a comparison between these two swords). There are also ‘Irish editions’ of the *spatha*: An example from Lagore (0002 Wk:002) bears significant resemblance to the Vimose-Illerup type common in ‘war-booty’ bog deposits in Denmark (Cahill Wilson, 2014:28; for more information on Danish bog deposits see Pauli-Jensen, 2009). This *spatha*, however, is more similar in length to Irish swords of the time i.e. rather short. Two other swords from Lagore also bear resemblance to the *spatha* type (NMI Wk:060, NMI R114). These swords have the squared shoulders and rounded point of the *spatha*, but they are both rather thin and extremely short. In order to understand the way swords were used, we must also analyse the other implements of the warrior’s panoply known from the Irish Iron Age, namely the spear and the shield. Iron Age spearheads in Ireland all measure between 14.80 cm and 47.80 cm and there are the remains of a now fragmented spear-shaft reportedly 8 feet in length when discovered (Raftery, 1983:109–111).

As discussed by Scott (1990:65), these weapons would not be out of place if found in any continental La Tène assemblage. These large spears are suggested by Scott to be the weapon of war, with the sword serving a parade role (c.f. Lejars, 2007:45 sqq.). However, this is a simplistic view that does not take into account the fact that even though the spear was the principal weapon, it was by no means used on its own. In both North and South Iron Age Europe, the long spear (or lance) is the main weapon: Danish warriors in the early centuries AD fought with the lance (Hvid, 2007); the Greek hoplite would be armed with a spear (Goldsworthy, 1997:6) and Roman infantry after the 2nd century AD were primarily spearmen as well (Stephenson, 1999:61). However, all the fighters described above carried swords: the Dane with the Illerup-Vimose type *spatha* (Hvid, 2007:139), the hoplite had the xiphos (Anderson, 1993:23) and the Roman a *spatha* or *gladius* (Stephenson, 1999:58). This is because spears, consisting mostly of a long wooden pole, can be shattered on an opponent’s armour or shield. A sword would be of vital importance in this eventuality and there is no reason why Irish fighters would not also carry swords as a backup weapon for just this situation. The other piece of military equipment known from this period are two shields; the example from Lambay consists only of a fragmentary bronze boss and its original form cannot be ascertained (Raftery, 1983:107; see also Cahill Wilson, 2014:chapter 4). The example from Clonoura bog, however, is excellently preserved. It measures 55.40×34.40 cm (Raftery, 1983:1007), being the

only example of its type in Ireland we cannot extrapolate that all Irish shields took this form. However it does bear resemblance to the shields on Roman-British gravestone illustrations and Tacitus describes British peoples using shields such as this as well (Coulston, 2006:313; Coulston, 2014:71).



Figure 7: Leather shield from Clonoura bog © Hughes 2015

Like the swords, the Irish shield is smaller than its continental La Tène counterparts, which measured between 110 cm and 120 cm in height (Lejars, 2007:165). Without experimental work we cannot predict its behaviour in use, but one could speculate that it must have been a fairly maneuverable piece of equipment. This would indicate that despite the resemblance in size of Irish swords to the Roman *gladius*, the Irish were not engaged in similar heavy infantry tactics requiring a large shield like the Roman scutum. Even so, evidence of this shield's effectiveness in battle is provided by the extensive damage across the front side (fig. 7).

The overall form of the Irish Iron Age swords informs us that it was probably a close-quarters thrust-and-cut weapon, probably used by infantry, who may also have

been armed with a small, manoeuvrable shield and a thrusting spear. This is in comparison to their continental and British contemporaries, the Roman military, while using a short sword, would also have been armed with a much larger shield, and the La Tène Iron Age peoples of the continent would have fought with much bigger shields and longer, slashing swords, albeit with some shorter weapons also in use.

It might seem strange that Ireland would have such different weapons and possibly military tactics from Britain and the continent. However, there is a period where the fighting style we see in the Irish Iron Age might be paralleled: the Irish Bronze Age. The 'true sword' as opposed to the so-called rapiers of earlier periods was introduced to Ireland in the earliest part of the Late Bronze Age (Mallory, 2013:132 sq.). These swords vary in length more than those of the Iron Age: they range from 43.50 cm to up to 75.60 cm but many are described as being "...noticeably short" (Colquhoun, 2011:52) and Molloy (2007:105) gives 400–600 mm as a range for the early 'Ballintober' type, which had a hilt similar to the earlier rapiers but a leaf shaped blade making it more suitable for cutting as well as thrusting. Irish Iron Age swords would be within the lower end of this range for the most part, but still within it. Molloy (2007:105–107) also demonstrates that these weapons would be lethal delivering either cut or thrust. Adding to this parallel is the fact that Irish Bronze Age shields, though round rather than rectangular are similar in surface area to the Clonoura Iron Age shield (which has a surface area of roughly 1.90 m²). An example of a leather Bronze Age shield from Clonfin has a diameter of ca. 50 cm (Osgood, Monks, and Toms, 2001:25) giving it a surface area of roughly 1.95 m².

These similarities could mean that even when a new type of weapon was introduced to Ireland – first the La Tène and later the Roman sword – it was adapted to fit the fighting style

already in place. Horn’s analysis of use-wear on Bronze Age weapons from Nordic countries showed that despite changes in weapon type over time, the type of damage sustained changed very little. This indicated that weapons were adapted to suit the type of combat already in place, rather than the other way around (Horn, 2013:111 sq.). Perhaps Irish Iron Age combat, instead of moving with the times and evolving toward the long-sword tactics of the continental peoples, retained a more ‘Bronze Age’ fighting style. This model of Irish warfare raises questions about other aspects of Irish Iron Age society. The most numerous types of La Tène metalwork found in Ireland are objects associated with horse-riding or -driving (Mallory, 2013:178) and Dolan (2014:368) highlights the importance the horse must have had to Irish Iron Age society on the basis of this equipment. Why then, is there an apparent lack of swords that would be useable from horseback or in a chariot, such as the ones in use on the Continent? The lack of differentiated sword types in Ireland might further indicate that we might be seeing a single infantry soldier type in the Irish archaeological record when on the continent, there appears to be a move toward a differentiation between infantry and cavalry (Lejars, 2007:160), something which in turn could be indicative of differing social and economic status.

While the differences between the Irish and British/continental material have been the focus of this study, it also shows us the type of interaction the Irish had with outside areas: The Ballyshannon Bay hilt provides evidence for Irish contact with the continent and it should be noted that this is not the only imported material in the area. Pottery from the same region of South-west France where the sword hilt probably originated from was dredged up off the Pocu-pine Bank, off the coast of Co. Sligo, to the south of Ballyshannon bay (O’Brien, 2009:193; Cahill Wilson, 2014:25 sq.). This indicates that imported goods could travel to all parts of the country, and were not the preserve of the east coast, where most continental material is found. As has been outlined above, the anthropoid-hilt sword type is known for its short length compared to other continental La Tène swords, measuring between 29 cm and 55 cm (Pleiner, 1993:69). The fact that this was the type of sword selected for import to Ireland emphasizes the conscious choices of the Irish when it came to the weaponry they used. The small number of ‘sub-Roman’ swords in this study also provides evidence for links with the continent, but of a more varied nature. The *gladius* type swords found in Ireland are well within their typical range, and may have been imported directly. The *spatha* types, on the other hand, have been downsized to “Irish proportions”. That is 41–57 cm in the examples from Lagore compared to 65–90 cm in the Roman world (Dixon and Southern, 1997:48). This would seem to indicate that these swords were possibly a local production, inspired by the foreign Roman types but adapted to the conditions of Irish warfare.

This project set out to investigate hypothesis that Irish Iron Age swords were suited to a different style of warfare than their continental counterparts, and to challenge the idea that they were ineffective combat tools that would only have been useful in a “...pub brawl” (Scott, 1990:65). This research brought the assemblage of Iron Age swords up to date through survey of the National Museum of Ireland’s single finds and published excavation finds, creating a more representative sample with which to work.

This allowed the comparison of each sword by dimension, blade shape and blade cross-section. It shows that a large proportion of these swords have specific characteristics that allow them to withstand thrusting-type attacks as well as cutting or slashing blows. When compared with fighting styles from the continent, such as that of other La Tène Iron Age areas and the Roman military, it would seem that the Irish had a distinct style of warfare. This ‘Insular fight-

Conclusion

ing style' may have been based on the type of combat pursued in the Bronze Age: new material imported from the Continent, be it La Tène or Roman in origin, was incorporated into the local fighting style.

In the case of La Tène weapons and the Roman *spatha*, this was done by making shortened versions of the weapon. There was no need to shorten the anthropoid-hilted sword from Ballyshannon or the Roman *gladius* type swords however, as these weapons were already suited to the type of use the Irish had in mind. Together, the short length and blade properties seem to indicate that the Irish Iron Age sword was not designed for use on horseback, but was an effective infantry weapon and not only the preserve of 'Pub brawls'.

* * *

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Les épées irlandaises de l'âge de fer sont remarquables parce qu'elles sont plus courtes que leurs contemporaines découvertes en Grande Bretagne et en Europe continentale à l'époque de La Tène. C'est à cause de cette caractéristique que l'on a émis l'hypothèse qu'elles étaient essentiellement des sortes de poignards ou des objets de cérémonie qui n'étaient pas destinés au combat. La présente recherche intègre des études d'épées précédemment publiées à du nouveau matériel provenant de l'étude de bases de données de musées irlandais, et a pour but d'examiner les épées en termes de morphologie et de dimension de lame, et d'en déduire leur utilisation possible dans les batailles. L'étude montre que la majorité des épées de la période 700 avant J.C.- 400 apr. J.C., qu'elles soient de type La Tène ou sub-romain, ont des caractéristiques d'armes utilisées pour se battre à pied. Ceci est en désaccord avec la nature des armes découvertes ailleurs à la même époque en Grande Bretagne et en Europe continentale, et souligne le développement insulaire de l'Irlande durant cette période. À travers deux études de cas, la présente analyse montre également qu'interagir avec le monde extérieur a pu signifier choisir d'importer des armes et des idées. Le présent article clarifie les suggestions indiquées dans d'autres travaux relatifs aux utilisations de ces épées et examine les épées sous un autre angle, l'angle sous lequel ces armes se rattachent à la nature même de la guerre et de la société dans l'Irlande de l'âge de fer.

Abstract (French)

Abbreviations used in Appendix 1:

BM	British Museum
NMI	National Museum of Ireland
UCMAE	University of Cambridge Museum of Archaeology and Ethnography
UM	Ulster Museum

Museum number	Find site	Site type	Raftery type	Total surviving length	Length of blade	Length of tang	Max. width of blade	Blade cross section	Description	Publications
NMI 1989:36	Harristown, Co Meath	Single	La Tène	43.4cm	29.2cm	13.2cm	3.2cm	Midrib	Heavily corroded and bent. Possibly La Tène based on the curved shoulders. The blade appears to have had parallel sides for much of its length. It has a lozenge-shaped cross section.	
NMI 1999:140	Sheeans, Co Kildare	Single	La Tène	49.5cm	37cm	12.5cm	3.5cm	Midrib	A fairly corroded and notched blade, the sides are parallel or sub-parallel for some of its length before tapering over the final 1/3 of the blade to a point. It has a midrib cross section.	
NMI 8377: Wk:10	River Shannon, Keeloge ford, Co Galway	River	La Tène	44.7cm	28.5cm	15.5cm	3.6cm	Unknown	Only the blade and tang survive. The blade is parallel-sided for the entire surviving length, the point is broken off. The curved shoulders indicate it is a La Tène type. Corrosion prevented the assessment of the cross-section.	Scott 1990, 71
NMI Wk:10	Kildrinagh, Co Laois	River	La Tène	51.7cm	38.9cm	12.8cm	3.3cm	Lozenge	The blade tapers gently over its length to the point. The curved shoulders indicate a La Tène type. It has a lozenge-shaped cross-section. Scott's analysis shows this is a well-made and quite serviceable blade.	Scott 1990, 71
NMI Wk. 24	River Nore, Kildrinagh, Co Laois	River	La Tène	20.1cm	12.4cm	9.8cm	2.9cm	Lenticular	The blade tapers over the course of its length. It is broken 12.4 centimetres from the top and has a flattened cross section. There is a trace of a campanulate hilt-guard. Analysis by Scott revealed that this sword was made from low-carbon iron and would have been a rather ineffective weapon.	Scott 1990, 72
No Number	"The old course of the Boyne", Russellswood, Co Kildare	River	La Tène	54.5cm	N/A	N/A	N/A	Lenticular (poss.)	A straight-sided sword described by Hencken as an "Anglo-saxon spatha". However, Rynne identifies it as having affinity with late La Tène type swords. It has a hilt guard mount of bronze, but this is straight rather than campanulate.	Hencken 1950, 92; Rynne 1982, 93
BM 80	Lisnacrogher, Co Antrim	Bog	Type 1	50.4cm	37.cm5	12.8cm	4.2cm	Midrib	Described by Raftery as leaf-shaped but its sides are parallel for much of the length. The copper alloy hilt-guard mount and washers survive. Scott notes this blade was not hardened.	Raftery 1983; Scott 1990, 68; Fredengren 2007
NMI 1926:47	Ballyshannon Bay, Co Donegal	Sea	Type 1	N/A (poss. 49cm)	N/A	N/A	N/A	N/A	Only the hilt survives: one-piece copper alloy in the shape of an anthropomorphic figure of Gaulish type. The blade is now lost. Length of the hilt: 13.6cm.	Raftery 2003; O'Brien 2009; Cahill Wilson 2014, 24ff
NMI 1934:190	River Shannon, Killaloe, Co Clare	River	Type 1	33cm	29cm	3cm	4.2cm (hilt-guard mount)	Lozenge	Uncertain, fragmentary. Copper alloy hilt-guard mount and washers survive.	Raftery 1983
NMI 1934:68	Lisnacrogher, Co Antrim	Bog	Type 1	N/A	N/A	N/A	N/A	N/A	This sword survives only as a copper alloy hilt-guard mount.	Raftery 1983
NMI 1958: 56	Cashel, Co Sligo	Single	Type 1	47.8cm	37.3cm	10.4cm	3cm	Lozenge	Fragmentary, but it appears to be straight sided and tapering to a point. The hilt-guard mount and washers survive.	Raftery 1983
NMI 1989:86	"Off Cullenagh", Ballyvally, Co Clare	River	Type 1	45.2cm	35cm	10.1cm	3.8cm	Expanded edge midrib (poss.)	The blade is parallel-sided for much of its length, tapering over the last quarter to the point. The corrosion makes the assessment of the cross-section difficult. It is possibly a midrib with expanded edge one. Mineral replacement of an organic handle may have taken place. A corroded and fragile hilt-guard mount of iron like that of the Dún Ailinne sword is present.	
NMI E79:630	Dún Ailinne, Co Kildare	Ringfort	Type 1	45.4cm	39cm	3.4cm	6.4cm	Lenticular	The blade has straight sides and tapers to a point (broken). The iron hilt-guard mount survives.	Raftery 1983; Johnston & Wailes 2007, 88-89

NMI F.690	Lough Gur, Co Limerick	Lake	Type 1	34.8cm	26.2cm	8.4cm	3.4cm	Lozenge	Fragmentary, but appears to be straight-sided and tapering to a point. A copper alloy hilt guard mount and organic handle are still present.	Raftery 1983
NMI W4	Ballinderry, Co Westmeath	Bog	Type 1	57.9cm	46.45cm	11.2cm	2.8cm	Expanded edge midrib	Parallel-sided for much of its length, it tapers to a point. The copper alloy hilt-guard mount is present.	Armstrong 1923, 19; Raftery 1983, 91
UCMAE M. C. 99.300	Edenderry, Co Offaly	Single	Type 1	41cm	29cm	12.4cm	4.3cm	Expanded edge midrib	Fragmentary. A very wide blade, it appears to have been parallel-sided. A copper alloy hilt-guard mount is present.	Raftery 1983
UCMAE M. C. 99.301	Edenderry, Co Offaly	Single	Type 1	42.8cm	32cm	10.4cm	2.6cm	Lozenge	Fragmentary, but it appears to be straight-sided and tapering to a point.	Raftery 1983
UCMAE M. C. 99.305	Edenderry, Co Offaly	Single	Type 1	49.8cm	37cm	12.8cm	3cm	Lozenge	Fragmentary, but it appears to be straight-sided and tapering to a point. One washer survives.	Raftery 1983
UM 167-1949	River Bann, Toome, Co Antrim	River	Type 1	15.3cm	N/A	N/A	2.9cm	Lozenge (poss.)	Uncertain, fragmentary. A copper alloy hilt guard, organic handle and copper alloy wrapping survive.	Raftery 1983
UM B2	Lisnacrogher, Co Antrim	Bog	Type 1	56.5cm	47.7cm	9.2cm	3.6cm	Midrib	Fragmented into six pieces, it is difficult to ascertain blade characteristics beyond the presence of a midrib. The copper alloy hilt-guard mount, fittings and washers survive. Scott interprets this blade as low-quality and probably one that would not have functioned well as a weapon.	Raftery 1983; Scott 1990, 66-67; Fredengren 2007
UM B3/B5	Lisnacrogher, Co Antrim	Bog	Type 1	44cm approx.	N/A	N/A	N/A	Lozenge	The blade was found lodged in its scabbard and the tang is gone. Part of blade has now been extracted. Scott believes this would have been the most effective weapon of the three swords from Lisnacrogher.	Raftery 1983; Scott 1990, 67-68; Fredengren 2007
NMI 1984:240	River Shannon, Hillquarter, Westmeath	River	Type 2 (poss.)	57.3cm	46.2cm	9.9cm	3.9cm	Expanded edge midrib (poss.)	The blade is heavily corroded, but is parallel-sided for most of its length, terminating in a sudden triangular point. The cross-section is indeterminable due to the extent of corrosion. There is a hilt guard, possibly of mineral-replaced organic material.	
NMI 1898:2	River Colligan, Dungarvan, Co Waterford	River	Type 2a	N/A	N/A	N/A	N/A	N/A	A deerhorn pommel, 6.65cm in diameter.	Raftery 1983
NMI W234	Ballykilmurry Bog, Co Wicklow	Bog	Type 2a	51cm	37.5cm	N/A	4.3cm	Lenticular	A wooden sword, a skeumorphic representation of metal hilt-guard mount is present.	Raftery 1983; Coulston 2006, 312-313
NMI L 1947:179	Lambay, Co Dublin	Burial	Type 2b	N/A	N/A	N/A	5.2cm	N/A	Fragmentary and heavily corroded.	Macalister 1929; Rynne 1976; Cooney 2009, 19; Cahill Wilson et al. 2014, 95
NMI No number	Unknown	Single	Type 2b	48cm	36.2cm	10.2cm	3.6cm	Lenticular	The blade has straight sides tapering to a point with a hilt guard and handle of bone surviving.	Raftery 1983
NMI W14	River Shannon	River	Type 2b	14.9cm	N/A	5.8cm	2.9cm	Lozenge	Fragmentary, but it appears to be straight-sided and tapering to a fine point. An organic hilt guard is present.	Raftery 1983
NMI Wk18	River Shannon, Banagher, Co Offaly	River	Type 2b	27.6cm	N/A	N/A	2.2cm	Lozenge	Uncertain, fragmentary. The hilt guard and a fragmentary grip (both of bone) are present.	Scott 1990, 71
UCMAE M. C. 99.297	Edenderry, Co Offaly	Single	Type 2b	12.2cm	N/A	N/A	2.6cm	N/A	Uncertain, fragmentary. The hilt guard and a fragmentary grip (both of bone) are still present along with a horn pommel.	Raftery 1983
UCMAE M.C. 99.292	Edenderry, Co Offaly	Single	Type 2b	33.4cm	N/A	9.8cm	3.6cm	Lozenge	The blade is broken, but its sides appear to be parallel. The hilt-guard and handle of bone survive.	Raftery 1983

NMI 0002:Wk002	Lagore, Dunshauglin, Co Meath	Crannog	Sub-roman	57cm	46.3cm	10.7cm	N/A	N/A	Long, well-preserved sword with a small bell-shaped bronze knob or pommel. The blade is very long and narrow. Hencken states that it is "clearly related to the Roman spatha".	Wood-Martin 1886, 62, pl. IX.2; Hencken 1950, 92
NMI 0003:Wk003	Lagore, Dunshauglin, Co Meath	Crannog	Sub-roman	40.7cm	31cm	9.6cm	2.9cm	Lenticular	A sword with right angled shoulders, parallel sided blade ending abruptly in a triangular point. Hencken suggests that this weapon resembles in its proportions the Roman gladius though far smaller in size.	Wood-Martin 1886, 63, pl. IX.4; Hencken 1950, 92, fig. 25
NMI 0004:Wk004	Lagore, Dunshauglin, Co Meath	Crannog	Sub-roman	43cm	N/A	N/A	N/A	N/A	Very small iron sword of sub-Roman type. The blade has more or less parallel sides and a fairly sudden point. Hencken argues that this feature is derived from Roman types and the sloping shoulders from La Tène examples.	Hencken 1950, 92
NMI 1197: Wk:5	River Deel, Derrymore, Co Westmeath	River	Sub-roman	47.7cm	37.5cm	10.1cm	4.5cm	Lozenge	This side has a thick fat blade, parallel sides for much of its length and ends abruptly in a triangular point. Squared tang, slightly flared shoulders. It has a lozenge-shaped cross section.	
UM A12184	Unknown	Single	Sub-Roman, uncertain	54.1cm	41cm	13.1cm	3.1cm	Lenticular	A sword with parallel or sub-parallel edges that narrows sharply to triangular point. It has convex shoulders and a flattened cross-section.	
NMI 0184 Wk:060	Lagore, Dunshauglin, Co Meath	Crannog	Unknown	36.6cm	28cm	8.5cm	2.6cm	Midrib	A thin-bladed sword tapering gently over the course of its length. The point is missing. The cross section is lozenge-shaped with small midrib.	Hencken 1950, 91
NMI 1989:103	Ballyvally, Co Clare	River	Unknown	27.4cm	27.4cm	N/A	2.1cm	Lenticular	Broken terminal end of a blade. It appears to have had parallel edges for at least some of its length before tapering to a fine point. It has a flattened cross section.	
NMI R114	Lagore, Dunshauglin, Co Meath	Crannog	Unknown	41.2cm	36.6cm	4.6cm	2.4cm	Mixed (see description)	A thin-bladed sword with off-parallel edges tapering for most of its length before narrowing more sharply to a now-lost point. The blade has two cross sections: double ribbed in the lower half and lenticular in upper part.	Raftery 1983; Coulston 2006, 312-313

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Re-assessing the Location of the Homeric Underworld in the Odyssey Book XI

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Homeric poetry displayed the first basic structures of the Greek underworld: the encircling deep river of Oceans, the rivers of Styx, Acheron, Cocytus and the “dank house of Hades”. The aim of this article is to gain a general understanding of where Homeric underworld was located, specifically the underworld in The Odyssey Book XI. To explore the exact location itself, this article will use a combination of archaeological evidence, comparative linguistic analysis of Hittite and Egyptian stelai and papyri, and literary analysis of Homeric poetry.

Keywords: Homer, mythological geography, Odyssey, Hittite, Underworld, Book of the Dead, Cimmerians, Bronze Age Mediterranean.

Abstract
(in German see b)

THE purpose of this article is to understand the location of the Homeric Underworld, the Cimmerians in the *Odyssey*, through the inspection of offerings. In this, Odysseus' offerings at this area and their functions shall be compared with those mentioned in Hittite and Egyptian hymns, rituals and *stelai*. Through translation, the analysis of Homer's description of the Cimmerian location will challenge the suggestion (presented by Herodotus) that the area was in Scythia, (Hdt. Hist.4.1.2) and instead examine whether the Homeric location resides in Anatolia or Egyptian territory. As M. Morford and Sham (2011:356) explains: “*the geography of the Homeric Underworld is vague... Particularly in the precision that is evident in subsequent literature*”. Homer was the first known person to write about the structure of the Greek Underworld (influencing Plato and Virgil's later works), so exploring where Homer considered the underworld to be will give a stronger understanding of Homeric geography and the impact it had on his successors' writings.

In the ‘East Face of Helicon’, West (1997:12) demonstrated that the formation of the Ancient Greek language came from surrounding Mediterranean cultures in Asia Minor, the Levant and Egypt. His philological inspection leads one to wonder whether Greek rituals were

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influenced by the same foreign cultures that helped form the archaic Greek language. In his inspection of the chthonic myths in the *Odyssey*, West (1997:425) makes consistent comparisons between Greek and Babylonian and Semitic cults. He gives, however, little credence to the Egyptians, and therefore pays little attention to their influence on Homer's writings (West, 1997:12). By contrast, Griffith (1997:353–362) suggests that in Book IV of the *Odyssey*, the underworld, the διπτετος ποταμοι “floating of river”, was referring to the celestial Nile mentioned in Egyptian hymns. While Griffith (1997) displays that Egyptian chthonic myths were evident in Homer's writing, he focuses on a more obscure passage, which does not directly deal with the larger area of the underworld, the Cimmerians. Therefore this article intends to demonstrate that Homer's Cimmerians were similarly set in Egypt.

Homer's Influences and Identity In order to appreciate where the underworld may have been situated, it is important to understand Homer's identity and his influences. Unfortunately, it is unclear whether Homer was an individual author of the *Odyssey*. M. Parry and A. Parry (1987:xi–xii) even contested the idea that Homer existed. His arguments against the poet's existence are based on the understanding that Homer could not write, the myths themselves were passed down to the poet, and that the Hebrew culture was superior in poetry. It is true that the early Semitic cultures held an important role in Hellenic writing such as the Phoenician supplying of the Greek alphabet. But the Hebrews themselves were unknown prior to the fifth century BC. Nevertheless,

Semitic influence in early Greek writing is well known to us, which means attention must be paid to their influence on Homeric writing and mythology. M. Parry and A. Parry (1987) is right for stating the possibility that the myths were passed down orally to the poet. He does not consider however that Homer, though not a creator of the myths, had combined varied myths from different nationalities into one epic poem. He also ignores the different Greek dialects in Homeric poetry. The combination of Arcado Cypriot, Attic, Aeolic and Ionic Greek was uncommon in oral tradition. For such varied dialects to be used, there would have had to be a poet subject to the cultures, who used and formed these dialects. For this reason this article will treat the poet as an individual.

M. Morford and Sham (2011:49) dates Homer between the eighth and seventh century BC. In that time, the Chalcidians (in Euboea) spoke Ionic Greek and were close to the Aeolic speaking Boeotians, and Attic Greeks (Woodard, 2008:51), the same dialects used in Homer's *Odyssey* and *Iliad*. This perhaps is an indication the poet might have been from around this area. As Hughes mentions, Homer's dactylic hexameter is identical to the metric system in the Boeotia Theban Linear B tablets, dated to the Late Bronze Age (Hughes, 2013:198). While not (as far as this argument is concerned) from the same time period, it is possible Homer belonged to an oral tradition from around the Boeotia area that continued to use this specific metric system. However there is little evidence to say if this was ever true. Nevertheless, because of the close parallels between the poetic form and dialects in this area and Homer's writing, there is a possibility the poet was from the same location. Bonfante (1986:69) posits that the Chalcidians, neighboring Boeotia, created sea trading posts in Northern Syria and Naucratis (Egypt's post), suggesting Homer, being from this area, could have been exposed to sea merchants. He does, in fact, seem to be aware that Euboea is a popular sea-port in his hymn to Apollo. He states that Apollo came to the *vausikleites Eubioes* “ship famous Euboea” (HH. Delian Apollo: 3.219). It is possible that he was from, or had at some point visited, this area in order to know Euboea was a popular port. The most common group of merchants, between the Bronze Age and Classical period, were the Phoenicians, a Semitic sea-faring people with a large presence in

the Mediterranean and Aegean Sea. According to Herodotus, these were the people who took Io as a hostage (Hdt. Hist.1.1.2–4). This does give the impression they were notorious for such kidnappings. Bonfante's evidence of Chalcidian ports indicates there was a strong demand for sea trade, which would have attracted the Phoenicians. Homer (possibly located there) might have been subject to the Phoenician traders. Given that the poet's name, Homeros, means, "hostage" (Liddell and Scott, 1940), and that the Phoenicians had a certain notoriety for kidnapping and taking captives, the poet might, given his name, have been a Phoenician hostage.

This theory is not without its evidence. Knott's map of Phoenician trade has shown Euboea, along with other Mediterranean countries such as Egypt, as a recognized port used by Semitic sailors in the first half of the tenth century BC (Knott, 2014). Struck, while displaying skepticism about comparing Homeric geography with modern geography, has illustrated a map of Odysseus' travels (Struck, 2009). Compared with Knott's, Struck's map shows similarities between the travels of Odysseus and the Phoenician trading routes, such as: Iberia, Carthage, Sicily and Etruria. For such similarities to occur, Homer might have had close relations with the Phoenicians. This theory, however, cannot be based only on scholarly comparisons. Primary evidence from one of these posts does need to be considered as well. One significant Phoenician trading post was in Etruria. In the seventh century BC, the myth of Odysseus and the Cyclopes Polyphemus was popular among Etruscan culture. The terracotta *pithos* amphora vessel, found in Etruria, depicts the scene of Odysseus stabbing the creature in the eye (96.AE.135). According to Getty, the vessel was used for funerary purposes and ritual. Phoenicians were known to have used terracotta objects in certain tombs at Tyre (Aubet, 2010:152). This would suggest they used this material specifically for funerary purposes. Given the funerary *pithos* amphora was made of terracotta, it is possible the Phoenicians crafted this themselves, as well as the painting of the Polyphemus tale. It could be argued that their ability to depict the myth in such detail might have meant they created the myth themselves. It is unclear whether this myth predates Homer, or if it was invented by the Phoenician poet. Nevertheless, the myth having such a ritualistic importance in Etruscan culture could indicate that, whatever the answer, Polyphemus was believed to have lived in Etruria in the *Odyssey*. This would give more reason to think that, because the myth was known on a Phoenician trading route, there is a possibility it was either passed to them or authored by a Phoenician. Assuming Homer was a Phoenician hostage (Etruria being a Phoenician port), it could be proposed that Homer travelled to that area.

Furthermore, the medium used was terracotta. In other archaeological examples, a seventh century BC terracotta vase, Amforicos, was found in Cyprus (MET 74.51.1416). Because the same medium was used in Cyprus as that found in the Phoenician port of Etruria, it is possible that this was a Phoenician vessel, and their trade was known between the two countries. In addition, the Cypriots of the seventh century BC used clay vessels, one in particular had Phoenician inscriptions (74.51.2299). This could demonstrate that the Phoenicians were established in Cyprus. Homer also uses elements of Arcado Cypriot (Willmott, 2007) as well as Aeolic, Ionic and Attic, indicating he would have come into contact with Cypriot culture. Evidence of his relations in Cyprus can be seen in the Homeric Hymn to Aphrodite, where he describes her as a *kypridos*, Cypriot (HH. Aphrod:5.2). To have this level of detail about the location of this Olympian deity, he would have had to have travelled to Cyprus or be associated with a group who had, the Phoenicians. This gives a clearer idea of his identity, and the influence he would have had. Given not only the similarities between Odysseus' and the

Phoenician sea-faring routes, but also the possibility Homer had contact with Cyprus, like the sea traders, indicates further he was a Phoenician.

During the seventh century BC, Cypriot Kingdoms, including Kingdom of Hatti (in Anatolia), were witness to an Assyrian intervention by the Assyrian king, Esarhaddon (Esarhaddon, Nineveh 1 V 54–73). Radner (2012) shows, from Esarhaddon's inscription, that in the seventh century the Cypriot kingdoms also worked towards helping Assurbanipal's army against Egypt. Because Homer did have contacts with Cyprus, there is a possibility the Kingdom of Hatti, Assyria, and Egypt would have had the most influence in his writing. Homer could have been inspired by certain Egyptian rituals. An Egyptian town was attacked by the Assyrian army (WA 124928), which Homer, given his association with Assyria, might have witnessed. As Taylor (2010:54) mentions, the Book of the Dead and their spells were recited from the New Kingdom (1550 BC) to as late as 50 BC. Therefore these chthonic rituals would have been present during Homer's time, meaning they may have been an inspiration to the poet. This theory, however, presumes that Homer travelled to Egypt without much evidence given to support this point. It is here that I hope the similarities between Egyptian and Homeric mythology, might also shed some light on whether the poet had travelled to this area.

Ritual and Offering The offerings mentioned in the *Odyssey* show similar rituals as those used in Asia Minor Homeric, Egyptian, and Hittite in Egypt. The similarity can indicate underworld might have been located in one of these countries.

“αμφ' αυτωι δε χοην χεομην πασιν νεκυεσσι, πρωτα μελικρητω μετεπετα δε ηδει οινωι, το τριτον αυθ' υδατι: επι δ' αλφιτα λευκα παλυνον” (Hom. Od. XI, 27–28).

“I first poured a libation of milk and honey to all corpses, and afterwards with pleasant wine, again three parts with water, and with sprinklings of clear barley grains” (author's translation).

These offerings were known in two different cultures, Hittite and Egyptian. The Hittite Hymns speak of wine being offered as a libation to the dead (Kapełus, 2011). By contrast, in the pyramid texts, wine was given as an offering to the deceased (PYr § 36.b). Though this similarity does not specify a location for the underworld; further investigation might suggest the location resides in Egypt. The Book of the Dead describes offerings of milk made to the deceased: “*Thou shalt scatter incense and thou shalt fill them with milk of a white cow*” (Budge, 1969:414). Egyptian ritual texts show the same offerings of milk and wine made as those in Book XI. By comparison, sections 12–13 of the Hittite hymns shows “liquid offerings” (Kapełus, 2011:12–13) were made. Without firm evidence, it cannot be speculated whether these “liquid offerings” refer to milk. Given that the Book of the Dead describes the specific offerings themselves, wine and milk, as Homer describes, it is possible the Homeric location of the underworld is within Egypt. Honey, according to the Papyrus of Berlin (University College London, 2002) was an ointment and incense for the god Amun Ra. Barley grains ‘*alphi*’ have been shown in the Papyrus of Ani, in which the deceased is shown collecting them (EA 10470/35AN30302001). This is important to mention since it is used as a process of gaining access to those in the afterlife both in Egyptian rituals and Homer's *Odyssey* Book XI.

In relation to the Homeric underworld, the offering of barley is interesting when considering Egypt as the location. The Papyrus of Ani shows Ani picking barley grains on that same piece of land. She is then shown to raise her arms at the *bnw* phoenix bird. After this image, the sun is shown in between two mountains (known phonetically as *ȝbt*). Next to those three

crested ibis birds (EA 10470/35AN30302001). By comparison, Homer describes Odysseus seeing the *psuches* ‘lives’ of the dead after he puts down his offerings of barley, honey and wine. The way in which Homer describes the dead throughout Book XI suggests they are reborn or, at the least, life-like. The same concept of bringing the deceased to life is shown, though rather ambiguously, in the papyrus described above, by Ani offering barley. The three ibis birds are particularly important in displaying this. The ibis bird was called ‘*nh*’ to the Egyptians. The title ‘*nh*’ means life (Collier and Manley, 1998:153), indicating these birds symbolize the spirits of life. This gives the impression Ani brings the deceased back to life similar to Odysseus bringing the souls to life. The phoenix, (*bnw*), is the “living image for typically renewed life” (Betro, 1996:108). Renewed life suggests a form of resurrection. A similar action is shown of the deceased in Book XI, where the dead are resurrected to speak with Odysseus. Ani is also shown to be carrying a scepter, looking towards the ibis ‘*nh*’ birds, symbols of the spirit of life. The scepter is significant in showing that Ani is the one bringing the deceased to life. A similar scepter is used as a determinative in the verb, *shm* “control” (Collier and Manley, 1998:159). This indicates that Ani, who holds the scepter, is in a position of control. The display of the ibis birds, symbolizing the spirits of ‘*nh*’, life, would indicate Ani was the one resurrecting other lives, not his own. In the same respect Odysseus, as king of Ithaca, has the same position of control by resurrecting the *psuche* lives of the dead. This may indicate Homer was inspired by Egyptian rituals, demonstrating that the location might have been in Egypt.

The Hittites were also known to grow barley. According to the “Hittite Law Code”, barley was part of agricultural produce (Gurney, 1990:86) and used as an offering to the storm god, *Telipinu* (Hoffner and Guterbock, 1997:124). The suggestion being it was used for a ritualistic purpose. Honey too, in Hittite customs (much like in Homer) was seen as a ritual offering. Hoffner gives a list of ritual texts in which honey was offered beside a rock: “Just as the rock is everlasting (so may the master, and his wife be everlasting)” (Hoffner and Guterbock, 1997:346). It is unclear if this particular offering helps resurrect the dead or gives mortals the ability to talk to them. The mention of honey being used to make the “master” everlasting does indicate, however, that the deceased were still existent in the afterlife and were able to be met by a mortal in the same way Odysseus meets the deceased. The similarities between the offerings described in Hittite texts and Homer’s Odyssey are substantial enough to suggest the underworld might have been located in Anatolia.

It is also important to take into consideration the similarities between Homer’s description of the underworld and areas (which resemble this location) in Anatolia and Egypt. This should help to gain a better understanding the underworld might have been sited. To look at the descriptions given in Book X, a case could be made that the rivers described by Circes were also in Anatolia.

‘ενθα μεν εις Αχεροντα Πυριφλεγεθων τε ρεουσιν Κωκυτος θ’ ος δη Στυγος υδατος εστιν απορρωξ, πετρη τε ξυνεσις τε δυω ποταμων εριδουπων’ (Hom. Od. 10.515).

“There both Puriphlegethon and Cocytus flow to Acheron, which indeed is a branch of the Styx waters, the rock is the unity of the two resounding rivers” (author’s translation).

Based on this passage, a geographical diagram can be drawn (fig. 1). Gurney suggests that honey, one of the offerings mentioned, was used in the village north of the Cappadox river (Delije Irmak) (Gurney, 1990:77). In the north of the Cappadox there are two rivers surrounding a small main land covered by rocks. This resembles the description Homer gives, indicating

Ritual and Geography: the rivers of the Underworld

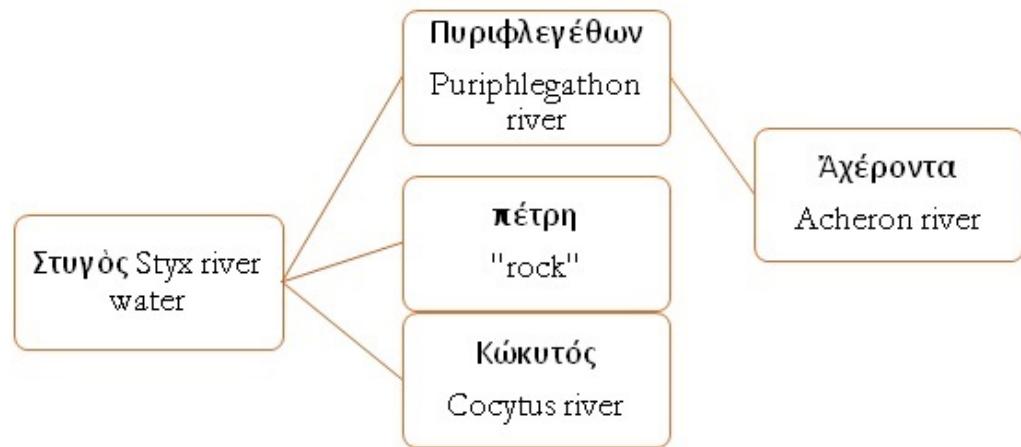


Figure 1: Geographical diagram

it may have been the area of the Cimmerians. Hoffner translated a Hittite text that declares honey was also offered by a rock (Hoffner and Guterbock, 1997:346), this bears a strong resemblance to Homer, at the *petre* "rock" in the underworld, offering honey to the dead. The Hittite law code contains the offerings that Homer mentions: wine, bull, sheep, and barley (Gurney, 1990:82). This list of agricultural produce, particularly honey, was well known in the north of Cappadox and valued as one shekel. It would seem that the higher the price, the larger the demand. Thus, the honey might have been in high demand for the rituals it was used to perform. The produce mentioned in the law code were the same as those offered by Odysseus. This similarity between the two locations and their offerings might indicate further the underworld was in Cappadox. Rocks, *hekur*, were considered sanctuaries (Slocum and Kimball, 2014), associated with the funerary cult of dead kings (Harmansah, 2014:43). Homer's description of the rock, being the meeting place of the deceased, would be considered a funerary sanctuary for the dead. The similarities between the rock as meeting place for the dead in Homer's underworld and the rock as a funerary sanctuary in Hittite customs suggest that north of Cappadox was the general area of the underworld Homer describes.

The theory above, however, is based on only one of the possible translations of *petre*. Though translated as a "rock" (Liddell and Scott, 1940), the term is also used to describe rocks as cliffs by the sea. The earliest mention of this is in Homer's *Odyssey*, Book III, "A smooth rock is high and steep to the sea, to the furthest of Gortuna in the misty and cloudy dark sea." (author's translation, Hom.Od.3.293–4). This association of *petre* with cliffs was known, and perhaps implied, in later translations. This suggestion can be applied to the description of the Cimmerians: "We first dragged the ship to steep heaven [sky]" (author's translation, Hom. Od.11.2). Despite the differences between the steep rock and sky, they both seem to share the same attributes. Possibly the same place is being described. It could be the concept of a high steep rock is similar to the mountain. Mount Olympus is associated with the presence of the sky (heaven), when Ares comes and visits the resting place of the gods (Hom. Il. 5.866–8). It may suggest that Homer's description of the protagonist and sailors going to the steepest sky is a hyperbolic description of the mountain or cliffs in Cimmeria. The similar descriptions of these steep rocks in Books III and XI may then suggest that the same location is being described. If

true, Egypt could be a possible location as the Papyrus of Ani describes the *ȝht* mountain cliffs as the meeting place for the spirits of life and resurrection in the same way Odysseus goes to the cliffs to resurrect the dead spirits to life. Nonetheless, to be certain, this does require more evidence and wider analysis of both texts.

In Book XI, Odysseus and the sailors come to the land of the Cimmerians, whose sun never reaches the stars (Hom.Od.11.15–18). They were people covered in clouds (*νεφέλη*). This description is not different from the one Homer gives of the *eroeidei pontoi*, “the cloudy dark sea” in Gortyna Crete. The same environmental features of both locations suggest the same area might have been described, the lower part of the Mediterranean (near Crete). This would suggest Egypt, being by the southern Mediterranean, might have been a possible location. The Egyptians, in the Papyrus of Ani, show a sun descending between two cliffs (*ȝht*) when the ‘*anh* (life) ibis bird and the phoenix bird (resurrection) are present. The *ȝht* is shown twice. The first one is a darker image of the sun, a suggestion it represents sunset. The other, below, shows a much lighter sun, indicating sun rise. The lack of its full appearance indicates they are in a persistent state of semi darkness. This is no different from the description Homer gives: that the sun, which shines with rays would never go to star filled heaven, nor does it ever urge itself towards the land (Hom. Od. 11.16–17), indicating a persistent sun rise and sun set. The details Circes provides of the *petre* steep rock, being in between the two rivers does also seem to be a concept shown in the Papyrus of Ani, where the land on the second island is surrounded by two rivers of water, and two cliffs which surround the sun. The similar geographical descriptions of these areas, might indicate the same area is being described, suggesting that the location of the Homeric underworld resides in Egypt.

Further consideration of the geographical descriptions might add more to our understanding of the location of the underworld. Homer describes the area of Cimmeria as being in the realm of the deep Oceanus *bathrouuu Okeanoio* (Hom.Od.11.13) The deep nature of Oceanus give an indication an ocean itself is being described. Homer gives a profound description of this mythological body of water in the *Iliad*: “The great strength of deep Oceanus, out of which all rivers and every sea and all springs and wells flow” (author’s translation, Hom.II. 21.195–7). Thereby giving the impression that Homer was describing an area of the Ocean surrounded by rivers. Geographically, this resembles the lower area of the Mediterranean, close to Asia Minor and Egypt, the Delta Nile. This theory is considered later by Diodorus Siculus, who states the name *Okeanen*, called by the Greeks Oceanus, referred to the rivers of Egypt (Diod. 1.19). This might indicate Oceanus was in the Mediterranean Sea and would allow us to consider the entrance of the underworld to be in Egypt.

Geography of the Underworld: Location Oceanus

Though it has to be queried why, in Homer’s poetry, Oceanus would be in the Mediterranean and not in any other alluvial plain. Mackie’s doubts of whether the chthonic rivers themselves were a part of the Cimmerian location are justified. His discussion of Oceanus as an encircling river raises the question whether Acheron, Cocytus, Styx, or Puriphlegathon rivers were in the same location (Mackie, 1999:486). Homer describes Oceanus as a *potamoio* “river” (Hom.Od.12.1) rather than the Mediterranean Ocean. However, it has already been acknowledged that Homer was in close contact with the Phoenicians and Assyrians. The Babylonians and Assyrians, much like Homer’s Oceanus, saw their world as encircled by a river (ME 92687). This river shown on the clay tablet was created in 700 BC, theoretically the same time as Homer. The profound similarity between Homer’s Oceanus and this Assyrian-Babylonian map of the world, can only suggest Homer was inspired by the Assyrian and Babylonian be-

iefs and myths. If true, then it is also likely their writing influenced him. West demonstrated that the Assyrian word for river was (the same word in the Babylonian map of the world) also used in the seventh century BC to describe the Mediterranean (West, 1997:145). That being the case, Homer, having this myth passed down to him by the Assyrians, could have viewed the river of Oceanus in the same way, as a representation of the eastern Mediterranean.

Given the importance of the Phoenicians' influence in Homer's writing, it is also important to consider whether the river of Oceanus was seen to represent the Mediterranean. In the Levant the closest Semitic group to the coast would have been the Aramaic Canaanites. Their inhabitance in a coastal area, would have meant they were able to create sea trading posts and be, in Greek thought, associated with the Phoenicians. There is a possibility the Greek word *potamoi* derived from the two Aramaic words *P-THb* "open" (Benner, 2005:422) and *MH* "sea" (Benner, 2005:166). Combined, these two read *pthhmhb* (*potehhmab*), "Open sea". This would indicate Homer saw *potamoi Okeanoio* not as a chthonic river, but rather a chthonic Ocean. The *PTHb*, according to Benner (2005), represents a subject breaking away from something else. *Mb*, on the other hand, was said to refer to the Mediterranean and feared by the Semitic groups for its deep nature. Homer describes the *potamoi* Oceanus, much like the Semitic Mediterranean, as deep and feared as their limits were where the dead reside. This would indicate the Mediterranean and Oceanus were the same. In Homeric thought, however, the term *Okeanoio* potamoi might have been a colloquial, shortened title, from the description Homer gives in the Iliad:

“βαθυρρειται μεγα σθενος Ωκεανοιο, εξ ου περπαντες ποταμοι και πασα θαλασσα, και πασαι κρηναι και φρειατα μαχρα ναουσιν:” (Hom. Il. 21.196).

“The great strength of deep Oceanus, out of which every river, every sea and every fountain and artificial well flows.” (Author's translation).

To Homer the rivers flow from deep Oceanus, indicating it is a far larger source of water, an ocean. This would suggest that the description of *potamoi Okeano* does not describe Oceanus as a river, but rather is a title to describe that which flows out from it, the rivers. It is reasonable to suggest that Oceanus, for its deep nature, is an Ocean. It is also important to take notice of the fact that every river flows from Oceanus. This would give the indication that it is in an area that is attached to a series of rivers. The Mediterranean resembles this description in that the rivers of the Delta Nile flow from this particular ocean. This indicates Oceanus was describing the Mediterranean closest to the Delta Nile and Egypt. As Oceanus is the body of water, representing the Mediterranean, that leads to the rivers of the underworld, it could be argued that these rivers represents the delta Nile, giving more reason to believe the underworld was located in Egypt.

The similar environmental features in the locations described in both the Book of the Dead and Homeric Underworld might also indicate the same area is being described by these two documents. Given that the Egyptian Book of the Dead predates the poet, it is possible that Homer was influenced by this document and would associate the location mentioned in the funerary texts with Egypt. An example of this Egyptian influence of the Homeric underworld would be the Papyrus of Ani (EA10470/35). The Papyrus shows Ani (the deceased) in the Field of Offerings when the sun is eclipsed, making offerings of agricultural work to the gods and Osiris, and there are some similarities with this and the *Odyssey*.

‘οὐδε ποτ’ αυτους, ηλιος φαεθων καταδερχεται αχτινεσσιν, ουθ’ οποτ’ αν στειχησι προς ουρανον αστεροεντα’ (Hom.Od.11.15–18).

“Never does the sun, shining with rays, look down on them, neither would it come to star-filled heaven.” (Author’s translation).

The Papyrus of Ani shows similar details. In the first passage, the sun is eclipsed, matching the description that the place of the underworld is filled with darkness. Such similar environmental features between these two areas would indicate the same area is being described. Given that the Book of the Dead predates Homer, it is possible the poet was inspired by this aspect of Egyptian mythology, and from this might have considered to position the Greek underworld in Egypt.

There is one flaw in presuming the underworld is set in Egypt. Circes mentions that the north wind should take Odysseus to the underworld (Hom. Od.10.507). An argument could be put forward that the underworld is set north. This, though, may be too quick a judgment to make. One interpretation, when looking at Hesiodic sources, is that the north wind, Boreas, blows southward from the north. Hesiod describes Boreas’ movements in some detail:

“και πηγαδας, αιτ’ επι γαιαν, πγενσαντος Βορεαο δυσηλεγεες τελεθουσιν, οστε δια Θρηικης ιπποτροφου ευρει ποντωι, εμπνευσας ωρινε’ (Hes.WD. 505-508).

“...and frosts, which are cruel come into being, while Boreas having blown towards the land and having blown through horse-bred Thrace to the wide sea, stirs it up.” (Author’s translation).

Thrace, what is now largely considered Bulgaria, was an area north of Greece. Hesiod makes a point of mentioning that Boreas blows through this area *dia Threikes*, to the wide sea, *eurei pontoi*. From Hesiod’s perspective, as a Boeotian, the widest noticeable sea would have been the Aegean or Mediterranean (south of Thrace). This does give reason to think that Boreas blows from Thrace (north of Boeotia) to an ocean south from this area. Given that Homer was debatably alive at the same time as Hesiod, and theoretically from a close location, Euboea, it is possible he also believed Boreas to have come from the north and blown southwards. Evidence of this can be seen in the *Odyssey*, when the poet uses the compound verb *katelthomen* “we went down” (Hom.Od.11.1), referring to Odysseus and the sailors going down from the Aegean to the underworld. This would imply they were going southward, and that the underworld by extension was south of them. If true then the north wind Boreas would blow them from Aegeus to a southern direction, which might have been the Mediterranean Sea. This would give reason to think that, as the Mediterranean is south of Aegeus, so is the underworld, indicating they may have been the same location to Homer. That said though the Mediterranean encompasses Asia Minor, the Levant and Egypt. This would not therefore show the specific location of the underworld, which means further analysis is needed.

Another interpretation is that the Homeric north wind was inspired by the Egyptian underworld. In the Book of the Dead it is the wind that carries the traveller from *Tem* to *Khenti Amenti* (Budge, 1969:300). The similarities between the two winds taking the traveller to the underworld, might indicate Homer was inspired by the Book of the Dead. If true, Homer might well have intended to set the underworld in Egypt, because of their mythology’s influential nature. A suggestion could also be made that the Cimmerians were, in fact, the domain of *Khenti Amenti*. The title *Khenti Amenti*, in the Papyrus of Nakht (EA 10471/21), has a determinative for a desert; often the burial place of the dead. This suggests *Khenti Amenti*

was a specific chthonic area in Egyptian mythology. The Papyrus of Nakht contains similar imagery as Cimmeria described by Circes in the *Odyssey* Book X. She mentions that Cimmeria contains black poplars, which lose their fruit beside a pool of water (Hom. Od.10. 510). The Papyrus of Nakht appears to show this same description: long trees (much like poplars) surround a pool of water. One tree in particular, containing black fruit, dangles and falls towards Osiris. The striking similarity between these two areas could mean that the same area is being described. This, and the presence of the north wind, in Egyptian mythology, indicates Homer's underworld was located in Egypt.

Throughout Book XI there is no mention of the offerings being dedicated to Hades. This is considerably different from the Book of the Dead cxxxviiia that mentions the offerings were dedicated to the Lord of the Underworld, Osiris. This distinction between the two offerings would indicate Homer was not inspired by Egyptian rituals. Book X line 535, however, implicates the offerings were made to Hades, Lord of the Underworld: “to make prayers for the gods and to strong Hades and to pray for Persephone” (Hom.Od.10.533–4).The emphasis of the prayers made to Hades would suggest the offerings were dedicated to him, much like they were to Osiris. This, though it tells us little about whether the Book of the Dead was an inspiration, does encourage us to look further and see if there is more conclusive evidence to suggest the underworld was in Egypt.

There is a conundrum (presuming the location is, in vague terms, an area set within Egypt) about whom the offerings are made; to the sun god Ra or the Lord of the Underworld Osiris. In the same way, it is difficult to say exactly which offerings were made to the gods of the underworld in Greek culture; whether it was Helios or Hades. Homer, as mentioned before, does not clearly specify at the beginning of Book XI whether any of these offerings were made to any Greek deities in particular. He does, however, give clear descriptions of the offerings themselves. He places particular emphasis on the sacrificing of a “black ram” (Hom.Od.11.32–33) an important description since similar offerings are shown in Egyptian culture. Named by the Manchester Museum as the “Stelae of Penwimetreru” (Acc. no. TN R4571/1937), this particular *stelae* shows ram funeral offerings made to Amun Ra, lord of the sky. As opposed to other *stelai* of the new kingdom, however, there is no mention in the first column of what the offerings themselves are, although, above the hieroglyphic inscriptions, there are two large rams inscribed as *imn ra*, Amun Ra.

Given that these animals are the most noticeable features of the *stelae*, it is possible the offerings are the rams mentioned above. Suggesting that Homer, based on these similar offerings, intended the rams to be given as a sacrifice to the sun god Helios (in the same way they were given to the sun god Amun Ra). Helios, however, in both Books X and XI of the *Odyssey*, seems to be used only evocatively. That is to say the sun is only treated as a feature of the environment, not a deity. As has been previously discussed, Homer does mention that prayers were made to Hades, which could imply the sacrifices were offered to him as well. This observation would give the impression that offerings were made to Hades himself rather than to Helios. A suggestion can therefore be put forward that Hades worship was inspired by the worship made to Osiris. Such influences, though not specific enough on their own to prove the location, can encourage us to further analyse the role of Osiris and whether there is any connection between his and Hades' offerings that could indicate the underworld resides in Egypt.

The distinct offerings of rams to Hades, as Homer describes, could have been inspired by the ram-like nature of Osiris, Lord of the Underworld. Before inspecting the Homeric poetry in Book XI, it is important to pay attention to Egyptian influences on Homer underworld. The tomb of Prince Mentuherkhepsef shows a ram-headed deity, known as *Banebdedjet*, holding a scepter shaped to resemble the *Djed* and *ankh* symbol. He is given offerings of oils and incense. To the right of the image is an inscription written in hieroglyphic form *ba-nb-dd-dd*. (KV.19.NO.19). While this has simply been labeled as a name of the deity, the title could well have been an epithet for Osiris. Gardiner says; “*Ba* meant the modes of existence with which the deceased continued to live” (Zabakar, 1968:15), indicating *ba* enabled the dead to live. Homer shows a similar concept, by Odysseus seeing the *psuches* “lives” of the deceased in Book XI. The *ba* sign, however, is represented as a ram. This could be allegorical, representing both a soul and offering of a ram, similar to the ram Homer describes. While the *ba* ram could be translated as an aspect of the soul, some scholars state the animal symbolising the *ba* soul is the *jabiru* (Betro, 1996:107). It could be that the meaning behind the *ba* ram is a determinative, a symbol of what was offered. This could translate to mean: “the ram for the *ba* of the lord of *dddd*”, thereby similar to the offering Homer gives of the ram itself. Just below this and the two *dd* symbols is a determinative, *niwt*, the determinative of a city or region (Betro, 1996:190), implying *dd* refers to a place. Given the observation of each hieroglyph, it is unwise to label this simply as a name for the god, but rather a description of who he represents “the existing soul of the lord of the region *dddd*”. In the funeral *stelai* of the New Kingdom (specifically the eighteenth dynasty), the Stelae of Senres and Hormose (Acc. No. 07,420), Osiris is known as the lord of *DDW* region.

Another *stelae*, belonging to the New Kingdom (A.No.22.155), shows the name of the region *ddw* written as *dddw*. The display of two *djed* symbols in this *stela* shows the location of *DDW*. The quail (*w*) bird is absent in KV.19 No.19 art, however the similarities to the writing of *ddw* are noticeable. This gives the implication the area described in the title *Ba-nb-dd*, is *ddw* itself. Therefore the *ba-nb-dddd* could describe “the constant existing soul of the lord of *ddw*” which would be Osiris. This translation of offering a ram to Osiris resembles the offering of a ram to Hades which Homer gives to Teireses (Hom.Od.XI,32). This would suggest Homer’s offerings were inspired by Egyptian rituals, reinforcing the idea that the Underworld location is in Egypt.

Furthermore, the above passage bears similarities to the Book of the Dead. Homer mentions that the sun never reaches heaven where the stars reside. This implies that the stars are never known to set. Such a feature of the Underworld is seen in chapter XCVIII of the Book of the Dead: “And the stars which never rest set [me] away from the slaughter” (Budge, 1969:296). The mention of the stars keeping the subject away from slaughter indicates he is a living mortal. Homer makes no mention of Odysseus’ death and is presumed living, much like the figure in the Book of the Dead. This similarity would indicate that Homer was inspired by the Book of the Dead. Further evidence supports this theory: the Papyrus of Nu (EA. 10/477 Sheet 21–22), found in Budges translation, displays a man in a boat. Just below where he is stationed is the symbol *udjat*, the eye of Horus. The *udjat* itself symbolises healing, a suggestion the person was protected from death, and therefore alive. This is similar to Odysseus being alive while visiting the Underworld. The same concept was used by Homer therefore supposes there was a shared belief system between Homeric mythology and Egyptian. This further propounds that the location of the Homeric underworld was in Egypt.

In conclusion, more evidence indicates that the mythical Cimmerians were part of the Egyptian territory. While there are certain similarities between Homeric and Hittite rituals, the offerings Homer describes as well as their purpose correspond strongly with the Egyptian belief system in the New Kingdom, in resurrecting the deceased. Not only this but the geographical descriptions Homer provides from Books X–XII are similar to the descriptions provided in the Papyrus of Ani, Nu and Nahkt. The parallels between the Homeric and Egyptian geographical and ritual description, prove that Egypt might have been the location Homer described.

Assessment The purpose of this article was to gain a general understanding of the location of the Homeric Underworld. The process of research has shown there to be a possibility the underworld was located within Egypt. Although the comparison between Homeric, Egyptian and Anatolian offerings helped to gain a broader understanding of the location, the results were not as conclusive as would have been expected. The offerings described by Homer in the *Odyssey* Book X and XI were similar to Hittite and Egyptian rituals, which, on its own, did not give enough conclusive evidence to mark a particular location. Nevertheless the ritual evidence, coupled with the inspection of Homer's geographical descriptions, both helped to narrow the analysis further. The ability to look at parallels between Homeric Cimmerian rituals and geographical details with Egyptian, helped to conclude the Homeric Cimmerians were set in Egypt.

While the evidence presented should help readers to assess the location of the Cimmerian underworld differently, I would encourage scholars to investigate Babylonian influences further. For example, compare the Homeric description of the chthonic rivers, and Oceanus, with Nineveh and the Babylonian map of the world further (ME 92687) and see if the Homeric Oceanus was located in Mesopotamia or the Mediterranean. In addition, while this article has focused on Ugaritic etymology, the derivation of the word *potamoi*, I would strongly recommend investigating Akkadian writings, and see how influential they were on Homer's location of the Cimmerian underworld.

* * *

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Abstract (German) Die Homerischen Epen zeigten die ersten grundlegenden Strukturen der griechischen Unterwelt auf: der die Welt umfließende tiefe Strom Okeanus, die Flüsse Styx, Acheron, Cocytus, und das feuchtkalte „Haus des Hades“. Ziel dieses Artikels ist, ein allgemeines Verständnis davon zu bekommen, wo die homerische Unterwelt lokalisiert war, insbesondere die Unterwelt im elften Buch der Odyssee. Um den genauen Ort zu bestimmen, benutzt der Artikel eine Kombination aus archäologischen Befunden, vergleichenden sprachwissenschaftlichen Untersuchungen hethitischer und ägyptischer stelai und papyri, sowie eine Literaturanalyse der homerischen Epen.

Schlüssbegriffe: Homer, Mythologische Geographie, Odyssee, Hethiter, Unterwelt, Buch der Toten, Kimmerer, Bronzezeit Mittelmeer.

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Dealing with Data: Naïve Bayesian Classification and a Case Study from Viking Age Sweden

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Mathematical analysis is becoming ever more useful when dealing with large amounts of archaeological data, due to the precision and certainty with which results can be produced. This article will discuss the use of a relatively new tool in deciphering and dealing with archaeological data, the Naïve Bayes Classifier. The ‘Bayesian’ approach was first proposed in the early 1990s, by archaeological statistician Clive Orton (Orton, 1992:139; Buck, Cavanagh, and Litton, 1996:1), though at that time the lack of computational power available made use of the Classifier prohibitively difficult. Today a Naïve Bayes Classifier can be employed by anyone with a computer, without any need for particularly specialised computer skills. Programs such as Orange use a graphical interface as a way to circumvent the need for specific mathematical knowledge of the process, and the use of this program is detailed in the paper. The Naïve Bayes Classifier is most useful in attempting to identify unseen patterns in a large amount of data, such as a database with thousands of entries, and potential uses will be illustrated here. This paper presents a case study using a Naïve Bayes Classifier in an attempt to date Swedish Viking-age rune-stones, which remain undated through conventional methods. Two variables were identified as showing some small trace of temporal evolution, the Christian crosses and runic inscriptions on the stones, and the Classifier was utilized to explore their further use.

Keywords: Bayesian Statistics, Archaeological Statistics, Naïve Bayes Classifier, Archaeological Methodology, Quantitative Methods.

As archaeologists we use mathematical tools in every stage of our profession, from calculating the minimal number of individuals in faunal assemblages, to assessing the likely use of whichever trench or square we are working with based on artefact appearance, to presenting and analysing results. Advanced mathematical methods, however, are often not explored until postgraduate study, and are in many situations and for many reasons avoided even then. A certain amount of advanced mathematical (generally statistical) literacy must be expected of archaeologists, and in particular of up-and-coming archaeologists. Moving from descriptive to inferential statistics is much less of a stretch than may be thought. This

Abstract
(in Swedish see below)

* Alix Thoeming is a PhD candidate in the department of Archaeology at the University of Sydney, having previously completed her undergraduate degree at the same university, graduating with first-class honours. Alix's PhD thesis will explore urban trajectories within Eastern and Northern Europe after the decline of the Roman Empire, though she has developed a strong interest in exploring alternative methodologies for use with archaeological data, specifically those derived from mathematics and computer science. She was the first recipient of the Bruce G. Trigger Award for Archaeological Thought at NASC 2014 for her presentation about her honours thesis, which inspired the present article.

paper aims to demonstrate this by detailing the use of a tool that comes under the umbrella of Bayesian statistics, known as the Naïve Bayes Classifier. While descriptive statistics have traditionally been the most widely-used form of statistical analysis, ‘description...is not to be confounded with inference’ (Buck, Cavanagh, and Litton, 1996:5), and from there comes a place for a tool such as the Classifier.

The Naïve Bayes Classifier is a tool using Bayes’ Theorem to summarise prior information from known information within a dataset into a qualitative model that may or may not have the strength to derive probabilistically significant conclusions to ‘fill out’ a dataset with unknown properties. It is best utilised when one class or feature within the given dataset is incomplete. The dataset should ideally have at least one thousand ‘objects’ - though this is just the author’s opinion, as it has proved possible with less - with at least 30 of the objects having a value assigned to the target category. A case study attempting to date Swedish Viking-age rune-stones is laid out here to show just how easy the use of inferential statistical tools such as the Naïve Bayes Classifier has become.

Bayesian Theory in Archaeology Bayesian logic is a process familiar to all of us; every day we make choices, and many of those choices require us to reason towards the likely outcome of a given hypothesis. Developed in the early 18th century by Thomas Bayes, this theory was the first to establish a mathematical approach towards the inference of probability (Delampady, 2003:2). The core principle of Bayesian analysis, that prior knowledge or information can be used to make an informed decision about that which is not yet known or understood, has been used archaeologically in many ways. While the earliest suggestion found of the use of Bayesian method within archaeology dates to the early 1970s (Doran, 1972:446), they were not implemented in this discipline until the mid-1990s. This was primarily due to both certain unfriendliness in the available software, as well as its ‘ferociously heavy computational needs’ (Orton, 1992:139). A book directed towards archaeologists was published at this time (Buck, Cavanagh, and Litton, 1996), outlining the basic concepts of Bayesian statistical methods and many situations to which they are suited. While the Buck, Cavanagh, and Litton (1996) volume does discuss the use of Bayes’ theorem, the mathematical rule upon which a Naïve Bayes Classifier is based, the Classifier itself is not explicitly mentioned. Traditional Bayesian statistical studies have been much more wide-ranging; for example, the construction of Bayesian chronologies to calibrate radiocarbon dates (Bayliss et al., 2007; Levy, Najjar, and Higham, 2010)(also see Bayliss (2009), for a detailed history of the process), Bayesian approaches and solutions to seriation problems (Halekoh and Vach, 2004), and even Bayesian assessments of the demagnetisation of limestone (Borradaile, 2003).

Recent studies explicitly detailing the use of a Naïve Bayes Classifier in their methodologies include a 2006 publication examining the identification of regionally differentiated features in Levantine ivory sculptures (Gansell et al., 2007). Several features noted as having been overlooked were then identified in this study as regionally significant for classifying sculptures. A study exploring the prehistoric Mexican site of Monte Albán utilised a hybrid of the Classifier and a decision tree (Reynolds, Ali, and Jayyousi, 2008), and another presented its use in image differentiation, by breaking down heritage images into colour-differentiated pixel maps (Polpinij and Sibunruang, 2010).

While Bayesian statistics are generally used for large multivariate problems (Buck, Cavanagh, and Litton, 1996:129–134), the Naïve Bayes Classifier is suitable for specific problems involving inferences concerning a single feature or class of artefact. This simplicity of design and implementation makes the Classifier an ideal starting point for archaeologists wishing to explore

advanced statistical methods. It is also important to note that one of the main differences between Bayesian statistics and the Naïve Bayes Classifier is its use of conditional independence, an assumption that variables exist independently of each other, i.e. that the existence of attributes are not interrelated (Tan, Steinbach, and Kumar, 2006:231)¹.

A Naïve Bayes Classifier is best utilised when there are ‘knowns’ –states of partial understanding (Orton, 1992:192) - that can be used to train the Classifier to calculate the probability of an individual object belonging to a pre-defined class. It is important to note that no Classifier can give a solid ‘yes’ or ‘no’ to any single object belonging to each of the classes or features within the target category; it can only offer a probability (Tan, Steinbach, and Kumar, 2006:235). The mathematical theory at the root of the Classifier is Bayes’ Theorem (Fig. 1). Results from the Classifier (posterior beliefs) come about through combining the information already present (prior beliefs) and their statistical significance (standardised likelihoods) into a quantitative model. A Naïve Bayes Classifier is essentially a somewhat more sophisticated version of the coin-toss problem (calculate the probability of tossing 3 ‘heads’ in a row; $0.5^3=0.125$).

Using the Naïve Bayes Classifier

$$P(\text{parameters}|\text{data}) = P(\text{parameters}) \times \frac{P(\text{data}|\text{parameters})}{P(\text{data})}$$

Posterior beliefs = Prior beliefs x Standardised likelihoods

Figure 1: *Bayes’ Theorem*; adapted from Bayliss et al. (2007:5).

For example, the Bayesian model could be employed by a museum in deciding whether or not to purchase a southern Italian Apulian krater with a mythical scene at auction, given the unknown variable of reliable provenance (Fig. 1 or Table 1). This particular type of pot is not represented in the ‘known’ data set, which includes a field stating the reliability of provenance, and so we can use this data to calculate our odds. These data are used to provide the Classifier with the base information required to make an informed decision about our new Apulian krater. The evaluation provided by the Bayes rule gives us the conclusion that the likelihood of our new pot’s provenance being reliable is 0.037, and the likelihood of it not being 0.069. Given that $0.069 > 0.037$, our example is classified into the ‘no’ category. The museum now has the choice as to whether or not accept these odds and risk purchasing the krater anyway. When used in an example such as this, the Classifier is run twice, first to assess the likelihood that our answer is ‘no’, and then to assess the likelihood that it is ‘yes’. In more complicated examples the Classifier would be run as many times as there are possible outcomes.

When setting up data for use in a Classifier, it must be presented in a format similar to either Figure 1 (Table 1), or the more complex case study presented in section six. The data must be consistent; the Classifier would view a pot with the feature ‘Apulian’ as discrete from one labelled ‘APULIAN’ and different still from one labelled ‘apulian’. As each feature is treated entirely independently, the user must be especially careful about correctly informing the Classifier of all information provided in the dataset. Scale is irrelevant – this could be just as easily

¹ It should be noted that this text is an exceptional resource for anyone new to computational statistical methods, and is highly recommended as a reference text.

	Style	Type	Scene	Reliable provenance?
1	Apulian	Amphora	Mythical	Yes
2	Apulian	Amphora	Mythical	No
3	Apulian	Amphora	Mythical	Yes
4	Lucanian	Amphora	Mythical	No
5	Lucanian	Amphora	Theatrical	Yes
6	Lucanian	Krater	Theatrical	No
7	Lucanian	Krater	Theatrical	Yes
8	Lucanian	Krater	Mythical	No
9	Apulian	Krater	Theatrical	No
10	Apulian	Amphora	Theatrical	Yes

Table 1: *Naïve Bayes Classifier Example; adapted from [Naïve Bayes Classifier Example \(2003\)](#).*

used for single artefacts as for large-scale settlements. It is possible to configure readable data in many different ways, but the key to reliable results is consistence in these data. The Classifier will not identify the value ‘75’ as any closer to ‘76’ than the value ‘234’, so if the user is, for example, measuring the size of objects, a range or ‘class’ (e.g. ‘small’, ‘medium’, or ‘large’), would be more useful.

Assessing the Reliability of Traditionally statistical reliability has been tested through the t-test for statistical significance. The Naïve Bayes Classifier instead utilises two alternate tests to predict the reliability of its results. Both of these use cross-validation, in which the ‘known’ dataset (as opposed to the ‘unknown’ dataset, from where our results will come) is tested against itself in order to check the validity of its results. While a cross-validation can be run as few or as many times as the user desires, ten is the generally-accepted standard, and so it is therefore known as a ten-fold cross-validation. In this ten-fold cross-validation, the ‘known’ dataset is split into ten equal sections. Nine of these are chosen to ‘train’ the Classifier, with the remaining 10 % used as test data. The validation is then run until each segment has been used in a test capacity (Tan, Steinbach, and Kumar, 2006:187).

The first of these tests is the confusion matrix, a standard tool for evaluating classification models. It provides the user with an approximation of the accuracy of the results of the Classifier, by simply dividing the number of correct predictions by the total number of predictions (Tan, Steinbach, and Kumar, 2006:149)(Fig. 2 or Table 2).

		Predicted Class		
		Class 1	Class 2	Class 3
Actual Class	Class 1	n_{11}	n_{12}	n_{13}
	Class 2	n_{21}	n_{22}	n_{23}
	Class 3	n_{31}	n_{32}	n_{33}

Table 2: *Example Confusion Matrix.*

The second test that provides an estimate of the Classifier’s accuracy is the ROC (receiver operating characteristic) curve. A ROC curve is a visual representation of the results that plots their true vs. false positive rates on a simple graph, forming a line of best fit through the results

cluster. It summarises the information provided in the confusion matrix into four groups; true positive, false positive, true negative, and false negative. These groups are then calculated into a True Positive Rate (TPR) and a False Positive Rate (FPR). These represent the instances in which each individual object is classified correctly or incorrectly into each of the classes, with TPR represented on the Y-axis and FPR on the X-axis (Tan, Steinbach, and Kumar, 2006:298–301)(Fig. 2).



Figure 2: *Example ROC (receiver operating characteristic) Curve.*

The results of a Naïve Bayes Classifier are typically produced in spreadsheet form, though they can be summarised by a graphical form². These results can only be considered reliable if the results of the two reliability predictors above satisfy the set minimum acceptable standard. The tabulated results assign a percentage to the probability of each individual object belonging to each of the specified classes, with the conclusion generally being that the class assigned the highest percentage is the correct prediction (Fig. 3 or Table 3).

	Class 1	Class 2	Class 3	Prediction
Object 1	0	0.02	0.98	Class 3
Object 2	0.37	0.39	0.24	Class 2
Object 3	0.07	0.11	0.82	Class 3

Table 3: *Example Results Table.*

Rune-stones are large, shaped stones raised during the Viking Age to commemorate the life of a well-regarded individual. Typically somewhere between five and eight feet tall, they are the work of professional carvers who integrate a runic inscription (naming the deceased and their deeds, the sponsor(s), as well as in some cases themselves) that winds either within or around a stylised ‘rune animal’ of some sort, variously described as a dragon, serpent or bird, and in around half of all stones a Christian cross (Sawyer, 2000:10). Sporadically erected before the end of the 10th century AD, the major period of activity in stone-raising was the

Rune-Stones and Context

² See Gansell et al. (2007:490) for an example of nomographic representation.

11th century AD This time period is traditionally seen as the tail end of the Viking Age, and while the raising of the rune-stones is surely causally related to the ‘viking’ activity taking place at the time (the word ‘viking’ itself is problematic; it has no modern equivalent, but is generally accepted to have been a verb, describing elite trading and occasional raiding. The term has since then undergone normalization, becoming a noun describing a horned-helmeted ‘barbarian’ (Jesch, 2001:56), they are much more a product of the small elite ‘stay-at-home’ population than the Vikings themselves. These elites owned land and perhaps held some form of lordship over their locality (Jesch, 2001:36–41), as well as potentially having a role in staking claims of inheritance (Sawyer, 2000:74–91).

The rune-stones are very important in an archaeological discussion of the Christianisation process that was taking place at this time. In Sweden the process occurred relatively later than in Denmark and Norway and was much more fraught. It is seen as having occurred relatively quickly in the south of Sweden where the rune-stone fashion had faded by the middle of the 10th century (Lager, 2010:501), but faced much more opposition in the north, especially in the most populous region of Sweden at the time, Uppland (corresponding today to the greater Stockholm area). The response here to the ‘stubborn paganism’ of the region (Herschend, 1994:39) seems to have been a deliberate upswing –especially in the raising of ‘Christian’ rune-stones– around 1070 (Lager, 2010:501). These ‘Christian’ rune-stones are identified in several ways, most commonly either through the integration of a Christian cross into the carved design of the stone, or through the use of a Christian phrase. Around 3,000 rune-stones have been documented in Scandinavia, with 250 in Denmark, 50 in Norway, and the rest in Sweden. This study only incorporated rune-stones from Sweden (Fig. 3), as their large number and well-documented presence in the runic inscriptions database Rundata allows for the measurement of a large number of variables.

Parameters of the Cas^tStudy The primary aim of this study was to investigate whether it was possible to apply the Naïve Bayes Classifier to date the ~40 % of rune-stones that remain undated through traditional methods. As stone artefacts, it is impossible to apply ‘absolute’ methods of dating, and while paint traces remain on several rune-stones, there are generally not sufficient enough organic binding agents remaining for the employment of C-14 dating (Kitzler, 2002:22). The currently accepted dating scheme combines historical dates referenced in the runic inscriptions, the dates known for the carvers who signed their rune-stones, and a stylistic sequence which identifies changes in the carved ornamentation on the stones (Gräslund, 2006)(Fig. 4 or Table 4).

As previously mentioned, two variables were selected for analysis, but due to the results being quite similar this paper only discusses the results from analysis of the crosses on the stones. These crosses are seen in just under half of the Swedish rune-stones. Lager (2002) proposed a classificatory system for these symbols, assigning each rune-stone a designation based on 51 sub-classes of seven main groups, each identified by both a letter and number. Lager detected a small amount of temporal differentiation in some of these features, noting that some appear only on earlier rune-stones, and that simpler crosses seem to appear in the later of Gräslund’s phases. Each cross is generally assigned several of the features based on its appearance; for example, a cross may as an example be given the designation ‘A1;B3;C8;C9;D1;F3’.

In order to run the Classifier successfully and ensure results that could be considered reliable, the way in which the data are read must be considered. Presented in a compiled fashion in textitRundata, each designation was detached using a small program (nicknamed *Runedalf*) into a spreadsheet, which assigned each rune-stone a value of zero or one (or two or more in

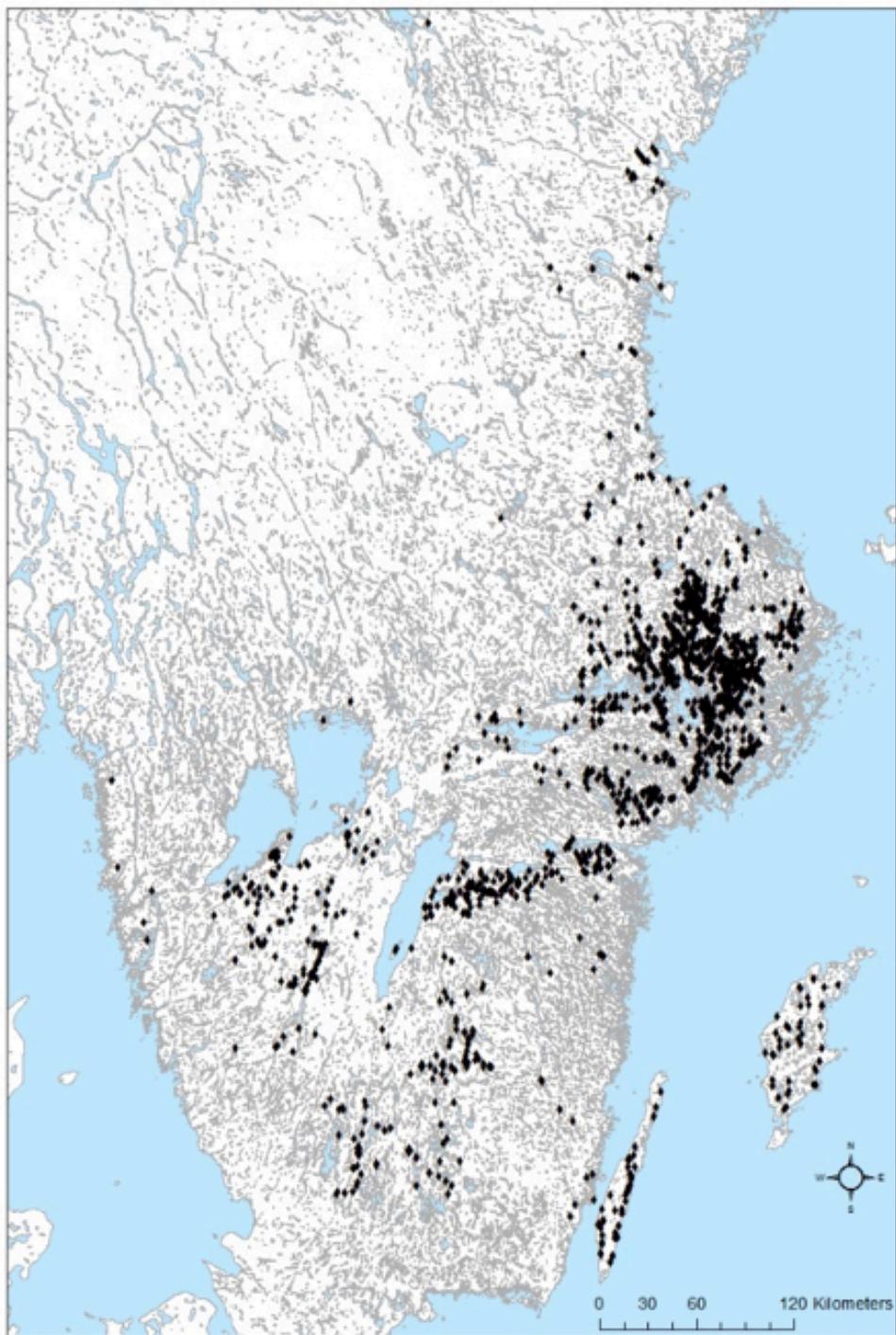


Figure 3: *The Viking Age rune-stones of Sweden included in the study.*

the case of multiple crosses) for each feature: A1 through G6. The only other data included in the spreadsheet were the names of the rune-stones and their date range (for those that were to

RAK	c. 990-1015 CE
FP	c. 1010-1050 CE
PR1	c. 1010-1040 CE
PR2	c. 1020-1050 CE
PR3	c. 1045-1075 CE *
PR4	c. 1070-1100 CE
PR5	c. 1100-1130 CE

Table 4: Gräslund's rune-stone dating; after Gräslund (2006). *Gräslund notes the end date for 'PR3' as being en generation framåt (a generation forward), which is here and in other literature (Sawyer, 2000:196) accepted to be around 30 years.

be used in the test category). This analysis of *Rundata* led to the identification of 992 suitable rune-stones with crosses on them, of which 24 %, or 235 stones, remain undated.

The program utilised for this Naïve Bayes Classifier analysis is a freeware called [Orange](#) (Demsar, Zupan, and Leban, 2004). This software has both a mathematical interface and a graphical one, leading to a certain ease of use for those less mathematically-minded archaeologists. The second interface uses a simple drag-and-drop procedure to connect individual widgets, which represent each stage of the process of building a Classifier, and can also be used to easily run simple descriptive statistics. Another program that was tested was [Weka](#), which also integrates an archaeologist-friendly Graphical User Interface (GUI), though without Orange's widget-based approach.

Result The Classifier was first tested for reliability using the two test-learners discussed above. The confusion matrix can be seen represented in Figure 5 or Table 5, with the correctly predicted rune-stones represented in the shaded cells. The Classifier did not accurately predict the class of any of the tested rune-stones to a suitable degree of certainty (see Figure 6 or Table 6 for descriptive statistics). Rune-stones attributed to the date-range PR4 were correctly predicted 55.70 % of the time, which was the most accurate of all classes. No rune-stones in the range PR5 were correctly predicted, though there are 26 in the test dataset. The ROC curves for each date-range are presented in Figures 4–10. Both PR1 and PR5 show a significant number of objects underneath the diagonal separating true positives from false positives, mirroring the earlier very small percentage of correctly predicted rune-stones. None of the results are approaching 0,1 in a significant fashion, and therefore cannot be considered reliable.

	RAK	FP	PR1	PR2	PR3	PR4	PR5	Total
RAK	69	14	5	4	10	23	2	127
FP	33	45	5	5	17	15	0	120
PR1	19	5	1	4	11	7	1	48
PR2	12	18	6	16	16	22	0	90
PR3	13	9	3	11	41	34	1	112
PR4	23	4	1	2	24	146	5	205
PR5	8	2	1	0	0	15	0	26
Total	177	97	22	42	119	262	9	728

Table 5: Confusion Matrix Accuracy.

Two possibilities present themselves in these results. The first is that the data are not comprehensive enough for the identification of meaningful patterns, and the second is that there

	RAK	FP	PR1	PR2	PR3	PR4	PR5
% correctly predicted	39.0%	46.4%	4.5%	38.1%	34.5%	55.7%	0.0%

Table 6: *Prediction Accuracy*.

is no significant temporal variation in the crosses and inscriptions on the rune-stones. These results show the potential for the use of a Naïve Bayes Classifier in a way that may not be expected; it may just as easily be utilised to show a lack of classificatory potential.

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The ease with which a Naïve Bayes Classifier can be put into use has been presented here, along with the methodology for doing so. Programs such as Orange, with their simple drag-and-drop GUI, require very little exposure to ‘actual math’. The outline for testing presented in this paper if used correctly will provide acceptable accuracy with which to make statistical conclusions about archaeological data. There are many situations for which a Classifier can be utilised, the most common of which have been presented above. Dating can be difficult for many reasons, i.e. a stylistic chronology cannot necessarily stretch to an entire artefact population, C14 dating can be prohibitively expensive for a large number of samples, etc. Other possibilities for Naïve Bayes Classification include classifying large numbers of samples into groups based on their combinations of attributes, or indeed, as identified above, doing the exact opposite of what the Classifier was designed for: identifying homogeneity. If nothing else, the ease with which the Classifier can be utilised and understood makes for an excellent avenue into the world of advanced statistical modelling for students of archaeology.

For his assistance in the preparation of this manuscript, I would like to thank my supervisor Professor Roland Fletcher. His support in my endeavour to use this strange-sounding technique in my work is most appreciated, and without it, this would not have been attempted. The feedback I received at the National Archaeology Student Conference (NASC) in Adelaide 2014 also influenced the preparation of this manuscript, and was much appreciated. Finally, I must thank Jack Galilee, whose patience in explaining the basics of inferential and Bayesian statistics to a somewhat clueless archaeologist is much appreciated, convincing me that advanced statistics need to be a much more central part of an archaeological education.

Matematisk analys blir allt mer användbart vid hantering av stora mängder arkeologisk data, tack vare de precisa och säkra resultat en sådan analys genererar. Den här artikeln diskuterar användningen av ett relativt nytt verktyg för att tolka och hantera arkeologisk data, Naiv Bayesiansk klassificering. Det ‘Bayesianska’ angreppssättet presenterades först i början av 1990-talet av den arkeologiska statistikern Clive Orton (Orton, 1992:139; Buck, Cavanagh och Litton, 1996:1), trots att bristen på den tillgängliga beräkningsförmågan vid den tiden gjorde det påfallande svårt att använda denna

Discussion and Conclusions

Acknowledgements

Abstract (Swed)

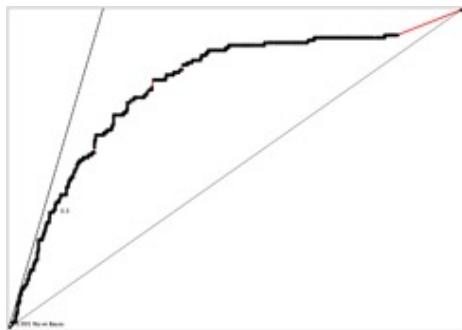


Figure 4: ROC (Receiver Operating Characteristic) Curve for RAK

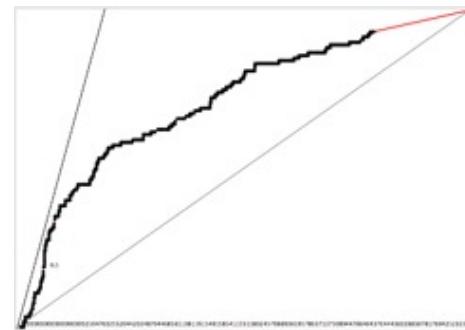


Figure 5: ROC (Receiver Operating Characteristic) Curve for FP

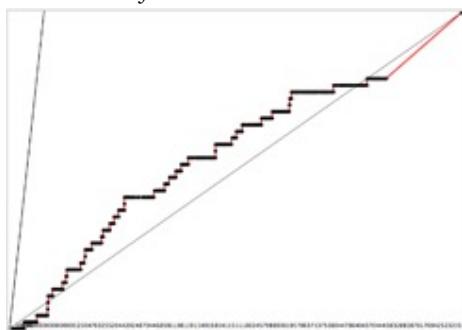


Figure 6: ROC (Receiver Operating Characteristic) Curve for PR1

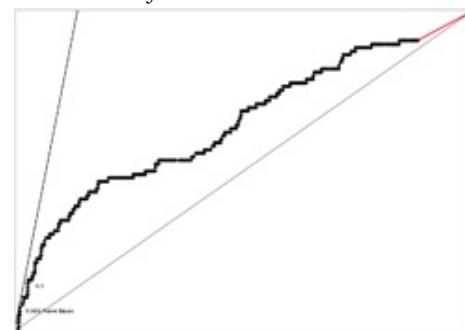


Figure 7: ROC (Receiver Operating Characteristic) Curve for PR2

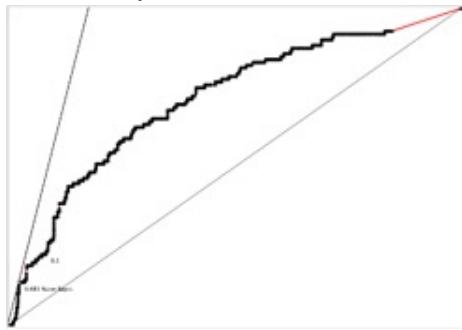
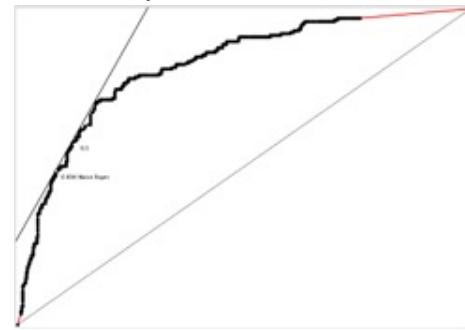


Figure 8: ROC (Receiver Operating Characteristic) Curve for PR3



Curve for PR4



Figure 10: ROC (Receiver Operating Characteristic) Curve for PR5

typ av klassificering. I dag kan en Naiv Bayesiansk klassificering hanteras av alla som har tillgång till en dator, utan krav på några speciella datorkunskaper. Program så som Orange använder ett grafiskt gränssnitt som ett sätt att kringgå behovet av särskilda matematiska kunskaper om processen, användandet av detta program finns specificerat i artikeln. Naiv Bayesiansk klassificering är mest användbart vid försök att identifiera dolda mönster i stora mängder data, så som en databas med tusentals poster, och potentiella användningsområden kommer att illustreras här. Den här artikeln presenterar en fallstudie där Naiv Bayesiansk klassificering används i ett försök att datera svenska vikingatida runstenar, vilka förblir odaterade med kontroversiella metoder. Två variabler identifierades genom att visa vissa spår av tidsmässig utveckling, de kristna korsen och runinskriftionerna på stenarna, och klassificeringsmetoden användes för att undersöka deras vidareanvändning.

Nyckelord: Bayesiansk statistik, arkeologisk statistik, Naiv Bayesiansk klassificering, arkeologisk metodologi, kvantitativa metoder.

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The Management of Social Space in the Upper Palaeolithic: Patterns, Statistics, and Open GIS in the Lower Gallery of La Garma (Cantabria, Northern Iberian Peninsula)

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Applications of intra-site spatial statistics decreased during the 1990s and early 2000s, reducing spatial analysis to refitting and density maps, thus leaving apart many interesting quantitative approaches. During the past 10 years, intra-site studies have increased their relevance due to the capabilities of Geographic Information Systems (GIS) and computer visualization. This paper recovers a few old concepts, such randomness or classical statistics, and incorporates them to more recent advances, such GIS, Open-Source Software (OSS), explorative analysis and geostatistical thought. These methods are applied to a lithic assemblage from the Lower Gallery of La Garma (Upper Palaeolithic cave site in Cantabria, Spain), where contexts are well-preserved, aiming to infer about human spatial behaviour from lithic distribution. I argue that there is a certain degree of spatial rationality behind actions in this site, and I explore its relationship with further dimensions of human activity. Due to lithic distribution and its relationship to other evidences (structures), temporal variation in the use of social space is proposed as hypothesis.

Palabras claves: Intra-site, Spatial statistics, Open-source software, QGIS, Upper Palaeolithic.

As a concept, spatial archaeology is coterminous with archaeology itself. Spatial dimension becomes an omnipresent environment for all human actions, and in archaeological research all sources of evidences must be located and integrated: stratigraphic relations, sites, landscapes, artefacts or others. The synergy between logical positivism, multidisciplinary, highly technical approaches, quantitative data analysis, and functional explicative theories led to the development of the *New Archaeology* during the 1960s and 70s. This paradigm became the real turning point of what we know now as *intra-site spatial analysis*, introducing important changes in the methods applied (spatial statistics) and the explanatory models for social behaviour (ethnographic data).

The beginnings of analytical spatial archaeology can be traced back to the 1970s, when Robert Whallon (1973) introduced the basic concept of randomness as a comparative tool

Abstract
(In Spanish see below)

Precedents
about intra-
analysis

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to study spatial distributions of artefacts, and David L. Clarke (1997) formalized the definition for spatial archaeology as the study of human groups through the spatial relationships between evidences. Due to an increased interest in the topic, many researchers developed several techniques in subsequent publications (e.g. Hodder and Orton, 1976; Upham, 1979; Hietala, 1984; Blankholm, 1991). However, faced by certain limitations (cf. Gamble, 1991), advances in quantitative spatial analysis were gradually disregarded in favour of simpler density maps and formative inferences, more often taphonomic than social. During the twenty-first century, major improvements have been developed as a result of the generalized use of GIS and digital tools, in addition to a raising application of geomatic technologies and the development of integrative frameworks (Llobera, 2011; McCoy and Ladefoged, 2009). Therefore, geostatistical approaches and analytical visualizations are earning importance, mainly boosted by user-friendly software and interdisciplinary research (e.g. Barceló et al., 2008; Craig, Aldenderfer, and Moyes, 2006; Lloyd and Atkinson, 2004; Katsianis et al., 2008). Nonetheless, instead of some common trends in this field (see Djindjian, 1999), intra-site archaeology stays without a standardised methodology yet, leading a huge but enriching diversification of methods and perspectives.

This paper aims to: (1) recover the concept of randomness as an extremely valuable tool to explore spatial distributions, (2) claim that descriptive statistics are useful to control second-order tests, (3) show the capabilities of Open-Source Software (OSS) to integrate different analytical stages, and (4) demonstrate that absence of protocols to analyse archaeological spaces is not necessarily a methodological weakness, provided that we address our questions and issues contextually in each case study.

Archaeological record The Lower Gallery of La Garma is an Upper Palaeolithic cave site in Cantabria, situated at 550 m above mean sea level (AMSL), in the core of a karstic system (La Garma hill), 5 km away from the Cantabrian coastline and 11 km from the capital city of Santander (Fig. 1a). The cave floors is about 300 m long and has an extension of 800 m. It has been divided into nine study areas, and maintains a constant altitude through many stances and passages (Fig. 1b). The main site feature is its ancient entrance collapse, happened at some moment during the Late Glacial Maximum. Due to this, a broad variety of Palaeolithic evidences remained in the cave floor surface without sedimentary processes, producing that could be called a close “living floor” concept: rock and mobile art, lithic and bone industries, faunal and vegetal remains, structures and more, all of them left in their depositional context (but not necessary of anthropogenic origin) (Fig. 1d-e). Nowadays, the access goes through two upper caves interconnected by chasms and galleries (La Garma A, La Garma B and Intermediate Gallery). Access is highly controlled for scientists and restricted for the main public (Arias, Ontañón Peredo, and Álvarez Fernández, 2011; Maximiano, Arias, and Ontañón, 2013; Ontañón, 2003).

From a regional point of view, La Garma belongs to the Magdalenian culture (c.18-10kya) of the Upper Palaeolithic. This is a temporal context during which climate suffered a gradual but discontinue moderation, favouring the inhabitation of ecological niches on the littoral, river valleys and mountains, where human groups exploited some specific resources intensively (e.g. deer, chamois, river fishes, molluscs...) (Strauss, 2010; Utrilla, 2004). Flint and bone industries evolved from Solutrean to classic Cantabrian Magdalenian lithic and bone tools, the latter with animal decorations (González Sainz and González Urquijo, 2004; Álvarez, 2007). A demographic increase seems well documented based on the intensity of cave occupations through time, and settlement patterning was oriented to the systematic catch of natural re-

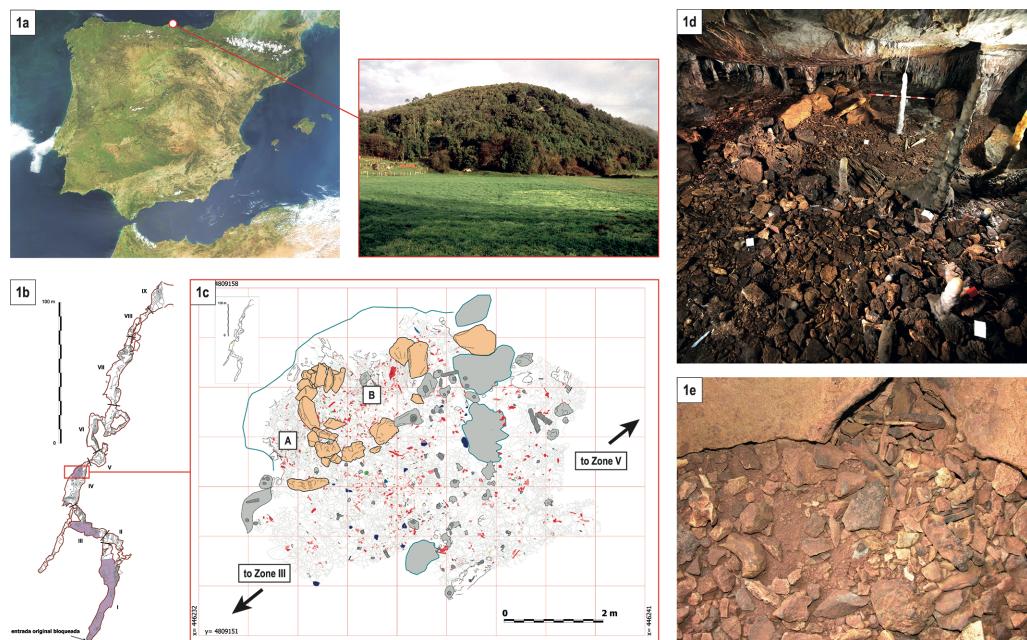


Figure 1: Geographical location of *La Garma* archaeological complex (1a); general map of Lower Gallery (1b); map of Zone IV (1c); general view of Zone IV (1d); detail of the occupation floor inside structure B (1e).

sources (i.e. minor specialized sites around base camps), partially related to “sanctuaries” with a broad presence of rock and mobile art, such as plaquettes, paintings, engravings, etc. (Strauss, 1992; Strauss, 2010). These cultural manifestations were also linked to a rich symbolic sphere and complex social relations (Arias, 2009; Schwendler, 2012). Long distance contacts to other peoples from the Pyrenees and south-western France have been suggested through the travelling of material, ideas, art, and probably also people (Sauvet et al., 2008).

This paper considers a particular area of the Lower Gallery of *La Garma* site: Zone IV. This sector is about 130 m from the original entrance and the cave morphology maintains it away from sunlight. In Zone IV, several rocks were disposed in a certain order forming closed spaces with low ceilings (no more than 1.50 m high) and different floor composition (lower height and finer grained sediment), which have been defined as the structures A and B, extending over 1.50 m² and 3.18 m² respectively (see Fig. 1c). Outside them, a larger space becomes a communicating passage between zones III and V (Fig. 1b-c). Around 1,200 lithics, 3,750 bones and several kinds of vegetal remains (pollen, phytoliths...) are distributed over 55 m², inside and outside the structures (Fig. 1d-e), associated to a chronology of 14300-14000 cal BC (Arias, Ontañón Peredo, and Álvarez Fernández, 2011). Research is still in progress. Thus, the following analysis aims to maximize inferences from the minor archaeological information available; in other words, this spatial analysis, with a reduced set of variables, could be helpful for further studies on prehistoric materiality and to more general spatial relationships within the site.

Archaeological evidences are the material expressions of human actions, motivated by social intentionality (Barceló, 2002), in accordance with cultural idiosyncrasies (Otte, 2012). The following analysis focuses on the lithic assemblage of Zone IV, in order to understand the social

Hypotheses for lithic remains

intentionality that distributes them through space, and how it relates to the human-made spatial limits represented by structures A and B (Kooymen, 2006; Maximiano, 2008). In order to construct an interpretative framework of social space from an archaeological context, we need to identify socio-spatially significant features on lithic distributions. If we consider site-formation processes (cf. Schiffer, 1976), lithics passed from a systemic context to an archaeological one once they lose their functionality, regardless of whether their function was social, economic or symbolic. Lithics become socially excluded rubbish, discarded, abandoned and forgotten, and are then incorporated into the archaeological record (Clark, 1991; Hull, 1987; Murray, 1980; Schiffer, 1976).

The lithic assemblage of Zone IV has been divided in two categories attending a basic contraposition: the spatial distribution of lithics that may have been useful after production and before abandonment (“Previous-Useful”: PU or artefacts), against the spatial distribution of objects that most likely were not useful after production (“Always-Useless”: AU or debris). During the knapping process, debris fall off from core and flakes, but due to their size, their passive role, and the stage of production in which are originated, they tend to be useless and left in place or moved away. After the knapping process, the flakes can be directly used, discarded, retouched or recycled, but by the end of their life-histories they’ll be equally discarded. The difference is that whereas “PU Objects” could be managed each one individually (one-by-one, just as artefacts), “AU Debris” tend to be managed collectively, by grouping or leaving apart many tiny remains at the same time. Since both categories can create dumping areas, they are different intentional contexts: lithic debris (AU) is directly related with knapping actions, so its location reveals activity areas or taphonomic events; while lithic objects (PU) are discarded as waste, and their spatial location could be related with (dumping) areas without any nuisance for culturally-accepted spatial ordering. Nonetheless, lithic disposals tend to follow social rules: dispersion indicates unconcern about refuse distribution in space, while accumulation implies cultural discrimination for dumping areas among the whole disposable space, relating that to those areas more frequently-used or not for determinate activities. This can help to relate areas to particular activities or social behaviour.

The lithic assemblage of the Zone IV of Lower Gallery of La Garma has been divided into these two categories. The first one (objects PU) is composed by 316 remains bigger than 7–9 mm, including flakes, retouched tools, blades and bladelets, both broken and complete. The second category (debris AU) contains 853 tiny and shapeless fragments less than 5–7 mm in size, regardless whether their origin derives from knapping activities, taphonomic or other processes. These reflections and classification are inspired on very basic techno-morphological assumptions (see Carbonell, 1992; Inizan et al., 1999; Mora, Martínez-Moreno, and Terradas, 1992), and entails just a preliminary and non-definitive approach to spatial identification of human actions and activity areas. Conclusions will be generalizations, and they may include some misleading or misclassified items, but the potential degree of error can be assumed without major impact on the interpretations. This way, we can obtain two possible conclusions at the level of social management of space: spatial segregation between activities can suggest further cultural rules in management of space; otherwise, superimposition of activities can suggest a socially polyvalent space (i.e. earlier actions not inhibit later ones).

GIS methods for ‘point patterns’

As previously stated, the introduction of randomness as analytical tool in spatial archaeology became a milestone, but it has arguably been underexploited. For the analysis of “point patterns” –i.e. spatial data given in the form of map coordinates–, randomness implies a non-

significant variability in the values of a given variable according to its spatial location. In other words, the spatial location of a variable –e.g. a flake in a locus represented by three coordinates (XYZ)– may not have any relation with a major or minor presence of the same (or another) variable in its proximities, no matter how near or far could stay a second artefact from the first one. In fact, the sets of values in various locations are completely independent. Once a measure for randomness is obtained, variations and patterns in the spatial distribution can be spotted. So, if the occurrence probability increases the shorter the distance between artefacts is, and decreasing the larger de distance is –i.e. flakes are placed less distanced than what would be expected under random conditions–, it will be called “aggregate pattern”. On the contrary, if the occurrence probability for spatial distribution tends to decrease at short distances, and increasing at larger spatial separations, it will be called “disperse pattern”. These spatial dynamics are well-defined in mathematical terms, and are the basis to confirm or reject the Complete Spatial Randomness (CSR) hypothesis, being a helpful explorative approach that brings important information and enables further advanced analysis (Bailey and Gatrell, 1995; Bevan et al., 2013; Illian et al., 2008; Maximiano, 2008).

Several methods have been developed for the analysis of “point patterns”, many of them based on measures such as the inter-distance –i.e. separating distance between locations– or intensity –i.e. density, number of points by unit area–. One of the most popular is the Ripley’s K function, addressed to extract structural information including reduced second-order characteristics, that is, certain covariation at multiple scales. Nonetheless, centrographic statistical measures can be also applied as a first-order summary, in order to complete and control more specialized tests, such as Ripley’s K function. In addition, Kernel Density Estimators become a valuable graphical expression for intensity values.

Centrographic Statistical Measures (CSM): are composed by statistical measures, such as mean or standard deviation adapted, to two coordinates of “point patterns” (2D in a map). Mean becomes “centrographic mean” represented by a XY coordinate, while standard deviation becomes “standard distance” and is expressed as the radius of a circle which reflects degrees of dispersion (Ebdon, 1985; Wong and Lee, 2005). Although, the maximum extension of a distribution is indicated by the minimum polygon or “convex hull” that includes all points.

Ripley’s K function (K-FUN): cumulative function that compares intensity in an area of radius r against expected CSR values. A graphic output is displayed: if intensity is higher than random (aggregate trend) function shows a peak above the confidence interval, but if values are lower than random (disperse trend) function shows troughs under confidence interval (Orton, 2004; Wong and Lee, 2005). Confidence intervals are obtained from 999 Monte Carlo simulations, and results are exposed with and without edge effect corrections due to there is not any sample but a complete archaeological set. K-FUN needs to fix a study area, usually provided by the Minimum Enclosing Rectangle (MER) for the given “point pattern”: to facilitate further comparisons, study area for both categories will be the MER of the most extended distribution (“PU objects”) (see “Boundary layer” in Fig. 2).

Kernel Density Estimation (KDE): probabilistic function that describes the intensity of points by displaying isolines according to a fixed radius and smoothing parameters

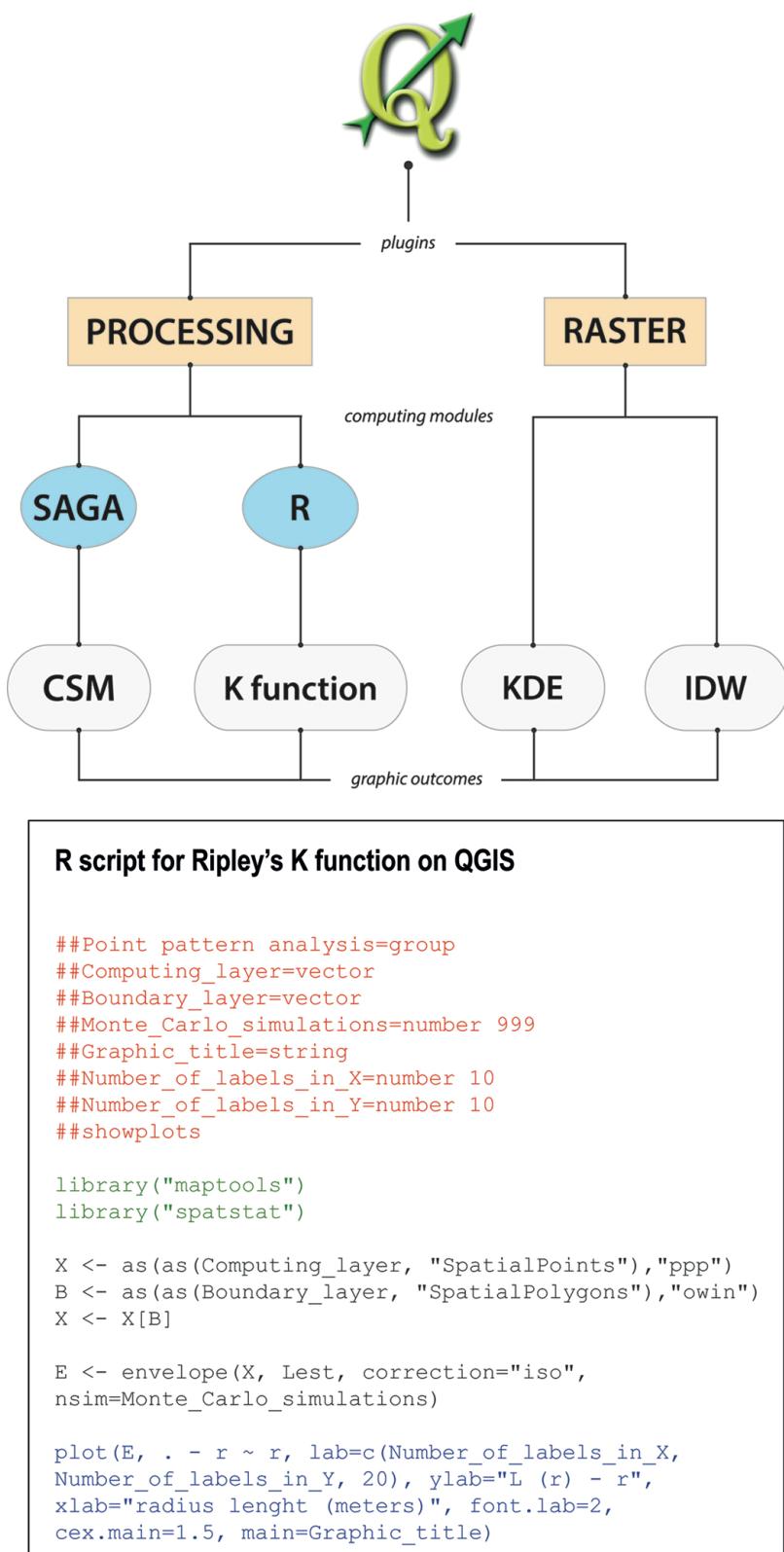
(Baxter, Berdah, and Wright, 1997). KDE technique is a powerful visual complement to K-FUN (see (see Sayer and Wienhold, 2013)). In this case, parameters for KDE are 20 cm radius and “quartic biweighted” for smoothing.

Multivariate visualization: analytic visualizations are valuable tools when we need to mix quantitative and qualitative spatial information; this way, the graphic plot of different variables or categories can be represented as trend surfaces, weighted quantities, or else (Craig, Aldenderfer, and Moyes, 2006). Hence, the procedure I have followed has been designed to express the spatial relevance of one category against other by unit area. Firstly, Zone IV is divided into a grid of equal quadrats (20 cm by side), and then each quadrat received a relative averaging measure. This last one is a percentage value calculated as follows; if the sum of “PU objects” and “AU debris” is 100 % in every grid cell, the percentage of each category per quadrat can be obtained by cross-multiplication: that is, the multiplication of all the remains of just one category (PU or AU) by 100 and then divide it by the sum of all remains of both categories (e.g. if in a quadrat called x-1, there are “PU = 12” and “AU = 19”, then “PU + AU = 31”, thus “PU = [12*100] / 31 = 38.71 %” and “AU = [19*100] / 31 = 61.29 %”). As the whole grid needs to be calculated the same way, the estimation of just one category for all quadrats (PU or AU) will reflect the other one as its counterpart (e.g. if “PU = 38.71 %”, then “AU = 100 – 38.71 = 61.29 %”). Finally, grid is converted into regular point data by quadrat centroids and giving these centroids a corresponding percentage value; these values are interpolated by Inverse Distance Weighting (IDW) to obtain a trending surface. A 45–55 % average indicates non-meaningful relevancy of any specific category among other, but departures indicate areas where one category dominates among the other.

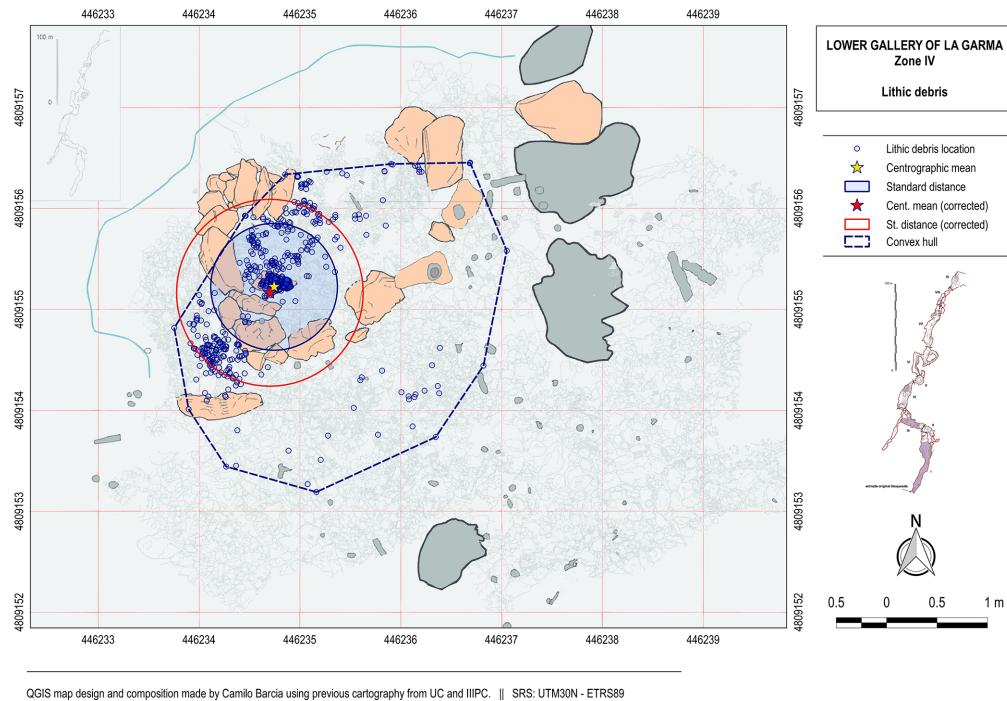
GIS environments have a reputed efficiency for an integrated data management, analysis and visualization (Conolly and Lake, 2006; Wheatley and Gillings, 2002). In this study, free OSS has been chosen, attending to both ethical and practical reasons: this kind of software neither charges user fees nor presents any restrictions in terms of licenses, it is a collective enterprise and it is usually user-friendly (Orengo, 2015). This way, QGIS provides all the analytic tools by itself, or through some plugins (e.g. PROCESSING) that connect the main program with other environments in order to increase its computing capacities (e.g. SAGA, GRASS, R, Python...). Thus, QGIS is used here for general management, CSM, KDE, and multivariate visualization; SAGA is used for CSM too; and R is used for K-FUN (Fig. 2). R programming language also uses a specific package for spatial analysis called SPATSTAT, which permits to calculate the K function (see *Analysing spatial point patterns in R* 2010; Baddeley and Turner, 2005).

Supported on GIS environments, the analysis aims to seek paths to discover and analyze the variability of spatial distributions. The need to know how a distribution is and how it varies can be fulfilled by exploring its trends, patterns, variations between different observational scales, and other parameters. That must involve a well-suited relation among data nature, research aims and statistical techniques (Anselin, 1999; Bivand, 2010). At first, we use statistics and GIS to know how a spatial distribution of remains is. And then, infer what kind of human intention has generated that pattern.

Results The CSM for “AU debris” locates the centrographic mean on a flat stone in the SW of structure B, while significant part of them stays in a small area close to centrographic mean accord-



Note: Python code for QGIS interface window (red); R libraries required to process .shp files (green); R code to calculate K function in an area defined by the user ("Boundary layer") and to plot its results (black and blue). For edge effects correcting methods see Baddeley (2010: 92-93).



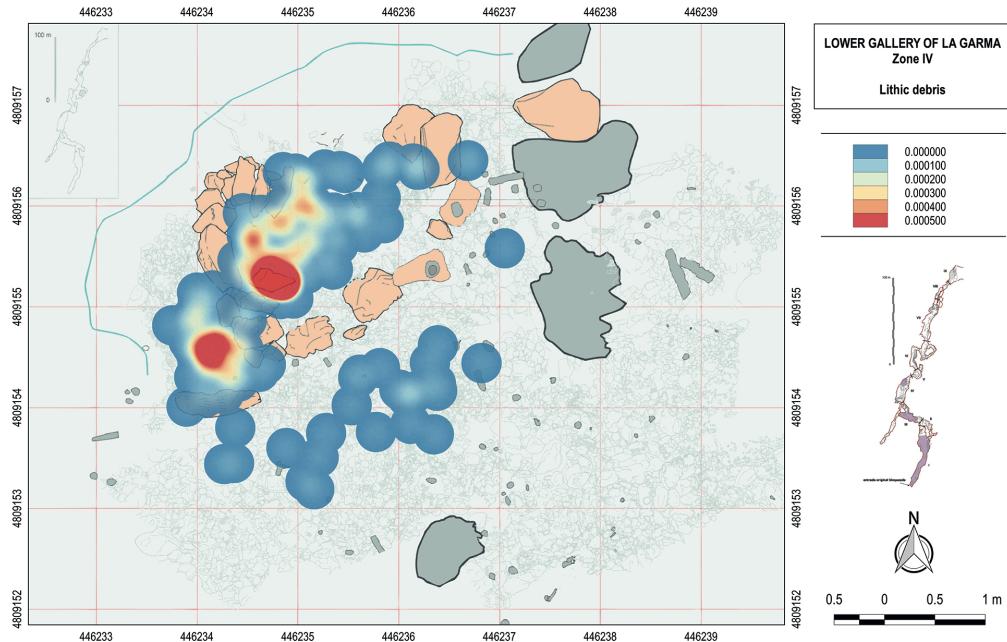
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Figure 3: CSM plot for “AU debris”. Outlier corrections are in red.

ing to standard distance. Both centrographic mean and standard distance are displaced from the convex hull centre, giving the SW corner of structure B a significant role above the whole distribution. It seems clear that past social intentionality did not have the same degree of incidence in all possible locations of study area, but the gravity centre is conditioned by a high concentration on the flat stone. This fact will bias further analysis and must be considered: if we remove these 467 elements, centrographic mean is quite similar but standard distance circle grows, although most remains stays inside structures (Fig. 3).

KDE indicates that CSM coincides with high intensity values. Moreover, minor concentrations can be detected around bigger ones: at first, the semi-circle with empty inner space nearby to greater concentration in SW corner of structure B; then, similar incipient pattern arises in the structure A but is cut by structure limits (Fig. 4, see top). The presence of “AU debris” in the outer area is merely residual. K-FUN describes a conventional aggregated pattern in two phases (Fig. 4, see bottom): firstly, an aggregating trend arises from early stages to middle ones (L ups to 0.70 between 0–0.55 m) due to high average density of lithic debris at closer distances for the whole set; finally, a decreasing random trend appears from middle stages to the end (L descend to 0.60 between 0.55–1 m) due to the lack of same lithic remain density at longer distances than the shorter. Both trends have relation to the higher intensity of points located inside structures and to the lower intensity placed outside.

Centrographic mean for “PU objects” is 0.38 m far from the “AU debris” one, also in the SW corner of structure B, but significant part of these objects are distributed through a larger area according to standard distance. While centrographic mean is displaced from the convex hull centre, standard distance reaches larger extension of total distribution than it seems: there’re



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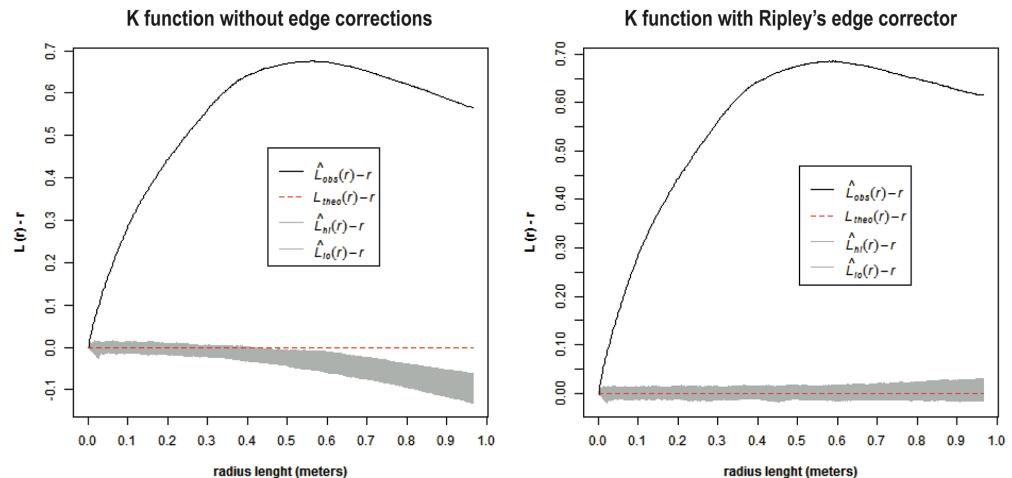
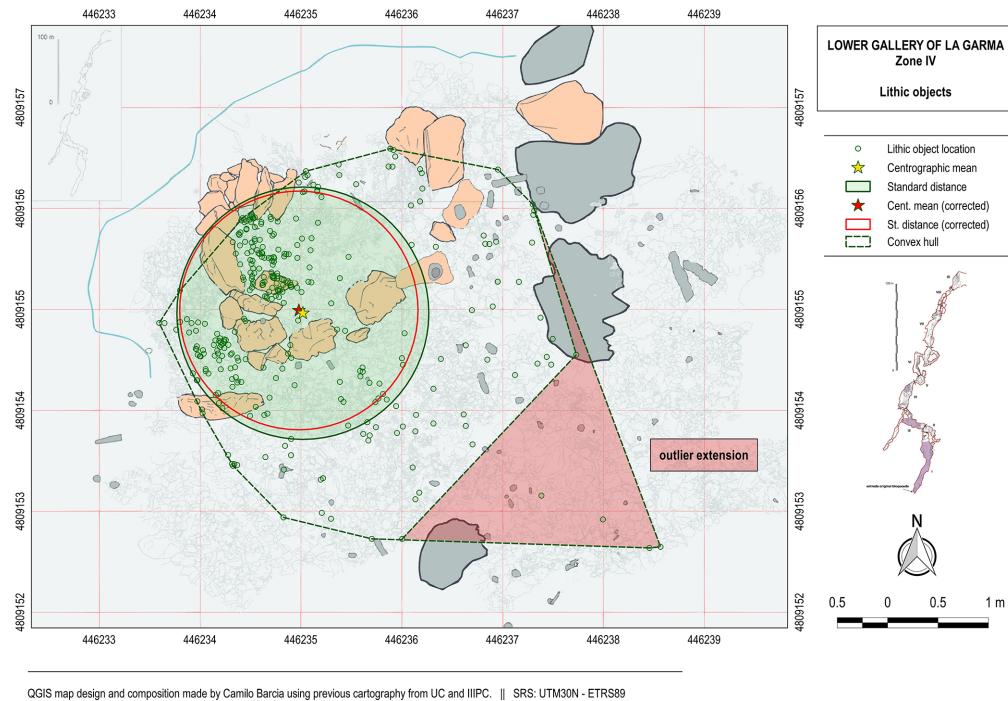


Figure 4: KDE plot for "AU debris" (top). Graphic display of K function (bottom); outliers previously explained (SW corner of structure B) are not computed.



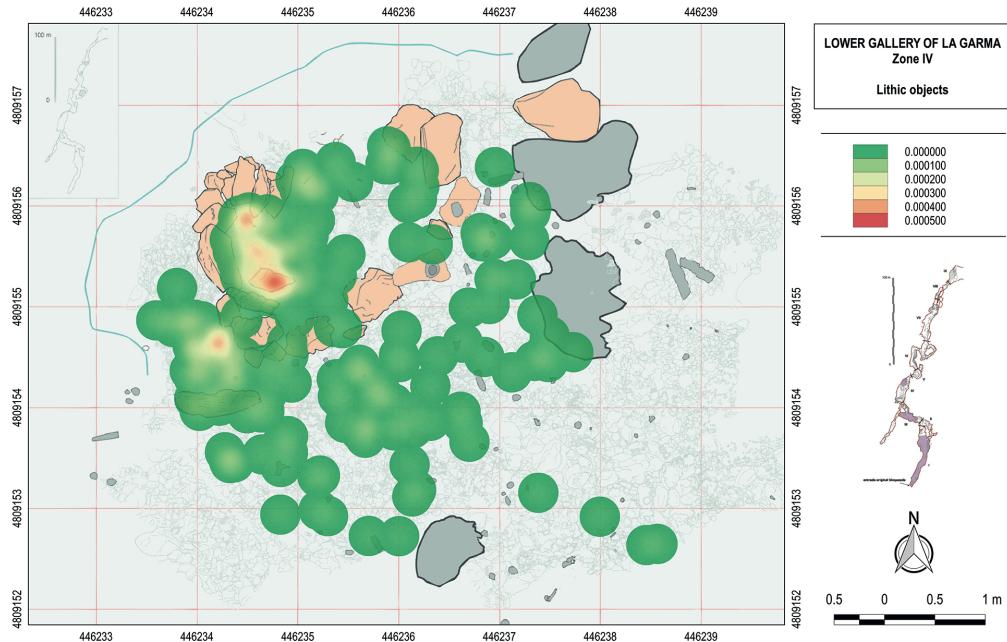
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Figure 5: *CSM plot for “PU objects”*. Outlier corrections are in red.

4 objects in the SE that force the total extension (outliers), diminishing and hiding the real relevance of CSM (Fig. 5). Thus, if these 4 elements are not computed, extension of convex hull decreases but it doesn't entail a significant change in the size of standard distance circle.

KDE indicates that CSM places all high intensity values inside structures A and B, but some other lower intensity values outside too. Intensity values are constantly low outside, while specific locations inside have higher intensities than surrounding areas. Furthermore, the shape of high values in structure B extends between SW flat stone and northern border (Fig. 6, see top). K-FUN describes a stabilized aggregated (Fig. 6, see bottom): at first, an aggregating trend arises from early stages to middle ones (L up to 0.42 between 0–0.51 m) due to a high average density of lithic remains at short distances for the whole set. Finally, as the “AU debris” case, the crescent aggregating trend is stopped by non-increasing intensity at larger scales, but in the case of “PU objects” a more compensated scattering than “AU debris” over the entire Zone IV (both inside and outside the structures) avoid the apparition of a random or disperse pattern (L keeps 0.40 between 0.51–1 m). Both increasing and stabilized trends are related to shorter and larger scales respectively, so higher densities of lithic objects are linked to accumulations inside the structures while the stabilized trend is caused by more (non-strictly random) scattered objects over the whole area outside the structures (see KDE in Fig. 6, top).

A relevant aspect for KDE and F-FUN comparison between “AU debris” and “PU objects” is the larger aggregation index shown in debris ($L = 0.70$) than that seen in the objects case ($L = 0.42$). Mathematically, in the case of K-FUN, theoretically finite aggregated patterns will show a former ascending trend (aggregation) before decline (dispersion), and this happens because the accumulation of points (at higher or same intensities) stops at some moment the longer



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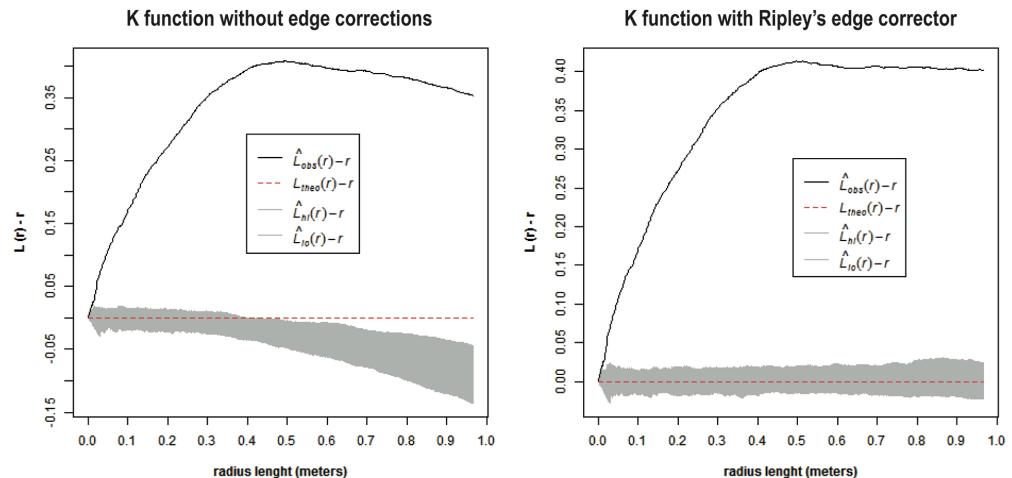
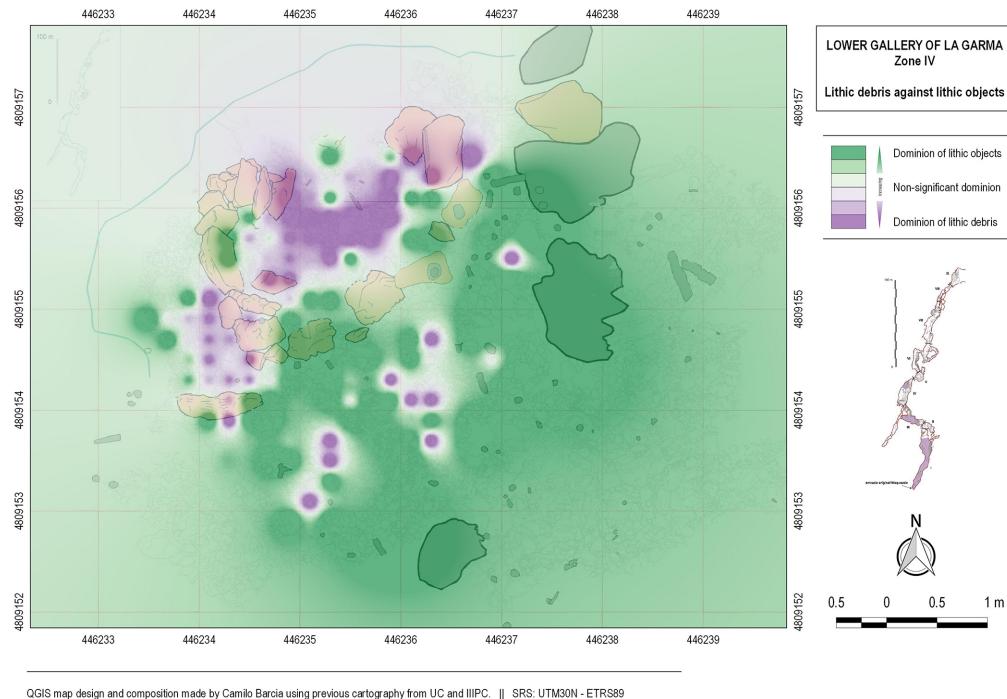


Figure 6: KDE plot for “PU objects” (top). Graphic display of K function (bottom); outliers previously explained (the four SE elements) are not computed.



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Figure 7: IDW plot for “AU debris” against “PU objects”.

the distance computed, then starts to be more dispersed due to most points are located nearer to others than farther (Maximiano, 2008). Anyway, if the reduction in point presence (intensity) is more gradual and smoothed than a classic aggregated pattern model, the natural declining trend will happen at longer distances than in the case of a strong aggregated one. What can be observed in K-FUN for “PU objects” is the stabilization of aggregation index: it cannot arise nor decline as a result of lower intensities at large scales, but this decrease is not enough to cause a random or disperse pattern yet (at these scales of observation: 0–1 m). On the other hand, debris K-FUN trends fits well to conventional conceptions of an aggregated pattern.

Plotting “PU objects” (green gradient, 55–100 % domination) against “AU debris” (purple gradient, 55–100 %), it can be seen that one single type dominates some areas (Fig. 7). Besides, areas of equality can be distinguished too (45–55 %). Differences in sample size could bias important information (i.e. “AU debris” can hide “PU objects”), so it is worth pointing out the most items of both categories have presence inside the structures. Thus, Zone IV is divided in two major trends: “AU debris” dominates inside structures (in a range from 60 to 100 %, but sharing space with “PU objects”) while “PU objects” clearly dominate outside (around 80–100 % over the area except in very few debris locations). Other trends take the form of small spaces shared by both categories around the largest aggregations (40–60 %), and there is also a very limited presence of “AU debris” outside the structures, and of “PU objects” surrounding inner debris. It can be concluded that there is a significant distinction between inside and outside areas, their linkage with one category for each one, and then, a deep variation that coincides with structure limits.

Interpretation: lithic remains in the Lower Gallery of La Garma are not randomly distributed in space.

There is a spatial dynamic which trends to aggregate debris in particular areas with a very specific distribution, while potential tools (“PU objects”) are also aggregated in some areas but more dispersed over others. It implies that spatial patterns are scale-dependant: gravity centres (traced by CSM) give more relevance to lithics inside the structures than those located outside, so the aggregating patterns of both categories are more conditioned by elements distributed within structures than their respective outer ones. Pattern variation shown at larger scales is more linked to distribution changes in external area than in the space closed by structures (see K-FUN explanation about “PU” and “AU” comparison stated above); this way, social intentionality tended to aggregate lithic elements inside, while in the outside area these intentional actions were more dispersedly distributed. Furthermore, there is a strong correlation between lithics and spatial segmentation (structures): the most meaningful changes in spatial variability of lithics coincide with structure limits. Hence, social intentionality –that rules on human actions and its material effects– makes distinction over all available space (the whole Zone IV), locating activities differentially and producing the observed spatial pattern.

From an interpretative angle, lithic debris located inside the structures can be related to knapping areas not only because of their classic definition or implications, but due to their spatial expression too (see KDE plot in Fig. 4): non-overlapping and well-defined small aggregations of debris in structure B, with a reduction in concentration intensity from the centre to their periphery (e.g. Kvamme, 1997; Nadel, 2001; Newcomer and Sieveking, 1980). Additionally, many debris remains are over the flat stone of SW corner in structure B. On the other hand, spatial meaning of lithic “PU objects” is more ambiguous: they could have been discarded next to knapping area as direct refuse after débitage or they might have been disposed there after some use. Attending a spatial pattern like the growth of aggregation only until specific scale, as shown in K-FUN and KDE (see Fig. 6), past social actions disposed lithic objects discerning different kind of areas: there is not only a distinction between inner and outer space for dumping actions, but also between inner spaces. As an example, the great majority of lithic objects in structure B is located in the SW lateral while other parts of structure are nearly empty, meanwhile remains are more scattered in the outside area as a result of actions that do not conceive preferential locations there. The entire available space in Zone IV does not play the same role in allowing social actions; these are differentially distributed in space.

In previous reviews of this site, temporal issues on occupational floors of Zone IV has been pointed out (see Arias, Ontañón Peredo, and Álvarez Fernández, 2011); this way, synchrony of remains confronts the absence of sedimentary processes –which is commonly related to short-occupation episodes (remains are visible during long time)–, to long age periods revealed by radiocarbon dating methods (Arias, Ontañón Peredo, and Álvarez Fernández, 2011:35–39). That introduces a palimpsest factor to the site, which can impact to spatial relations between elements, structures and to inner/outer areas stated above; however, intra-site spatial analysis and spatiotemporal interpretative framework can help to identify possible biases and to avoid this kind of low-resolution aspects. For example, non-statistical elements as the arranged floor and small inner space of structure A for knapping or other activities (1.50 m) could suggest not a functional one, but a remnant of an earlier occupation previous to structure B. This argument is strengthened by the diffuse southern limits of structure A, and by the presence of lithic remains between the bends of rocks which separate both structures (see Fig. 3 and 5). When statistical geospatial data is put in context, both spatial patterns of debris and objects

increases doubts on synchrony in favour of the palimpsest hypothesis: the shape of two lithic distributions looks similar to those located on SW part of structure B, but disrupted by structural limits (see KDE in Fig. 4 and 6). All of this could indicate a superposition of buildings upon early lithic remains.

Concluding remarks This analysis leads us to some interesting questions and hypotheses: (a) the minimum number of occupational stages of the site, and whether there was a temporal evolution of social space; (b) what indicators can be sought in the material record –i.e. lithics and else– to detect different kind of actions (e.g. trampling, use-wear traces, chemical residues, marks on flat stone in an “anvil” way...), and locating them to confirm or reject spatial segregation; and (c) if certain actions, such as flint knapping were carried out there (in full darkness, surrounded by rock art and other evidences), which would require a complex social interpretation and maybe the consideration of symbolic dimension.

Further research in the Lower Gallery of La Garma is still ongoing, so any interpretation should be considered as provisional, as a set of hypotheses to be tested. Future research should aim to undertake a full spatial analysis of all remains and environmental information in this site, together with a spatial comparison with similar archaeological contexts in the region (see Arias, Ontañón, et al., 2005; Arias, 2009).

This paper focuses on basic quantitative approaches to quantify differences in spatial analysis. I argue that focusing on density maps do not allow to fully understand spatial interaction: is not the same random than disperse or aggregate, so implications for social inferences are substantially different. Therefore, density maps should be combined with other statistical and spatial techniques in order to approach questions regarding the social implications of an assemblage’s distribution. Considerable efforts are being directed to providing archaeology with robust spatial methodologies, mostly imported from other sciences. Intra-site spatial analysis is a powerful instrument to study archaeological spaces and their past social significance. However, explanatory models and the characterisation of socio-spatially relevant features in materiality, linking social intentionality with observable spatial patterns, needs to be revisited and expanded. A common criticism to *New Archaeology* and *Processualism* has been Eurocentric aprioristic assumptions, rigid deductive reasoning and limited interpretations (in terms of scientific laws). These general laws imply the mechanical correlation of an evidence to just one or two possible interpretations for all cultural contexts, underestimating the role of historical processes and social relations in their own idiosyncrasy (Hodder and Hutson, 2003; Trigger, 2006). That methodological correlation was called “Middle-range theory” –similar to “Observational archaeological theory” in the terminology of Marxist Archaeology–, and despite their limitations, it can be a starting point for future research. Spatial models for intra-site studies of human behaviour are not broadly developed yet, but they could evolve from classic models through the application of methods such as experimental archaeology, ethnoarchaeology, computer simulations, geostatistics, digital 3D environments, GIS and more geospatial tools. Moreover, after taking care of the *post-processual* warnings about the nature and the applicability of the evidence, spatial models should be conceived and played for further interpretation in a more indirect and “socially ambitious” way: becoming *an analytical aid* to further interpretations –e.g. describing parameters as spatial segregation, minor statistical trends, attraction and repulsion between actions, correlations...–, *more than an interpretation itself* –e.g. spatial models and quantitative techniques that aprioristically fit some classic activity areas on a given

spatial distribution...—. This second one should be the last step in research, rather than the first.

* * *

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La estadística espacial intra-site sufrió un descenso durante la década de 1990 e inicios de los 2000, reduciendo el análisis espacial a remontajes y mapas de densidades, lo que dejó de lado diversos e interesantes enfoques cuantitativos. A lo largo de los últimos 10 años, los estudios intra-site han recobrado su relevancia gracias a la capacidad de los Sistemas de Información Geográfica (SIG) y la visualización informática. El presente artículo recupera viejos conceptos como la aleatoriedad o la estadística clásica, y los une a avances más recientes como los SIG, el software libre, los análisis exploratorios y el pensamiento geoestadístico. Estos métodos se han aplicado a un conjunto lítico procedente de la Galería Inferior de La Garma (yacimiento en cueva del Paleolítico Superior de Cantabria, España), donde los contextos están bien conservados, para inferir sobre el comportamiento espacial humano a partir de la distribución de restos líticos. Se concluye que existe cierto grado de racionalidad espacial tras las acciones sociales en este yacimiento, y se explora su relación con otras dimensiones de la actividad humana. A partir de la distribución lítica y su relación con otras evidencias (estructuras), se propone como hipótesis la variación temporal en el uso del espacio social.

Abstract (Spanish)

Palabras claves: Intra-site, Estadística espacial, Software libre, QGIS, Paleolítico Superior.

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Making Better Knives: An Experimental Analysis of Projectile Point Technology and Multifunctional Uses

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Testing the behaviour and function of projectile points broadens the understanding of site function and activities. Projectile point morphology may play a significant role in the efficiency of specific functional uses in Clovis and Cumberland projectile points. This experiment explores the inference that hafted projectile points serve secondary purposes as hafted butchering and cutting tools. The project uses four porcelain casts of Clovis and post-Clovis projectile points, natural animal leg sinew, animal hide glue, and pinewood for hafted handles. The experiment investigates whether a later morphology of projectile points is more effective for use as a knife. The quantitative results reveal the functionality of both Clovis and Cumberland point knives, but determining whether later morphologies served an improved functionality remains in question and requires further experimentation.

Abstract

Keywords: Projectile point morphology, experimental archaeology, New World archaeology, use-wear analysis, Pleistocene, Clovis, Cumberland.

STUDIES of the wear and corrosion of projectile points indicate their diagnostic use, whether propelled by hand, spear throwing, or through another formal use. This particular experiment focuses on the wear and tear damage of the hafted area of projectile points to indicate whether later projectile point morphologies would have been functionally more effective as a knife. A need for technological advancement serves as a main factor in the morphology of projectile points over time. This experiment examines two complex research questions. Firstly, did projectile points have secondary uses? Secondly, does projectile point morphology affect the functionality of stone tools? These questions were selected for general interest and also for the range of potential relevant techniques used to address them. With the application of use-wear analyses, the following experiment investigates the inference of prehistoric hafted projectile points serving secondary purposes as hafted butchering and cutting tools through a series of repetitive trials. The project investigates the evolution of projectile point technology and tests the functional efficiency of hafted points used as knives for cutting specific materials.

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Stone artefacts are usually by far the most common finds on prehistoric sites. Therefore, stone artefacts provide major sources of information into prehistoric life, since they remain controlled witnesses of prehistoric peoples and their activities (Cahen, Keeley, and Van Noten, 1979). The history of archaeological investigation into the nature of Pleistocene North America has largely been dominated by the collection and classification of lithic artefacts into the framework of a cultural evolutionary pattern. In order to understand the behaviours of stone tool production, one must use a holistic approach to account for diverse types of variation (Woods, 2011). Archaeologists use the properties of stone tools to make inferences about the evolution of human behaviour and technology. Experimental and ethnographic research attempts to recapture patterns of prehistoric stone tool production. In addition, experimental research acknowledges the differing environmental and social contexts in which specific tool using behaviour became possible (Thomas, 2011). Lithic analyses and technical studies tend to focus either upon the identification of prehistoric ethnicity or upon functional patterns that crosscut ethnic boundaries (Henry, 1989). The contingencies of projectile point manufacture, hafting, use, and rejuvenation create morphological changes. Experiments account for these variables to demonstrate that a single point-type may manifest more than one time-sensitive shape within its primary use. Artefact type reflects conscious preferences and norms on the part of the prehistoric people making and using the artefacts. However, the shape of the projectile does not always disclose the numerous modes of manufacture and use that occurred in the prehistoric context before deposition and recovery from the archaeological record (Fleniken and Raymond, 1986).

The patterns of damage on stone tools have been shown by both experimental and archaeological studies to be highly diagnostic indicators of various modes of use, and studies that have been conducted to date indicate that this area of research will be an important aspect of behavioural research associated with prehistoric lithic assemblages (Anderson, 2010; Dockall, 1997). Fatigue and abrasive wear patterns associated with the use of point tools indicate diagnostic patterns, some of which are exclusive to the use of projectile armatures, whether propelled by hand, spear thrower, or through the use of a bow. These two types of wear patterns occur on hafted projectile points. Particular worked materials imprint diagnostic types of abrasive and fracture damage on the edges and tips of tools that can be used in the formulation of inferences regarding tool kinematics and task reconstruction. Wear traces are diagnostic of the mechanics of projectile points subjected to both static and dynamic handlings (Dockall, 1997).

This experiment utilises similar approaches of technique and method used by past experimental and ethnographic researchers. The design, preparation, and testing were all deeply controlled and standardized in order to deal with projectile point knives and the wear and tear they experience after many repeated uses. The four points used for the experiment were obtained from Dr. David Thulman's porcelain cast collection. Porcelain material is elementally comparable to chert/flint and other stone materials typically used for the production of prehistoric projectile points. Therefore, the porcelain casts provide a reliable, controlled variable for the testing and analysis of prehistoric projectile points.

The two types of projectiles purposefully chosen were standard Clovis (approx. 11000 BC) and Cumberland (approx. 9000 BC) points. The point and tool typologies classify the two distinct hunter-gathering cultures of the Clovis and Cumberland Paleo-Indian people. The Clovis people are often understood to be the first inhabitants of the North America and most

likely predecessors of a number of other indigenous cultures, including Cumberland and even living Native American populations (Haynes, 2002). Both types of Clovis and Cumberland points are found in the New World dispersed throughout North America. Since the Cumberland point dates to a later period than the Clovis point, it is inferred that the design and structure of the Cumberland point would have been better for hafting, and hence would have been functionally more efficient for its second use as a knife (Anderson, 2010).

In particular, the Clovis complex is represented more densely in localities across eastern North America, but there are also distinctive authentications of Clovis technology across western North America (Morrow, 1995). These points are a relatively large tool that has a short flute (Fig. 1). The bifacial flute was utilised for hafting purposes. The parabolic shape of the tip curves out into somewhat straight, parallel sides. Overall, the shape of the Clovis point is wide and thick (Anderson, 2010). Cumberland projectile points are also found throughout North America and date to the Paleo-Indian period. The substantial shape of the point is of a wide V with ears at the distal end of the point and a long, bifacial flute making the point easy to haft. The projectile increases in thickness towards the midpoint with the thickest area at the most proximal point of the fluted area. Overall, the shape of the point is steep and rapidly changes in thickness down the middle and has its greatest width at the midpoint. Cumberland points have a distinct tip that is sharp and long (Anderson, 2010).

Through the use-wear analyses, the following experiment investigates the damage on the hafting materials of Clovis and Cumberland projectile point knives with repeated trials of handling and usage. The analyses of variations in wear patterns and damage provides insight into the inference of prehistoric hafted projectile points serving secondary purposes as hafted butchering and cutting tools.

On each of four projectile point knives (two Clovis and two Cumberland), ten trials of one hundred back-and-forth cutting motions along the length of the projectile point were performed on a pinewood block. An Excellence-Precision Balance was used to apply a standard 3.60 kg of pressure to each knife during each back-and-forth repetition of the experiment. In order to track the changes in the hafting material after each of the ten trials, measurements and photos were taken. Measurements for the change in angle between the point and handle and also the change in length of the knife were recorded in a data table. In total, there were forty attempts with one hundred repetitions for each trial of back-and-forth cutting.

The experiment used two of each of the Clovis and Cumberland points, four pinewood handles of the same exact size (Fig. 2), Whitetail deer hide glue, Whitetail deer leg sinew (Fig. 3), and an Excellence-Precision Balance to control the amount of pressure applied to the knife during each trial. All points were hafted using the same materials and design. Two of each of the Clovis and Cumberland points were used in order to obtain more data for analysis. Data pertaining to the change in angle between the hafted area of the projectile point and the handle was recorded after each trial of cutting. In addition, the change in length of the knife was recorded to determine whether the pressure from cutting pulled the projectile point from the hafting material.

Each of the four handles was designed and produced to maintain a controlled standard for the experiment. The handles were made using two sections of pinewood measuring 17.78 cm in length and 3 cm in width. The 3 cm end sections of the handles were cut and triangulated for hafting purposes. One layer of Scotch® Heavy Duty packing tape held the two sections of

Experiment and Methods

Materials

Knife Handles

wood together leaving a 3 cm section at the end of the handle without tape to allow for hafting of the points. The handles were 0.70 cm thick taped together.

Points and Hafting The porcelain projectile points were made from the casts of original Clovis and Cumberland points. Both Clovis points were 7.70 cm in length and 3.30 cm in width at the widest area of the point with its maximum thickness at 0.70 cm. The Cumberland points both measured 13.70 cm in length and 3 cm at the widest point with its maximum thickness at 0.90 cm. All of the points were hafted in between the two 3 cm triangular wood sections of the handles. The points were held in place using Whitetail deer leg sinew wrapped from the 3 cm line on the handle to the end of the handle. The sinew was then crisscrossed at each corner of the 3 cm length segment and then rewrapped over again from the point of the handle to the 3 cm line on the handle. After wrapping the point and handle with sinew, the 3 cm section of the handle was coated with a layer of Whitetail deer hide glue (Fig. 4).

Wood Block and Scale The testing for the experiment was done on a pinewood block with dimensions of 60 cm × 15 cm × 15 cm (base × width × height). The block was placed on an Excellence-Precision Balance in order to maintain a controlled amount of pressure on each knife.

Measurements Measurements of the total angles between the handles and projectile points and also the total lengths of the knives were recorded after each trial. In addition, the changes in angle and length for each individual trial were recorded. Tracking the changes in angle between the handle and projectile point and modifications in the total length of the knife provided the fundamental data for the overall understanding and evaluation of the results of the experiment. All of the measurements for change in angle between the handle and projectile point were taken using a protractor and recorded in a data table. The angle measurements were taken at the end of the projectile point underneath the hafting materials (Fig. 5). The measurements for change in the length of the knives were also recorded in a data table. Even though all of the handles and each of the Clovis and Cumberland points had the exact same lengths, the lengths of the completed knives varied slightly due to the hafting process. The first Clovis knife was 22.70 cm in length; the second 22.60 cm. The starting length of the Cumberland's knives were 28.40 cm and 28.70 cm respectively.

Data and Results The following sections dedicated to each type of knife are organized to present the qualitative and quantitative results in a more meaningful and understandable manner. The final comparisons and conclusions follow in a discussion after the individual presentation of each knife type.

Clovis Point Knife 1 and 2 Before testing, the Clovis knives were expected to experience drastic changes in their structure and consequently, their ability to function would diminish as the trials went on. The point's width, linear shaped confirmed the former expectation that the hafting material would wear and tear at a much quicker rate than the Cumberland knives. However, during the first trials, there were either no changes or only slight changes in the lengths of the knives and angles of the projectiles and handles of the knives. The hide glue and sinew experienced some wear and tear, but the knife remained highly functional. The slight wearing and tearing of the hafting material did not affect the overall sturdiness of the knives. In addition, the functionality of the knives remained the same throughout each of the trials. The measurements for both of the Clovis knives are shown in table 1.

Cumberland Point Knives Originally, the Cumberland point knives were hypothesized to not experience drastic wear and tear on the hafting materials, since the shape at the distal end of the points allowed for easier hafting. A visual analysis of the knives showed only minor wearing or tearing on the glue or

sinew of the knives. The measurements demonstrated slight changes in the angles between the handles and projectile points and also in the total lengths of the knives. Overall, the knives remained functional in cutting. The measurements for both of the Cumberland knives are in table 2.

In terms of the wear and tear of the hafting materials (Fig. 6), the Clovis point knives experienced more deterioration and corrosion on the sinew and glue of the hafting portion of the knife. Damage likely occurred due to the wide and linear shape of the Clovis projectile point. During each trial and repetition, the straighter edge of the Clovis point knives rubbed frequently and consistently and in effect, this created more deterioration after each trial. The wings of the Cumberland point created a narrow gap in the hafted segment of the knife. The narrow gap provided some relief from the stress and friction of the back-and-forth movement during each repetition. Consequently, the hafted portion of the Cumberland point knives did not experience as much scraping for the same action.

Despite the differences in the wear and tear of hafting materials between the Clovis and Cumberland point knives, the two types did not vary significantly in their changes of length and angle (Figures 7; 8 or Charts 1 & 2). Overall, the modifications were minimal for both knives. During the first few trials the Clovis point knives, no change or very slight change in the angles and lengths of the knives was perceived. The change in angle between the projectile point and the handle was greatest in the second Clovis point knife. However, comparing these differences was not possible to reach significant conclusions based on the ability to function more efficiently as a knife.

In terms of reduction in lengths, the first Cumberland point knife experienced the most significant change in the overall length of the knife, which was unexpected based on the hypothesis presented earlier in this paper. Nevertheless, the changes in length likely resulted from the greater length of the Cumberland projectile point in comparison to the Clovis projectile point. The repetitions were done along the length of the entire projectile point. Therefore, the Cumberland point knives experienced a longer repetition than the Clovis point knives, which may have pulled the Cumberland projectile point from the haft at a slightly quicker rate than the Clovis points.

The constant, high pressure and repetitive trials applied to the knives created only minor variations in the structure of the knives. In comparison, the changes in angles and lengths of all the knives were not significant enough to determine whether later morphologies of projectile points were technologically better for secondary uses of projectile points. All the remained knives highly functional throughout the entire experiment.

Overall, each of the four knives remained highly functional after many repetitions and trials. Based on comparisons of the measurements in angle and length, determining whether the later morphology in design and structure of the Cumberland point would have been functionally more efficient for its secondary use as a knife remains inconclusive. Further research and testing is needed to determine whether later morphologies of projectile points functioned more efficiently as hand tools.

This experiment included many variables, and in the future, the controlled variables of this experiment could be altered to conduct similar types of research. For example, testing prehistoric hand tools on different types of materials, rather than only a controlled wood block, has potential to provide insight into the distinct uses of knives and other hand tools in prehistoric times.

Results

Use-Wear Damage of Hafting Material

Functionality of Projectile Point Knives

Discussion

Future research can find the results of this analysis useful in other types of experimentation that aim to test the morphology and multifunctional uses of projectile points. This experiment and research can represent a stepping-stone into the exploration of the secondary uses of projectile points. Overall, the results provide strong evidence in support for the inference that hafted projectile points indeed served secondary purposes as hafted butchering and cutting tools.

In spite of the efforts to keep the experiment controlled, a few uncertain variables need to be accounted for. Even though a scale was used to maintain a consistent 3.60 kg of pressure on the knives during each trial, there were a number of minor fluctuations while performing the repetitions of the back-and-forth movements on the knives. In addition, the angle at which the knife was cutting varied slightly throughout the experiment. An effort to keep the knives at the same cutting angle was attempted; however measures were not taken to keep this exact. Additionally, the space in between the two wood segments on the hafting end of the knife varied slightly due to the taping of the handles in preparation for the experiment (Fig. 9). Lastly, since use-wear patterns on the blades themselves were not visible upon objective observation alone, one may propose a necessity to utilize microscopic analyses in order to examine the use-wear on the blades of the knives. This could then be used in conjunction with analyses of the use-wear in the hafting material. Overall, these uncertain factors are minimal but their recognition is necessary, especially for future research and experimentation.

Conclusion Overall, the analyses of damage patterns on Clovis and Cumberland points provide valuable insight into the functionality of projectile point knives. Although, determining whether later morphologies served an improved functionality remains in question, the results, nevertheless, reveal a strong likelihood that Paleo-Indian cultures employed projectile points as secondary hand tools. The efficient strength and durability of the knives throughout many repeated trials adds to a more broad comprehension of human behaviours with stone tools. Incorporating this information about human behaviour with the reconstruction of subsistence strategies in archaeological sites with Clovis or Cumberland points further develops the understanding of a site's function and activities.

* * *

Acknowledgement The author owes a great thanks to Dr. David Thulman for help with experimental construction and setup and also for providing vital materials for the project. Without his supervision and expertise the experiment would not have been successful. Finally, thanks to all the readers.

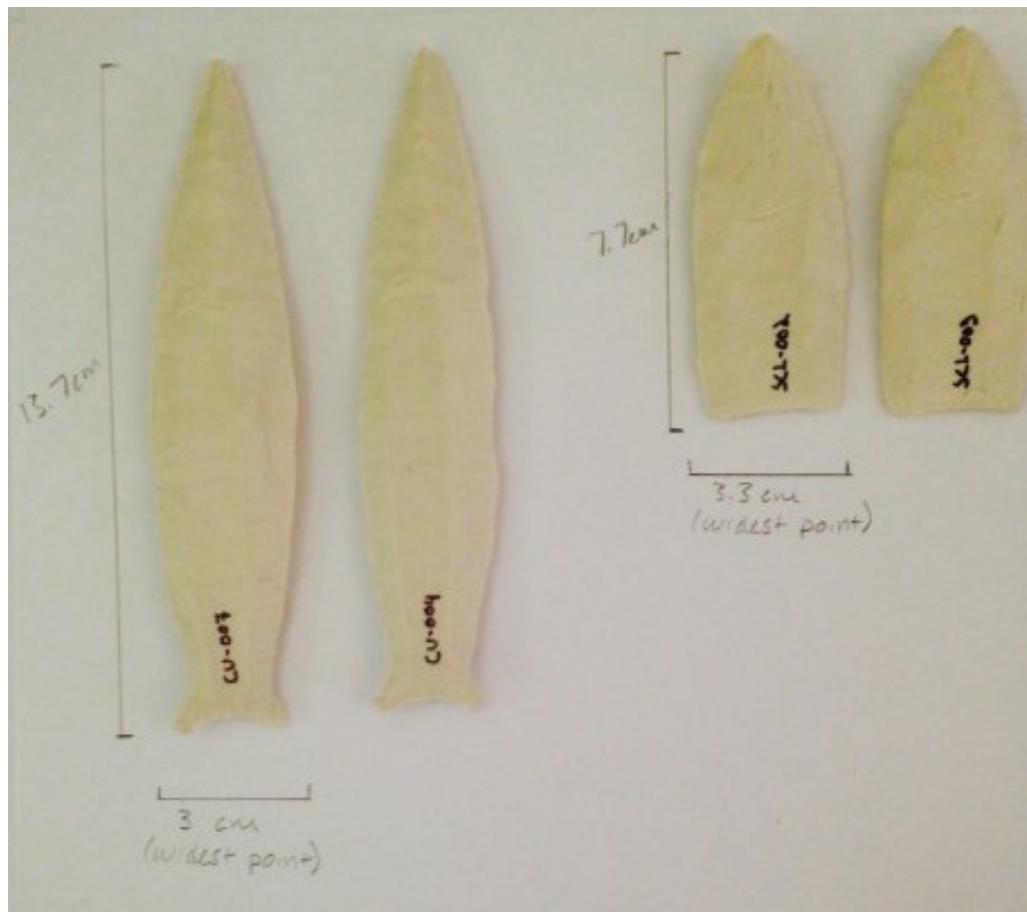


Figure 1: *Cumberland* (left) and *Clovis* (right) points.

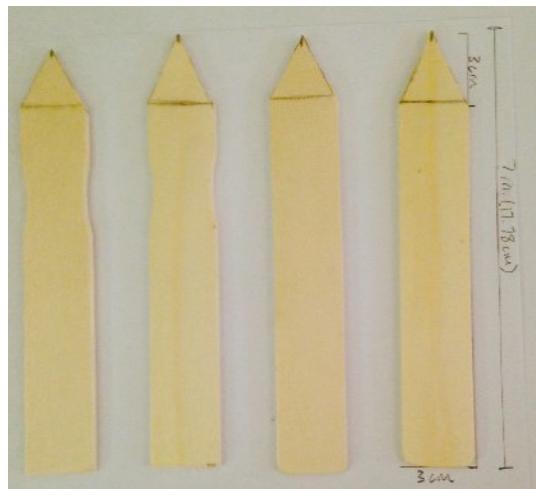


Figure 2: *Four Pinewood handles crafted for experimental purposes.*



Figure 3: *Animal hide glue* (left) and *sinew* (right).



Figure 4: Clovis (left) and Cumberland (right) point knives.

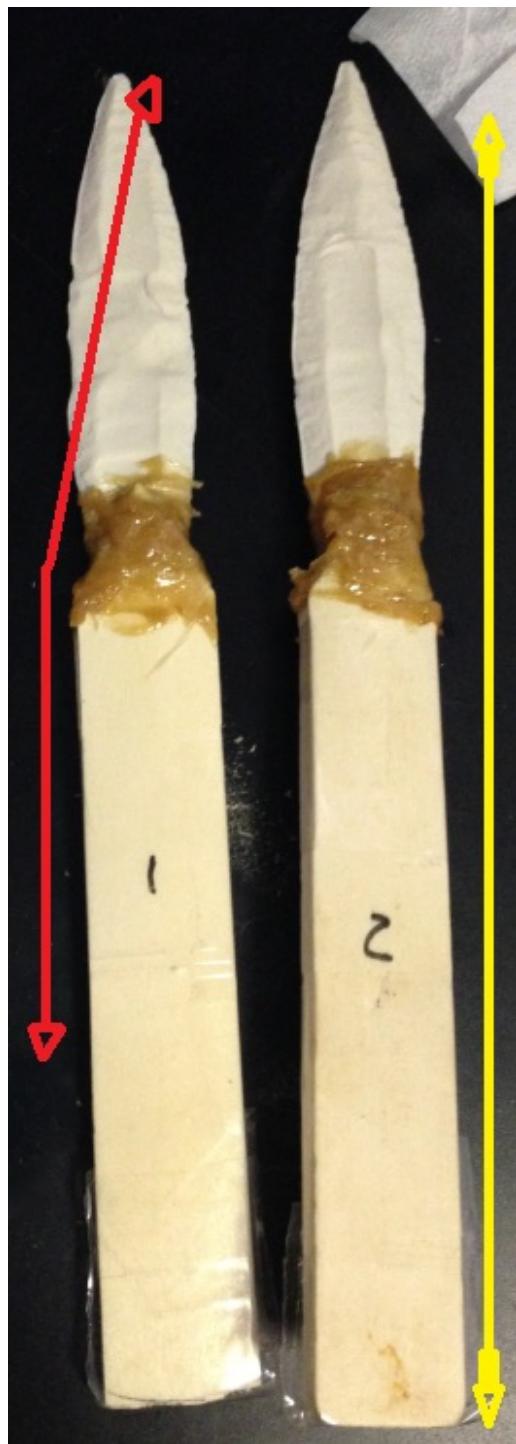


Figure 5: The red arrows demonstrate where angles were measured and the yellow arrows demonstrate where the length was measured.

	Clovis 1 Start: Length = 22.7 cm Angle = 180 degrees					Clovis 2 Start: Length 22.6 cm Angle = 180 degrees			
Trial Number	Angle (degrees)	Angle Change (degrees)	Length (cm)	Change in Length (cm)		Angle (degrees)	Angle Change (degrees)	Length (cm)	Change in Length (cm)
1	180	0	22.7	0		180	0	22.6	0
2	180	0	22.7	0		181	1	22.6	0
3	180	0	22.7	0		181	0	22.7	0.1
4	182	2	22.8	0.1		183	2	22.8	0.1
5	183	1	22.85	0.05		183	0	22.8	0
6	183	0	22.85	0		184	1	22.8	0
7	183	0	22.85	0		185	1	22.8	0
8	183	0	22.85	0		185	0	22.8	0
9	184	1	22.9	0.05		185	0	22.8	0
10	185	1	22.9	0		186	1	22.9	0.1
Totals and Averages	Total Angle Change	Average Angle Change	Total Length Change	Average Length Change		Total Angle Change	Average Angle Change	Total Length Change	Average Length Change
	5	0.5	0.2	0.02		6	0.6	0.3	0.03

Table 1: Trial Data for Clovis Points.

	Cumberland 1 Start: Length = 28.4 cm /Angle = 180 degrees					Cumberland 2 Start: Length = 28.7 /Angle =180 degrees			
Trial Number	Angle (degrees)	Change in Angle (degrees)	Length (cm)	Change in Length (cm)		Angle (degrees)	Change in Angle (degrees)	Length (cm)	Change in Length (cm)
1	181	1	28.4	0		180	0	28.8	0.1
2	181	0	28.5	0.1		180	0	28.8	0
3	181	0	28.5	0		181	1	28.8	0
4	181	0	28.6	0.1		182	1	28.9	0.1
5	182	1	28.7	0.1		182	0	28.9	0
6	182	0	28.7	0		182	0	28.9	0
7	183	1	28.8	0.1		182	0	28.9	0
8	184	1	28.8	0		182	0	29.0	0.1
9	185	1	28.9	0.1		182	0	29.0	0
10	185	0	28.9	0		182	0	29.0	0
Totals and Averages	Total Angle Change	Average Angle Change	Total Length Change	Average Length Change		Total Angle Change	Average Angle Change	Total Length Change	Average Length Change
	5	0.5	0.5	0.25		2	0.2	0.3	0.03

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Table 2: Trial Data for Cumberland Points.



Figure 6: *Hafting material: Cumberland (left) and Clovis (right).*

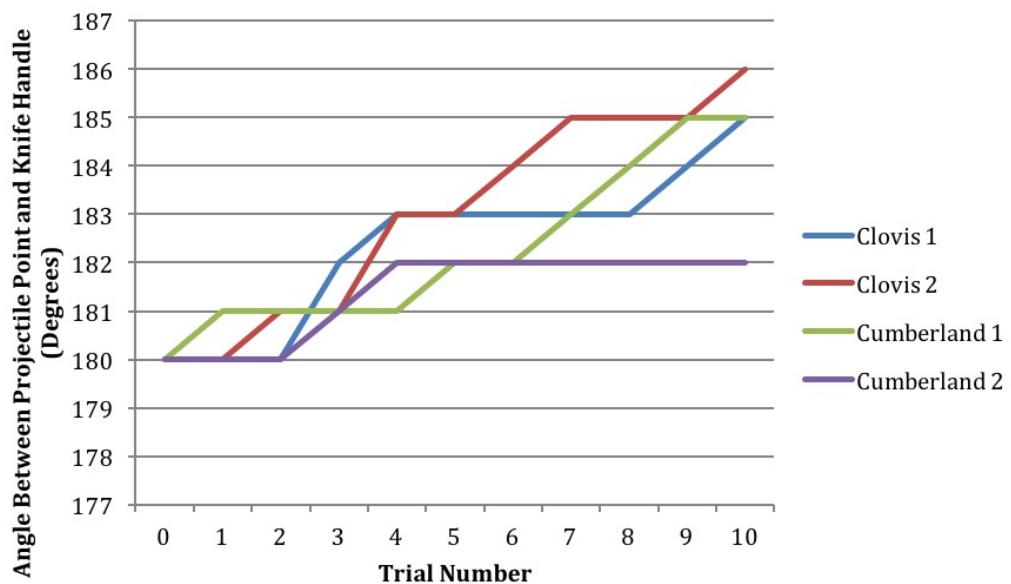


Figure 7: (Chart 1) The Change in Angle Between the Projectile Point and Knife Handle.

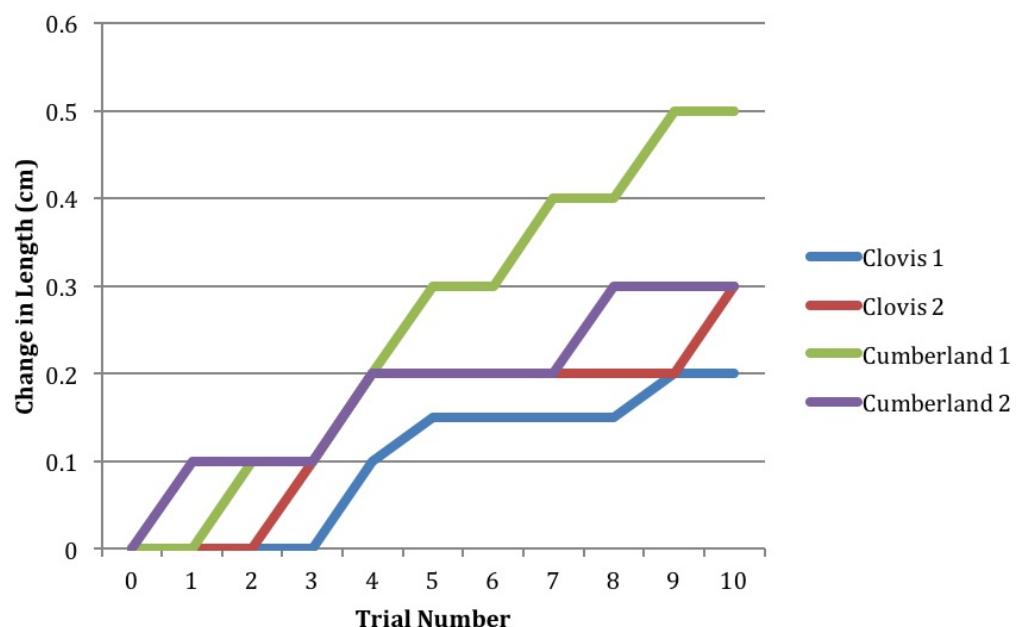


Figure 8: (Chart 2) Change in Length of Each Knife.



Figure 9: Spacing in between two wood segments. Cumberland (left) and Clovis (right).

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Treatment of Khedive Ismail's antique gun (1863–1879) at the National Military Museum. A Case Study

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In this case study Khedive Ismail's antique gun, which is currently kept at the National Military Museum in Cairo, is documented and treated. The antique gun with a handgrip was made up of a spear of wood, a barrel and a blow up instrument made from iron. The maximum handgrip width of the gun is about 9.40cm and its total length with wood spear is 113cm. The gun deteriorated throughout the years due to neglect and inappropriate exhibition conditions at the museum which

Abstract

* Professor of Textile Conservation, Conservation Department, Faculty of Archaeology; Main fields of research are in Ancient Textile Technologies dating back to different periods of Egyptian history. The assessment of decay and deterioration of these objects and methods of their conservation and treatment are also part of his research. Additionally he supervises MA and PhD theses in the field of conservation of organic materials.

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included; relative humidity, temperature, and the accumulation of air dust particles and aerosols inside the inadequately sealed display cases. This resulted in the manifestation of heavy metal rust in the pipe, especially underneath the wooden spear, in addition to the formation of dust and rust stains on the wood.

This research explains the treatment and restoration steps of the archaeological gun and illustrates the actual scientific procedures that were followed, starting from the documentation, followed by the analysis and scientific tests which were carried out to identify the components and archaeological parts of the gun, concluded by the actual stages of restoration and conservation.

Keywords: Wood, Iron, Rust, Gun, Conservation, Treatment, Analysis.

THIS paper deals with an applied study on an antique gun, which is in the collection of the National Military Museum at Saladin Citadel in Egypt, the standing evidence for the victories of the Egyptian army and the heroism of the Egyptian soldier; who was described by Napoleon as the finest soldiers in the world. The Museum illustrates the story of the Egyptian military forces since ancient times until our modern age, illustrating a large number of battles and wars where the Egyptian army showed great skills (Seaman, 2013).

This gun belongs to Ismail Pasha, who was the Khedive of Egypt and Sudan during the 19th century (1863 to 1879). Ismail's khedivate is closely connected to the construction of the Suez Canal (Dye, 1880:49–55).

In previous research the preservation of a rare French pistol of the Revolutionary period which had been found after resting for 185 years on the wreck of *Le Cygne* (1808) was described. Treatment and restoration stages included general description, magnetic examination and interpretation, X-ray examination, cleaning of the cavities and treatment of different materials, such as wood and the brass mounting (Mardikian and David, 1996:161-169).

In a study the effect of iron rust on wood in an archaeological gun (No. 7 / 14 at the Museum of Applied Arts, Helwan University) was documented and the procedures for the treatment and restoration of the gun were explained (Abo Elgat, 2010:285–290; Zidan, El Hadidi, and Abo Elgat, 2011:348–353).

In another study the treatment and restoration methods of an antique sword dating back to the Ottoman period (13th AH/19th century AD) at the National Military Museum-Saladin Citadel in Egypt, are clearly explained, including the actual scientific procedures that had been followed during the restoration and treatment, starting from the archaeological documentation, the analysis and scientific tests which were carried out to identify the components and archaeological parts of the sword, and the actual stages of restoration and conservation (Zidan, El Hadidi, Mansour, et al., 2013:1–6).

In this research the effect resulting from the precipitation and interpenetration of rust from the iron metal into the wood fibers is studied. The physiomechanical and chemical properties of wood which are correlated with these metals were the main points, in addition to the deformation that takes place in the appearance of wood as a result of its spotting or blotting with the residue of the rust on the surface of wood.

The identification of damage, which occurs on wood as a result of these factors helped study the possibility of how to minimize the dual effect of wood and metals on each other in archaeological materials. Treatment and repair included several stages, but prior to these stages a study and detailed documentation of the guns' condition was completed.

The dimensions were measured carefully and photographed, the gun was closely examined and samples were analyzed to identify the components of the metal parts. The condition and

degree of damage was evaluated, and the materials used in previous restoration were documented. Then the practical procedures for repairing and maintaining the gun, which involved disassembly and cleaning of all of its components, strengthening, blocking and filling gaps and cracks, followed by isolating, reassembling and putting the pieces together correctly once again.

Analysis and investigation were undergone using infra-red spectroscopy (FTIR 400–4,000 cm⁻¹ +ATR unit), Atomic absorption analysis (analytic Jena instruments- Conter. AA 700), X-ray diffraction (Philips, Diffractometer type: PW1840, Generator tension: 40KV, Wavelength Al- $\bar{\lambda}$: 1.54056 Å, Start angle: 4.03°, End angle: 69.98°, Maximum intensity: 67.24), light microscope and Scanning Electron Microscope with E.D.X (operator: EM unit Fac. Sc.; All ISIS users: Demonstration Data SiLi detector and LV5400 model 2005).

For treatment and restoration of the gun the following procedures were applied:

Materials and Methods – Analysis

Treatment

1. Dust and damage in the form of cracks and separations internally and externally and old varnish layers from the different parts of the gun (Fig. 1a-d and 2a) were cleaned using mechanical techniques, such as different types of brushes and scalpels (A. Unger, Schniewind, and W. Unger, 2001:143), which were suitable for both wood and metal.
2. The state of the gun allowed easy handling, and the metal parts that had been attached to previously added wood in old restoration (Fig. 2a, b, d) were separated from the gun. (Davis, 1998:1–2; Zelinka and Rammer, 2005:1–15).
3. Chemical cleaning and the removal of the remains of materials used in earlier treatment, e.g. the old varnish (as identified by FTIR) which heavily covered both the metal and wooden parts of the gun, was removed from the metal parts using acetone and from the wooden parts using 95 % ethyl alcohol (from: El-Nasr Company for Intermediate Chemicals). Distilled water and ethyl alcohol 95 % with different mixture ratios 1:1, 2:1, respectively was applied to clean surface dirt, Ammonia solution (2 %) was used to clean the dark strong dirt from the outside of the wooden handle of the gun (Fig. 2c).
4. Cleaning of the remains of iron rust formed under the barrel, was applied by using a diluted solution of oxalic acid 1–2 % in hot distilled water (R. William, S. William, and Feist, 1999:5; Williams and Knaebe, 2002:1–20) followed by washing off the previously cleaned parts with acid using distilled water several times.
5. The separate parts and crack in the longitudinal wooden part were reassembled together using Paraloid B72. The upper parts of the wooden handle, as well as the area below the screws, were completed in order to reinstall the lock plate correctly using balsa wood (*Ochroma pyramidalis*) (Newman et al., 2013:4–11). The lacunae around the completion parts were filled with a mixture of glass microballoon and soft wood sawdust with Paraloid B72 (5 % w/v) dissolved in ethanol + acetone (40 : 60) (Fig. 3c).
6. The metal parts that had been disassembled and removed from the gun were cleaned using a solution of citric acid 3–5 % by soaking and mechanical cleaning. This process was repeated several times until rust was removed. Rochelle salt solution was used for cleaning copper parts, followed by washing all the parts with distilled water using hot-cold cycles several times to prevent the future effects of solutions on the metal or to maintain the pH value. Finally, the parts were dried with 95 % ethyl alcohol (Fig. 3a,b).

7. Heavy black rust, in certain parts of the barrel was cleaned chemically by soaking using EDTA solution (Ethylene Diamin Tetracetate - Komplexon3) with a pH reaches to 5.50 by adding concentrated acetic acid (Sobhy, 2006:225). To increase the effect of the cleaning process and to remove a layer of iron oxide magnetic black (magnetite), which has a scarce solubility, the powder of Komplexon3 was added on the black portions locally. After every application, the powder was mechanically cleaned to remove the dissolved corrosion products, until the desired effect of cleaning was reached, commensurate with the case taking into account the preservation of the patina layer. This was then followed by washing with distilled water, hot then cold, and drying with ethyl alcohol. This was followed by isolation of all parts of the gun immediately after drying using two cross layers of Paraloid B72 dissolved in toluene 4 % (Fig. 3d).
8. 25 shot cartridges of iron, lead alloy (identified by Atomic absorption) were wrapped with a piece of tissue paper in the presence of the remains of gunpowder which was discovered while cleaning the inside of the iron barrel (Fig. 3b).
9. In the last step all the parts were reinstalled using the screws that also had been previously cleaned and isolated. Then parts of the iron rings were put in place along the iron barrel to link between them and the parts of wood underneath (Fig. 10).

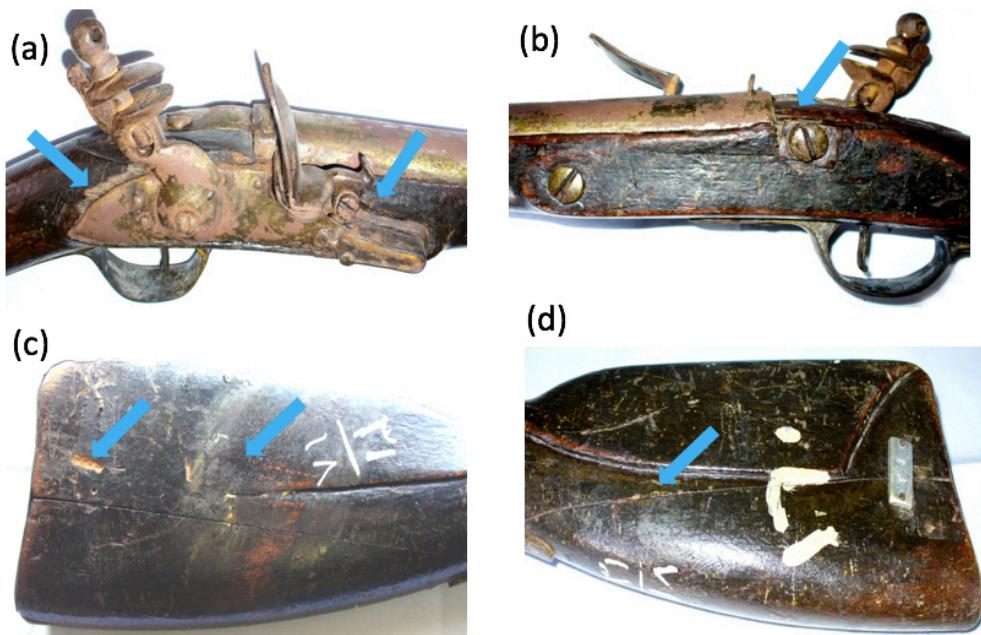


Figure 1: Shows the gun before treatment; a,b- lock plate of the gun showing iron rust and the heavy bright layers of varnish covering the hall handle, c,d- show damage in the form of cracks and separations in the wooden handle of the gun and deformation, heavy dust, black layers, human deterioration on the wooden stock of the handle. Figure by Wael A.A. Abo Elgat.

Results

After examination and analysis of the different parts of the gun, documentation of technique and materials used to make the gun was possible. The state of preservation was recorded prior to the repair and conservation stages. The following results were obtained:

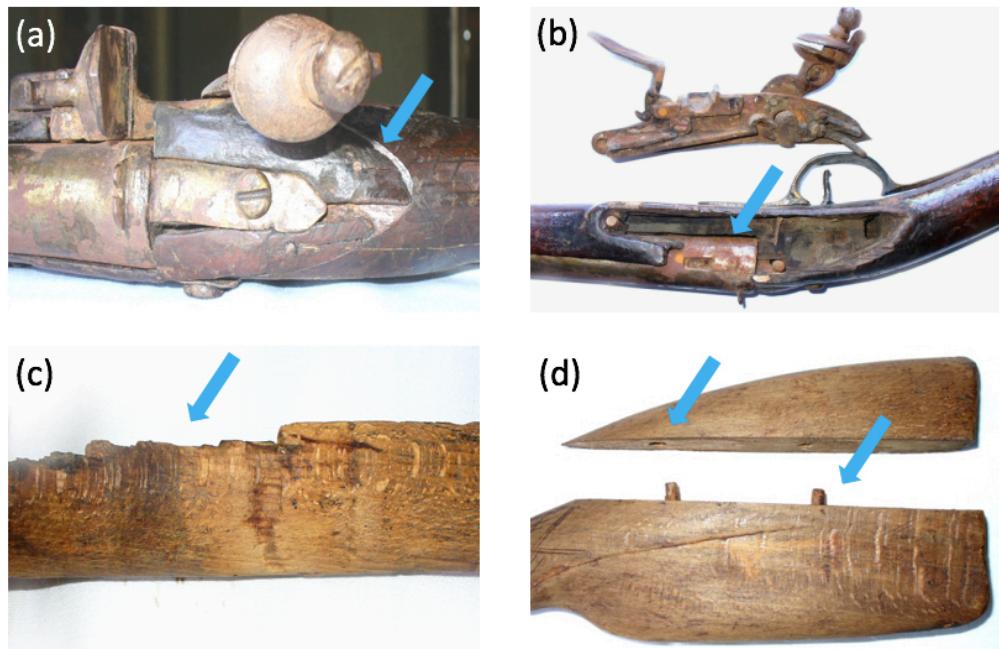


Figure 2: Shows the gun during and after treatment; a- the deformation and separated wood above the handle. b- during investigation and cleaning of the wood underneath lock plate. c- stages of localized initial chemical cleaning of soot in wooden surface, d- the stock after cleaning during assembling two parts. Figure by Wael A.A. Abo Elgat.

1. By comparing the results obtained from analyzing the remains of an old lacquer used on most parts of the gun with several natural lacquers using FTIR it turned out that dammar resin was used as a coating (Fig. 4).
2. Samples taken from rust products from different parts of the gun were analyzed using X-ray diffraction. The bottom of the barrel and inside the nail holes were affected by iron rust from surrounding metal parts and the impact of air pollution in the atmosphere of the museum had increased the damage (Fig. 6, 7).
3. Examination of the sample from the wooden handle (the stock) of the gun using optical microscope proved that it was made of beech wood *Fagus sylvatica L.*, according to literature. Pore Distribution: Diffuse-porous; growth rings distinct, Pores: Small, solitary and in irregular multiples and clusters, numerous and evenly distributed throughout most of the ring; narrow but distinct latewood in each ring due to fewer, smaller pores, Rays: Largest rays conspicuous on all surfaces; darker ray fleck against lighter background on radial surfaces (Hoadley, 1990:117–118)(Fig. 8a,b).
4. Analysis of the sample from the remains of the gunpowder with X-ray diffraction, X-ray fluorescence unit attached to scanning electron microscope (EDX), and FTIR + ATR confirmed that the gunpowder consists of saltpeter (potassium, or sodium nitrate), sulphur and charcoal (carbon) (Driel, 2000:3; Alexander, 2012:3–5; E., 2011:5) (Fig. 5,7,9).

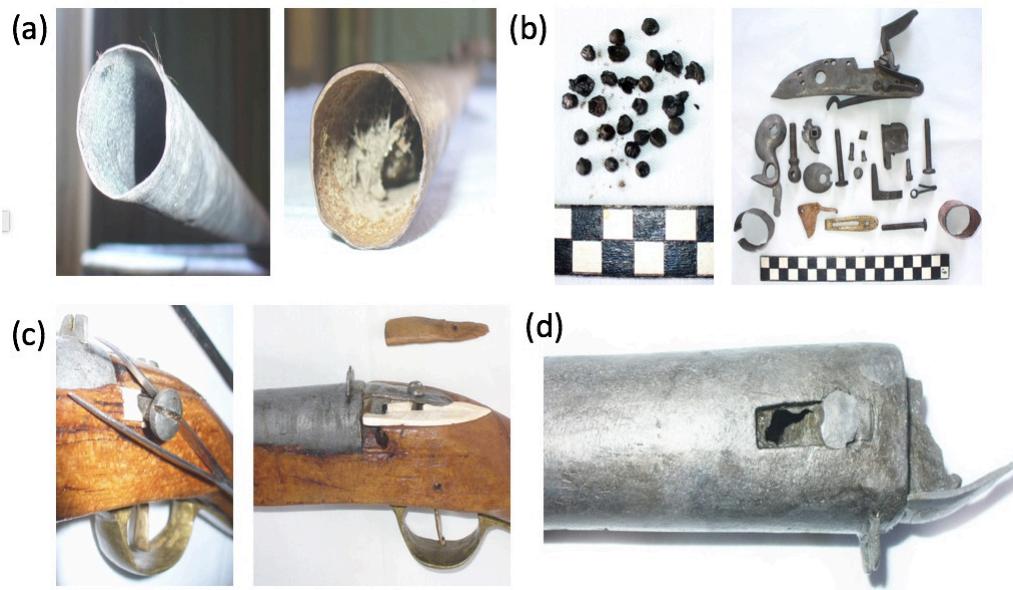


Figure 3: Shows the gun during and after treatment; a- part of the barrel before and after cleaning, b- the different metal parts of the lock plate and the shot cartridges during cleaning, c- the use of balsa in reconstruction and repair, d- part of the barrel after cleaning. Figure by Wael A.A. Abo Elgat.

5. For confirmation of the elemental composition of the rusted products from the barrel and lock plate, small samples from the rusted products were analyzed by an X-ray fluorescence unit attached to scanning electron microscope (EDX). The main component of the metals was made up of iron, where it appeared in high rates, mixed with a very small percentage of elemental traces of iron rust component.
6. Analysis of metal parts from the gun by Atomic Absorption-Flame technique, showed that the first piece of metal that was connected to the wooden part with iron barrel, the lock plate and barrel were made of iron, whereas the shot cartridges were made of iron-lead alloy (50 % iron, 50 % lead).

Conclusion
X-ray diffraction, light microscope and Scanning Electron Microscope with E.D.X, Atomic Absorption analysis and Infra-Red spectroscopy techniques are important tools that help archaeologists and conservators to understand the nature and state of preservation of a complex composite object like the gun mentioned in this case study. Additionally the examination and analysis of the gun have helped explain the methods used in manufacture and reconstruction of guns dating back to this period.

The authors explain the treatment and restoration steps of this gun and illustrate the actual stages that were carried out.

* * *

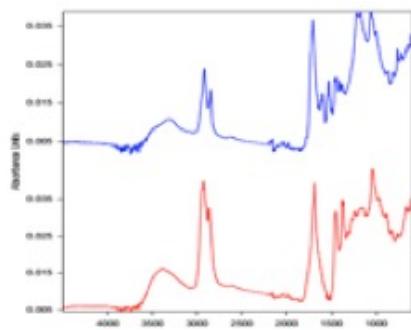


Figure 4: Shows FTIR+ATR spectra of sample analysis of the old lacquer taken from the barrel surface of the gun (top), that similar to the dammar resin - control (bottom).

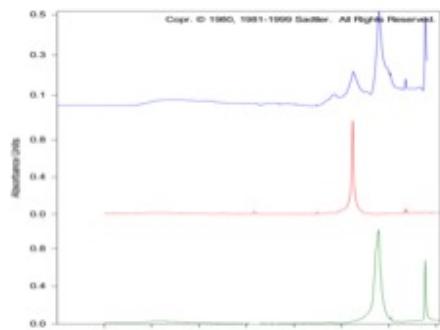


Figure 5: Spectra of sample analysis of the gunpowder (top) by FTIR+ATR are similar to the sample spectrum of potassium nitrate (middle), and potassium sulfate (bottom).

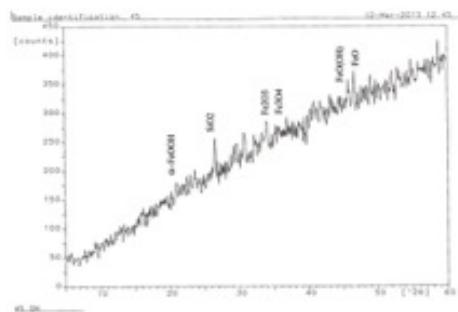


Figure 6: X-ray diffraction pattern of the sample taken during the cleaning of the entire parts of the lock plate, showing iron rust components.

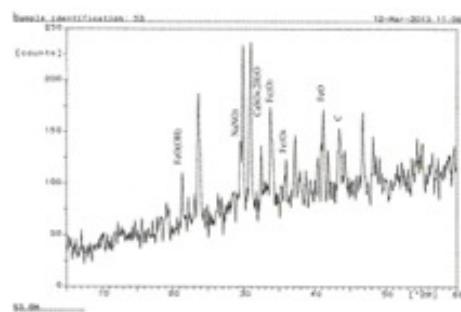


Figure 7: X-ray diffraction pattern of a sample of the gunpowder from the barrel showing that it contains iron rust compounds, carbon, sulfur and nitrate.

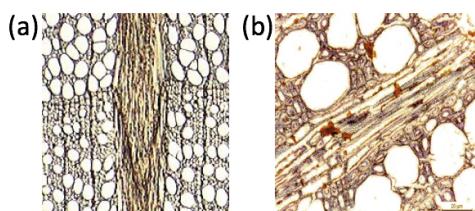


Figure 8: Cross sections of Beech wood (*Fagus sylvatica L.*) on light microscope (a) standard from Richter and Dallwitz (2000), (b) sample taken from the handle of the gun (20 µm).

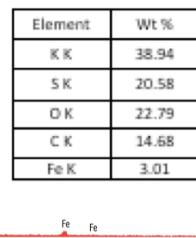


Figure 9: Results of elemental analysis EDX of a sample of gunpowder from the inside the barrel of the gun, showing the chemical components of the old gunpowder (saltpetre (potassium), sulphur and charcoal (carbon)).

Acknowledgement The authors would like to express special thanks to the ministry of Defense and the National Military Museum-Saladin Citadel in Egypt Administration for their support.

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Figure 10: *The gun before (top), after cleaning and isolation (bottom).*

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Part II

CONFERENCE REVIEWS



Third ‘Annual Student Archaeology’ Conference

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THE third Annual Student Archaeology (ASA) Conference, ‘Developing Integrated Archaeology’ was held at the School of History, Classics and Archaeology at the University of Edinburgh on the 11th-13th June 2015. The ASA conference series, organized by and for students, was established in 2013 with the aim to offer undergraduate and post-graduate students of archaeology a constructive platform to share and discuss their research, in a relaxed, fun and engaging environment. In the last three years it has been a great experience for students to get feedback on their current research projects and to find out what other students from different universities and countries are doing. The conference was a three day event with two days of presentations, including a poster session and career roundtable discussion, followed by archaeological excursions showcasing some of Edinburgh’s heritage on the final day of the event.

Oral presentations were divided into four themed sessions that tried to encompass as many fields of archaeology as possible. The session on *Scientific Archaeological Methods* was intended to cover the wide field of archaeological science, including dating techniques, remote sensing and archaeological survey methods, geoarchaeology, archaeological chemistry, archaeobotany, zooarchaeology and osteological methods. The second session focused on *Archaeology Beyond Academia* and included the use of methods employed in areas such as community archaeology, archaeologically themed video games and public archaeology. The third session on *Applied Archaeological Theory* hosted papers on innovative interpretations of archaeological data. The papers in this session were predominantly aimed at exploring the impact of theory on the practice and analysis of artefact recovery. Finally, the *Historical Archaeology* session

* Ülle Aguraiuja’s research focuses on reconstructing palaeodiet and -ecology based on stable isotope analysis. She is currently working on Bronze Age skeletal material from Romania for her PhD thesis.

† Rachel Faulkner-Jones’ research focuses on bronze weaponry from the Early Bronze Age in Scotland; using archival and experimental methods, it aims to better understand the function of early weaponry and the structure of EBA society in northern Europe.

‡ Marta Lorenzon’s interests lay on material culture and built environment. Her PhD research investigates earthen construction techniques in Bronze Age Crete domestic architecture.

§ Cindy Nelson-Viljoen’s PhD investigates seasonal shellfish use during the Later Stone Age of South Africa through stable isotope and sclerochronological analysis in order to better understand occupational histories of past populations, and the possible seasonal nature of their coastal diet.

aimed to present different case studies regarding historic cultures, which have been investigated through material culture, as well as through documented sources and oral history.

The overall goal of the sessions and poster presentations was to allow students to present different research approaches to the investigation of archaeological contexts. More specifically, the conference aimed at showing and debating complementary case studies on themes such as science, theory and public outreach, and to motivate students to engage in discussion of these themes. Of the eighty students registered for ASA 2015, about half were undergraduates. The delegates were a varied group, with the number of UK students (61, 76 % higher, than the number of foreign students (19, 24 %).

The papers presented at the conference were considerably well-received not only for the quality of the research presented, but also for the variety of contexts, methodologies and topics. The first day of ASA 2015 opened with a short introduction by Professor Ian Ralston, Head of the School of History, Classics and Archaeology at the University of Edinburgh. Between the diverse and thought-provoking papers of that day, Mackenzie Downing impressed the audience with her paper *An experimental investigation of sharp-force skeletal trauma with replica Bronze Age weapons*. She gave a live demonstration on how the blow was carried out and what the impact traces would be on the skeletal remains.

A gripping discussion ensued after Theresa O'Mahony gave her talk *Archaeology for All* on archaeology and disabilities and how, often, archaeology is still not open to everyone. It was a particularly stimulating discussion based on the realization that it is our responsibility as archaeologists to ensure that archaeology, as a profession, is more accessible to both professionals and students with physical and/or invisible disabilities. Day one was closed by Professor Lord Colin Renfrew, who delivered the keynote lecture: *Difficult integration. Archaeology, language and genetics: the Indo-European problem revisited*. Professor Renfrew highlighted the complications of an interdisciplinary approach in investigating archaeological data, but also the importance of it. He believed it to be the best method of breaking through and enriching the discipline with new discoveries as well as confirming an initial hypothesis.

The second day was as inspiring as the first day with the session on Public Archaeology and Community Engagement being one of the most followed sessions both via social media and in the lecture theatre. Emily Stammitti, in particular, gave an enthusiastic presentation titled *Impact above the intertidal zone* in which she focused on underwater archaeology and community engagement. The poster session (Fig. 1) took place during the lunch break on the second day,



Figure 1: Poster Session. Courtesy of ASA2015 Committee.

with the poster *Archaeology of Elegy* on video-games and archaeology by Tara Copplestone winning the best poster award of the 3rd ASA conference, sponsored by The Society of Antiquaries of Scotland. Additional prizes were kindly offered by Historic Scotland for the best papers in each session. The winners were: Gary Pratt (*Speed under sail in the Aegean MBA:*

Testing optimal maritime networks), Mackenzie Downing, Emily Stammitti, and Peter Swallow (The early life of the Theatre of Dionysus at Athens). Honorable mentions for important talks raised during the 3rd ASA went to Theresa O'Mahony, Mackenzie Downing, and David Banks (Community interaction with archaeological heritage: Case study from the Hagar Qim and Mnajdra temples World Heritage Site at Orendi, Malta), who each received a colorful T-shirt sponsored by DigIt2015.

The second day ended with a roundtable discussion moderated by Tom Gardner on career paths in archaeology, focusing on both the academic and non-academic strands. The discussion panel consisted of Dr. Andrew Heald (AOC Archaeology), Dr. Alison Sheridan (Curator of Early Prehistory at National Museum of Scotland), David Connolly (BAJR), Gaille MacKinnon (Centre for Anatomy & Human Identification, University of Dundee) and Dr. Simon Gilmour (Director of Society of Antiquities of Scotland). It was an amazing group of specialists from different branches of the archaeological career spectrum: commercial, museums, academia, and forensics. They helped students in answering questions about what a career in archaeology demands, and what the required skills are and how to achieve them.

As organizing committee (Fig. 2) it was humbling for us to receive so many suitable and interesting abstracts for both the paper and poster sessions. It was a pleasure to witness the students fulfill our conference aims of organizing a platform for the sharing of ideas and useful discussions. We tried to make the conference as accessible as possible by also opening the discussion on the ASA 2015 Twitter page (@ASA2015Edin, #ASA2015) where the most relevant highlights

of each paper were live tweeted as incentive for further discussions on the web as well as in the lecture theatre. In this short review it is not possible to mention all the amazing papers that have been presented, but we would like to thank all the presenters who were part of the 3rd ASA Conference.

Finally, we would like to thank everyone who made this conference possible and without whom this event would not have been successful. Special mention must be given to our sponsors: The School of History, Classics and Archaeology (University of Edinburgh), The Society of Antiquaries of Scotland, The Prehistoric Society, DigIt 2015, The Royal Archaeological Institute, Centre for Medieval and Renaissance Studies (University of Edinburgh), Historic Scotland, Edinburgh University Archaeology Society and the volunteers from the University of Edinburgh who helped us during the day.



Figure 2: Organising committee (from left to right): Marta Lorenzon, Ulle Aguraiuja, Cindy Nelson-Viljoen, Rachel Faulkner-Jones.



National Archaeology Student Conference Australia 2015

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THE National Archaeology Student Conference (NASC) Australia was held at both the University of Sydney and Macquarie University this year from the 14th-16th of August, and was organised by students from both campuses. Keynote speakers were selected based on their archaeological experience and their appreciation for inter-disciplinary approaches towards archaeological research. As a result, Dr Aedeen Cremin from the University of Canberra was invited as our Domestic Keynote speaker. Her research interests include European Archaeology and Celtic studies, but she has also worked in South East Asia (within the Greater Angkor Project) as a ceramicist. Associate Professor [Amanda Esterhuysen](#) from

* [Rebekah Hawkins](#) is the Chair of the NASC2015 Organising Committee. She is in her fifth year at the University of Sydney studying a combined Bachelor of Arts and Science degree majoring in Archaeology, Anatomy and Geology. She will undertake honours in 2017 focusing on lithic technology. At the start of 2015 she stepped down as the President of the Sydney University Archaeology Society to focus on the organisation of NASC2015. In 2014 she was on the National Committee for NASC and put forward Sydney University as the next university to host NASC. Rebekah has been one of the driving forces in making sure NASC comes to Sydney in 2015, and was extremely excited to be involved in its organization.

† [Sharna Katzeff](#) is the Vice Chairperson of the NASC2015 Organising Committee. She completed both a BSC (Hons) and BA at the University of Sydney, majoring in Anatomy and Archaeology respectively. She has a particular interest and passion for bioarchaeology. During her degree she excavated in the United Kingdom on the Durotriges Big Dig excavation, and worked as an osteoarchaeologist intern for Eastbourne Ancestors Project. Her Honours project last year used genetics to examine the development of the nervous system in sea urchins and this year she was back excavating in Israel at Tel Burna and Romania with Transylvania Bioarchaeology. Sharna loves the multidisciplinary nature of archaeology and looks forward to combining Science and Archaeology in the future.

‡ [Olivier Rocheleouste](#) Olivier Rocheleouste is a PhD student from Macquarie University, Sydney, Australia. His topic involves analysing the published 'elite' mortuary remains of the ancient Egyptian Early Dynastic period (c. 2900-2545 BC) and evaluating the theoretical applications associated with their archaeological interpretations. He also specialises in the 3D scanning of artefacts for research and educational purposes. He is the Treasurer of the NASC2015 Organising Committee.

the University of the Witwatersrand, South Africa, was the International Keynote Speaker. Her unique background in both modern and pre-historical archaeology was fascinating and she provided a unique insight into the relationship of archaeology and cultural heritage issues against the political and economic realms within South Africa. The conference, although run by students for students, maintained a professional programme, with pre-conference workshops and an opening dinner on Friday the 14th of August at Macquarie University, followed by conference proceedings on the 15th and 16th of August at the University of Sydney, and a formal closing night dinner on the 16th August. Over 100 students and staff attended the three day conference coming from universities all over Australia, with the option of pre-conference tours.¹

The pre-conference activities happened on the 13th of August and included a guided tour of the Nicholson Museum at the University of Sydney by Dr Craig Barker and a walking excursion of the heritage area in ‘*The Rocks*’ within Sydney, led by archaeologist Wayne Johnson from Sydney Harbour Fore-shore Authority (SHFA).

The morning sessions of the first day were held at the Macquarie Art Gallery and started with an acknowledgement of country by Amelia Corr of the Indigenous Studies department, on behalf of the Darug community and a welcoming address by Macquarie University Deputy Vice Chancellor, John Simons. The aim of this morning was focused on providing attendees with the opportunity to listen and engage with individuals whom have experience in excavating and networking advice followed by a Q&A panel of our Keynote speakers and guest speaker Associate Professor Kenneth Sheedy from Macquarie University. Samantha Jones and Rodney Cross presented about their recent involvement with the ‘*Australasian Carsulae Archaeological Project*’ (ACAP) in excavating the ancient Roman Town of Carsulae in Umbria, Italy (220 BC–AD 250). The workshop described the cultural history of the site, as well as the surveys performed to explore the geophysical characteristics of the area.²

Macquarie PhD candidate, Aaron de Souza, presented ‘*Making Connections: Building Networks in Archaeology*’ to the student delegates about the importance of networking in archaeological circles. This was based on his own experience whilst obtaining fieldwork and museum visits for his Egyptian archaeological research. Aaron emphasised key strategies for developing your professional network, these include asking for help from your supervisor or fellow colleagues, contacting relevant experts for research advice, talking to new people while attend-



Figure 1: The updated logo for the National Archaeology Student Conference in Australia. Design credit goes to Kayla Tenielle Gourlay.

¹ Student and staff representatives came from the University of Sydney (USYD), Macquarie University, Sydney (MQU), Flinders University, Adelaide (Flinders), University of Western Australia, Perth (UWA), University of Melbourne (UNIMELB), Monash University, Melbourne (MON), La Trobe University, Melbourne (La Trobe), University of Queensland, Brisbane (UQLD), Australia National University, Canberra (ANU) and the University of New England, Armidale (UNE).

² Much thanks to Samantha Jones who helped to amend this and the previous sentence.



Figure 2: (Left) The conference bags contents. (Right) Registration table set up for the conference including lanyards for all attendees.

ing conferences, selling yourself as a potential employee, and taking risks to get ahead. NASC organisers felt it was imperative that this information is provided to attendees from a PhD student to allow them to connect and understand that opportunities in archaeology are available to students. The Q&A panel followed, where questions were asked of the panel members about their life and careers in archaeology; such as Amanda's efforts to increase the awareness and importance of cultural heritage in South Africa, specifically at school level; Aeeden's PhD experience and its importance as a qualification that anyone should attempt to gain and Ken's thoughts on the job prospects for archaeologists lying within cultural heritage occupations. Audience members followed up with their own questions, allowing an informal discussion about the state of Archaeology today and the need for current students to broaden their skill set in order to be employable.

Afternoon workshops focused on providing students with an insight into practical archaeological skills. PhD candidate, Mary Hartley (MQU), presented her '*Archaeological Illustration Experience Workshop*' where she taught the basics and importance of technical archaeological fieldwork illustration (Fig. 3); not to mention her experiences in hand drawing artefacts for Macquarie's Egyptian excavations at Thebes near Luxor. Macquarie staff members, Dr. Adela Sobotkova, Dr. Brian Ballsun-Stanton and Assoc. Prof. Shawn Ross, demonstrated a practical demo of their *Federated Archaeological Information Management Systems* (FAIMS) project mobile app, which allows offline digital recording on the field. Students were given a theoretical introduction about the app's purpose and design, followed by a practical, where the students used the app on provided tablets or on their own electronic devices. These two archaeological recording workshops complemented each other, emphasising that paper recording is still a requirement but that technology can also be integrated into field recording. After a long day of workshops, the Macquarie Staff Café hosted the student attendees for a BBQ dinner, before attending the keynote presentation by Dr. Aeeden Cremin at Macquarie's Museum of Ancient Culture's seminar room. Aeeden discussed her presentation '*Peripheral Vision*' which focussed on the idea of the Beaker "culture" and their cultural material indicator the



Figure 3: *Mary Hartley from Macquarie University whilst presenting her 'Archaeological illustration experience workshop'.*

bell-beaker. Part of her presentation discussed the limitations in defining this culture through just relying on the ceramic evidence and exploring other indicators, such as dental remains.

Conference proceedings over the weekend were held at the University of Sydney in the Footbridge theatre, a former theatre transformed into a 500-seat lecture space with great acoustics. The lecture hall was chosen as it provided enough room for attendees as well as a more intimate and less confronting setting for student presenters, particularly for those presenting at their first conference. Furthermore, to provide feedback to students, a panel of judges including academics and professional archaeologists evaluated presentations and posters. This was to provide valuable feedback for the students, as no doubt they would be presenting at future conferences in their academic career. Feedback from all of the judges was then sent to each presenter after the conference and prizes were also awarded for each academic level. The panel of judges included Michael Lever (Consultant Archaeologist), Dr Peter Keegan (MQU), Dr Wayne Johnson (Sydney Harbour Foreshore Authority), Dr Annie Clarke (USYD), Dr Patrick Faulkner (USYD) and keynote speaker Associate Professor Amanda Esterhuysen.

The Saturday began with a welcoming address from the Organising Committee chairperson, Rebekah Hawkins, followed by a '*Welcome to Country*' by Uncle Chicka on behalf of the Cadigal community. Four sessions of research papers were conducted that day and each presentation was allocated fifteen minutes to present with five minutes for questions. Morning tea, lunch and afternoon tea were provided as part of the registration fee. Session one was chaired by Olivier Rocheleoste (MQU), with three research papers; Honours students Natasha Naughton (USYD) and Francesca McMaster (USYD), along with PhD candidate, Jordan Ralph (Flinders). Session two was chaired by Sharna Katzeff (USYD), with presentations by PhD candidate Liesel Gentelli (UWA) as well as Greg Sing (USYD) and Sarah Janson (USYD). Session three was overseen by Patrick Bailey (ANU) with two Honours student pre-



Figure 4: Sharna Katzeff (Vice Chairperson), Assoc. Prof. Amanda Estherhuysen, Olivier Rocheleoste (Treasurer) and Rebekah Hawkins (Chairperson) at the closing conference dinner.

sentations, Bronwyn Woff and James Donon (La Trobe) along with PhD candidate Ben Dharmendra (USYD). Session four was chaired by Kelsey Rydar (ANU), with a presentation by PhD candidate, Georgia Roberts (La Trobe) along with two undergraduate students, Chris Sylvester (La Trobe) and Marc Cheeseman (UQLD). A fifth session followed for the presentation of seven research posters on display in the downstairs foyer; these included posters by Emmy Frost (La Trobe), Benjamin Bassett (MON), Harriet Donnelly & Samantha Leggett (USYD), Georgia Burnett (MQU), Felicity Buckingham (La Trobe), Anthony Romano (La Trobe) and Georgia Roberts (La Trobe).

Amanda ended the day's proceedings with her keynote presentation, '*A retro- and introspection of post-1994 archaeology in South Africa*'. This presentation examined her experience with preserving South Africa's cultural heritage and its clash with past and present political issues involved. This included being challenged by past apartheid ideals that confronted her when trying to reach out to schools and incorporate evolution into the curriculum. Continuing, with her experiences with native burial customs and tribal belief systems and how they clash with, for example, mining companies. As a result, she elegantly demonstrated the need for archaeology students to be aware of modern political goals and both modern and past cultural beliefs of any country they wish to work in to properly respect and co-operate with the individuals of a community or region.

Sunday the 16th of August was the last day of conference proceedings. Session six was chaired by Ada Dinckal (La Trobe) and was a unique session that had students present their recent fieldwork experiences. The conference is run by students for students and the aim of this session was to provide students an opportunity to hear about excavations that are happening around the world and hear about fieldwork. This was particularly aimed at the lack of fieldwork opportunities in Australia compared to elsewhere, like Europe, the Levant or the Mid-

dle East. Since this was a more informal presentation compared to the research presentations, students were given a ten-minute slot to present their fieldwork experience and questions followed. This session included presentations by Brenan Dew (MQU), Coral Hardwick & Eli Gentzakis (MQU), Margot Murray (UNIMELB), Sharna Katzeff (USYD), Charlotte Kowalski (USYD) and Hannah Morris (USYD). Research sessions then continued and session seven was chaired by Melissa Bendell (UNE) with four presentations, Masters candidate, Michael Leadbetter (USYD), Honours student Eleanor Pitt (USYD) as well as PhD candidates Jacob Heywood (UMELB) and Charles Barnett (MQU). Session eight was chaired by Benjamin Bassett (MON), featuring a presentation by honours student Ané van der Walt (USYD) and two collaborative presentations by students of ANU; Kelsey Rydar, Simon Williams, Sean Sheehan, Melandri Vlok, Lucy Blackam and Marni Booth. Session nine was overseen by Georgia Roberts (La Trobe), containing presentations by Honours student Adam Valka (La Trobe) and PhD candidates Olivier Rochehouste (MQU) and Amy Way (USYD). The tenth and final session, chaired by Rebekah Hawkins (USYD), featured Honours student Rebecca Morris (USYD) and Undergraduate student Colin Randall (USYD).

The conference judges were asked to give general feedback to the students before closing the conference. The judges felt that the presenters portrayed ideas and case studies which were rich and of a world class conference standard. Furthermore, they encouraged and emphasised presentation skills such as engaging the audience and limiting words on a PowerPoint.

The conference closing night dinner was held at the Toxteth Hote. Before the dinner started, awards were presented for each student level presentation, poster and excavation experience presentation. The winners of each category were Chris Sylvester (Undergraduate), Ané van der Walt (Honours), Michael Leadbetter (Masters), Georgia Roberts (PhD), Benjamin Bassett (Poster) and Hannah Morris (Excavation). The 'Bruce G. Trigger Award for Archaeological Thought' award was also given to the presentation that showed originality, flexibility and a critical understanding of archaeological thought. It was awarded to Michael Leadbetter (USYD) for his presentation 'Cities Across the South-China Seas', with honourable mentions going to Francesca McMaster (USYD) and Olivier Rochehouste (MQU).

Deciding where the next NASC in Australia would be, was discussed in a forum during the lunch break on Saturday 15th. Interested students from a range of universities were invited to listen to the 2015 Core Organising Committee's experience organising the conference and had the opportunity to ask them questions. This was also used as a time to judge the interest from the student body to continue NASC. The fact that NASC is not associated to any particular university is both a benefit and disadvantage. It's beneficial as it allows students from a range of universities to hopefully gain experience in holding a conference, and with each new university, their focus in archaeology may differ slightly and as a result Keynote speakers and judges that are invited will differ each year. This not only is beneficial to the students organising the conference, but also to the attendees as it exposes them to different fields, thoughts and practices within archaeology. However, it does mean that each year a new organising committee takes charge in organising the conference, preferably one that is composed of a new group of willing, enthusiastic and committed students who are prepared to take on the conference for the next year. It also means that dates and venues change each year depending on the organisation capabilities and location of the organising committee.

Even though there are limitations and challenges in running a student conference, organised by students, the benefits outweigh all the costs. NASC allows students to present in a



Figure 5: Each winner received a certificate, chocolates and a unique NASC gift; a golden trowel.

welcoming environment and practice their presentation skills before presenting what will be numerous papers in their academic careers. Furthermore, the last two committees have chosen to run NASC with no parallel sessions. There are a number of reasons for this decision; firstly it provides students a respectful audience that will listen to any and all presentations that have been prepared for the conference. Additionally, it's a student conference and encouraging undergraduate students to attend is imperative to facilitate its future. By listening to all presentations, students can appreciate the complexity of this discipline and listen to the wide range of archaeological topics, regions, techniques and skills it has to offer. We can only hope that those students who were looking for some inspiration found it during their time at NASC. Having everyone present together, with such a broad array of research topics, there was a considerable effort by the organising team to try and create themes for each session, or links between presentations where possible. Last but not least, conferences are a time to network and realistically the students at the conference this year, will be at conferences together in the future for a few decades to come. Why not let them learn how to appreciate and engage in archaeology now, before academic rigour means they will be attending conferences that are only pertinent to their own research?

After evaluating many proposals, the *University of Western Australia*, Perth has been selected to host NASC 2016. NASC invites students nationally and internationally to attend the conference and if you would like to stay informed with its upcoming dates and venues, follow our [Facebook](#) page or [website](#) for further details.



Thanks to our sponsors; Macquarie University, The University of Sydney, National Australia Bank (NAB), GML Heritage, Australian Association of Consulting Archaeologists INC (AACAI), Comber Consultants, Australia Archaeology Institute at Athens (AAIA), The Museum of Applied Arts & Sciences (MAAS), The Nicholson Museum (USYD), Museum of Ancient Cultures (MQU), The USYD Archaeology Society (ArchSoc), The Museum Appreciation Society of Macquarie (MAS) and the Macquarie Ancient History Association (MAHA).



Taking stock of archaeological thought, method and practice in southern Africa. A review of the ASAPA Conference from the 1st–3rd July 2015

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THE biennial conference of the Association of Southern African Professional Archaeologists (ASAPA) was hosted in Zimbabwe, at the University of Zimbabwe (Harare).

The conference theme, “*Towards an interdisciplinary framework for southern African archaeology: Taking stock of archaeological thought, methods and practice*”, was appropriate, albeit poorly realised at the conference.

The proceedings were opened by plenary talks given by Innocent Pikirayi (University of Pretoria), Judith Sealy (University of Cape Town), Gilbert Pwiti (University of Zimbabwe), and Simon Hall (University of Cape Town). Each speaker reflected on the background and development of archaeology in the region, and noted key ideas for the future development of the discipline. Pikirayi discussed a key issue in African archaeology, that of the need to decolonise the practice across the continent, in his speech ‘*Breaking barriers and decolonising practice: Towards an African Archaeology of the Future*’. A talk was given by Sealy on ‘*Archaeological science in Southern Africa archaeology today: contributions and challenges*’ in which an appeal was made for researchers to address the ‘grand challenges’ in archaeology. She asked researchers to consider ‘what are the key questions we, as a region, are trying to answer, and how best could we bring the key questions and scientific techniques together?’ The talk resonated with much of the audience and left an impression, with multiple references from other conference presenters. The next talk was given by Prof. Pwiti on ‘*Archaeological heritage management in southern Africa*’. He discussed the different perspectives encountered within heritage management in the region, and noted how these varying perspectives complicated as well as contributed to the practice of heritage managers locally. Presenting on the topic

* Thank you to the members of the Local Organising Committee, and the various funders and supporters of the conference: ASAPA, University of Zimbabwe, Confucius Institute, Republique Francaise, The National Museums and Monuments of Zimbabwe, The United Nations Educational, Scientific and Cultural Organization, The Wenner-Gren Foundation. Acknowledgements also need to be given to the Palaeontological Scientific Trust (PAST) and its Scatterlings of Africa programmes for the allocation of funds for my attendance of the conference. Lastly, thanks are given to G. Jordaan, and T. Forssman, and subsequent reviewers, for their comments on this document.



Figure 1: Prof. Pikirayi presenting his plenary (photo courtesy of Carlton Rambanapasi).

of the recent past, and it's handling in a dynamic political present was Prof. Hall's speech '*The Go-Between? Historical Archaeology in Southern Africa*'. He called for researchers to be aware of the contemporary context of their research, and to act responsibly in light of this awareness. In his speech, Hall referenced the recent removal of the controversial Cecil John Rhodes Statue from the grounds of University of Cape Town as an example. Rather than using heritage as a space for discussion, to de-nature politics and bolster unity as a nation, it simply became a symbol of racism. Hall's message was ironically held true just days after the conference, when an opinion piece was published in the 'The Herald' (Zimbabwe's largest daily newspaper). The piece titled '*Africa must rid itself of imperialistic symbols*' cited both Prof. Pikirayi and Prof. Hall's remarks on the Rhodes statue debate (Tsiko 2015)¹. These presentations, and their after-effects, remind us that archaeological knowledge is not isolated from a present socio-political discourse.

Following the opening presentations, a range of sessions ensued. The sessions held at the conference were under the following topics: 'Early, Middle and Late Stone Age', 'Archaeo-Mining', 'Archaeo-Metallurgy', 'Heritage, Archaeology' and 'Education', 'Hunter Gather and Farmer Interactions', 'Spatial Archaeology', 'Farmer Communities Archaeology', 'Climate Variability and Archaeology', 'Material Culture and Identities', 'Rock-Art', 'Historical Archaeology', 'Ethnoarchaeology', 'Conservation', and 'Archaeozoology'². The sessions reflected the diverse interests of practitioners in the region. However, an intense focus was placed on her-

¹ Tsiko, S. 2015. 'Zimbabwe: Africa Must Rid Itself of Imperialistic Symbols', The Herald [online allAfrica], 9 July, available [here](#).

² For a more detailed list of conference sessions and presenter titles, follow this [link](#), also the conference proceedings are set to be published the following year.





Figure 3: A quiz team at SAASC student night (photo courtesy of Lu-Marie Fraser).

up award was given to N. Mokoena, for the presentation '*What is your heritage? Communities' Perceptions on Heritage and Rock Art: The Case of Rural South Africa*'. Both presented novel and outstanding papers, and were fair winners of the prize.

To end with a note on the conference's theme in mind, the full stock and diversity of archaeological thought, methods and practice in southern African archaeology was not exhibited at the conference, because a majority of southern African archaeology practitioners did not attend the conference. This is testified by the fact that the number of delegates, those with ASAPA membership, was so low that the bi-annual general meeting of ASAPA members could not be held. In of itself this has repercussions for the broader discipline in the region, as the general meeting is a time for bi-annual review and election of new council members. How do we expect the discipline to grow in southern Africa if we don't make the effort to meet and discuss our objectives and research? There are assuredly reasons for this low attendance of the conference; however, is it not our responsibility to make an effort for the betterment of the discipline?



Proceedings from the 2015 New Zealand Archaeological Association Conference

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FROM 17–20 June 2015, the New Zealand Archaeological Association (NZAA) annual conference took place in Waitangi, Bay of Islands, Aotearoa/New Zealand (Fig. 1). As a site of national significance as the imagined birthplace of the New Zealand nation, Waitangi was chosen as the location for our 2015 conference to commemorate the 170th anniversary of the end of the Northern Wars, the 175th anniversary of the signing of the Treaty of Waitangi, and the 200th anniversary of the establishment of the first mission station (December 1814). The history of Waitangi (Fig. 2) is central to New Zealand's bi-cultural nationality as the location where British representatives signed a treaty with Maori in 1840 to recognise indigenous land rights.

The annual conference field trip visited many local archaeological sites related to the Northern or the First New Zealand War of 1845–46. These trips included visits to the Church Mission Society Mission at Waimate North, and the Ruapekapeka battle site (Figs. 3&4). Local guides Kate Martin, Kevin Ashcroft, Stuart Park, and Jonathan Carpenter gave informative talks throughout the trip.

Conference-goers were also encouraged to visit the Waitangi Treaty Grounds, which was the location of the signing of the Treaty of Waitangi/Te Tiriti o Waitangi. Te Whare Rūnanga (Meeting House) and the Treaty House (Fig. 5) were inhabited by James Busby, as the representative of the British Crown during this era. Ceremonial war canoes are launched from here

* Jennifer Lane is an MA student at the University of Otago in New Zealand. She graduated with a First Class Honours BA in Anthropology (Archaeology), and received a Diploma for Graduates endorsed in Classics. Her research focused on the available methods for investigating non-denominational cemeteries using a pilot study from Dunedin's Historic Northern Cemetery. Jennifer's current archaeological interests include the monitoring and protection of New Zealand cemeteries and burial grounds, the social transformations surrounding the First World War, and the impact of the 1918 influenza epidemic on New Zealand society.

† Helen Heath is a Masters student at the University of Otago, New Zealand. Helen graduated with a First Class BA Honours in Anthropology, her research included chemical ceramic analysis on assemblages from the Philippines and Thailand. While her current work focuses on Iron Age ceramics from Northeast Thailand, Helen's interests also include pre-contact New Zealand archaeology and the monitoring and protection of early Maori sites.



Figure 1: *View from the Conference Venue. Photo Credit to Naomi Woods.*

every year on Waitangi Day (6th February) in commemoration of the signing of the Treaty. Many of the sessions focused on pre-contact (fourteenth to eighteenth centuries AD) to contact period (post-1769) archaeology in New Zealand to highlight the national and archaeological significance of this region.

The conference began on Wednesday with a pōwhiri (traditional Māori greeting) from a representative from Te Tii Marae, followed by the first round of presentations. Presentation topics included: cultural heritage practice, management and further improvements; pre-contact New Zealand archaeology; Bay of Islands archaeology; environmental archaeology, historical archaeology; and material culture studies.

The student session was introduced in the 60th Anniversary of the New Zealand Archaeological Association conference (2014) for undergraduates and postgraduates to gain experience in presenting papers. These sessions have been reduced from the standard 20 minute presentations to a 10 minute presentation to encourage first time speakers and to promote the research being carried out in our universities.

Student Session The student presentation session covered a diverse range of topics, from ceramic analysis in Thailand, to nineteenth century built structures in Ashburton, South Island. Participants in this session included undergraduate and postgraduate archaeology students from [Auckland University](#) and the [University of Otago](#).

Helen Heath presented her preliminary results on an electron microprobe analysis of ceramics found in Iron Age kilns at Non Ban Jak, Northeast Thailand. With a focus on the kilns excavated, Heath's research used chemical analysis to describe the nature of pottery production at the site, indicating that potters were producing a variety of forms for local consumption.

Following the theme of ceramic analysis, Jenny Loader investigated the disappearance of ceramics in the Western Pacific after 1000 BC. In addition to the transformation and subsequent disappearance of Lapita ceramics after reaching Samoa, there is no archaeological evidence for a post-Lapita ceramic industry in this region. However, the presence of ceramics and produc-

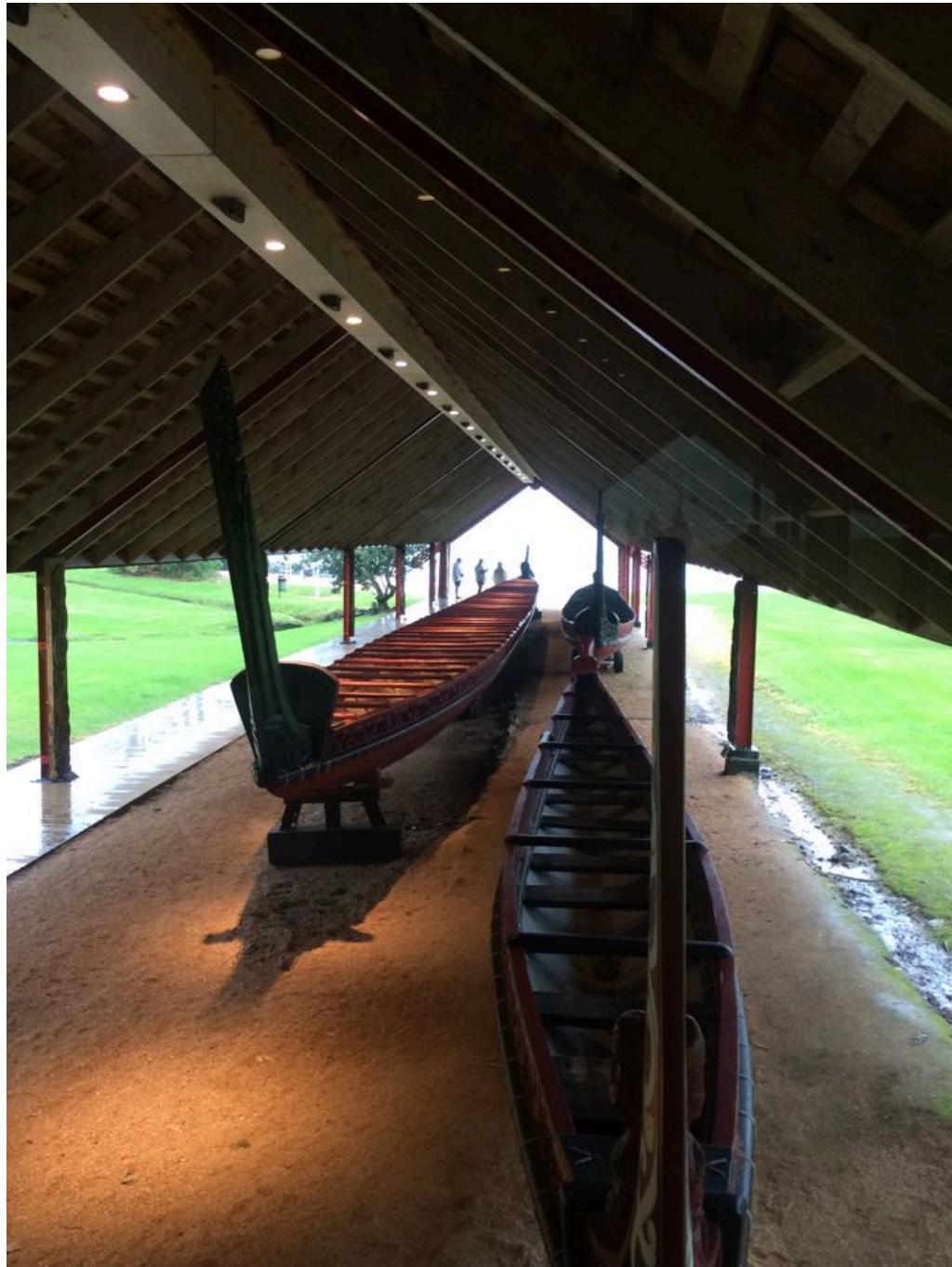


Figure 2: Ceremonial war canoe (*Ngātokimatawhaorua*), at Waitangi. Photo Credit to Jenni Lane.



Figure 3: *Ruapekapeka Pa entrance.* Photo Credit to Jean Spinks.



Figure 4: *Field trip to Ruapekapeka Pa.* Photo Credit to Jean Spinks.



Figure 5: *The Treaty House, built in 1833. Photo Credit to Jean Spinks.*

tion technologies continued in Fiji and Vanuatu up until European contact. Loader explored the reasons why this existed, and the social implications for this apparent disappearance.

Also in Pacific archaeology, Jessie Hurford's presentation on '*Houses, Shrines and the Social Landscape of Tetepare, Solomon Islands*' investigated pre-contact to early-contact period sites in New Georgia. Hurford examined the remains of shrine and house architecture on Tetepare, investigating how it reflected socio-political interactions between island polities, particularly surrounding the practice of ritualised head-hunting raids.

The practical uses of LiDAR in the Pacific were outlined by Joe Mills who compared pedestrian survey data and LiDAR data from settlements on Tutuila in American Samoa. He presented a convincing argument for the potential of LiDAR as a means to combat difficulties faced by pedestrian methods, such as dense vegetation and limited visibility, as well as being a tool to re-evaluate the current pedestrian collected site data from Tutuila.

Luke Tremlett presented the construction phases of the Ashburton Hospital between the 19th and 20th centuries, and the corresponding social transformations and medical innovations that motivated these architectural additions and remodelings. The presentation of Tremlett's preliminary results regarding the transformations suggest that patient rooms became smaller and specialised over the construction phases with the requirement for ventilation simultaneously decreasing.

Kurt Bennett used Rangitoto Island as a case study for the re-use of ship parts in holiday cabins around the coast. Many parts were salvaged from clusters of known shipwrecks from the surrounding area, although few locations are identifiable today due to extreme weathering of the remains. Bennett used archaeological and archival data, as well as oral histories to determine which materials survived for possible reuse. Bennett researched the site formation

processes at individual vessel sites and re-used material in cabins to help identify any remains of abandoned vessels.

In light of the recent evidence of climatic change from the Intergovernmental Panel on Climate Change (IPCC) (2013), Rebecca Ramsay reported on her assessment of vulnerable coastal sites within the Hauraki Gulf, Auckland. Ramsay applied a coastal vulnerability model to identify three main archaeological site types that require priority in future conservation efforts to protect New Zealand's coastal heritage.

Matthew Carter (LaTrobe University) presented his research into the motives, strategies and products of Pākehā and Māori entanglement during the shipbuilding period between 1792-1840. Carter's presentation outlined the historical context, theories and expectations of what his future work will entail.

Main Conference Sessions Multiple sessions over the course of the week touched on current cultural heritage issues and Topics: Cultural Management, and suggested ways to improve current practice. New Zealand archaeology has Practice, Management, and several pieces of legislation that protect our archaeology and cultural heritage. Many parties, Further Improvements such as local and regional councils, Heritage New Zealand/Pouhere Taonga, the Department of Conservation/Te Papa Atawhai, local iwi (tribes), and land developers have conflicting views on how to best acknowledge and manage these heritage sites and excavated cultural material. The balance of these interests is a challenging national issue.

Māoritanga and Archaeology in New Zealand/Aotearoa Suggestions on how to improve working relationships between local iwi and archaeologists were presented by Huia Pacey and Makere Rika-Heke, which included a discussion on terminology as a continued thread from the 2014 NZAA Conference. The suggested terms 'pre-pākehā' or the eurocentric term 'pre-contact' to represent the period prior to European contact, were preferred to the term 'pre-historic', whose colloquial connotations are insulting to Māori, who are living descendants of the original settlers of New Zealand.

A large part of working in New Zealand archaeology involves continuous consultation with various groups and organisations including local Maori, interested community groups, and legal parties. Ben Teele emphasised the importance of maintaining a dialogue with the community in any situation where we have the ability to converse with the public.

In the last few decades there has been a shift in focus in New Zealand archaeology from pure research to cultural resource management driven by statutory processes. Andrea Farminer suggested updating the current codes of practice for New Zealand archaeologists, and suggested the benefits of introducing a professional body to maintain standards.

New Zealand Transport Authority/Waka Kotahi In pre-contact to contact period archaeology, Mary O'Keefe presented preliminary results from her work on the 18 km long Kāpiti Expressway for the New Zealand Transport Association/Waka Kotahi (NZTA). O'Keefe presented on the types of sites discovered, and the material analysed by Southern Pacific Archaeological Research (SPAR). O'Keefe's preliminary results provided an understanding of economy in the pre-European environment. Another NZTA project presented by Ann Neill detailed the historical archaeological discoveries resulting from major earthworks projects along the North-western Motorway and Auckland's CBD, reflecting particularly on the cooperation between companies and governmental bodies invested in these projects.

Heritage New Zealand/Pouhere Taonga An illuminating example of cooperation between tangata whenua (local Maori) and the New Zealand Chinese community was presented by Bill Edwards. The SS Ventnor, a mortuary ship carrying 499 Chinese bodies for reburial in their homeland, sank in 1902 southwest of the Hokianga Harbour. This site became protected at the request of the Chinese commu-

nity through gazettal (where a post-1900 site meets the definition of an archaeological site and is therefore protected as if it were pre-1900 site) under the *Heritage New Zealand Pouhere Taonga Act 2014*. The impetus to protect this shipwreck came from increased visitation by divers and looters fossickers. The bodies of the thirteen crew who died, and some of the deceased Chinese were washed ashore and reburied by the local iwi. Edwards discussed the gazettal process, facilitated through Heritage New Zealand/Pouhere Taonga, in balancing cultural ties to their Chinese homeland while respecting the urupa (burial sites), but also allowing the descendant community access to their ancestors.

Matt Schmidt presented an update of Heritage New Zealand's ongoing work in Central Otago, outlining the history of sites in the Lower Nevis Valley, possible pre-European moa-hunting camps and Chinese occupation during the gold rush of the 1860s. The rich history of the area is under evaluation, including how to best protect the heritage sites while achieving a balance with the development needs of the district.

Recently, issues have been raised regarding the use of heritage sites as tourist locations or filming in New Zealand. In particular, archaeologists and local councils have collaborated to discuss access permitted to these heritage sites for either public or corporate use. Laura Dawson and Chris Mallows, of the Auckland Council, explained some issues regarding the protocols for filming on heritage sites, and how archaeologists are responsible for ensuring these protocols are adhered to.

Hayden Cawte, Matt Schmidt, Sheryl Cawte, and Dan Cropper have successfully applied global archaeological authorities to streamline statutory processes in several sites in the Southern region of New Zealand. These authorities allow for greater protection and management of these sites and active collaboration with stakeholders.

Malcolm Hutchinson reported on the discovery and documentation of 180 previously unknown sites, generating a large amount of textual and graphic data. Many archaeological sites in New Zealand remain unknown and are unrecorded as they are not visible from the surface; therefore, accidental discoveries occur frequently. This led Hutchinson to develop an experimental software package for the storage and access of this data, and long-term preservation of computational archaeological material.

Similarly, Benjamin Jones, Shannon McColley, and Igor Drecki presented a new digital resource for cartographic material. As many of these documents are subject to copyright and ownership issues, or are resources unknown to archaeologists, Jones, McColley, and Drecki, in collaboration with the Auckland University digitised approximately 16,000 historical governmental maps in Auckland University Library and the National Library of New Zealand/Te Puna Mātauranga o Aotearoa.

The session started with a presentation on the recent excavation of a nationally significant find, Dilys Johns (Auckland University), Rachel Wesley (Te Rūnanga o Ōtākou) and Shar Briden (Department of Conservation/Te Papa Atawhai). A c.6 m long tōtara waka (canoe) was excavated from the sand dunes of Papanui Inlet on the Otago Peninsula in October 2014. Local iwi, archaeologists and conservation specialists worked together to recover the pre-contact waka, which is the second oldest in New Zealand. Along with the waka recovery, Johns also reported on the future preservation of the waka and the continual monitoring of the culturally significant and eroding site of Papanui.

Wrapping up his doctoral thesis this year, James Robinson (Winner: best paper) presented his research on the Poor Knights Islands. Using an archaeological landscape approach paired

Pre-Contact New Zealand
Archaeology



Figure 6: View of Paihia. Photo Credit to Jean Spinks.

with traditional and historical records and earth sciences, Robinson mapped and assessed the inaccessible and densely vegetated Tawhiti Rahi Island. The information Robinson gathered was used to identify the various uses of the island through time, such as garden outliers, muttonbird resource areas, horticultural settlements, defence and pig farming. This research was used to describe the relationship of the Poor Knights Islands to the mainland and other surrounding island groups. Inspired by his previous work on the old telegraph system across the Coromandel Ranges, David Wilton explored a different form of information technology this year. Wilton compared visual signalling technologies used by early Māori with other communities, such as the use of fire among the Chinese and the North American Indians. Wilton also received the Public Archaeology Award for his long term work bringing the archaeology of the Thames Goldfields to the general public.

Kevin Jones presented an update on his work on the Northern Mahia Peninsula. Jones discussed various sites and their significance in contributing to understanding the area's archaeology. In particular, Jones noted the favoured quincunx patterns of taro cultivation, the landing sites from early occupation, and the positioning of outlier settlements in relation to the mission and whaling stations occupied during the 1840s.

Using data from shore whaling sites, Garry Law reported on his investigation into early settlement sites in New Zealand, through the use of modelling to assess the frequency of site loss. He left the audience to ponder how much we really know about early sites in New Zealand.

Bay of Islands Archaeology The presentations of fieldwork undertaken in the Pēwhairangi (Bay of Islands) area focused primarily on the initial contact between Pākehā and local iwi. The town of Paihia (Fig. 6), on the southern bank of the Waitangi River, was the location of the 3rd Church Missionary Society Mission Station and a pā site. Unfortunately, the exact position of the pā site has been lost; however, recent investigations by Caroline Phillips have evaluated likely site locations. Through the study of historical images, written accounts, and reconstructing the landscape using known landmarks, Phillips has worked on locating the site, thought to be in the middle of the Paihia township. Several accounts mention the presence of defensive structures, due to rumours of attacking southern tribes, while historical images show the presence of a flagpole. According to written accounts, the site was occupied by Māori and missionaries at separate times, and the site itself transformed in use over its occupation period.

Angela Middleton and Ian Smith both discussed other mission stations located within the area, particularly ones at Hohi and Paihia, which were occupied between 1814 and 1845. Middleton followed the path of missionaries Marsden and Nicholas inland from Paihia towards Waimate, focusing particularly on the relationship between Marsden and the local iwi, Ngāpuhi.

Middleton noted the transformations in the political situation of Ngāpuhi through Marsden's diaries and images during the years after contact.

Smith examined evidence of the political economy present in the Bay of Islands during the early 19th century in relation to the rise and decline of Rangihoua pā. Te Puna village was considered the centre of operations in the Northern area, and even termed the 'capital' by a visitor in 1805. Smith's discussion of agricultural and horticultural trade networks, particularly the settlements with extensive gardens, as opposed to those with coastal resources, indicated that the alliance between the north and south offered a balance of land and sea resources from trade networks, eventually overcoming the limited resources of the eastern tribes.

John Booth's presentation consisted of a comprehensive overview of the marine ecosystems present in the Bay of Islands, with particular reference to pre-contact coastal sites across the bay. Booth noted that the content of marine resources consumed at pre-contact sites were comparable with Smith's theories of the wider Hauraki Gulf with particular reference to Mangahawea (AD 1260-1350), Opunga (AD 1402-1455), Wairoa (AD 1390-1455), and Patunui (AD 1450-1500). The midden analyses of these sites displayed a transformation, from a wide variety of fish and shellfish species plus marine mammals and moa bones, towards a limited consumption of a small range of estuarine shellfish species.

Matthew Campbell presented a case study on fish identification from Parton Road (Papamoa) and Urquharts Bay (Whangarei Harbour). The standard method of identification in New Zealand includes five major mouthparts for a cross-assemblage and cross-site comparison. Campbell extended this method to include cranial and sub-cranial bones, plus vertebrae, for a more successful identification of species across multiple contexts.

Lindsay Alexander investigated the historic 1820s-1880's whale ships, which docked seasonally at north-east ports in New Zealand. The presence of these ships in Northland transformed the society and culture of the towns: where whalers docked had a significant impact on the economic state of the wider communities. The economic structure of towns such as Russell and Mangonui relied heavily on the presence of these ships to thrive, and for the identity of their people. Alexander argued that there were a greater number of ships that docked in the north-east coast of New Zealand than previously known, forcing the towns in the area to transform their identities into cosmopolitan ports. The decline of whale ships arriving in New Zealand ports may have reduced the presence of whalers in New Zealand, but their unique culture had already made their mark.

Mark Horrocks presented a macro-botanical approach to compare environmental and agricultural evidence in archaeological excavations in the Pacific. Horrocks argued that pollen, phytolith, and starch grain analyses may be used to identify material discovered in archaeological sites with both wet and dry environments. These three analyses cost the same as standard radiocarbon analysis and are valuable tools for discovering a range of preserved material, due to the diverse number of methods for micro-botanical preservation. The benefit of using these methods in an archaeological context provides useful chronological and environmental information, specifically that of the horticultural actions of early populations. For example, in New Zealand these methods have identified early Māori cultigens and introduced European plants, while across the Pacific, these analyses have been carried out on a range of sources on various islands from New Guinea to Hawai'i.

Rod Wallace's analysis of material from pre-European horticultural sites in the Waikato (Central North Island) indicated an unusual gardening pattern practice. Wallace identified

Environmental
Archaeology

where land was cleared in the existing Tawa/Mataī bush for a one-off horticultural use, which differs from the northern North Island gardening practice which utilises the same garden multiple times.

For several seasons, the University of Auckland in partnership with the Auckland Museum, have carried out multiple field schools on Ahuahu (Great Mercury Island). Louise Furey, Alex Jorgensen, Rebecca Phillipps, Simon Holdaway, Rod Wallace, and Josh Emmitt are the primary archaeologists associated with this field school. In further research, Isaac McIvor and Thegn Ladefoged have investigated the land use and settlement patterns of the site using a multi-scalar approach of a 300 ha area. The impacts of the communities on the environment was discovered through categorising the landscape with regards to mobility, storage, competition, and cooperation. The identification of the best locations for horticultural production evaluated the area in 25 m by 25 m squares for insolation (sunlight exposure), soil composition, slope, and access to streams. The results of this spatial analysis with the notation of storage pits, residential features and fortified locations indicated that the island was occupied on a continuous basis rather than seasonally.

Historical Archaeology Two key themes were present in the historical archaeology presentations: aspects of New Zealand's early conflicts, and recent investigations into buildings archaeology. Jonathan Carpenter presented an update of his fieldwork in Ruapekapeka, which included the location of several areas of significance during the Northern or First New Zealand War 1845-46 between the British and Māori allies, and the local iwi. Alexy Simmons investigated the food security of soldiers during campaigns in the Waikato region, particularly the methods used to store, distribute, and ensure a continual supply of food.

Katherine Watson presented an overview of the work carried out by Underground Over-ground Archaeology over the last four years in post-earthquake Christchurch. Watson looked into the wider implications and understanding of Christchurch's history, through the structures and features of the documented domestic houses. Patrick Harsveldt from Opus international Consultants reported on the recording prior to and during demolition of a pre-1900 farmhouse, which gave further insight into the style of building practiced in rural Canterbury during the late 1800s-1900s.

Another aspect of historical archaeology was addressed by Maddy Fowler, who looked into Aboriginal influences on maritime archaeology at mission stations in South Australia. This topic explored a niche that has not been investigated, and she concluded that in these situations it is crucial to work with the local indigenous people for a more comprehensive understanding of the context. Indigenous people living at the Point Pearce Aboriginal Mission/Burgiyana merged indigenous and western maritime practices, which have not been investigated as part of mission archaeology, nor part of maritime archaeology. Fowler has investigated the applicability of western concepts in maritime archaeology to indigenous missions, and its applicability to New Zealand maritime archaeology.

Material Culture Studies Nicholas Sutton (Winner: Best Student Presentation) in collaboration with supervisors Glenn Summerhayes and Anne Ford presented their current work on ceramic production and mobility at Oposisi, Papua New Guinea. Through a stylistic, fabric and chemical analysis, Sutton was able to report preliminary results on a new ceramic sample from Oposisi, in turn investigating the dates for the first settlement and the earliest ceramic horizon, Early Papuan Pottery (EPP).

Political movements in Christchurch, while well recorded, are not always reflected as vividly in the archaeological record. In light of the discovery of a clay pipe assemblage depicting international political figures and ideal excavated at 152 Armagh Street, Jessie Garland was able to link material culture as a means to reinforce political ideas in 19th century Christchurch. Following in the theme of historical material culture, Naomi Woods led the audience through the gardens depicted on popular Willow pattern tableware. Woods described the influence of the plants and structures in the pattern pertaining to the decision-making process of ornamental garden design in 19th century Whanganui.



The conference ended with a formal dinner and awards for the best papers. The main sponsors were the New Zealand Transport Agency/Waka Kotahi, Far North District Council/Te Kaunihera o Tai Tokerau Ki Te Raki, CFG Heritage, Heritage New Zealand/Pouhere Taonga, Clough & Associates Ltd., and Heritage Survey Consultants (HSC), whose contributions made this year's conference possible. Many thanks to the Copthorne Hotel for hosting, and to Brooke Jamieson for organising the 2015 conference.



Warfare, Environment, Social Inequality and Peace Studies Seville, Spain: May 29–30, 2015

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THE Warfare, Environment, Social Inequality and Peace Studies (WESIPS) Conference was celebrated at the Center for Cross-Cultural Study (Spanish Studies Abroad) in Seville, Spain. Thanks to the great effort of organizers Dr. Richard J. Chacon (Winthrop University) and Dr. Yamilette Chacon (James Madison University), around 70 researchers from diverse countries, such as France, Germany, Mexico, Israel, the USA, England, Belgium, Peru, Australia, Sweden and Spain, met in this amazing city, defined as a cosmopolitan center during the sixteenth and seventeenth centuries. Anthropologists, biologists, archaeologists, psychologists, historians, graduate students, and independent scholars presented their concerns, as well as different theoretical and methodological perspectives on the origin, development and consequences that violence, social inequality, and warfare have on the environment and societies throughout history. In this review we will discuss selected topics presented in this conference and some of the papers that we believe reflect the main goals of this academic meeting.

* Mariana Favila Vázquez is an archaeologist by the National School of Anthropology and History in Mexico. She has a Master in Mesoamerican Studies by the National Autonomous University of Mexico (UNAM). Her research topic is the pre-Hispanic Mesoamerican navigation. She has participated in archaeological projects in the basin of Mexico and in the Maya area. She is currently a lecturer in the National School of Anthropology and History and is studying her doctorate in Mesoamerican Studies at UNAM.

† Ximena Chávez Balderas is a bioarchaeologist at the Templo Mayor Project. She is specialized in funerary archaeology, sacrificial practices, mortuary treatments and archaeozoology. She earned her BA from the Escuela Nacional de Antropología e Historia. Her MPhil was awarded by the Universidad Nacional Autónoma de México and her MA by Tulane University. She is PhD candidate at Tulane University. She was the main curator of the Templo Mayor Museum between 2001 and 2007. She received three INAH national awards for her BA thesis, her MPhil thesis and for an exhibition she curated in 2006. She has presented more than eighty lectures and conference papers and has published some forty articles as well as a volume on funerary rituals—specifically cremation—at the Templo Mayor. Currently, she is working in two books, one as author and the other as editor. Chávez Balderas has worked on a number of national and international exhibitions and has excavated at Teotihuacan (including Teopanzaco, Xalla, and the Pyramids of the Moon and the Sun), Loma Guadalupe in Michoacán, Huacas de Moche, Peru, and the Great Temple of Tenochtitlan.

Research on these topics was considered from economic, environmental, historical and social approaches. Archaeological research allows us to examine patterns of conflict and violence through the analysis of individual and collective actors, sociopolitical conditions and group affiliations as reflected in the material culture. However, evidence from other sources needs to be incorporated in order to interpret this data, making interdisciplinary approaches necessary. This approach was reflected in the conference proceedings. Peter Eekhout (Université Libre de Bruxelles) and Lawrence Owens (University of London) presented "*From domestic to ritual and beyond: evidence for conflict and violence at Pachacamac, Peru*". The authors created an interpretative framework based on the analysis of archaeological remains, iconography, bioarchaeology and ethnohistorical data, allowing them to identify the manifestations of violence at different scales (interpersonal, socio-cultural, and state-sponsored). This concern, shared with other researchers, seeks to investigate the causes and patterns of warfare, as indicated by Elizabeth Arkush (University of Pittsburgh) in her paper "*Patterns of warfare in the Pre-Columbian Andes at the large scale and the long term: horizons, variation, and causality*". She proposed the development of a GIS database to create a model for large-scale analysis which would create a visual of various indications of warfare, such as congregations of fortifications, settlement patterns and skeletal trauma rates for the Pre-Columbian Central Andes. On the other hand, research by Ximena Chávez Balderas (Instituto Nacional de Antropología e Historia), Alan Barrera (Instituto Nacional de Antropología e Historia) and Diana Bustos (Universidad Nacional Autónoma de México) "*Sacrificial victims at Aztec Tenochtitlan: Captive warriors or slaves?*" reached an interesting conclusion. Their research suggested that violence is not necessarily connected to warfare and conflict, but rather could be related to standardized patterns of ritual violence, in order to reenact mythical events (Fig. 1).



Figure 1: *Ximena Chávez presenting her paper about sacrificial victims in Tenochtitlan. Courtesy of Dr. Richard Chacon.*

inflict, conservation **When we think about conflict, environmental conservation is not taken into account on a regular basis.** By exploring the relationship between these concepts from an anthropological and a historical point of view we will be able to understand environmental management. As stated by Charles Bishop (Union College) in his paper “*Conservation and Territoriality among Northern Algonquians*”, what we call conservation today depends on territorial concepts; unfortunately this does not mean that all forms of territoriality resulted in conservation. How can we address the complex topic of territory and resource management? Rubén Mendoza (California State University, Monterey Bay) and Jennifer Lucido (Sonoma State University) in their paper “*Cartographies of Sustainability: A Geospatial and Digital Resource based Approach to the Visualization of the Environmental History of California, 1769- 1892*”, established a project based in environmental history and historical geography. Through the analysis of maps the authors obtained environmental histories of resource abundance and scarcity, connected to the water crisis.

Maritime routes have been documented around the world through rock art, codices, written documents, ship wrecks and other archaeological findings. This activity was pursued for two main objectives, warfare and trade, both intrinsically connected. This connection was confirmed in the paper “*Rock Art, Warfare and Long Distance Trade*” by Johan Ling (University of Göthenburg) and Kristian Kristiansen (University of Gothenburg). The authors demonstrated that Scandinavian local warriors would have increasingly played an important role in the metal trade. In consequence, this privileged the rise of maritime chiefdoms in Scandinavia. In the paper “*Nautical Warfare in Mesoamerica: Conquering through Water*”, Mariana Favila Vázquez (Universidad Nacional Autónoma de México) pointed out that the understanding of the nature and variability of Mesoamerican battles is still limited. However, there is enough evidence to conclude that nautical warfare synergistically occurred along with terrestrial warfare. As a result lacustrine and maritime landscapes became part of the political territories during Pre-Hispanic times.

Conflict can be identified through the study of different construction systems. For example, researchers are well aware that the period preceding the Inca Empire was characterized by conflict and warfare. This can be attested by the existence of numerous fortifications. However, the northern coast and the highlands were “far from adopting the same defensive patterns”. In the paper “*Pucara VS Fortress: Defensive Arrangements during the Late Intermediate Period in the Coast and the Sierra of Central Andes*,” Vincent Chamussy (CNRS / Université Paris I) and Romuald Housse (Université Paris 1 - Panthéon Sorbonne), analyzed these two different defensive sites, and presented an understanding of their important implications for various conflicts in each of these regions.

Oftentimes, human conflict is not only directed to other humans, but also to other species. In the paper “*Co-existing with Large Carnivores in the San Francisco Bay Area*” by Zara McDonald (UC Berkeley), Anne Orlando (UC Davis) and Ally Nauer (Felidae Conservation Fund) promote, through a long-term ecological research and an educational program, the protection of pumas living in urban areas. The goal of this program is to make humans understand that there is no real conflict between promotion of human life and wildlife. On the other hand, animals have been used to support humans in their conflicts against other humans, as demonstrated in the paper “*War Elephants in Antiquity, Logistics and Ancient Ecology*”, by Arturo Sánchez Sanz (Universidad Complutense de Madrid). These animals have been used for different purposes by the elites, leading them to become a commodity. Unfortunately, this rela-

Maritime strategic warfare and trade

The study of conflict through the analysis of defensive architecture

Human-animal relationships: interaction with animals through violence

tionship has not been positive for the pachyderms. For example, the forest elephant became extinct due to their indiscriminate exploitation in the battlefields and also as a consequence of being used as a spectacle for the masses.

Theoretical approaches presented at the conference, focused on distinguishing different concepts, and how these ideas could be communicated. For example, Yamilette Chacon (James Madison University), David Willer (University of South Carolina), Pamela Emanuelson (North Dakota State University), and Richard Chacon (Winthrop University) presented the paper "*Chiefdom and State: Exactly How Do They Differ?*" Despite that scientific literature which gives the impression that some early states and advanced chiefdoms could merge, the authors provide analytical tools, allowing researchers to distinguish chiefdoms from territorial and city states. A novel approach, María Mercedes Matás (Universidad de Murcia) and Gonzalo Linares Matás (Oxford University) presented the paper "*Transformative Intelligence for a New Communicative Education.*" They emphasized that a new education direction should be contextualized in "an integrative perspective of concepts and feelings of resemblance and mutual survival, respecting the differences". Under an educative program of this nature, individuals will be able to find adequate solutions preventing the rise of conflict; that is, instead of seeking a solution for human conflicts, through a proper education, conflicts can be prevented. In this conference a broad time and space spectrum was discussed. It promoted



Figure 2: *Assistants to the WESIPS Conference, in the Andalusian patio of the Centre for Cross-Cultural Study, Seville. Courtesy of Dr. Richard Chacon.*

a stimulating dialogue amongst the conference participants, focused on how humans appropriate, manage and modify the environment, as well as how humans construct social relations of conflict and violence directed towards other human and non-human populations and landscapes. In this sense, the manifestations of violence are not confined to mankind but also in-

clude animals and the environment. The broad temporalities that were addressed during the conference made possible a debate on the various factors that regulate and promote the exercise of power and war. It is clear that we need to encourage more events like this to exchange diverse points of view and to discuss the concepts of war, conflict and violence, all together. Fortunately, Richard and Yamilette have launched a new call to participate at the [2017 WE-SIPS Conference](#), which will again be held in the wonderful city of Seville, Spain. As in the first edition, this call is also opened to students interested in sharing their knowledge on these topics. We are sure that new proposals and discussions will help contribute to the field of warfare and environment, social inequality, and peace studies.

Part III

INTERVIEWS



Brian Fagan, Ph.D. *Professor Emeritus*
at the University of California, Santa Barbara

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This interview was conducted over late May, early June 2015 via email between Dr Fagan and the author for the *International Journal of Student Research in Archaeology*. –
C. Colwell-Pasch



Figure 1: *Professor Emeritus Brian M. Fagan with a canine pal. Dr Fagan is an avid animal lover who has three cats and up to 24 rabbits at his home (Photo courtesy of Brian M. Fagan).*

IJSRA (International Journal of Student Research in Archaeology) *Thank you Dr Fagan for allowing IJSRA to interview you for the inaugural issue of our Journal. Your contributions to archaeology are numerous and especially significant for students who are first introduced to archaeology through your foundational texts like ‘Archaeology: A Brief Introduction’ (1978), now in its 10th edition.*

How did you end up studying archaeology at Cambridge?

BMF (Dr. Brian M Fagan) I became interested in archaeology at Cambridge University, having elected to study the subject on the recommendation of my tutor. My first instructor was the Stone Age archaeologist, Miles Burkitt, and I got hooked by his story telling. So I stayed on with archaeology for Part II of the degree and specialized in Stone Age archaeology under Charles McBurney.

IJSRA *Was it a childhood dream or did you happen to “fall into it” as they say?*

BMF I had no intention of becoming an archaeologist, but met J. Desmond Clark, the Africanist, by chance, and ended up joining the Rhodes-Livingstone Museum in then Northern Rhodesia as Keeper of Prehistory. He was the Director. My mandate was to study the Iron Age cultures of the territory, 100 miles long and 1,000 wide, which is the history and archaeology of the modern African inhabitants. This got me in on the ground floor of multidisciplinary African history.

IJSRA *What do archaeology students today have to face that is different from your generation?*

BMF When I entered the field, archaeology was expanding, especially in the US and overseas. We were encouraged to work abroad by Grahame Clark, the Professor of the day at Cambridge. Few of us had PhDs, but sometimes acquired them in later years, as I did. Archaeology really was a village in those days and one tended to have met most people. There were plenty of jobs, especially if you were prepared to leave Britain, mainly in what was then the British Empire. Today, we’re paying the price of too rapid expansion, gross-overproduction of PhDs, and training that is ever more specialized and high-tech. That makes it hard for many people to launch careers, especially when many folk are retiring later.

IJSRA *You mentioned on your website that you had almost given up archaeology in 1966 before changing roles from specialist to generalist. What roles do specialisations have in archaeology today, and if a student wanted to specialise in something specific what would your advice be?*

BMF We live in a world of specialisations, and the problem is not facing archaeology alone. One factor is the “publish or perish” syndrome, another the overproduction of PhD students, many of whom follow in their already specialised mentor’s footsteps. To be employable in most of higher education today, you have to be; (a) possessing of a broad general knowledge of archaeology to teach internationally minded students, (b) able to teach well at the undergraduate level, and (c) have a strong multidisciplinary perspective. If you are going to specialise, go into something with an ingrained multidisciplinary perspective, be prepared to be part of a research team, and try and acquire an expertise in something that has a relevance to today’s world. Cultural resource

management and heritage are still expanding areas, especially the latter and cultural tourism. Be aware that you cannot become a credible generalist without having some fieldwork and some specialized archaeology; also to have published it.

IJSRA You were the “Keeper of Prehistory” at the Livingstone Museum in Zambia, Central Africa in the 1960’s. Do you feel colonialism played or plays a role (good or bad) in fostering archaeological research and influencing archaeological interpretation in less developed regions?

BMF No question that “colonialism” played a role in fostering archaeological research. Apart from early human evolution, a main thrust while I was in Africa was developing multidisciplinary history in which archaeology played a major role. Our research went straight into school and university curricula. There was nothing else. Colonial administrators did much to foster museums and monuments protection. They were, on the whole, a benign influence culturally, except in post-independence Rhodesia and South Africa. The controversies over ‘Great Zimbabwe’ are a classic example of colonial interference.

IJSRA What is the motivation and impact of post-colonial theory in archaeological research and interpretation?

BMF I do not know how to answer this question, as I no longer work in Africa. My impression of the field is that it has moved well ahead of that. Sorry. Not my expertise. But they are still writing history, much of the emphasis being local, I think.

IJSRA What can we learn from the historic background of the development of the discipline?

BMF Any discipline is a product of its history, and archaeology is no exception. We learn a great deal from the mistakes and challenges faced by our predecessors, who were poorly funded, and very thin on the ground. It’s remarkable what they achieved and we have much to learn from them, so we don’t reinvent the wheel.

IJSRA You were appointed to the University of California – Santa Barbara in 1967. How are approaches in archaeological research, teaching, and funding different in the US compared to the UK?

BMF Undergraduate education in the US is on an enormous scale with many anthropology classes with over 1,000 students. The largest introductory archaeology classes were, in my day, about 300, which was bad enough. There is a huge emphasis on testing and grading, which is mindless nonsense, and in my view, counterproductive. I think the UK system with its essays and annual exams is much better, for it forces students to take responsibility for their work and to think. The total obsession in academic archaeology these days is ‘publish or perish’, with there being intense competition for permanent jobs. Many instructors are now on short-term contracts as a way of saving money, which is a dreadful way to build a career, and are underpaid. At major research universities, there is a great preoccupation with fund raising and money and you get rewarded for the grants you obtain. Not a healthy way to advance knowledge.

IJSRA *How do you feel the social engagement with archaeology of the British population differs in comparison to the US, and indeed on a more global scale?*

BMF I would say that the US population as a whole is little engaged in archaeology. It being generally the archaeology of “them” (Native Americans), rather than “us”. There is, of course, stronger interest in historical archaeology, the period after 1492. Archaeology is much more embedded in the UK mind, largely because of TV, most recently ‘Time Team’. Globally, the interest varies wildly. Oddly enough, the Germans are very interested in Native Americans. Scandinavia is seriously engaged with the remote past.

IJSRA *You have worked as a consultant with various organisations throughout your career, like National Geographic. What are the opportunities/limitations for engaging with non-archaeological organisations?*

BMF Opportunities to engage with non-archaeological organizations depend entirely on individual initiative. There’s an open demand for lectures from local organizations of all kinds. Major keynotes and other platforms are few and far between. Generally non-archaeological organizations recruit people who have written general books of broad interest. I would say that about 50% of my lecturing is for non-archaeological audiences, which appears to be unusually high. A word to the wise: It’s fatal to assume that everyone is interested in archaeology. They aren’t.

IJSRA *You were awarded the Society of Professional Archaeologists’ ‘Distinguished Service Award’ in 1996 for your “untiring efforts to bring archaeology in front of the public.” How important is public/community engagement within archaeology?*

BMF Engagement with the public is all-important in an era of unprecedented destruction of archaeological sites worldwide. And it’s a time when funding shortfalls are making people, especially politicians, think about priorities. How does archaeology rank against such issues as social safety nets, environment, poverty, and national defence, as well as restoring infrastructure? We definitely have a perception problem; many people still think archaeology is a self-indulgent activity. And in some cases, I’m afraid they’re right. We cannot afford to be an ivory-tower discipline divorced from the real world. This is one of the great challenges for future generations of archaeologists.

IJSRA *Also in 1996 you received a ‘Presidential Citation Award’ from the Society for American Archaeology (SAA) for your work in textbook, general writing and media activities. What is the role of publishing archaeological research, and what is the point of publishing “for the public”, rather than (or in addition to) a specialised, academic audience?*

BMF It’s important to make sure that archaeology reaches as broad an audience as possible if it is to survive in the future. As part of this effort, publishing books and articles for a general audiences is all-important, something that is getting harder and harder in a world saturated with books (often junk ones) and other, including electronic, media. It’s very important that we publish first rate material for general audiences and that we tell good stories based on solid science that are compelling, relevant, and entertaining.

IJSRA *You mentioned we cannot be an “ivory tower discipline.” Do you believe there is still an “ivory tower” separating the public from archaeological research?*

BMF Yes, although it's more permeable. To put it grossly simplistically, the priorities of much of academia are raising money and publication and increasingly specialized research—very pervasive values in today's research universities. And these priorities are not only wrong, they are inappropriate for a discipline like archaeology, which, as Barry Cunliffe once somewhat aptly remarked, "is really a series of unperformed theatrical performances".

IJSRA *Should students get involved in the publication and the dissemination of archaeological knowledge, or are top academics better positioned for doing this kind of work?*

BMF Yes, they should be, for the earlier you start the longer and better your experience, especially in the areas of writing for general audiences and fluent public speaking. As I said before, it is hard, if not impossible, to do this without solid first-hand archaeological experience. It is definitely not something for only senior folk to undertake. Quite the contrary.

IJSRA *Many of your recent books, like 'The Long Summer' (2004) and 'Elixir: A History of Water and Humankind' (2011) have a focus on climate change and sea level rise. How do you feel archaeology plays a role in understanding these phenomena and why should future archaeologists understand these contemporary issues?*

BMF Climate change, sustainability, water, whatever... it's vital that archaeology concern itself with today's world. There are many perceptions and ideas from the past that have relevance today. Of course, to say that we are destined to repeat the mistakes of history is an oversimplification, for the world has changed so drastically in recent decades. But we have a huge amount to tell today's world about cultural and biological diversity, and about the nature of being human.

IJSRA *IJSRA is a student run and student research focused international peer-reviewed journal. Do you believe that students can contribute to international dialogues and perspectives on archaeology with a value equal to those with higher degrees?*

BMF I think it's very important that students, as the future generation, contribute to the international dialogue. This is how something like archaeology retains its vitality. Without new ideas, fresh faces, and innovative perspectives, we are nothing.

IJSRA *Do you have any advice or wisdom you would like to impart on those who are choosing to enter archaeology as a career, either professionally or in academia?*

BMF Be multidisciplinary, work in areas unexplored by others, and don't consider archaeology as a career unless you have a passion for it, fire in your belly if you will. It's not for everyone. And if, after a few years, you find you aren't happy, get out while the going's good. I know a large number of middle-aged (and older) archaeologists who have regrets. On another note, there are hundreds of archaeologists who spend their entire careers studying deliciously obscure, high specialised topics and publishing their work for fewer than half a dozen people. This is fine, but it's a form of scholarship in archaeology that may be endangered by budget cuts. Now there's a provocative statement to end with!

Brian Fagan is a prolific author of popular and generalist archaeology books and Professor Emeritus at the University of California, Santa Barbara where he served as Professor of Anthropology from 1967 to 2003. Dr Fagan trained in archaeology and anthropology at Pembroke College, Cambridge, in his native England (BA - Honours 1959, MA 1962, PhD 1964). After spending six years as 'Keeper of Prehistory' at the Livingstone Museum in Zambia, Central Africa, he moved to the United States of America in 1966 and decided to completely change the focus of his career. Dr Fagan was a specialist in African Iron Age archaeology, but decided to switch his concentration to communicating archaeology. His talent for simple and effective communication of complex topics has led Dr Fagan to write and edit 46 books, including seven popular undergraduate texts that are many archaeologists' introduction to the field. He has also published over 100 specialist and generalist peer-reviewed papers.

—D



Rosemary Joyce, Ph.D.

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Throughout my time as a university level student, I have had the opportunity to learn from some very successful Maya scholars with years of field and research experience. So I understand how crucial and formative those years are for beginning university students in developing as independent thinkers, writers and field archaeologists. When I was asked to conduct an interview with my advisor and mentor, Dr. Rosemary Joyce, I was more than happy to do so. She is a passionate educator and influential anthropologist that I believe is a great person to include in the first issue of the *International Journal of Student Research in Archaeology*.

—L.M. Johnson

IJSRA (International Journal of Student Research in Archaeology) *You have often been an advocate for undergraduate research and writing, enabled through very specific learning settings and curriculum structure. Can you briefly discuss your philosophy of teaching, learning and practice?*

RAJ (Dr. Rosemary A Joyce) I begin with the proposition that learning happens by engaging directly in the closest way possible to professional practice. This draws on the writing of anthropologist Jean Lave, whose concept of "Legitimate Peripheral Participation" says that we learn when what we do is legitimate, not a made up exercise, as long as what we are asked to do is something we can successfully do with the skills we have at our stage of practice. The example in her collaborative book (with sociologist Etienne Wenger) *Situated Learning* of tailors in west Africa stuck with me: she noted that novices are given jobs like finishing buttonholes, which is reversible (if they do it wrong) and won't wreck the piece of clothing. Only after you gain greater skill do you get to cut the cloth into pieces.

So what's the equivalent in teaching? Right away, I realized that the conventional term paper—write 25 pages at the end of a semester—is not what Lave and Wenger are promoting. Instead, in each course, I ask, what do beginning scholars do to gain skills? So an early assignment may be a book review; or writing an annotated entry



Figure 1: *Rosemary Joyce, Ph.D., Professor of Anthropology at the University of California, Berkeley*

for a bibliography; or working in a group to develop a grant proposal. In my museum exhibit design course, for example, instead of having the class develop and install an exhibit in one semester—something that isn’t true to museum practice—we spend the semester identifying the audience for an exhibit, developing themes, writing sample texts, doing layouts—and assemble those things in a draft following the guidelines of the NEH.

What goes along with this actively engaged approach to learning is that each student is responsible for learning. I have no way to pour coins of knowledge into someone’s head—the discredited but still all too alive banking model. Learners create their own knowledge. So in large lecture courses, I try to set things up so that students discuss readings and reach their own understandings before I tell them my opinions about the topic. This means my lectures follow from what students raise as questions and concerns. Every time I teach a course, my lectures are different, because each group of students starts at its own point, and develops at its own pace. I have had to move to defining semester-long goals and sets of concepts I want to be sure to cover—and to be prepared to talk about those when the students want, not when I would prefer.

IJSRA *You have been engaging with fieldwork in Honduras since 1977. What kind of research are you carrying out, and what opportunities and challenges are still present for students interested in Mesoamerican archaeology?*

RAJ In 2009, there was a coup in Honduras. Since then, I have not returned to fieldwork there; instead, I returned to my original love, museum work, and have now travelled

to museums throughout Europe and the US to record older museum collections from Honduras and begin to do what we keep saying we as a discipline need to do: excavate the museums. This has led to my series of projects about materiality, how things created social relations, drawing from study of museum collections and pulling together data from field projects.

I have encouraged students to consider when already existing collections may be the right thing for them to use to address a specific question: after all, we are a problem-oriented discipline, and where our data lie follows from the questions we ask. I have had recent PhD students I co-advised (our normal model at Berkeley) who studied human remains from colonial Mexico City, and the metal objects from the Cenote of Sacrifice at Chichén Itzá.

Still, many of my grad students do conduct original excavations as part of their dissertation projects. Since 2010, I have been lucky to have a great collaboration with a leading Mexican Maya specialist, Rodrigo Stuardo Liendo, a senior researcher from *Universidad Nacional Autónoma de México* (UNAM), who spent a year at Berkeley on sabbatical a while back, and so current and former students of mine are engaged in household archaeology, the study of ritual, and archaeologies of practice and materiality in Chiapas.

What I see as a major challenge for students starting out in Mesoamerican archaeology is simply that it is no longer feasible to conduct as much fieldwork as people in my generation were able to do for a dissertation. I spent about 20 months total in the field working on my dissertation. That was possible in part because it was relatively inexpensive to work in Honduras, and partly because many of the methods in general use now were not even developed then, or were only done by specialists. Today, the goal is quality of data, employing a range of analyses to tease out more information, even from the sediments (through micromorphology, for example), rather than quantity, which was key to research questions in the 1970's that aimed to generalize about life in specific sites from a dissertation research project. So archaeology today requires a different kind of research question. But we haven't switched gears quite quickly enough: I often read proposals for dissertation research that propose to make broad interpretations from small samples, and that really doesn't work.

IJSRA Considering your academic trajectory (*B.A. Cornell, PhD Illinois-Urbana, Harvard, Berkeley*), does the US system encourage mobility and academic exchange, in contrast with the life-long attachment of academics to their alma maters in other countries? In 1994, you joined the Anthropology Department at Berkeley from Harvard. What attracted you the most about UC Berkeley?

RAJ Mobility is relative: the US has such a large number of universities, especially state universities, that it can look like people are flowing all around. But since moving to California, I have been struck by how this apparent circulation conceals some circuits. We know from research done at Berkeley that the majority of Berkeley PhDs across all fields who pursue academic careers stay on the west coast, the vast majority, in California itself. I don't think my own trajectory is a model; it is more testimony to the role of accident in the absence of knowledge about how academia works. I am a first gen-

eration college graduate (neither of my parents graduated from college). My working class family had no tradition of postgraduate education for me to draw on; although one of my brothers has an MFA and is also a college professor, I was the only PhD in my immediate family at the time that I received the degree. So at each step, I kind of fell into where I went. Cornell was recommended to me by a doctoral candidate who was employed in education programs at the Buffalo Museum of Science, where I worked as a volunteer; she had gone to ASU and regretted not trying to get into an Ivy League school. But Cornell was a bad choice for me at the time, since my original goal was to do historical archaeology of the 19th century US– preferably New York State. Mesoamerica was an accident due to a field school opportunity (actually, of course, I went to the Naco Valley in Honduras, which is not core Mesoamerica). When it came time to apply to grad schools, my approach was pretty unsystematic. I asked one grad student on the Naco project where I could go to study Honduran archaeology, having fallen deeply in love with the country, and was told the only person doing a Honduras PhD was at the University of Illinois. I applied there (and a random assortment of places whose names I knew– Michigan, Chicago, SUNY Albany...). The professor who became my advisor, Dave Grove, made coming to UIUC compelling because he wrote to me personally and explained what I could do there with my career goal– which was museum work. But it wasn’t like he was a specialist in Honduran archaeology.

The job search, of course, was primarily about where the jobs were. I like to tell the story of one of my brothers trying to wrap his head around the idea that I was turned down by University of Wisconsin Lacrosse then hired by Harvard... of course, that was as a museum curator.

Coming to Berkeley was the first completely intentional move in the trajectory. Harvard at the time did not routinely promote to tenure; I was an untenured Associate Professor, and I really wanted to return to the Chicago area, but the only job open was untenured Assistant Professor. Before that job decided who to interview, Berkeley made me the offer– and what it offered was a chance to follow up on my work at Harvard’s Peabody Museum with directing another of the great anthropology museums in the US.

IJSRA *You are a former curator of the Peabody Museum, Harvard and a former Director of the Hearst Museum of Anthropology, Berkeley. Are Museums effective institutions for the transmission of knowledge and information to anthropology and archaeology students and visitors? What roles should they fulfil? How should they adapt to the new requirements of the 21st century?*

RAJ Museums are certainly effective– but they may be effective at creating knowledge that scholars don’t want to advance. If you have never worked in a museum, it is easy to think they are traditional and not forward looking. Museum anthropologists actually have been concerned with how to promote engagement, active learning, and how to persuade visitors to reconsider their taken for granteds for a long time– my entire career, certainly. But the challenge is, museums are settings to which visitors bring their own expectations, their already existing ideas about what is true, and ethnographic

research shows they find the parts of museum representations that resonate with their existing knowledge. Museums are nonlinear, so they have the same challenge as the internet— you cannot ensure that someone reads an introduction before plunging into things. So the process of setting up background knowledge can be daunting. But museums are amazing for the same reason: visitors can literally create unexpected concepts not previously considered. What we need to do is build on what we understand about how people create knowledge in fragments. One practice of some museums that is really useful, and should be universal, is having texts signed by their authors. That is a very modest step toward alerting a visitor that what they are being told is not universal timeless truth, but a representation, an interpretation. If you can then introduce the authors as part of the exhibit, and have multiple authors from different perspectives— you can open up the idea of museum as laboratory. At the Hearst Museum, my absolute favorite exhibition project was the first one that was developed after I became director: The Carver's Art of the Indians of Northern California. It did all of these things. It also blurred the line between fine art and artifact (including works by modern California Indian artists, one of whom was a co-curator of the exhibit). And it took all the formats possible: a movie, a book, the exhibition, and live programming.

IJSRA *In 2001 you contributed to the establishment of the Journal of Social Archaeology. What was the collective motivation behind this new Journal? How would you define “Social Archaeology” and what is the value of researching issues such as gender, household organisation, bodily practices and inter-personal relationships in the past? Why is it important to publish research results, and what role can students play in this process?*

RAJ Lynn Meskell, the editor in chief, and Bob Preucel, who had been my colleague at Harvard, invited me to be part of the initial editorial panel for the journal. I was enthusiastic, because as I said to them, we needed a place where our students could publish the kinds of cross-disciplinary work that engaged with social theory that we were fostering. At the time, that kind of work could make publishing in journals an uphill battle. I was also enthusiastic about the aim of being international, especially of reaching out to areas, like Latin America, where scholars were doing great work that mainstream English language archaeologists did not always read or cite.

The hardest thing we had to do was craft an editorial statement that clarified what we meant by “social archaeology”. If we were writing it today of course, it would be a different statement. But what we wanted to emphasize was centering attention on “the social”, which I think of in contrast to the cultural emphasis that remains, even in very processual Americanist work, a dominant strand. To ask questions about how people make histories, how histories make societies, how things make people, all at once: that for me is essentially to address the social.

It is urgent that all the aspects of social life in the past that can be approached— which I think is everything, I do not privilege some aspects of social life— be dealt with. This is a political urgency: so much bad policy in the present world is justified by claiming that there is some natural, or even just long enduring, human way of doing things, archaeologists really need to be vigilant in breaking up that kind of argument. We

know that the past is full of alternatives. We need to be sure others don't get away with suggesting any kind of hierarchy, subordination, violence is somehow inevitable. Publishing research results is a funny topic. First, we need to acknowledge that most archaeological writing reaches tiny audiences. (So does most of any academic discipline, so I am not being harsh about archaeology.) Second, there is a tendency to treat "research results" as little nuggets of information. We need to step back and take a long-overdue look at this topic. First, it is a shame of our discipline— and I am as guilty as any other active archaeologist— that we record excavations and excavated material years before we normally produce writing about those records. We could use a return in some ways to a very old form of antiquarian writing, in which descriptive texts (about objects, maps of sites, descriptions of excavations), short narratives, were quickly presented and circulated. The internet means we can do this now and reach millions of people. I recently began a blog called *Real Honduran Archaeology* where participants can just post short reflections— including short posts that point out material regularities— without the heavy burden of MAKING A BIG POINT. If we did more of that quick offering of preliminary ideas, we could overcome our disciplinary lag time. But of course, publication has become capital, and only certain kinds of capital count. Also: publishing preliminary ideas means other people may criticize you. And frankly, we have a nasty disciplinary culture that would inhibit most people from taking the risk of saying, "hey, look at these neat data I think might be telling us this...". Too much credit goes to people for the gotcha remark, or even the personal attack.

I actually think if we could publish descriptions of data more quickly, more informally, with more graceful reception, we would see a huge increase in understanding, because others might recognize connections based on their own experience and knowledge. We could create a network of knowledge production— which is what I see when I read the 19th century reports that people presented on the antiquities I have been recording in museums. And then, we could each spend the time it takes to mull over the broader implications of our work, we could craft our writing to be beautiful prose that non-archaeologists would read.

So if I could, I would urge students beginning their careers to be generous scholars, to adopt the first person pronoun and hang on to it against all attempts to make you give it up, and to consider developing in parallel works that seek to present observations about archaeological phenomena quickly, and others that seek to intervene in broader public understanding fueled by the expertise that writing about phenomena can develop.

IJSRA In 2002 you published *The Languages of Archaeology*, a book where you analysed the creation of representations of the past by archaeologists. What is the ethical responsibility of archaeological interpretation, and what impact do these creations have in local communities?

RAJ In that book, I argued that archaeologists have a responsibility because even where there are descendant communities, whatever we say based on specific materials we study is a representation that the people represented cannot contest. Their descendants may speak up on their behalf, but we shouldn't be creating that burden. So, as

I said there and elsewhere, archaeologists need to acknowledge that history matters, it is political, and we make choices about what aspects of other people's lives we want to foreground. We can sensationalize past societies; we can portray them as failed, as violent, as disappeared; and because of our disciplinary standing, we can do a great deal of damage to the humanity of other people with no (or little) accountability.

This responsibility, for me, is separate from the responsibilities we have to local communities, which we also need to be mindful about. Here, I have a cautious attitude, because sometimes, archaeologists seem to think that we have some special insight to offer, if only the stupid locals understood. To be blunt, we lack humility. So what I think is a useful approach is to seek out the places where archaeological sites are under threat; to labor to create records of those places; and to engage with anyone who expresses an interest in what those places could tell about the past. That may mean—as it did through most of my years in Honduras—doing the equivalent of CRM, and finding a way to mold your research orientation to mitigate loss of knowledge during construction. It may mean offering to talk to local groups, but accepting when they don't want you to do so. It means being ready to explain what you are doing and to listen to what people think you should do—and explain why you cannot if you cannot. Not rocket science, but still not universal: many many archaeological sites are thought of as free from these responsibilities because there are no certified descendant communities, even though there are people living all around.

IJSRA *An international collaboration between top academics from world-leading universities allowed the publication of the Oxford Handbook of Archaeology (2009), of which you are co-editor. What are for you the positive aspects that such multinational enterprises entail and the issues they encounter?*

RAJ In 2015, everything is multinational, so it is hard to remember. The biggest goal of opening up debate in archaeology to a global scope (as for example in the JSA, or the series of books that Lynn Meskell and I started for Blackwell) is to mix together people who understand the goals of archaeology very differently: as culture history, as an adjunct to textual history, as cultural heritage, as a branch of social science; and see if it is possible to listen past differences.

IJSRA *You were appointed in 2011 to the Federal Cultural Property Advisory Committee, advising the State Department of the US on its responses to foreign nations requesting protection of their cultural heritage from looting and antiquities trafficking. How do you think Western countries should deal with issues such as the destruction of national collections and of internationally-recognised and protected sites in the context of armed conflict?*

RAJ I am happy to serve on the Advisory Committee because it is the means that the US uses to fulfil its obligations to other nations under the UNESCO Convention. But I serve with a real sense of the ambiguity inherent in reinforcing the idea that material remains of the human past should be valued primarily because they are important to national governments. Nationalist strategies draw on materials to put forward a preferred idea of the past that has little to do, in most cases, with the interests and experiences of most people. Indeed, the development of cultural properties for tourism

can provide rationales to dislocate and deprive people in the pursuit of a very abstract national identity. This directly underpins the propaganda value that leads to deliberate destruction of material traces of the past, whether in times of armed conflict or as part of development. I wish as archaeologists there were a place for us to stand as critics of the mobilization of things by nations, that would also allow us to decry the pain caused to local people when something they value is destroyed— I think here of tombs of saints, churches, sacred places valued by indigenous people and endangered by mining. National collections and officially recognized sites are very distant from most people's lives. I am not saying I celebrate such destruction— there is a legitimate loss to those who love the abstract global past, as all archaeologists do. But even as I support the mobilizations that seek to train US military in how to recognize and protect sites, and the efforts to put in place emergency import restrictions so blood antiquities cannot be trafficked as easily, I think we show a great failure of perspective to worry about these things when so many people have been killed, wounded, and displaced. How would I like to solve this? Stop the wars. Stop strategic invasions. Stop drone strikes. Stop the international traffic in arms. What could we as citizens in "western countries" do? Find a place that is not in flames and help local historians scan photographs. Record gravestones near a community that has no written history before they are lost forever. Spend less of our time pursuing big history, and more writing the textured histories of the local, the everyday, and everyone.

IJSRA You are the author of a popular blog *What Makes Us Human* and you manage an active account on social media, such as Twitter (@rajoyceUCB). What kind of opportunities and challenges does the Internet present for the divulgation of anthropology?

RAJ I also blog about archaeology at three other places: my own *Ancient Bodies, Ancient Lives*; the collaborative *Real Honduran Archaeology*; and as part of the *Berkeley Blog*, so clearly, I think social media are critical. I actually think we could use social media to renew our discipline. A post I publish on one of these platforms can gain thousands of readers quickly— not true of a journal article or book. That's the opportunity: to be engaged with wider worlds. The challenges are equally clear: first, we need to relearn how to write for people who are not in the academy or the discipline; second, we need to be prepared to fight for our views— no one commenting on a blog post really cares that I have a PhD and am a professor at Berkeley if they disagree with me; and third, we need to escape the narratives about archaeology that are waiting to trap us. People know that archaeology is about origins, about discoveries, about treasures, and these are all images that archaeology as a discipline has said we need to erase, and replace. But how do you do that and be interesting as well? I find humor works; so does honest but mild anger (irritation, really). Let people know you care. Tell them why. But mainly, use the same insight I mentioned in writing above about museums: people care about what resonates. Think about how to make something very different seem potentially intelligible to someone unfamiliar with our ideas and methods. Explain our methods! Use everyday language. Use the first person. Write as if archaeology matters in the modern world.

IJSRA A 2013 blog entry discusses the importance of funding archaeology. What can archaeological research offer to broader academic debates and how can it contribute to our

understanding of the present socio-political reality, in order to remain relevant not only for academic audiences or funding institutions, but also to the wider tax-paying public?

R AJ That blog post made an argument that we should not try to bend over backwards to meet the "relevance" criterion, at least as normally envisaged. In that model, we should show how our research helps explain things today. There are places that work—for example, studies of how people living in arid environments coped and cope today can make very direct comparisons, and historical archaeologists illuminating the emergence of racism in the US are able to make visible invisible histories that continue to create contemporary conflict and misunderstanding—but usually, we contort ourselves to be "relevant". I am not able to argue with a straight face that understanding ancient Maya warfare will help us prevent our modern global conflicts. But I can argue that understanding ancient Maya warfare helps us learn how to ask good questions about social life. I actually think the "wider tax-paying public" is more interested in what we have to offer about being human than the logic of relevance, with its implicit utilitarianism, suggests. I would use the example of talking about gender diversity in the past as a good example: finding instances of same-sex relations doesn't really tell us how to arrange same-sex relationships today. It doesn't compel us to accept marriage equality, nor would the absence of such relationships in the past justify not recognizing them today. But showing that human beings have a diverse history of social arrangements for love, sexuality, reproduction, and economic support is a really good way to show that there is no single way of being human that is more legitimate, universal, or "natural".

Archaeologists are in a great position to talk to the public and other disciplines about human variety, flexibility, the plasticity of human behavior, about resilience, about consequences for human abuse of the world. We can show that human societies can fail to meet challenges, because we can show that they have before. And we can show that when human societies fail, it is often because they ignore the evidence before them in order to conserve "traditions" that benefit a few powerful and wealthy individuals. If you want to think of that as relevance, well, OK. But I am not saying we have ever faced the kind of challenge that global warming presents us: I am in fact saying that we have not done so: but we know from other instances in our history that we can kill ourselves through insistence that doing the same thing will work.

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