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REPORT SERIES



Archiving Archaeological Materials

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FOREWORD

Archiving Archaeological Materials is an interesting and useful addition to our Archaeological Report Series. As archaeologists, we are often oriented towards answering research questions. We uncover material culture and create data that addresses those questions.

However, as ethical as we [archaeologists] want to perceive ourselves, we are sometimes forgetful if not neglectful of subsequent fields of study and responsibility: conservation, curation, or even museum displays for aesthetic appreciation, cultural preservation, education, and so forth. Archaeologists are but one step in a chain of responsibility. Each step needs to consider the next. Archaeological assemblages, features, and artefacts are non-renewable. It is our responsibility to maximize the preservation of potential value for future generations. The ensuing papers serve as a reminder of these responsibilities.

This publication is, in a sense, Singaporean and United Kingdom–centric. However, there are valuable lessons that apply globally. We hope readers will appreciate the problems and solutions. It is in our greatest interest to move beyond the adventurous “**Indiana Jones**” mindset of high-value object recovery, to that of responsibility for assemblages – to not only include artefacts, but soil samples, ecological settings, context, local community sentiments, researcher notes, etc. Archaeologists are stewards of cultural heritage. The following articles convey only a fraction of that responsibility. It is our desire that these issues will continue to be addressed, debated and garner further attention. We hope that these concerns will resonate from the individual level to supporting government and international organisations.

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Archiving Archaeological Materials

ABSTRACT

ISEAS - Yusof Ishak Institute and the National Heritage Board Singapore conducted a workshop on *Archiving Archaeological Materials* in 2014. Heritage practitioners and archaeology specialists from the United Kingdom and Singapore were invited to discuss the need to develop an archaeological archive. Related issues in handling archaeological remains were also discussed. Archaeological remains are non-renewable heritage assets. They need to be removed, processed, catalogued, stored, and archived properly for future generations of researchers, educators, the public, and many other global stakeholders. The papers in this volume compile a range of perspectives, approaches, and possible solutions.

Keywords: Archaeology, archaeological archives, archaeological materials, custodianship, heritage, preservation, policy, post-excavation, Singapore, storage.

WORKSHOP SYNOPSIS

The uncovering of a country's past through archaeological investigations often results in vast quantities of artefacts and other materials. Prior to the excavation, it is not possible to project the yield of a site, and archaeologists throughout the world are frequently faced with the challenge and dilemma of what objects to collect during the excavations, copiously aware that their actions will determine the future archival record.

Singapore is no exception and archaeologists working in the city-state face the surmounting challenges of seeking sufficient resources to address processing and analysing the backlog of artefacts, and creating an accessible platform for other researchers and the lay public to the collection. They are essentially confronting what becomes of the materials in the post-excavation phase, and how relevant and accessible the archaeological collection is to the historical narrative of Singapore.

For the last three decades, archaeologists have **been quietly excavating the island's past**, but because there was previously little attention on the ownership of recovered artefacts, archaeologists are ethically charged to be the custodians of the finds and continue to exercise this stewardship. Over the years, several museums in Singapore and the National Heritage Board have accessioned archaeological finds as part of the National Collection. These were generally selective in nature, pertaining to exhibition in museum galleries.

Notwithstanding that the **artefact collection forms part of Singapore's national identity** and historical conscience, all archaeological materials should be available for future re-interpretation and re-examination. It is crucial to ensure that post-excavation and archiving processes are comprehensively created and coherently curated to enable them to be safeguarded and usable in the future. This workshop on Archiving Archaeological Materials addresses surrounding and rising issues on the processes and curation of the excavated materials.

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1: INTRODUCTION - ARCHIVING ARCHAEOLOGICAL MATERIALS: WHOSE RESPONSIBILITY?

BY LIM CHEN SIAN

ISEAS - Yusof Ishak Institute and the National Heritage Board Singapore organised a workshop on Archiving Archaeological Materials at the National Museum of Singapore on 25 November 2014. The workshop brought together Singaporean archaeologists and government heritage practitioners interested in the curation, storage, future, and fate of artefacts recovered from excavations in Singapore. The event was a timely discussion on the role of archaeological materials, their immediate custodianship, and long-term responsibilities for their ownership and care. The presentations and discussions centred on issues of 'whose responsibility', specifically addressing the custody of the finds, and touched on the general apathy or disinterest from organisations and agencies in the country. However, the archaeological participants were quick to point out that disinterest did not stem from any malicious disregard or prejudices, but typically from the lack of awareness of archaeology as a discipline, its roles, and the limited resources available.

Currently, in Singapore, there are two principal collections of archaeological materials. They form the bulk of the excavated finds accumulated over the last three decades and are held separately at the National University of Singapore and ISEAS – Yusof Ishak Institute by independent groups of archaeologists. While deposited in these institutions, their actual ownership in the strictest legal sense is rather unclear. They were assemblages accumulated and brought along by the archaeologists when they joined the organisations. The two institutions do not hold any actual legal title over them. Elsewhere, smaller collections remain with the National Parks Board Singapore at Fort Canning Park and the Botanic Gardens Singapore, the National Museum of Singapore, the Asian Civilisations Museum, the Indian Heritage Centre, the Malay Heritage Centre, and other organisations such as Sentosa Development Corporation and the Battlebox operated by Singapore History Consultants. These are typically smaller quantities of materials that are employed for exhibitions and display.

At present, no state or private institution in Singapore is prepared or ready to function as a centralised archaeological archive for the storage of hundreds of thousands and potentially millions of archaeological remains, because they do not have dedicated long-term storage facilities for the material. More crucially they do not have archaeologically trained personnel on staff to process, identify, and catalogue these finds, much less to conduct follow-up research on the artefacts from the collection. Aside from the absence of qualified professional staff, the archaeological assemblages are in addition mired by the want of clarity regarding legal ownership of archaeological materials; hence the question posed, *whose responsibility?*

Jack Lee (formerly with the School of Law, Singapore Management University) in his presentation 'A Presence of the Past: The Legal Protection of Singapore's Archaeological Heritage' provides a concise summary of the current legal framework

pertaining to heritage and archaeology in Singapore. Lee purposefully pointed out that existing legislature ‘avoids dealing with the issue of ownership of objects of archaeological or historical interest’ (Lee 2013:278).¹ There is certainly much to ponder about Lee’s conclusion, and it remains an appropriate call for a review of the current legislation to demarcate clear ownership of archaeological materials and other antiquities uncovered in Singapore.

Two case studies from the United Kingdom, particularly England, were brought to the fore about how British archaeological practitioners address issues in managing the archaeological collections within existing English legal and regulatory frameworks. Frank M. Meddens, Director of Pre-Construct Archaeology Ltd, summarises in a succinct manner the archaeological processes currently practised by commercial or **contract archaeology** in ‘*The Archaeological Archive and Post-Excavation Process: From Frustration to Publication and Then What?*’. Meddens remarks on archiving and retention policies adopted by contract archaeology and the depositories receiving the finds from development-led excavations. Duncan H. Brown, Head of Archaeological Archives, Historic England discusses ‘*Frameworks for Managing Archaeological Archives Collections in England*’, where he drew attention to the issues of storage, retention, and discarding of archaeological materials from an institution’s perspective, particularly one serving as an archaeological depository.

In my paper ‘*Beyond the Excavation: Post-Excavation and the Archaeological Archives*’, I attempt to bring to light issues confronting Singapore by detailing the long-drawn processes of post-excavation work, as well as presenting the current state of affairs in the country and the ways in which local archaeologists deal with them. More importantly, the paper emphasises the fact that insufficient resources are being allocated to local archaeology, particularly for post-excavation, and the maintenance and care of the finds.

Historian Derek Heng (previously of Yale-NUS College) echoes my view on developing historical and colonial period archaeology in Singapore (Lim 2006a). Heng’s ‘*Historical Research in Singapore and the Place of Archaeology*’ expounds further and seeks participation by historians in mapping out archaeological research agendas, arguing that both disciplines study a shared past. Things, however, may not be as straightforward, for archaeological methodologies are grounded in both the social and physical sciences, and field techniques and artefact analysis are life-long lessons unique to the discipline.

While a few historians have successfully made the transition to become archaeologists, often it is the archaeologist who manages to bridge the two disciplines. In the last half century, there has been a steady growth of the historical archaeology sub-discipline. Historical archaeology is an archaeology of the more recent past, a past that is text-aided and frequently well-remembered (Orser 2004; Hicks and Beaudry 2006). The call for the use of archaeology to aid historical research, particularly in the

¹ Lee’s paper is not reproduced in this volume and can be found published separately in the *International Journal of Cultural Property*; see Lee (2013).

specialised arena of historical or post-medieval archaeology, remains an untapped potential in Singapore. The opportunities for cross-disciplinary collaborations between historians and archaeologists remain boundless.

Pioneer archaeologist John N. Miksic presents ‘*The Classification of Stoneware Ceramics in Singapore*’ in discussing the ability of the discipline to investigate inanimate objects and to tease out information from these silent witnesses of the past. Miksic saliently points out that the typological studies of this specific ceramic class still remains to be carried out. He last attempted creating a ceramic type series some three decades ago from the Fort Canning dataset (Miksic 1985). Despite being a brief overview about applying archaeological study to a specific class of ceramics, **the paper’s importance lies** in its demonstration of the potential or rather the danger of disregarding what these materials can tell us.

During the workshop, historian and longstanding patron of Singapore archaeology Kwa Chong Guan moderated the sessions and led the closing discussion on the explicit ownership of artefacts. While current legislature is unclear about the ownership of finds, the National Heritage Board, as the state agency for heritage, has in recent years increasingly made clear its position that all archaeological materials uncovered from State Land belong to the state. The speakers from the United Kingdom and I championed ownership of the artefacts by the state through the development of dedicated and responsible agencies as depositories. I advocated that archaeologists are ethically bound to serve as the natural custodians for the materials on behalf of the people and country. That archaeologists have the ethical responsibility to safeguard the materials and ensure that any depositories are well equipped and ready for receipt of the artefacts.

The undeniable conclusion made at the forum is that Singapore is far from any pressing issue of deficiency in storage facility for archaeological finds faced by some counties in the United Kingdom. Instead, Singapore suffers from apathy or a lack of awareness among governing agencies responsible for heritage and safeguarding the past. Often, while sympathetic to archaeological endeavours in Singapore, document archivists and historians advising heritage agencies have made uninformed and misguided calls for discarding archaeological materials on their ill-perceived belief in the lack of storage and archiving facilities. These proponents of discarding the archaeological collection typically cite documentary archival policies of retaining only a select percentage (5–10%) of government files.

It should be emphasised that there is no storage crisis for the archaeological archives in Singapore, but instead, a crisis looms on the horizon due to the lack of attention to, or care for, the materials. What is evident is the misunderstanding among non-archaeologists regarding the needs of the discipline. The bulk of archaeological material remains to be processed and researched. The archaeologists are facing the pressing need of processing a stockpile of **30 years’ worth** of artefacts before embarking on researching the finds. Should these archaeological finds become part of the national collection, it will provide new research material for years to come.

Archaeology in Singapore can learn from the painful instances exemplified in case studies from elsewhere, such as the United Kingdom. With adequate resources, Singapore will be able to establish laws, protocols, and practices in place to ensure that archaeological heritage is preserved for generations to come. The papers presented here in this special issue of the *Nalanda-Sriwijaya Centre Archaeology Unit Archaeology Report Series* hope to serve as a guide to continue steering the discussion on the future of the archaeological collection in Singapore. At the closing of the workshop, Kwa concluded by declaring, ‘the general consensus today by all participants is that archaeological resources, both excavated and unexcavated, belong to the country’. It now remains for the archaeologists and heritage policy makers to follow up on implementing the mechanisms to ensure that this can become a reality.

LCS

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2: THE ARCHAEOLOGICAL ARCHIVE AND POST-EXCAVATION PROCESS: FROM FRUSTRATION TO PUBLICATION AND THEN WHAT?

BY FRANK M. MEDDENS ²

2.1: Introduction

As a case study, this paper will begin with some questions to set out the particular issues concerning archaeological archives in the United Kingdom. Essentially, it tackles the questions—what is an archaeological archive, what are the reasons for its creation, and how is it formed? Why are there standards for its formation, retention, and curation and what should these involve?

Archaeology allows us to address past human behaviour through surviving material remains and their extant environmental contexts. For historical periods, archaeology adds the advantage of having a data source independent from historical biases, whereby archaeological materials can be contrasted with documentary records. For periods where there is no contemporary written material, archaeology constitutes the only method available to us to understand and analyse pertinent past human activities. Therefore, the archaeological archive can be viewed crucially as a depository of our past. These archives consist of not only the artefacts uncovered from excavations, but also the documentary records generated and produced by the archaeologists.

2.2: The Existing Systems and Structures

Before we arrive at the archaeological archive, some background to the existing systems and structures for archaeology needs to be explained. The present legislative context in the United Kingdom, which encompasses heritage conservation and archaeology, developed as one of the outcomes of a series of accidental archaeological discoveries during London's construction and development. These started with the uncovering of the temple of Mithras in 1954, followed by the unearthing of the Rose Theatre and the Huggin Hill Baths sites in 1989. All of these events resulted in popular disquiet, questions being asked in the House of Commons about the value of the preservation of important archaeological sites vis-à-vis modern development, and a degree of embarrassment to the governments of the day.

Following the events of 1989, the Conservative government in power at the time introduced '*Planning Policy Guidance 16: Archaeology and Planning*', more commonly known as PPG16, in November 1990. This was in due course replaced by '*Planning Policy Statement 5: Planning and the Historic Environment*', which at the time of writing represents existing guidance for archaeology in the United Kingdom. This regulatory

² I would like to thank Gary Brown from Pre-Construct Archaeology for encouraging and facilitating participation in the workshop, and Rebecca Haslam for her helpful comments, suggestions, and amendments.

framework is rooted in the planning process where local authorities are responsible for looking after cultural heritage in their respective geographical areas. The principal concept underlying these policies is that archaeological remains are a finite and irreplaceable resource and that their presence should be a cause for consideration in applications for new development to a property. Preservation *in situ* of the archaeological remains is deemed a priority with the alternative being preservation by record through controlled archaeological excavations. Nevertheless, in practice, preservation of archaeological remains *in situ* is the exception rather than the rule. The planning guidance is formulated in a manner similar to that concerning environmental issues with the ‘polluter’ paying to mitigate the impact of the development, albeit in this context for cultural rather than environmental heritage. To do so, archaeologists intervene and excavate to mitigate sites before development commences, thus preserving the site by record through the recovering of materials for the archaeological archives.

Potential stakeholders of the archaeological archive consist of the archive's users, who tend to be students, schools, universities, archaeologists, local history societies, and archaeological practitioners. This community of stakeholders figure significantly in the manner the planning policy is formulated. Policy Statement 5 stipulates, ‘The Government’s overarching aim is that the historic environment and its heritage assets should be conserved and enjoyed for the quality of life they bring to this and future generations’, and ‘local planning authorities should take into account the particular nature of the significance of the heritage asset and the value that it holds for this and future generations’. Clearly, stakeholders are meant to benefit from the necessary development-led archaeological excavations and access to the preserved record in the archaeological archive. However, in practice, opportunities for significant community engagement tends to be rather more limited than the ambitions implied in policy writing.

2.3: Fieldwork and Post-Excavation Processing

In the planning of any development-led archaeological project, the Written Scheme of Investigation (WSI) formulates the planning of the fieldwork, the preliminary research questions, **post-excavation methodology and focus, and its fit with the client’s programme.** The WSI, therefore, constitutes an important element of the archaeological archive. The mainstay of the archaeological archive begins with the on-site work of collecting field data. Field projects comprise of evaluations, watching briefs, strip and map excavations, and large-scale excavations. The strip and map exercise is a hybrid approach which was developed out of attempts aimed at limiting the amount of time spent by the archaeologist on-site **as opposed to a conventional ‘full’ excavation approach.**

The site supervisor, field archaeologists, surveyor, and photographer are the principal contributors to the creation of the site archive. Much of the documentation used and created is in standard pro- forma formats, sizes, and scales. Where complex

urban stratigraphy is concerned, single context recording tends to be used, a methodology that was originally developed by Edward C. Harris and Patrick Ottaway in 1976 following suggestions by Lawrence Keen (Harris 1989:110). This single context method was further elaborated by the Department of Urban Archaeology of the Museum of London in the 1980 s (Westman 1994). Each context is individually numbered, recorded, and any associated finds and samples are cross-referenced by the context number. The three-dimensional relationships between individual contexts or archaeological events, and the chronological sequence are tracked using the Harris Matrix. This comprises a flow type diagram in which the stratigraphic relationship between individually numbered contexts is depicted. The sequence of events as reflected in the Harris Matrix and the dating evidence from the individual contexts forms the basis for the site phasing (Westman 1994:28, 63). Although issues of sequence will remain important on single period (usually rural sites), there are no phasing-related questions with these types of site. Therefore, simpler area excavation-based approaches tend to be used (Barker 1993). Fundamental to the systems used is the issuing of site codes that are unique to each individual archaeological excavation and a context numbering system which has no duplication of numbers for the site code that they are linked to. Whether the archive is generated as part of a limited single-unit evaluation exercise or full-scale mitigation process are both equal in value and importance for retention and accessibility.

When site work is completed, all finds and samples are sorted and packed so that they can be accounted for and received in an orderly fashion in the processing 'laboratory'. The processing of the finds and sample archive consists of cleaning, labelling, bagging, and boxing, including any required emergency conservation or stabilisation for the artefacts. The basic set of finds and sample information is also entered into a database. The latter is both fundamental and vital to keeping track of the various elements of this artefact archive as they go through the spot-dating, assessment, analysis, and publication process.

The assessment alone or the assessment and analysis jointly will result in a complete cataloguing of all the excavation data. The level of detail of the cataloguing will vary depending on standards set by specialist interest groups and/or the receiving archive or organisation. Nevertheless, the assessment and cataloguing documentation and data is of fundamental importance to any stakeholder wishing to access the excavation archive for their own research purposes or interest.

While the processing of finds and samples are underway, the site supervisor will formulate a preliminary summary of the results of the fieldwork, a context index or catalogue, and a Harris Matrix (Harris 1989). These building blocks of the archaeological record serve to assist the specialists in their assessment and analysis of the materials from the excavation archive. Processed finds, samples, and sample residues are distributed from temporary storage to the various specialists to assess and analyse the material. This serves to catalogue the excavated materials, artefacts, and ecofacts. It facilitates the identification and interpretation of past activities that took place on the site to establish the site formation processes and its environmental context.

2.4: Publication

It will normally be the project director's or project manager's responsibility to ensure that a coordinated approach exists between the principal author of the text concerned with the stratigraphic and excavation data, and the various finds and environmental experts as well as graphics and illustration specialists. This coordination is crucial and its importance escalates with the increase in size of a project. A true multidisciplinary approach will ensure that the implications of potential interactions between data sets are fully taken into account in the assessment and analysis process. For example, where archaeological features reflect aspects of enclosures related to animal husbandry, such as associated animal bone, plant macro fossils, pollen, insect remains, pottery, lithics and others, the features should be analysed, compared, and contrasted in a completely integrated format, contextualised by its animal husbandry origin.

Every publication, whether a research paper for a journal or in a more comprehensive book form, must be founded on research questions that were developed from the specialist's review and assessment of the archaeological archive. Any publication should not be thought of as being the last word to be said about a given archive. It can only represent a snapshot of the archaeological data that offers opportunities to answer research questions at the point of the assessment and as part of the larger ongoing analytical process.

A desired result, therefore, is to have an archive that is open and accessible to future research questions and analysis, and where published results will increase the value of the archive. Indeed, wherever possible, the publication will do well to also serve the wider interest of the local community in terms of rendering their local heritage accessible in a manner that permits past archived data to be reinterpreted and reappraised. Wherever possible, non-academic publications targeting the local populace should be included in the project outcomes. This is because whenever a community loses interest in its local heritage, public support and, by extension, political enthusiasm for its preservation and research will fade rapidly, to the detriment of all stakeholders.

With the completion of the publication, the archive can then be finalised to the standards set by the receiving repository for final deposition. Typically by this stage, despite how interesting any particular archive may be, most of the project archaeologists who have been engaged in working on the project will have moved on to other excavations, and those involved in finalising its deposition will be delighted to close the books on it. The stage is now set for the depositing of the archive into the repository.

2.5: Repositories

Any archaeological materials or documentation created or collected from the planning stage onwards will require temporary care until transferred (where possible) to a repository for long-term curation. In the United Kingdom, such repositories tend to be

local history or area-focused museums and archives. To a limited extent, the national agency, Historic England (formerly English Heritage) serves as a repository of last resort, when a local receiving archive is not available and where the responsible archaeological contractor goes out of business. At present, not all local planning authorities or local council areas retain either an archaeological planning advisor to consider the need for archaeological interventions in advance of development. Local councils may not have a receiving archive willing and able to take in the excavation archives being generated by the archaeological contractors active in their council area.

Where receiving archives exist, best practice dictates that they will have a standard set of requirements to ensure compatibility with materials already present in their collections, to facilitate cross-comparisons between archives, and to aid accessibility for stakeholders and interested parties (Brown 2007). In recent years, the Archaeological Archives Forum (AAF) has done much both to build up standards and to increase awareness among museum and archive professionals in understanding the peculiarities of archaeological archives. This specifically refers to how they should be stored and kept accessible, as well as how to cater to the nature of their geographical interest and keep up with the foci of current research themes and interest groups (Brown, 2007; Nixon *et al.* 2002). AAF's **standards are set to ensure the longevity, accessibility, and usefulness** of the archives concerned (Brown 2007:11–25).

In recent decades, a shift has taken place from paper and film (microfiche) records to more digital formats (Brown 2007:18–19, 31). The metadata accompanying any digital data set is crucial to the notions of longevity and accessibility. Access to the digital data in recent decades has proven to suffer from significant drawbacks resulting from rapid software programme updates not being particularly backward compatible. Data sets originally saved on punch tape and cards (unless these were transferred onto new media platforms) are no longer readable on modern devices. The data retained on tape and cards or earlier forms of disks are difficult (or costly) to recover as these mediums have become obsolete.

Among the first requirements of any archival facility that is receptive to excavation archives will be the one of ownership. This will require a deed of transfer of ownership if the repository is to receive and retain archaeological materials and documentation from sites. In the United Kingdom, this will principally be the landowner signing over his or her property rights to the archive and the archaeological contractor signing over their copyright to written, graphic, and photographic records produced as a result of the excavation. Such deeds transfer rights concerning the use and attached copyright of the deposited materials.

Any archive is only as useful as its accessibility. This will be limited by the amount of space that is available with respect to its physical or digital size. Therefore, a receiving repository usually has policies in place about discarding the archive or parts of it. These need to be reasoned and founded on views regarding future research and exhibition potential, sample size, contextual integrity, as well as conservation and storage requirement and the stability of the objects. Where guidelines exist, they should be consulted, and any final decision to discard archive should be approved or endorsed

by a qualified and respected specialist or organisation. If an archive is to be discarded, the form of discard and the final deposition location needs to be considered to avoid the potential risk of creating false future site signals. For example, the reburial of excess medieval ceramic roofing tiles may cause the consternation of unsuspecting future archaeologists who may misinterpret the site.

2.6: Conclusion

An archaeological archive consists of several distinct elements. It comprises all documentation detailing what led to the creation of the archive, as well as all data records, graphics, and images created as part of the archaeological fieldwork and subsequent assessment, analysis, and publication processes. It also includes all objects and artefacts, ecofacts and environmental residues, waste products, as well as scientific samples recovered and retained during the archaeological project and identified for long-term curation. The written and visual documentation of any project will be on paper, film, and digital form.

Some of the difficulties encountered in retaining archaeological archives derive from questions regarding what needs to be retained in the long-term. Research values and interests potentially change over time. During times of austerity in particular, storage space and the value of the archives may become constrained and diminished. Artefact and ecofact groups that were once rare may over time become common and **discussions about ‘rationalising’ collections, efficiency, and space saving will inevitably arise.** There can be valid reasons for the disposal of certain archaeological materials. Indeed, such decisions are made at the beginning of the process and determine the nature of the archive in the first place. Forms of on-site sampling and collection methods followed as outlined in the WSI will form the constraints of the resulting archive. The reasoning behind these approaches is usually carefully considered and argued to ensure that an approach is appropriate for the particular site and the nature of the archaeology present.

There is no ‘one size fits all’ answer to the problems encountered in retaining and looking after archaeological archives. The research value of the archive will increase or diminish as new topics, approaches, methods, and technologies develop. Accessibility and methodical organisation are essentials of any good archive facility. Public goodwill and interest are instrumental to ensure that the political support and continuity of funding for such facilities remain in place.

Any increase in use of the term ‘rationalisation’ without consideration of the research interests or the needs of the usual stakeholders is normally not a good sign. The value of these collections rests in their ability to respond to questions about human behaviour and activities in changing environmental contexts, as well as their potential in explaining the reasons behind the nature of human activities. If our cultural heritage is a finite and irreplaceable resource worth excavating, then the resulting archive by corollary must be worth retaining. The reasons for not doing so must be other than the lack of space masquerading as a validation for disposal.

3: FRAMEWORKS FOR MANAGING ARCHAEOLOGICAL ARCHIVES AND COLLECTIONS IN ENGLAND

BY DUNCAN H. BROWN

This paper presents a view of archaeological archiving in England as a form of case study. Many of the issues that affect the successful delivery of archaeological archives are shared across the world and it is hoped that this paper will, therefore, be relevant to a wide audience of readers.

It may be useful to begin with a definition of the term ‘archaeological archive’, the most recent having been formulated by the ARCHES project, or *Archaeological Resources in Cultural Heritage, a European Standard*. Supported by the EU Culture Fund, the ARCHES group produced ‘A Standard and Guide to Best Practice for Archaeological Archives in Europe’ (Perrin *et al.* 2014). This document has been adopted by an increasing number of European states as a standard for archive practice in archaeology and offers the following definition:

‘An archaeological archive comprises all records and material objects recovered during an archaeological project and identified for long term preservation, including artefacts, ecofacts and other environmental remains, waste products, scientific samples and also written and visual documentation in paper, film and digital form’ (*ibid.*:20).

An archaeological project, meanwhile, is defined as:

‘any programme of work that involves the collection and/or production of information about an archaeological site, assemblage or object in any environment, including in the field, under water, at a desk or in a laboratory’ (*ibid.*:20).

It is important to recognise that an archaeological archive is the product of an archaeological project because that distinguishes it from other archaeological material collected by other means. In the United Kingdom (UK), archaeological archives, or parts thereof, are usually curated in museums, where they become accessioned into a collection. Museum archaeology collections consist of various records and objects acquired by donation, purchase, or loan, and also as a result of archaeological projects. An archive, therefore, is one component of a larger resource, the collection, which represents the sum of knowledge of the archaeology of a particular locale. This important principle must be acknowledged because it should drive the requirement of a project to produce an ordered, stable, accessible archive that fits alongside all the others that are being curated as part of the same collection, in the same repository. A consistent approach to the production of an archaeological archive will facilitate future study and also the comparison of data between projects and across different collections.

That, surely, is the ultimate aim of archaeology; to produce and disseminate information that can be re-analysed, together with interpretations that can be re-formed.

3.1: The United Kingdom

England, Northern Ireland, Scotland, and Wales do not all share the same frameworks for the practice of archaeology or the delivery and care of archaeological archives. It may therefore be worth describing some of the differences before focusing on England.

In all four countries, archaeology is largely conducted as a result of the planning process, where part of the planning condition for a development is the requirement to fund fieldwork to record the archaeological remains that will be destroyed. This has given rise to commercial archaeology, where contractors often compete to win project contracts and it is usual for them to work within tightly constrained budgets and timelines. In terms of how archaeological work is structured, and archive delivery managed however, there remain some differences between the countries of the UK.

In Northern Ireland, a licence is required to conduct archaeological excavation, which is viewed as a good way of ensuring that best practice is maintained. The licence is issued by the Northern Ireland Environment Agency (NIEA), which also monitors the outcomes of a project. At the end of a project, archaeological archives may be transferred to one of the 38 accredited local museums in Northern Ireland, although pressure on their stores has led to many of them becoming unable to accept further acquisitions. National Museums Northern Ireland may collect some of those archives as a museum of last resort, although that is not a deliberate policy. As a result an estimated 1.47 million archaeological objects remain in the stores of contracting organisations because there is no museum willing to accept them (Hull 2011).

In Scotland, all finds of objects more than 100 years old are the property of the Crown and therefore subject to the treasure act. All such finds, including those from archaeological projects, are considered by the Scottish Archaeological Finds Allocation Panel, which decides where the archive will be curated, the choice being either a local museum or the National Museum of Scotland. The first principle of the Panel is for the material archive to be transferred to a local museum, with the National Museum collecting assemblages that are considered to be of national significance. All documents and digital records produced by archaeological fieldwork in Scotland are required to be transferred to the Royal Commission for Ancient and Historical Monuments in Scotland, now merged with Historic Scotland to become Historic Environment Scotland (HES). This model ensures the longevity of the documentary resource, but the future of the material archive is perhaps less certain as an increasing number of regional museums are finding it difficult to accept large quantities of finds.

In Wales, the National Museum may also collect archaeological archives considered to be of national significance but in general they are offered to local museums for long term care. Here too, a large quantity of material is retained in the stores of various commercial contractors because the relevant local museums are unable

to accept archaeological archives (Edwards 2014:20). The Royal Commission for Ancient and Historical Monuments in Wales accepts documentary archive material and is planning to achieve Trusted Digital Repository status in order to take on the curation of digital material. Some museums, therefore, hold only the material archive from archaeological projects, while the documentary component is held centrally.

In England, it is customary for the entire archaeological archive to be transferred to local museums for long-term curation and there is no national museum to provide the function of a museum of last resort. The National Monuments Record (NMR), once managed by the national heritage organisation English Heritage, used to collect microfiche copies of original documentation, providing a single secure backup of recorded archaeological information. This system is no longer in place, partly because few archaeological projects now produce microfiche security copies, being more reliant on digital versions, while the NMR no longer collects documentary material in the same way. There is, therefore, no central repository for archaeological information, no national organisation to control commercial archaeology, and no consistent approach to the production and curation of archaeological archives. The Archaeology Data Service, based at the University of York, is a Trusted Digital Repository and is the closest thing in England to a central resource for archaeological digital data.

3.2: Issues in England

In 1990, the British government issued 'Planning Policy Guidance 16 (PPG16): Archaeology and Planning' (Her Majesty's Stationery Office 1990), which sought to formalise the responsibilities of planning authorities and developers in the protection of archaeological remains in England. Prior to the release of PPG16, local authorities would support the excavation of archaeological sites on a more or less ad hoc basis, with funding coming from their own budgets, from the Department of the Environment, or from other sources such as the Manpower Services Commission (which gave money to help provide work for the unemployed), or even the developers themselves. Many local authorities also supported archaeology field units, as well as museum services, both of which worked closely together to run projects and manage archives. The overall situation was one where field units operated within a well-defined region that was supported by a museum.

Throughout the 1980s it became clear that this system could not prevent all archaeological sites from being destroyed during development and PPG16 was created to provide guidance on the 'handling of archaeological matters in the planning process' (*ibid*, Section B). The concept of 'preservation by record' was introduced as a way of making sure that archaeological evidence was not destroyed without being properly investigated. The onus was placed on the local authority to ensure the provision of a proper archaeological response to a planning application, while the developer was expected to fund any investigation that was considered necessary. This led to an increase in the number of archaeological projects carried out as part of the planning process, one result of which was that independent archaeology contractors began

bidding for work in areas where until now they had not customarily operated. Competitive, commercial archaeology became the normal framework for the production of archaeological archives. It is unfortunate, therefore, that PPG16 made no mention of the responsibility for local authorities, or developers, to ensure that the products of preservation by record were curated in secure and accessible repositories. **Indeed, the words ‘archive’, ‘museum’, and ‘repository’ do not occur anywhere in PPG16.** It was therefore assumed that the pre-PPG16 pattern would persist, with local museums collecting material recovered within their collecting areas. This assumption did not, however, take into account the increase in the numbers of projects being carried out across the country as a result of the formalisation of archaeology within the planning process.

One other consequence of commercial, competitive archaeology was that standards of work became more variable as some independent archaeological contractors began to cut corners in an attempt to balance budgets. Given that there was no mention of archaeological archiving in either national guidelines or the briefs prepared locally to inform the aims and methodologies of archaeological projects, archiving tasks were often compromised when savings were required.

Local museums developed standards for the preparation and delivery of archaeological archives but these were very inconsistent in scope and detail and were not based on any pre-existing national guidance. With archiving omitted from the planning guidance, some museum curators found themselves separated from the project development process, to the extent that they would sometimes discover that an excavation had been completed only when the contractor contacted them to ask when they could deliver the archive.

In 2002, in response to this worsening disconnect between commercial archaeology and museums, English Heritage published ‘Archaeological Archives: a way forward’ (Perrin 2002), which summarised the state of archaeological archiving practice in England and considered a number of actions. One of those was the formation of a national forum that would address archiving issues; another was the production of national guidance for archaeological archiving.

The Archaeological Archives Forum (AAF) was formed later that same year with a membership that included representatives of various national bodies such as English Heritage (EH; now Historic England, HE), Historic Scotland (HS; now Historic Environment Scotland, HES), the Department of the Environment for Northern Ireland (DoENI), the Council for British Archaeology (CBA), the Society for Museum Archaeology (SMA), the Institute for Archaeologists (IfA; now the Chartered Institute for Archaeologists, CIfA) and more. Following a review of archiving standards (Brown 2003), the AAF published the guidance document ‘Archaeological Archives’ in 2007 and produced an updated edition in 2011 (Brown 2011). That publication was intended to provide both development control archaeologists (who develop project briefs and monitor outcomes) and museum curators with the means to ensure that standards for archiving could be measured, while field archaeologists were given guidance on how to achieve a consistently high standard.

That initiative was only possible because of the existence of state heritage organisations and professional archaeological organisations. Their endorsement of archiving standards, especially by ClfA, whose members are obliged to follow a Code of Conduct, gave project regulators in development control and museums, a lever for ensuring that archives were properly delivered. Where such organisations do not exist, but a competitive, commercial archaeological environment does, it would be difficult in the extreme to enforce, or even gain acceptance of, standards for archiving. This is not because commercial contractors do not wish to work to a high standard, it is because when archaeology is driven by the commercial imperative, projects are often compromised by very restrictive controls on budgets and time. In such situations, it is usually the final tasks in a project that are under-resourced and those, seemingly inevitably, become the ones related to archive compilation. In a commercial environment, therefore, regulation is essential.

In 2010, PPG16 was finally updated and superseded by a new Planning Policy Statement (PPS5) which, after lobbying from the AAF, included a section on archaeological archives:

‘Local planning authorities should require any archive generated to be deposited with a local museum or other public depository willing to receive it’ (Department for Communities and Local Government 2010).

The advent of PPS5 gave cause for a new optimism in professional archaeology, mainly because it was predicated on the significance of the archaeological resource rather than the necessity, as purveyed by PPG16, to clear it from development sites and preserve by record. Following a conference session in April 2010, a group of archaeologists representing English national heritage organisations, universities, and professional bodies formed the Southport Group. Their aim was to review the state of archaeology in England and use PPS5 to develop a more coherent future for what was seen to be an increasingly fractured profession. The Southport Report appeared in July 2011 (Southport Group 2011) and included a section on issues around archaeological archives, highlighting issues and proposing solutions. The review was carried out by means of a survey, supported by discussion groups, and the results echoed the issues identified by English Heritage in 2002 (Perrin 2002):

- **‘The consensus is that archives are often seen as an inconvenient by-product of a project and that once in store they are forgotten and unused.**
- **...archive creation and compilation is compromised...because it is usually carried out at the end of a project, when the budget is compromised.**
- **Archaeology stores are full to capacity.**
- **...the planning process does not successfully monitor archive delivery.**
- **For projects in many areas there is no repository for the archive generated’** (Southport Group 2011:17–18).

Almost 10 years on from the English Heritage review, and following the formation of the AAF and the publication of universal guidance, the issues had not changed. Indeed, some of them, such as the lack of space in museum stores, had worsened. The recommendations of the Southport Group also reiterated the English Heritage report:

- ‘Raising the profile of archaeological archives
- Improved standards and better guidance for archive compilation and curation
- Development of resource centres’ (*ibid.*: 20).

The first two of those recommendations were already being achieved, but following the arrival of the coalition Conservative and Liberal government in May 2010 and the introduction of ‘austerity’ measures, the third became an increasingly remote possibility. There was little chance of public money being directed towards the resolution of the storage crisis and in fact, museums suffered further trauma as local authority spending was severely curtailed. At the same time, PPS5 was replaced by the National Planning Policy Framework (NPPF) and the optimism briefly felt in the early part of 2010 dissipated in the face of government efforts to ease what they viewed as the ‘red tape’ that unnecessarily hindered the planning process.

The NPPF did at least retain a reference to the necessity for an archaeological project to produce an archive and make it accessible:

‘Local planning authorities should also require developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and the impact [of the development], and to make this evidence (and any archive generated) publicly accessible’ (Department for Communities and Local Government 2012).

By 2012, therefore, despite a clearer understanding of the issues and the promotion of archiving standards, archaeology in England was heading towards a crisis as increasing numbers of museums closed their doors to further depositions of material from developer-led projects. A further survey, conducted by the Society of Museum Archaeologists (SMA; now the Society for Museum Archaeology), set out to establish the true extent of this issue (Edwards 2012).

A questionnaire was sent to 161 museums that were known to have archaeology collections. There were 134 responses. The results indicated that within 47 planning authorities, there was no repository for archaeological archives, while only 30% of museums employed specialist archaeology curators. Those figures have increased since the survey report was released at the end of 2012, and it is difficult to ascertain which is more worrying, the loss of expertise in our museums or the diminishing amount of storage space. What is plain, however, is that those collections that are regularly utilised by visitors to the stores are ones that have specialist staff able to facilitate access

(*ibid.*:31). The notion that archaeology collections sit pointlessly in boxes on shelves is refuted by the finding that, among 40 museums, visits to the stores number over 2,000 per annum (*ibid.*:8).

As an aside, it is worth reflecting that archaeological material represents the only evidence for millennia of human development in Britain, from around 500,000 years ago to the coming of the Romans in the first century AD. It is therefore of inestimable value. In Singapore, archaeology provides all the evidence there is for pre-colonial activity. It is a prime duty of museums to continue to collect, preserve, and provide access to such premium resources. There is therefore a clear principle that museums exist to collect and ceasing to do so undermines the purpose of curating an archaeology collection.

In Britain, that principle is supported by the requirement in NPPF for archaeological archives to be publicly accessible, although none of this helps museums to resolve issues of storage and dwindling resources. The closure of museum stores to new accessions had left archaeological archives in limbo. A parallel survey carried out by the Federation of Archaeological Managers and Employers (FAME), also published in the SMA report (*ibid.*:8), showed that in 2012 there were over 9,000 project archives that could not be transferred to a repository. The rate of archaeological investigation has not slowed that much, despite the recession, and since 2012 that figure would have increased considerably. There is, however, no obvious way of resolving the problem that, although museums have ran out of space, there are no resources available to find **a home for 'homeless' archives**. Debate has thus shifted to consider how to reduce the size of archaeological archives, by being more selective about what should be retained and finding alternative storage facilities. It is these issues that are driving current discussions and will be considered next.

3.3: Selection

One of the proposed solutions to the present storage crisis is to be more selective about what is to be retained in a project archive. This is not especially new, and the Society for Museum Archaeology published guidelines on that subject in 1993, principally to inform the management of museum collections rather than the on-site development of recovery procedures (SMA 1993). Subsequent attempts to create universal selection criteria foundered, mainly because it became clear that it is almost impossible to reach a consensus on what should or should not be retained. In many cases, it is usually accepted that plain fragments of clay pipe stems, for example, are not worthy of long-term preservation and can thus be fully recorded and disposed of. There will, however, always be a project that proves an exception to that general assumption and it is thus **dangerous to introduce a 'rule' or standard that could result in important information being lost**.

The 2011 edition of 'Archaeological Archives' (Brown 2011) included an extended section on selection that introduced six principles that should underpin the process:

1. Project planning must consider finds selection. Strategies for selection must be agreed between all relevant parties, especially the project executive, the project team, and the archive curator, and the fact that this has been agreed must be stated in project documentation.
2. The agreed procedure for selection must be fully described in the project design or associated documentation (e.g. archive repository guidelines).
3. Changes to the finds selection strategy must, where possible, be agreed by the project executive, the project team, and the archive curator. It is recognised that a finds selection strategy agreed before finds retrieval has begun may need revision during the course of a project. Unexpected quantities of a particular find type, or unusual depositional circumstances, may instigate a re-assessment. The mechanism for altering the finds selection strategy must be described in the project design.
4. The archive curator, with relevant members of the project team, should assess the finds assemblage after fieldwork and decide which finds are to be retained in the project archive. This process should be included in the initial selection strategy. The character of the finds assemblage and/or the site stratigraphy will inform the final selection process.
5. The selection process must be adequately resourced. Some finds may be recorded but not retained, and this process should be realistically costed in project estimates. It should be recognised that selection is undertaken by the project team, in accordance with agreed strategies, prior to transfer of the archive, and it is the responsibility of the project manager to ensure that there are sufficient resources within the project budget to complete that task.
6. The selection process must be completed before transfer of the project archive.

Here, the emphasis is on the procedure that would enable the correct decisions to be made, rather than identifying particular types of finds or objects that are generally not required for long-term preservation. Those principles were supported by guidance that identified what particular members of project teams were meant to do at different stages of the project. It was also made clear that selection does not apply solely to the material archive (the finds).

Although the debate over selection has intensified recently in relation to the amount of space excavated objects are taking up in museum stores, the documentary archive must also be subjected to a selection process. Digital files, especially, are likely to occur in several versions and must be managed to ensure that only the most recent, or useful, versions are retained for curation.

While it is recognised that future projects could be more rigorous about what should be retained in the archive, it is also true that a similar approach could be applied to existing museum collections as a means of creating shelf space. In the 1970s and

1980s, there was little control over what was retained during excavations. Boxes of unstratified animal bone, for example, would not now be retained and so should not remain in museum stores. It is envisaged, therefore, that a combination of more selective approaches to new projects and a rationalisation of existing collections could **provide some repositories with a little ‘breathing space’ before their stores reach capacity.** The greatest obstacle to this, rather predictably, is that museums do not have the resources to carry out a selection exercise on their collections and too many, furthermore, no longer have the expertise among their staff.

3.4: Alternative Storage

For those museums that do aim to continue to collect archaeological archives, the simplest solution to the storage issue is to establish a new, larger, store. This is, of course, the thing that is least likely to happen, although some museums are bidding for Heritage Lottery Fund grants to do just that. Another equally unlikely ambition is that of the **Southport Group, who envisaged a network of ‘archaeological resource centres’** that would not only store archaeological archives but also provide specialist staff to make them accessible and even promote research (Southport Group 2011:19). Guidelines for the establishment of archaeological resource centres, produced by the AAF, define them as:

‘An accredited centre dedicated to the collection and curation of archaeological archive material from within a defined area, that is staffed and managed to provide the best possible access to the archaeological resource for the purposes of enquiry, **exhibition, learning, research and general interest’** (Brown 2008:2).

This might still be the best strategy, because however well local museums are set up to curate archaeology collections, the rate of archive production will continue to put pressure on their resources. It should be remembered, after all, that most museums collect much more than archaeological material and therefore need storage space for a wide variety of other objects, such as artworks, costumes, natural science specimens, and vehicles. There is, however, no political or professional will to promote archaeological resource centres and the possibility of a network of these being established remains remote.

Alternative means of storage have therefore become a topical subject and focus **on the concept of ‘deep storage’, where collections are maintained in remote, less accessible sites that are cheaper to run.** One such facility is offered by the Deepstore company at a salt mine in Cheshire. Located 500 feet below sea level, mined out chambers have been converted into storage units with racks of shelving and, given that the mine extends over several square miles and is still in operation, capacity is virtually limitless. The facility has been used for a number of years by the National Health Service and the British Library and is secure and well organised, while the environment is exceptionally stable. Deepstore require deposits to be comprehensively catalogued and

guarantee to deliver any item to a specified address within 24 hours. Costs are also very low, especially in comparison with what would be required to rent or build a new store. Deepstore is therefore a realistic option and has been taken up by some museum and heritage services, including Cheshire and Cambridgeshire. Similar companies are converting the hangars on vacated American air bases into stores and these too offer security and a huge amount of space.

One objection to remote or deep storage is that access is problematic and **potentially costly**. However, a more difficult issue is the concept of a region's heritage being cared for outside that area. Many people who are invested in their local heritage believe that it should be available to them at any time, and are opposed to the notion of it being stored outside their county or district. The principle remains that heritage resources are understood to have local significance. This is important because museums depend on local support. As a medium-term measure, however, the use of deep storage must be preferable to ceasing to collect altogether.

3.5: Conclusion

The situation described above may be understood to result from poor foresight and a tendency to overlook archaeological archives and archiving tasks as vital to the successful conclusion of archaeological projects. It may therefore be worth setting out the principles for archive practice as a reminder of what must underpin future **discussions and plans**. These principles were first set out in 2007, in 'Archaeological Archives', and have since been adopted by the ARCHES European standard (Perrin *et al.* 2014):

- All archaeological projects must result in a stable, ordered, accessible archive.
- All aspects of the archaeological process affect the quality of the resulting archive.
- Standards for the creation, management, and preparation of the archive must be understood and agreed at the beginning of any project.
- Ensuring the security and stability of the archive is a continuous process and a universal responsibility.
- A project has not been completed until the archive has been transferred successfully and is fully accessible for consultation (Brown 2011:3).

Acceptance of these principles is fundamental to successfully addressing archive issues, in England and beyond. From there it is possible to define what is required for successful archive delivery:

- Standards for archive creation, management, compilation, transfer, and curation, including a selection strategy and a data management plan.
- Acceptance of the principles of archive creation and management (as shown above).

- Adequate resourcing of archive procedures throughout the course of a project.
- The provision of an appropriate repository that provides long-term security and access, with:
 - Staff who are trained in archaeological curation.
 - Environmentally controlled storage areas.
 - The facility and expertise to store, develop, and make accessible appropriate reference and research collections.
 - Facilities for interaction, learning, and study.

These points may provide an appropriate conclusion here, but they also offer guidance for future decision-making. Archaeological archives represent the future of our subject, just as much as any remains yet to be investigated. They must be treated with the same regard. With that in mind, it may be worth closing by addressing issues related to the situation in Singapore. Although this paper focused on England, some of the conclusions that may be drawn from it should resonate more widely. It is much easier to follow the principles set out above within a trained and securely established archaeological field team.

If the aim of archiving is to facilitate access, then the key to good archiving is a consistent methodology, and that requires a professional approach. The ad hoc response to threats to archaeological sites in Singapore brings to mind the struggles of the 1960s and 1970s in Britain, where local action groups actively resisted the demolition of historic buildings and the destruction of archaeological sites (see for instance Clarke 2008). The formation of the pressure group RESCUE, and the creation of professional archaeological field units, led to a formal system for the protection and recovery of archaeology, culminating in the emergence of PPG16 as described above. The situation in Singapore is not unfamiliar and should also not be difficult to resolve with adequate resources and political infrastructure. There needs to be an understanding that resources are required well beyond the time spent in the field to include the process of post-excavation.

As has been shown above, the development of commercially competitive archaeology in Britain has led to some projects working to restricted budgets, to the extent that corners are sometimes cut. In Singapore, and indeed in any instance where there is currently no competition for contracts, there is the opportunity to put in place a system that provides the best outcome for the archaeology as well as developers and landowners. That would require all parties to understand the way archaeology works in terms of project development and the resources needed for each stage. In terms of storage, while there may not be an issue of space for archaeological material in Singapore, the actual collecting process could be reinforced by clear procedures for establishing and assuming ownership. For many reasons, it is vital that museums have title to the objects they curate (Collections Trust 2011; Museums Association 2016); but this is, fundamentally, about security. Without ownership, the future of a collection cannot be guaranteed, while the provision of access and the use of objects for display or publication may also be problematic. Ownership is therefore equally important in

keeping intact the archaeology collection that currently exists in Singapore. There may be no pressure in terms of storage space, and thus no necessity to consider selection, nor dispersal of the collection, but threats can come in other guises, such as indifference or neglect. An established and well-supported system for the investigation of archaeological sites, the recovery and analysis of archaeological evidence, and the curation of archaeology collections would secure Singapore's past for future generations.

4: BEYOND THE EXCAVATION: POST-EXCAVATION AND THE ARCHAEOLOGICAL ARCHIVES

BY LIM CHEN SIAN

4.1: Introduction

Archaeology as a social science is the study of the human past through material remains—be it large-scale ruins and effects on landscapes such as settlements, or a specific individual site in the likes of a 19th-century coastal artillery fortification, to the micro-level interpretation of the causes of death and past subsistence from human remains. Archaeology has been increasingly active in Singapore. Since its inception in 1984, approximately 30 sites have been investigated, some more thoroughly and systematically than others.

While archaeological investigations in Singapore over the past 30 years have recovered vast quantities of material, there is no inventory or catalogue for excavated finds. These artefacts have been under the custodianship of the archaeologists, but tracking of individual artefacts of the expanding archaeological collection poses a serious challenge. A framework needs to be developed to categorise the finds and create a system of accounting and inventory control for proper analysis. Minimally, a basic data set from each excavated site in Singapore should be created. This paper calls our attention to the necessity of the post-excavation processes and the importance of creating an archaeological archive.

4.2: Brief History of Archaeology in Singapore

The arrival of the East India Company in the 19th century witnessed the rise of antiquarian interest in **the island's past**. **There exist** European accounts of observing evidence of early remains such as old pottery scattered on the surface of Government Hill; an earthen defensive rampart surrounding the Singapore village core; and a large sandstone stele with weathered inscriptions at the mouth of the Singapore River (Crawford 1828; Bland 1837; Laidlay 1848).

Scientific enquiry into the natural history and historical environment of the island and the region came into being with the establishment of the Botanic Gardens (c.1859) and Raffles Museum (c.1874), where the curators of these two institutions, in spite of backgrounds outside of the archaeology discipline (typically botany or zoology), made occasional forays to investigate the ancient past. In the 1920s and 1930s, the Raffles Museum conducted several expeditions to Malaya excavating prehistoric sites in Kedah and Perak. Intriguingly, apart from the few casual and cursory surface collections, no serious archaeological enquiry took place in Singapore. In the 1950s, a few trial trenches were undertaken on Pulau Ubin island exploring for Neolithic stone tools (Williams-Hunt 1951; Tweedie 1953).

It was only in 1984 that the first recorded systematic archaeological investigation took place on Singapore island proper (Miksic 1985). The success of this excavation encouraged archaeologists to explore more of the old colonial quarter in the downtown civic district by the Singapore River. The early excavations were led by expatriates, American archaeologist John Miksic and Greek museum consultant Alexandra Avieropoulou Choo (Choo 1986). Since 2006, Singaporeans have spearheaded all the major archaeological initiatives in the country. Singaporeans are now the principal investigators, research designers, project managers, field crews, laboratory technicians, and so forth. Many of the efforts are voluntary in nature—demonstrating a significant desire on the part of Singaporeans to take ownership of, and responsibility for, **Singapore's heritage**. **Adequate support for this sector of Singaporean society still lags behind the enthusiasm of other interest groups.** In the last decade alone, some 20 new sites were investigated and contributed to our understanding of the **country's past, progressively exploring sites from the colonial and more recent periods, such as the Second World War and post-independence Singapore.**

4.3: Beyond Excavation

Excavation or digging is the stereotypical impression the public has about archaeology. Beyond such popular imaginations, excavation is but one of the multifarious processes of an archaeological investigation. **A significant proportion of an archaeologist's tasks lie with the post-excavation processing of the artefacts.**

The artefacts recovered are often our only link to studying the past. Careful analysis of these materials can enable us to reconstruct what happened through time. This helps us to address a multitude of questions such as: how were past societies organised; what was the nature of past environment; what can we discern about subsistence and diet; what were the types of available technology and how were these technologies employed; what local, regional, and long-distance contacts are revealed; what was the nature of local and external trade and exchange; what is exposed about issues of cognition, art, religion and multi-cultural interaction? More direct and relevant to Singapore are questions: Who were our predecessors who shared the same island we reside on? What were they like? What happened to the ancient Singaporeans? Why did things change? Can it happen again?

Post-excavation work is an integral part of any archaeological operation. Post-excavation research constitutes basic processing, cataloguing, and finally, analysis. Processing the artefacts entails cleaning them to the extent that they can be described, identified, and sorted into basic meaningful material categories. This expedites the cataloguing process and helps us identify the artefacts in need of special treatment.

Cataloguing the artefact assemblage is the beginning of the analysis. Its goals are: (i) to inventory the collection, and (ii) to organise the collection to facilitate its study by archaeologists and other researchers. Labeling of the artefacts is a time-consuming but necessary task for the archaeologist to preserve the provenance data associated with the artefact.

With adequate personnel and resources, an approximate computation of the time taken to tackle post-excavation work equates one day of excavation to about 21 days of post-excavation processing. The following sections detail in brief the post-excavation processes of a typical archaeological assemblage.

(i) *Cleaning and Washing*

The removal of dirt and encrustation on the artefacts, with separate techniques employed for different material types. Dry brushing and mechanical cleaning are used for metals and sensitive objects that cannot be washed, while wet washing typifies most of the bulk samples. Specialised cleaning with distilled water, deionized water, or industrial methylated spirit are reserved for materials earmarked for further archaeometric or scientific analysis, such as radiocarbon dating, residue lipid analysis, thin section petrography, and geochemical analysis.

(ii) *Sorting and Classification*

After cleaning, the items are dried and prepared for sorting into identifiable categories. This classification serves to create the basic materials typology and chronology of the objects. For instance, ceramic artefacts are sorted and classified into grades of firing (earthenware, stoneware, porcelain) and further into descriptive sub-types (porcelain whiteware, greenware, blue & white, etc.), followed by diagnostic vessel parts (rim, body, base, ornamental, lug, etc.). These classification processes are also applied to other archaeological materials, such as glass, metals, faunal, and shell. This stage will also entail documentation of quantifiable data, count, weigh, and excavation provenance.

(iii) *Marking and Labelling*

Each artefact is given a Unique Identification Number (UIN) and when appropriate, marked with indelible ink on a coat of varnish or tagged with a conservation grade paper label. UIN enables excavation provenance information, such as horizontal and vertical controls, to be coded with the item by referencing it in an electronic database as well as providing the necessary inventory control to track and identify individual objects.

(iv) *Packing and Storage*

Often overlooked, a considerable amount of time and resources are also spent on packing and storing the artefacts. All artefacts are bagged and tagged with multiple levels of redundancy to prevent accidental misplacing or loss of items. Packing materials are also perforated to permit the ventilation and breathability of stored items. Archival grade and rot-proof labels are included with each bag or box. Special care items, such as fragile materials or unique finds, require more attention, and additional

packing materials and time are needed to create customised storage envelopes, packets, and boxes.

(v) *Photography and Illustration*

Artefacts are selected for photography and detailed illustrations due to their fragile or unique nature to ensure a record of the items are made. While digital technology aids with the expedition of the processes, the traditional method of illustrating the objects is still the preferred mode of recording and conveying archaeological data. This is because mechanical drawings often have a superior ability to present three-dimensional data as compared to digital photography.

(vi) *Inventory and Database Entry*

Ideally, an electronic database is the end goal for inventorying archaeological materials. A database comes in many guises and complexity, and is mostly contingent on available resources for its development and upkeep. At one end of the range, its potential is a full-fledged research database with both qualitative and quantitative information, while on the other end of the terminus it may be a simple catalogue or register of finds. A basic database will serve the needs of both inventory control and the keeping of rudimentary statistical data relating to the artefact's **contextual provenance, materiality, and** quantitative attributes.

(vii) *Other Non-Artefact Post-Excavation Processes*

Briefly discussed here are a few other post-excavation processes not directly related to the handling of the artefacts per se, but are nonetheless pivotal components of the process. They include: (i) documentation of field notes—the transfer of recorded field data into written and digital formats; (ii) production of site plans—the creation of cartographic materials and detailed drawings of the site, such as sediment profiles, elevations of built remains, excavation unit plans, as well as the reconstruction of chronological layers from the excavation; (iii) production of site report—a preliminary site report describing the excavation methodology, processes, site formation, preliminary findings (sans artefact analysis), and discussion of site history, chronology, and the occupation sequences.

(viii) *Specialist Conservation and Long-term Preservation*

The long-term preservation of artefacts frequently requires intervention by conservation specialists to treat the finds. Such treatments include stabilisation of the object to prevent further deterioration, and active mitigation in cleaning and removal of encrustation to aid in the study of the artefact. Apart from objects selected for museum display and exhibition, no robust conservation practices have been actively

included in the post-excavation processes. Instead, archaeologists make do with basic first aid for finds and periodically monitor the state of the materials. The level of attention paid to the archaeological archives varies greatly between the storage facilities and collections held at the different institutions (see tables 1 and 2). The condition of several facilities are less than ideal, and presently the Archaeology Unit at the Nalanda-Sriwijaya Centre, ISEAS - Yusof Ishak Institute (ISEAS) is the only entity with some rudimentary protocols in place pertaining to the monitoring, storage, micro-climate control (dry boxes), pest control, and routine housekeeping and cleaning.

4.4: Current State of Affairs

At the point of writing, no legislation or regulation exists pertaining to the ownership and custodial responsibilities of archaeological materials recovered either by deliberate archaeological investigations or chance occurrences. For the last 30 years, John Miksic and I have been storing these materials, frequently at our own personal expenses. This **stewardship is principally guided by the discipline's professional ethics exemplified by the Chartered Institute for Archaeologists United Kingdom Code of Conduct, the Archaeological Institute of America Code of Ethics, and the Japanese Archaeological Association Code of Ethics**, which stipulate that archaeologists are custodians of the past. We also do so as social scientists who are aware of the immense value of the collections for future scientific and historical studies. More importantly, archaeologists recognise that the archaeological archive belongs to the people and nation of Singapore, as well as global stakeholders in the likes of the wider academic and scholarly community. It is an integral component of the island's **history and national identity**.

Presently the archaeological materials are held in two principal collections; chiefly with ISEAS, and the National University of Singapore Department of Southeast Asian Studies (NUS DSEAS), the latter currently under the maintenance of John Miksic. The collections are demarcated by projects undertaken by respective archaeologists, and they are generally separated under the custodianship of Miksic and this author. Projects between the years 1984 to 2004 are stored with NUS DSEAS, while investigations from 2006 to 2017 are under the care of ISEAS. Table 1 provides the breakdown of the finds and their current storage.

Apart from the **Jacob Ballas Children's Garden, Fort Serapong, and Neil Road House sites**, the total amount of the finds outside of the ISEAS Archaeology Unit collection is not clear. No audit or inventorying has ever been undertaken. Miksic and I estimate a yield of anywhere between three to five tonnes of artefacts are held at NUS DSEAS and Fort Canning.

Other smaller quantities reside with the National Museum of Singapore and the Asian Civilisations Museum. These pieces essentially function as exhibition pieces on display as part of the museum narrative and are accessioned in the National Collection. There may be additional materials recovered by National Museum of Singapore staff—Alexandra Avieropoulou Choo, Cheryl-Ann Low, and Ng Ching Huei—on several smaller investigations that were conducted in the 1980s and early 2000s.

Table 1: Archaeological Collection in the Custody of ISEAS (as of August 2017)

S/No.	Site	Yield (Kilograms)
1.	Empress Place Lawn	3,000
2.	Singapore Management University	18.5
3.	Victoria Concert Hall	654
4.	Indian Heritage Centre	3
5.	National Art Gallery	375
6.	Adam Park	153.4
7.	Cathedral of the Good Shepherd	58.8
8.	Singapore River Diversion	38.8
9.	Fort Tanjong Katong	43.7
10.	Palmer Road	26.4
11.	Other Sites	50.6
12.	Brick & Soil Samples	350
	Total	4,772.2

Table 2: Archaeological Collections in the Custody of Other Institutions

S/No.	Site	Institution
1.	Keppel Marina	NUS DSEAS
2.	St. Andrew's Cathedral	NUS DSEAS
3.	Singapore Cricket Club	NUS DSEAS
4.	Old Parliament House	NUS DSEAS
5.	Istana Kampong Gelam	NUS DSEAS
6.	Parliament House Complex	NUS DSEAS
7.	Colombo Court	NUS DSEAS
8.	Duxton Hill	NUS DSEAS
9.	Pulau Saigon	NUS DSEAS
10.	Other Sites	NUS DSEAS
11.	Fort Canning	National Parks Fort Canning/NUS DSEAS
12.	Jacob Ballas Children's Garden (yield 58.9kg)	National Parks Singapore Botanic Gardens
13.	Fort Serapong (yield 300kg)	Sentosa Development Corporation
14.	Neil Road House (yield 73.4kg)	NUS Museum

4.5: ISEAS Pilot Project for Post Excavation and Cataloguing

In March 2014, a pilot project began in ISEAS to systematically process the backlog of finds from past excavations. The National Art Gallery excavation project was selected for the trial. Two research assistants, Michael Ng and Aaron Kao (one full-time and one part-time) were engaged for this project.³ While their principal duties were to engage in the post-excavation work, their other responsibilities included serving as field crew members and site supervisors on field projects during the first 24 months of employment.⁴ This project is currently ongoing and entering its final phase of inventory and database entry (see table 3). The project has completed the marking and labeling of a total of 23,152 items, representing the entire ceramic, metal, glass, faunal, coral and geological assemblages, and small finds from the excavation (Lim 2017).⁵

Table 3: National Art Gallery Post-Excavation Pilot Project

S/No.	Process	Status	Remarks
1.	Cleaning & Washing	100% Completed	
2.	Sorting & Classification	100% Completed	
3.	Marking & Labelling	100% Completed	
4.	Packing & Storage	100% Completed	
5.	Photography & Illustration	100% Completed	Limited to Selected Small Finds
6.	Database Program Development	Beta Trial Version Completed	Undergoing trial
7.	Inventory & Database Entry	Ongoing	Undergoing trial

Additionally, a separate but related web catalogue is hosted on the ISEAS Library SealionPlus portal. The public-access web-based catalogue showcases approximately 300 items as highlights from the National Art Gallery excavation.

³ The site has been renamed as the National Gallery Singapore.

⁴ During this period, the research assistants were involved in four evaluations and surveys (Singapore Management University, Jacob Ballas Children's Garden, Bukit Brown, and Empress Place); four major excavations (Bukit Brown, Empress Place, two annual field seasons in Cambodia); one international field school; two exhibitions (Bukit Brown, 30 Years of Singapore Archaeology); and assisted with organising the Archiving Archaeological Materials Workshop where this paper was presented.

⁵ Glass, metal, faunal, shell, coral, and geological categories are restricted to materials from the Temasek Cultural context.

Apart from the necessity of progressively processing the enormous backlog of archaeological material from the last three decades of excavations, this pilot project also seeks to demonstrate the relevance of the collection with the production of several academic research outputs. Two papers addressing the decorative motifs of earthenware pottery in ancient Temasek are in production. One was presented at an international archaeological conference in Bangkok in May 2016 (Kao, in press). A lengthier research dissertation by the author as part of his PhD will study the impact of ceramics and reconstruct the trade and exchange networks of pre-modern Singapore.

4.6: Storage: To Retain or Discard?

The bulk of the archaeological materials excavated in Singapore are made up of ceramics. Ceramics represent 90–95% of the entire collection. This percentage is consistently uniform throughout the sites in Singapore. Part of the explanation for such a high representation is because fired clay is highly durable compared to other materials, such as organic remains (bone, textiles, timber, etc.). Ceramics are one of the best-preserved materials in buried contexts. However, such large volumes of ceramic remains raised concerns regarding their storage and brought about queries on the necessity for retaining them.

It is not unexpected that when large numbers of artefacts are reported from archaeological discoveries, a fear, albeit unwarranted, of dealing with the volume is generated. Confronted with new yields, officials from the **National Heritage Board's** institutions, where heritage collections form an integral component of their core activities, frequently cite the lack of storage space as the reason not to accept any archaeological materials. These institutions include the National Museum of Singapore, the Asian Civilisations Museum, and the Heritage Conservation Centre—**National Heritage Board's general central depository for the museums.**

Recently, there have been increasing discussions amongst National Heritage Board officials and their advisors on the storage of the archaeological collection. What is perturbing and of serious concern is that although the advisory and executive committees within state agencies may comprise of heritage practitioners, at present there is still no professional archaeologist represented at these policy and decision-making bodies. Typically, these committees are made up of historians, geographers, archivists, museum administrators, and others. While these individuals are often sympathetic to archaeology, none of them are qualified archaeologists. They do not possess professional knowledge and experience concerning archaeological processes. It is simply not their area of expertise. Hence, they are the least qualified to make assessments and policy decisions concerning the fate of archaeological materials and archiving.

Recent discussions are worrisome. The Chairman of the National Archives, **adopting an archivist's perspective and drawing from the National Archives of Singapore's example, has gone on record to suggest that only five percent of archaeological artefacts need to be retained.** This is alarming as we are only in a nascent

stage of analysis. What is valuable or not valuable has not been determined by qualified archaeological professionals. Archaeologists deal with entire assemblages; not just single artefacts. That is where the value of the collection lies. Similarly, senior members of the National Heritage Board's administration and their Heritage Advisory Committee are of the opinion that archaeological materials may be discarded once they have been 'studied'. To what extent the 'study' is to be the determination factor for discard is unclear.

In reality, no such crisis in storage exists, and the entire collection housed at ISEAS merely occupies a single storage room in the dimensions of 3m x 3.5 m. Should space prove to be an element of serious concern in the near future, suitable rental of modest storage will conveniently resolve the matter. Based on the average accumulation of materials, the author estimates that a small 700 sq ft facility will suffice to adequately store the combined archaeological archives from ISEAS and NUS minimally for the next decade. Instead, the way forward is to critically address the want of existing laws pertaining to the ownership, custodianship, and maintenance of the archaeological collection, and to allocate sufficient resources and funding for the necessary post-excavation processes and care for the archaeological materials.

4.7: Conclusion

Archaeology at large is significantly underfunded in Singapore. In the past, sporadic funding was obtained for excavation works. Little if any funds were allocated for post-excavation processes, archiving, and storage of the finds. As this paper demonstrates, Singapore does not currently confront an archaeological archive crisis. Rather, Singapore encounters the urgent need to provide the necessary funding and resources for archaeologists to undertake post-excavation work and the creation of an inventory of finds, out of which a specialised reference collection may be developed in the future.

An ambitious but certainly achievable plan has been developed by the archaeologists at ISEAS to create a basic inventory of all the finds currently held at the institute. With adequate funding and personnel, it aims to complete the post-excavation and cataloguing of the collection under its care within a decade. All that remains is a very serious political will to commit resources to the creation, maintenance, and custodianship of an archaeological archive and an enduring professional archaeological team.

Post-excavation work is the most time-consuming and tedious of all archaeological processes. The primary impediment facing the archaeology team over the years has been the want of resources to employ dedicated personnel to undertake this essential task, therefore, these processes have been left out. This issue cannot be avoided or delayed any further as the archaeological collection grows with each new discovery and subsequent excavation in Singapore. Archaeological materials are an important key to Singapore's past and should be protected as part of Singapore's National Collection.

5: HISTORICAL RESEARCH IN SINGAPORE AND THE PLACE OF ARCHAEOLOGY

BY DEREK HENG

5.1: Introduction

Traditionally, the study of the history of Singapore has been confined, on one hand, to textual and archival research, and archaeological research on the other. While the textual research has had an extremely well-developed pedigree, its reach has been confined primarily to the colonial, and more recently, the early modern period (Turnbull 2009; Hack 2014). The pre-modern history of Singapore has hitherto been relegated to the preserve of archaeological research (Miksic and Low 2004). This disciplinary distinction has created an artificial divide in the chronology and narrative of Singapore's history, with each discipline operating exclusively within the research area of each historical period.

Over the last two decades, significant strides have been made to develop a historical narrative that extends from the 14th century onwards, as a continuous chronology, into the 21st century. While this has been somewhat successfully done through textual research, the gap between history and archaeology as a means of explicating and expounding on Singapore's past is still a real divide (Kwa, Heng and Tan 2009:33–52; Heng and Aljunied 2011). In effect, archaeology has been further relegated to the research of the pre-modern era, more specifically the 14th century, with the adage that nothing more can be elucidated from historical texts, leaving frontiers of knowledge to be opened only by archaeology.

This paper seeks to make the case that, like textual archiving and research, the archiving and research of archaeological data need to be regarded as an integral element of research into Singapore's history, and as interchangeable means of attaining the goals of the production of historical knowledge (Heng 2010a). Critically, the importance of the textual basis of history as the foundation upon which archaeological research may complement our understanding of Singapore's past, and vice versa, has to be addressed. In the process, archaeological research as an important element of historical research may then be accorded its rightful and appropriate place.

5.2: Critical Challenges in Historical Research on Singapore

Research on Singapore's past has been delineated into two fairly distinct strains—historical research and archaeological recovery. While historical research has had a significantly long pedigree that extends well into the late 19th century, archaeological research, apart from the sporadic finds of the early 20th century, has only been an academic concern over the last 30 years. The result of such disparate trajectories for these two key approaches to probing Singapore's past has resulted in two distinct outcomes in terms of the articulation of a historical narrative.

On the one hand, historical research has been primarily concerned with the production of historical information and knowledge. Entailing the development of a processual chronological history, the primary areas of concern are the political, social, economic, and cultural histories of the island. Additionally, it is concerned with extending the stories of the individual into the collective narrative, and to develop a collective social experience based on shared memories over the course of time. Importantly, the research is based primarily, if not entirely, on textual studies that utilise archives located over several continents, such as biographies of individuals, particularly in the early modern era, and other pre-modern textual corpora (Tan 1998). On the other hand, in the case of archaeology, the primary objective has been to develop fixed-frame pictures of the past. These static reconstructions, informed by scientific processes of information gathering and retrieval from the ground, provide information concerning topics such as consumption patterns, economic linkages, settlement patterns, uses of material culture, and the reconstruction of key physical features. As several of these images are reconstructed as representative of key periods of time of the island's inhabitants, a moving image of change over time may then be recreated (Heng 2010). Here, given the absence of monumental remains, small finds, including large caches of inorganic remains, such as ceramic sherds, metal objects, and glass items, as well as the occasional dense organic item, such as bone and shell remains, are the only materials that such reconstructions of the past have to be based on (Chen 2001; Stulemeijer 2011; Borelle 1998; Heng 2004).

Differences in the reconstructions have been compounded by differences in the chronological framework in Singapore historiography. In the case of archaeology, the primary fixation to date has been on the pre-modern history of Singapore. More specifically, the preoccupation of archaeological work has been on the 14th century, or commonly known as the Temasik [Temasek] cultural layer. From an archaeological point of view, we now know much more about the 14th century than we do about any other period in Singapore's history. It is only very recently that some acknowledgement of the 15th to 17th centuries has been made (Miksic 2013:289–324). Nonetheless, absolutely no research has been conducted on the early modern period, other than a handful of very cursory reports. Similarly, the colonial period represents a gap in terms of archaeological research. While some work has been done over the last decade, this has centered primarily on battlefield archaeology of World War Two sites (Lim 2005; Lim 2006b). The 19th and early 20th centuries remain unexplored historical periods in Singapore's archaeological landscape. The result is a wide gap in the chronological framework based on archaeological research.

In contrast, historical research on Singapore has resulted in three key periods in Singapore's history: pre-modern (14th century), early modern (16th–18th century), and colonial to independence (19th century onwards). This chronological framework, to a large extent, has little to do with any actual breaks or fissures in the habitation history of the island. Instead, it is driven primarily by the different textual corpora that research on the respective periods are dependent upon—Chinese, Southeast Asian, and Indian

Ocean texts, Portuguese, Spanish, and Dutch records and biographies, and colonial records and written materials (Heng 2009; Kwa 2004).

What is clear is that there is very little interaction and engagement between the two disciplines to breach the obvious problematics pertaining to the truncated chronological frameworks. This is all the more stark, given the arbitrariness of the chronological divisions that have been developed.

The articulation of the findings has manifested in contrasting ways. For archaeology in Singapore, the visual impact of the material finds has in fact superseded other means by which the findings from archaeological research would be disseminated.⁶ At present, archaeological research in Singapore has, at best, been to make manifest the nature of Singapore's past in a static nature, primarily through the display of visually interesting examples of recovered material in museum settings. In other words, the findings have been expressed in art historical terms, linked to production styles and period-specific features that may be visually discerned. Relatively few studies have been made available to date that may take different approaches towards the yielding of information from such bodies of materials.

History in Singapore, on the other hand, has continued to look to texts as the sole source of historical information, and therefore the need to bolster the discovery and exhibition of the text as the objective of historical enquiry, with no other method or sources deemed necessary for complementing or augmenting textual information for the production of the historical narratives. In this regard, the pre-modern history has hitherto been regarded as the domain of archaeology, while the early modern and modern periods have been the preserve of history. This demarcation and dichotomy have been exacerbated by belligerent statements that include, 'the texts cannot tell us anything new anymore about the pre-modern period, and archaeology is the key to the frontier of historical knowledge', or 'do we really need archaeology if the textual base is so rich?'

Why should engagement of archaeological materials and archaeological research be seen as critical to the pushing of the frontiers of Singapore historical research and knowledge, and vice versa, as we move forward?

5.3: Re-Envisaging Research Approaches and Methods on Singapore History

One of the key priorities in Singapore history research is the reframing of the chronology. Prior to the last decade, the chronology of post-1819 Singapore as the core focus left the pre-1819 periods effectively outside of the purview of historical enquiry and research (Ban, Pakir and Tong 2004; Chew and Lee 1991; Lee 2008). Granted that there was already a significant body of historical studies on the pre-1819 history, and historical sources, of Singapore, including works by Raffles, Mills, Braddell, Hsu Yun H'siao, Gibson-Hill, Wheatley, and Wolters, to name but a few, this knowledge and

⁶ See for example, the exhibition on archaeology at the National Museum of Singapore, *Archaeology in Singapore: 30 Years of Uncovering the Past 1984-2014* October 28, 2014–August 10, 2015.

scholarship has remained largely outside of mainstream historical consciousness since 1965 (Gibson-Hill 1954; Wheatley 1973; Braddell 1980).

Changes in the last decade of Singapore's historiography have amplified the need to rethink the means by which the narrative framework could be reconstructed and rationalised. In the process of penning *Singapore: A Seven-Hundred Year History*, upon which the recently revamped Ministry of Education history curriculum and the narrative in the National History Museum Singapore galleries are based, one of the most significant challenges that the authors of that volume had found was to construct a convincing chronological narrative that enables us to view the history of the Singapore as a continuous, or at least longer periods of, seven-centuries long experience (Kwa, Heng and Tan 2009).

Whereas textual source bases do not easily lend themselves to a continuous chronological framework, archaeological data can provide that longer chronological reach. The key challenge is not so much in the transference of emphasis from one discipline to another, but the need to begin to integrate skill-set competencies across the two disciplines, so that both sources of data can be used in tandem and interchangeably.

In this regard, the pre-modern history of Singapore may be approached as a series of cyclical patterns of state-formation and the establishment of varying degrees of autonomy by its inhabitants, as opposed to a pre-modern and early modern divide (Heng 2010b). It is also possible to envisage a continuous chronological framework from the pre-modern into the colonial period, through the framework of shifting ports of trade set within the context of regional and global patterns of economic interactions and geo-strategic concerns (Heng and Aljunied 2011). Importantly, the interplay between the local and international, or micro- and macro-level histories, can be successfully integrated within a singular narrative.

A second imperative in the historiography of Singapore's past has to do with the framing of historical enquiries. At this point, the example of how Singapore in the 14th century could be studied may be highlighted. Textual sources provide a lot of information on the context within which Singapore came about in the 14th century. Archaeological materials can enable historians to develop a narrative on how that initial formation process occurred, the types of goods that were involved, and the changes over time.

The picture hitherto reconstructed is one that portrays the 14th century as a period of relative stability for Singapore (Miksic 2013: 145–208). Similarly, while the 15th to 17th centuries has been articulated as a period during which Singapore was subsumed under the Malacca and later the Johor Sultanates, the nature of this change has not been expressed through the archaeological data (Andaya and Andaya 2001:39–116). Nonetheless, there were, at least from textual sources, significant changes in the operative environment in Maritime Asia, including a change in dynastic rule in China from the Yuan to the Ming, the shift from the coast towards the Deccan Plateau in the case of South Asian geo-politics, and even environmental changes that included a major tsunami off the coast of northwest Sumatra at the end of the 14th century. This does

not include other major regional developments, including the rise of Majapahit Java, the emergence of Sukothai in Mainland Southeast Asia, and the decline of Angkor as a regional power during this time. This is not even considering the possible effects that changes in the climate and its impact on the weather patterns in Island Southeast Asia in the 16th and 17th centuries had on trade and the viability of a major settlement in Singapore during the period in question (Heng 2011; Buckley, Lieberman and Zottoli 2012).

Such historical contexts, in informing historical enquiry, would enable archaeological research on the Singapore River settlement of the 14th to 16th centuries, and the shift in settlement from the Singapore River bank to the Kallang River Basin in the late 16th century, to be probed as part of a much larger historical experience that goes beyond the discreet rise and demise narrative of these pre-colonial urban centers in Singapore. A closer examination and development of a database of the material remains, such as ceramics, closely tied to stratigraphy and therefore chronological passage, would not just make scholarly sense, but also be propelled by an actual research agenda. Even the size of the settlement sites, the changes in the volume of human detritus, and the types and relative value of the types of material culture imported by the settlements, would go beyond merely ascertaining the hierarchy of settlement patterns within the context of regional political entities or the theoretical discourses of settlement and polity types, to one that could establish a more indigenous narrative that is able to stand in its own right. In this regard, the combination of the narratives that are elucidated from the textual materials, and the questions that arise from that research, can then frame these questions in a substantive manner so that the archaeological research agendas can be suitably informed.

Another example would be the Duxton Hill excavation conducted in 1989. A number of sites were excavated in the area that is part of present-day Tanjong Pagar. Recovered items include utilitarian items, such as toothbrushes, crockery, and opium pots. Apart from an exhibition that was curated to show the associated finds, there are only two cursory reports on this excavation and its findings, with very little information on the nature of the excavation, the methodology of the field work, and extremely limited access to the recovered materials at present (Tanjong Pagar Citizens' Consultative Committee 1989). Granted that there was almost no interest at the time of the excavation from historians of the colonial period, the situation could be drastically different if a different approach to colonial period archaeology had been established.

The potential for historical research on Duxton Hill and Tanjong Pagar is significant. Maps of the area, along with Straits Settlement, India Office, and Colonial Office records, indicate that the area was one of the key gateways to Singapore's hinterland, where as early as the 1830s, large numbers of gambier and pepper plantations were beginning to be established. The social lives of plantation workers, as they came into town for recreation and other personal affairs, would have engaged in such activities as opium smoking, gambling, money lending, and the obtaining of provisions and sundry supplies (Trocki 1976). The social lives of these individuals, which do not have a voice in the typical textual sources of this period, could be

recovered and aggregated through systematic archaeological work in the area. As Keppel Harbour was established in the 1840s, and the railway station in the 1880s, questions, such as how the economic and social life at Duxton Hill and Tanjong Pagar interacted with those of the plantations workers who were coming in at periodic intervals, could be framed and answered (Wong 1978). At the same time, the growth of opium syndicates and opium farms through the course of the 19th century, which became one of the most important sources of wealth in the internal economy for the Chinese capitalists not only in Singapore but also Malacca and Penang, would likely have left a record in the material cultural remains of the area (Trocki 1990:51–81, 117–118). Finally, in the early 20th century, as female migration into Singapore was permitted by the colonial administration, how did this policy change affect the way the Tanjong Pagar area developed as a commercial and residential area (Freedman 1979; Ee 1961)? What does the archaeological record, and the recovered materials, tell us about this important aspect of Singapore's colonial history, and about the issue of the relationship between economic stratification, labour exploitation, and diasporic experiences of the overseas Chinese? How can excavations be framed such that historical questions can be used to guide the conduct of such fieldwork practices?

The pre-modern, early modern, and colonial examples of historical enquiry highlighted above requires an integrative approach towards the research and writing of Singapore history through what has been coined as the historical archaeological approach. This approach, while radical in the Singapore historiographical context, has been pioneered first in the United Kingdom, and then in the United States, over the last three decades (Walker 1967; Orser Jr 2010). The approach is not without its challenges and criticisms. However, in Singapore's case, the absence or paucity of identified pre-historic sites pre-dating the historic period settlements provide the possibilities of historical modes of enquiry to inform, frame, and sustain archaeological research as one aspect of historical research in Singapore.

In the face of such opportunities and imperatives, how should historical research through archaeological fieldwork and research on excavated materials be facilitated to ensure that Singapore historiography has the potential to chart new ground in historical research?

5.4: Developing Historical Archaeology in Singapore

Three critical issues have to be addressed in order for historical research to be able to incorporate archaeology as part of its approach: 1) how recovered materials should be made available for research; 2) how the data of excavations should be retained so that the contexts of the materials would be available to assist in contextualising the materials; and 3) how future excavations have to be informed by historical modes of enquiry.

The first pertains to the establishment of an archive of archaeological materials presently in the custody of various archaeologists and research units. Taking the practice of textual archiving, the presently known caches of archaeological materials need to be quickly inventorised, with the sites excavated, and the materials recovered

and recorded in a very basic manner. The key would be to establish a searchable system that allows for the materials to be worked on in batches, based on the context of their recovery. Batches, collated in squares and spits, would likely be the best way of building up a framework for the archaeological archive to be initially established, and for the materials to be made accessible to researchers.

Herein, the objective is not necessarily archivalisation, in which a process of assessing what specific items would be worth keeping in the long run and accessioned to a permanent collection is carried out. Such a process would require a longer term commitment to work through the excavated collections that have hitherto been accrued. **It also connotes an interpretive lense, as the notion of 'value', and what is presumed to be 'worthy of preservation', may be subject to different interpretations,** including unique visual and compositional characteristics of individual items, the retention of representative squares and spits of excavation sites, or the objectives of presentist historical narratives, to name but three. Rather, archivisation, a process through which materials are fed into a system, or systems, of storage and record so that they can serve as a repository of information about the past, needs to first and foremost be immediately established (Ketelaar 1999). In this regard, the levels at which the records need to be maintained could be minimal. Herein, even basic categorisations of finds into such classifications as stoneware (green; white; others), porcelain (blue and white; others), earthenware (high-fired; low-fired; coarse paste; fine paste), and other such categories are not necessary for a usable archive to be established. In fact, such first-level classifications, beyond inventorising through squares and spits, are in themselves research frameworks with specific methodologies in mind. Such classification processes should, therefore, be regarded as the application of research, as opposed to the establishment of an inventorised system to allow for research to take place. Such frameworks ought to be set up with the objective of facilitating and enabling the use of such materials as one source of historical data.

Along with the concept of archivisation is the rendering of materials in a timely manner. The fact that archaeological excavations will continue to be conducted, in the face of a growing awareness of the importance of heritage and history in Singapore at many levels of society, suggests that more of such materials will be aggregated in various collections. It is clear that first rights for the conduct of post-excavation analyses should be accorded to the research unit that has carried out the excavation in the first place. However, it is critical that such materials be made available to others in a timely manner, so that the study of Singapore history may not be unduly stymied. In this regard, the similarities with the declassification of archival materials, normally practiced in many places, could be replicated for archaeology in Singapore.

Part of the overall strategy, apart from the setting up of a strong oversight structure, would be the development of digital databases that would allow for the materials to be captured in digital image form, with any site reports to be made available for access in digital format as well. Greater access to the materials can be made available through electronic portals, which will allow the issues pertaining to the provision of

physical space and the management and administration of material caches to be addressed to some extent.

Secondly, contextualisation of the excavations and their associated finds, typically achieved through the publication of both preliminary and more detailed site reports and excavation reports, needs to be agreed upon by the various archaeological research entities and individual practitioners as one of the most important outcomes of any fieldwork to be conducted in Singapore. More importantly, as in the establishment of any archival collection, such reports often provide the only basis upon which the material remains may be studied. In Singapore, it is all the more important that archaeologists recognise this imperative, given that there is no central agency that manages the aggregation and dissemination of archaeological research and information in the country, and which would demand the production of records with the provision of funding for excavations and post-excavation work.

Thirdly, as archaeological research in Singapore moves forward, it is imperative that historians begin to play a role in the planning of future excavations. Inherent in the dichotomy in the research and output of Singapore history is the difference in methodologies, approaches, and even historical interpretations and therefore the narrative output of the disciplines of anthropology and history. Given that Singapore's past is, at least as the state of the field indicates at present, confined to the historical period; historical archaeology, as opposed to solely anthropological archaeology, would be a critical approach in the yielding of maximum outcomes and lines of enquiry as the historiography of Singapore matures. Indeed, textual history has always been the basis upon which archaeological research in Singapore has developed. The static reconstructed images of archaeological research can fill in the significant gaps that are apparent from the textual materials. Similarly, the use of chronological historical research can inform the way in which archaeological research during the field recovery stage is to be conducted to effectively maximise the yield of usable data for historical research purposes. It would also inform how post-excavation classifications may be conducted through a reassessment of the chronological periodisations and research questions that may be formulated for such post-excavation projects.

5.5: Conclusion

The field of Singapore history is at the cusp of change. Across the landscape, new methods and approaches, including historical sociology, contemporary history, public history, and alternative and people's histories, have begun to emerge over the last decade. Along with the discovery and new release of caches of archival materials, the narrative of Singapore's past has started to move along different trajectories from the one established over the last three or four decades.

Archaeological research can and should be part of this important change. This is particularly important, given the limited space that the pre-modern settlements and colonial town of Singapore were known to have occupied. It cannot be over-emphasised that the irretrievable loss that comes from the destruction of sites of archaeological

potential is the result of not only the rapid rate of urban development and renewal, but also of archaeological research itself.

Contrary to the ruminations in certain quarters that archaeology in Singapore is a lonely field, and that there is a general lack of interest in such research in a high modernist developmental state, archaeology in Singapore has only been left on the sidelines simply because it has hitherto been a relatively inaccessible source of data for historians.

In order for archaeology to become an integral part of the broader thrusts of historical research, frameworks for instituting the usability and accessibility of archaeological data, including recovered materials and excavation reports, have to be established. In the face of a plethora of archaeologists working independently on archaeological research in Singapore, a set of accepted best practices, informed by the needs of historical research, would be necessary so that a predictable research environment may be developed, and for archaeological research in Singapore to move beyond merely being an esoteric interest of a small fraternity.

6: THE CLASSIFICATION OF STONEWARE CERAMICS IN SINGAPORE

BY JOHN N. MIKSIC

6.1: Introduction

Stoneware ceramics of the Song to Ming period are ubiquitous in Southeast Asian sites, especially in Singapore and the surrounding region. Nevertheless, they have received relatively little attention. Chinese archaeologists have shown little interest in stoneware ceramics in contrast to the related subject of porcelain, but a comparison in the distribution pattern of stoneware with that of porcelain may yield interesting insights into the economic and social structures of early urban sites. A preliminary system for sorting stonewares of the 14th through 16th centuries found in Singapore has been devised, but further research is needed in order to interpret the patterns so far discerned.

Archaeologists have supervised the excavation of close to a million artefacts from precolonial Singapore (Miksic 2013). The range of materials in the overall assemblage is quite wide. Materials include metal, stone, various organic substances, glass, plastic, and ceramics. As usual, when one is researching urban sites, the ceramic component dominates both in amount and in variety. The problems of dealing with such a mass of material are obvious, starting with the need for physical space to store them.

Since archaeological investigations began in Singapore in 1984, hundreds of volunteers have been involved in processing this mass of material. Volunteers are the **lifeblood of archaeology in most places. Despite one's best efforts to train volunteers,** it is impossible to trust volunteers completely. There is no offense intended—archaeology is simply not their primary vocation or expertise. On the positive side, they are passionate and engaged. They want to learn about archaeology because they respect heritage.

Although some volunteers remain engaged for five years or more, they are almost by definition short-term participants in the never-ending struggle to make sense of all the things we acquire. Training of new laboratory helpers is therefore almost a full-time pursuit.

One is therefore always going to have to work with a wide range of people, who **will have very different skills in terms of being able to learn quickly the 'ins and outs'** of distinguishing between different materials. This is one of the main constraints involved when it comes to devising a strategy for processing finds. Where ceramics are concerned, in the Singapore context, there are three main categories that constitute the first level of sorting: earthenware, stoneware, and porcelain. Almost all precolonial earthenware found in Singapore was locally produced, although there is one variety that is obviously imported from southern Thailand and belongs to a distinct tradition of ceremonial water ewers or *kendi*.

One also comes across individual sherds that appear to have been produced within the same tradition of carved paddle impressing and coiling, but are sufficiently different in material and decorative motifs as to suggest that they were made somewhere else in the Straits of Melaka. At some point in the future, petrographic analysis and other physical characterization studies have the potential to solve this question. For example, a doctoral student from Boston University has analysed sherds from Singapore and some other sites in Southeast Asia, as well as some samples from India. **Her research topic specifically concerns evidence for the growing subject of “foodways”** in Banten Lama, west Java. The researcher has now completed her doctoral dissertation, which is available from Proquest (Ueda 2015). It is hoped that she will continue to pursue this topic in the future.

One of the first questions that arises is that of provenance. Energy-dispersive X-ray fluorescence (EDXRF) has been applied to sherds from Singapore (Miksic and Yap 1990; Miksic and Yap 1992; Miksic, Yap and Hua 1994; Miksic, Yap and Vijiyakumar 1996). It has proved to be of some utility. However, by itself, it is not a method that is able to resolve questions about origins. For earthenware and stoneware, both of which have mineral inclusions, petrographic analysis of paste can provide a useful source of comparative data. For porcelain, this is not an option.

Unfortunately, Singapore does not have facilities for petrographic analysis. There are no departments of geology at any Singaporean universities. One former PhD student at the National University of Singapore (now graduated) learned the techniques of petrographic analysis before returning to the Philippines to teach. For the past few years, he has been working at a university in Palawan where they unfortunately do not have the necessary equipment. If he moves to a larger university in the future, it may be possible to collaborate to expand the use of this technique in Southeast Asia.

The largest single component of Singapore’s precolonial assemblage is stoneware. This alone is enough to demonstrate the importance of this material. Like porcelain, it is all imported, mainly from China. However, in the 15th century assemblages, there exist imports from Thailand and Vietnam, and possibly Myanmar.

One of the more difficult things for volunteers to learn, it seems, is how to distinguish stoneware from earthenware. These categories are very important for archaeological analysis. Porcelain is almost always glazed, but some varieties of stoneware have no glaze at all. It is necessary to learn how to differentiate between the stoneware and earthenware types by feel/touch (qualitative tactile differentiation) rather than just by visual cues. Some people acquire these skills faster than others.

Utilitarian stoneware storage vessels are often ignored in the archaeology of early historic Asian cities. This is true not only in Southeast Asia but even in China, where most of this material was made. Some probably found its way here [Singapore] from Thailand, Vietnam, and Myanmar, but we have not had time to differentiate the stoneware category into finer types. If and when that stage of analysis is reached, this information could provide an important new perspective on the trade of 14th to 16th century Singapore.

Chinese archaeology does not yield much help to scholars in the realm of stoneware. In fact, the archaeology of urban areas in China in general has not yet made much progress. Xin Guangcan, who received her BA in archaeology from Beijing University, devoted part of her doctoral research at the National University of Singapore to a search for comparative material from China with which to put the Singapore ceramics in perspective. She had little success in this endeavour (Xin 2016). Chinese historical archaeologists only recently broke away from their previous reliance on texts and concentration on palaces and graves in northern China to devote more attention to mass-produced items and other artefacts related to the lives of commoners. However, their ceramic research has mainly been confined to kiln sites where porcelains were made. There is no ready-made typology for stonewares in China which we can adopt for our research in Southeast Asia.

6.2: Stonewares in Southeast Asian Archaeology

The first article on the subject of stonewares in Southeast Asian archaeology was written by a volunteer, Carla Zaine (1967), who worked with the British anthropologist and amateur archaeologist Tom Harrisson in Sarawak in the 1960s. She came to Southeast Asia as a Peace Corps volunteer. She was a teacher, but spent some of her spare time working with Eine Moore in the Sarawak Museum. Three years later Moore published her own article on what she called 'stonewares of Martabani type' (Moore 1970). The term 'martavan' is still in general use among ceramic collectors in Indonesia and other regions to refer to stoneware storage jars made during the Song to Ming periods (Mranata and Susanto 2012).

These two articles in the Sarawak Museum Journal still form the standard basis for the system used to classify Chinese stoneware found in Southeast Asia. This system has the virtue of being simple, though as usual there are always 'devils in the details'. Ms Zaine's classification was not meant to provide a basis for archaeological analysis. Her objective was simply to devise a system to facilitate sorting of sherds in order to match bases to bodies and rims to derive reconstructions of shapes of vessels. It was probably her unspoken assumption that once shapes were known, it would be possible to trace the objects back to their places of origin.

This system was also the original concept employed when work began to classify material from Kota Cina, a trading port of the late eleventh through mid-thirteenth century, excavated by Dr Edmund Edwards McKinnon (Miksic 1979; McKinnon 1984).

Barbara Harrisson, who spent much of her career in Sarawak and is one of the foremost experts on the subject of stoneware in Southeast Asian archaeology (e.g. Harrisson and Sharifuddin 1969, Harrisson 1970), has pointed out that reconstruction of individual artefacts by restoring them is 'fun', but does not produce information that one cannot get from the sherds themselves. The material, not the shape, is the critical variable (Barbara Harrisson, personal communication, January 1977).

6.3: Nomenclature Issues

The study of stoneware is afflicted by a problem of nomenclature: the boundary between earthenware and stoneware is easy to discern, but that between stoneware and **porcelain is controversial**. Following Anna O. Shepard's philosophy (Shepard 1974; Miksic 1979), the three types of ware should be distinguished by the physical nature of the pot. Earthenware has been fired to a temperature no higher than 900° C. Below 900°, the clay particles do not undergo physical changes. The only major alteration of the material is the expulsion of the water from the clay. Earthenware is still porous, however, meaning water can percolate from the interior to the exterior of the vessel and evaporate.

Between 900° and 1200° C, a physical change occurs. The surfaces of the clay particles melt. This is called sintering. When the pot cools, the surfaces of the particles fuse together and create a less porous material. It is also possible to coat the surface of the clay with a silicate substance which when fired creates a glassy surface on the pot. This is called glaze. Earthenware can be glazed too, but only with lead based substances, which are less shiny and durable. Between 1200° and 1350° C, another physical change occurs. The clay particles completely melt. This is called vitrification. When they cool, they create a completely non-porous material, which can be glazed with a very shiny appearance.

Many art historians and some archaeologists use a different set of criteria for distinguishing stoneware from porcelain. In this terminology, only very pure kaolin clay with a sugary white colour is considered porcelain. Other high-fired wares such as Longquan celadon may have a grayish colour. This was intentionally created by the potters by adding other minerals to the kaolin in order to create a darker background which would create a deeper more aesthetically pleasing shade of green on the surface of the glaze. The problem is that colours of paste can vary along a cline instead of being sharply divided. This makes it difficult to classify some pieces. The criterion of firing temperature also correlates well with the types of objects made. Those fired to around 1200°C are coarser, less dense, larger, and utilitarian objects. Those fired beyond 1200°C are normally much more refined in shape, smaller, and used for a completely different range of purposes – mainly the serving of food or pure aesthetic expression. The term **'porcellaneous stoneware'** is also found in the literature. This term only serves to create another category which cannot be precisely defined and is therefore difficult to apply objectively.

Well-known names for Chinese stoneware types used by scholars and connoisseurs in Southeast Asia include the term **'Dusun jars'** (named in Harrison 1965; it is now known that these mainly date from the 9th and 10th century). Some of these were found on the *Belitung* or *Batuhitam* shipwreck (Krahl *et al.* 2010). The term **'dragon jar'** refers to jars with molded dragons on the shoulders. It is now known that the first examples of this type were made during the Yuan dynasty, at the end of the 13th or early 14th century (Dupoizat 2007). In Indonesia, the Iban people distinguish seven traditional classes of premodern stoneware jars according to their locally assigned

values. These values are correlated with the ages and forms of the jars. They were traditionally used as a form of high-value currency.

Moore's (1970) study of 'stonewares of Martabani type' explored the distribution of these artefacts in the context of the sites in the delta of the Sarawak River where they were found. These sites can be dated by the Chinese porcelains found in them. It was observed that sites of the pre-Song period (identified by the presence of Yueh-type high-fired ware) do not contain later Longquan ceramics. Therefore, she dated the stoneware types by their association with sites dated by reference to Chinese high-fired (porcelain) ceramics. She based her classification system on Anna Shepard's book referred to previously, but by using the word 'martaban' in a generic rather than literal sense (i.e. as a style of jar rather than the product of the port or region of Martaban/Mottama in southern Myanmar), she perpetuated the slippery and imprecise terminology that still hinders the study of stoneware in Southeast Asian archaeology.

Shepard's book *Ceramics for the Archaeologist*, the first edition of which was published in 1956, is still the basic guide to the study of ceramics by anthropologically-oriented archaeologists of the American school. It is based primarily on paste, with glaze and form as secondary considerations. Each class is assumed to represent a kiln or group of kilns using the same clay source. Moore (1970) adopted a binomial system, in which numbers substituted for types which have no known kiln sites, which is often called the type-variety system. Moore called her types 'classes' instead of types, and divided her classes into sub-classes instead of varieties. Otherwise, her procedure is completely compatible with the standard American system.

Moore describes no fewer than 20 classes. She dates some of these to the 18th or even 19th centuries. This is possible because the sites in Sarawak seem to have been utilised for short periods of time. After the 13th century, respective sites are all burials that can be dated rather precisely by the Chinese porcelains of known types found in them. She assigns one class to the Kalong kiln complex of north Thailand. This particular conclusion may need to be re-evaluated because our knowledge of Kalong ceramics has improved substantially since the 1960s. No typical Kalong ceramics have been reported from archaeological sites.

6.4: Sorting in Singapore

In Singapore sorting, at the preliminary stage that still characterises the progress of research on the ceramics from precolonial Singapore, stonewares are divided into three categories. **One corresponds more or less to Moore's category number 1: an early olive-glazed ware with a uniform body, coarse and heavy, which rarely burns red.** These are covered with thin, olive to gray-green glaze. Type 1A consists of thickly potted heavy jars. Similar examples have been found in 9th century levels at Borobudur, and graves in northern Vietnam. This ware probably comes from Fujian. It is used for a variety of shapes in addition to jars, including basins of similar dimensions to modern plastic basins used for washing clothes or dishes, and bowls with striations on the interior, possibly used for grating food. It has long been thought that these were all made in

Guangdong, since the earliest Chinese jars found in Southeast Asia such as those on the Belitung shipwreck are of this type. Recently, a Chinese archaeologist from Fujian has reported that such jars are also found at the Cizhou site in Fujian (Lee Jian An, personal communication, 2013). The kilns where these jars were made has never been found, so **for the moment, the best procedure is to give this type a neutral name.** The term ‘buff ware’ has been provisionally adopted.

Moore’s second type is called ‘Brittle ware’. This term is still used in Singapore precisely because it is neutral. She defines it as hard granular gray stoneware with black specks which may represent grog. The glaze is usually thin, with a fine crackle, brown to olive or dark green, sometimes almost black, temmoku-like. A bright green lead glaze is common on smaller vessels (Moore 1970: IIH, plate 2c: this example is from Vietnam).

Moore’s type IIC is by far the most common type of material found in 14th century Singapore sites. It comes in the form of IIc (Moore 1970: IIF, plate Id: *xiao kuo ping*/small-mouthed jar/mercury jar). We can now confirm on the basis of Chinese reports that one of the main places of production for these bottles was in the Quanzhou area, which makes perfect sense since that was a predominant Chinese port in the 13th and early 14th centuries. Other than these bottles, Singapore yields relatively few examples of brittle ware, all of which seem to have been made in the form of large jars.

Two other types described by Moore may also deserve to be categorised separately. One is her Type X, labelled ‘Soo Chou ware’, consisting of heavier pieces with coarse body containing grog. However, Moore’s plate 15a is almost certainly from Vietnam, not China. Almost nothing was known of Vietnamese ceramics in 1970. This situation has changed considerably; we now know much more about stoneware from Thailand, Vietnam, and Cambodia than we do about China; and recently important new information has come to light on pottery from Martaban. Plate 15b termed Soo Chou ware is almost certainly from Mottama/Martaban. Moore’s Type XV, ‘small brown dragon jars’ with poor quality ochre-olive glaze and eight lugs are almost certainly Vietnamese (‘Annamese’ in the terminology of 1970 has been abandoned by most scholars). Moore’s category XIX ‘tall narrow jars and bottles’ includes some of Near Eastern origin, for instance, plate 21a, b, c, are almost certainly ‘Zamzam jars’ used by Muslim pilgrims to bring back water from the Muslim holy land.

6.5: Comparison with other sites

We have three main types of stoneware. For comparison, one can cite Kota Cina in northeast Sumatra. This site belongs to the period preceding Singapore: the 11th through 13th centuries. All three main types of stoneware were also present there, but there were some interesting differences in the percentage composition of the assemblage. Brittle ware was much more common there than in Singapore, but *xiao kuo ping* bottles comprised a smaller proportion of that class. The range of brittle ware was also much broader, including many smaller, more refined shapes, such as *kendis* and

various kinds of jarlets. The significance of this pattern is so far impossible to ascertain; we have little quantitative data from any other sites to compare with.

The site of Kota Batu, Brunei, dates from the 15th and 16th centuries (Harrison 1970). Harrison divided the ceramic assemblage there into five categories:

- A. Chinese and Annamese (i.e. north Vietnamese) celadons, blue and white ware, polychromes, whites: 3,953 sherds or 63% of the assemblage;
- B. Tongkin and Siamese (Thai) blue and white and polychromes: 188 sherds or 3.5% of the assemblage;
- C. Large coarse stoneware jars: 1,428 sherds or 23% of the assemblage;
- D. Local earthenware: 221 sherds or 3.5% of the assemblage;
- E. Recent (19th century): 220 sherds or 3.5% of the assemblage.

Of the large coarse stoneware jars, almost all have only incised rings. Only two are decorated with raised dragons. The assemblage includes five bases of conical [*xiao kuo ping*] jars.

Another interesting site for comparison with Singapore is Sungai Lumut in Sarawak (Harrison and Shariffudin 1969). The site assemblage includes stoneware, porcelain, beads, bangles of glass, shell, stone, iron, bronze, and damar (tree resin/amber). The ceramic assemblage is said to be similar to Calatagan in the Philippines, Niah Cave in Sarawak, and the Kelabit highlands of Sarawak. Of 6,000 sherds obtained, 49% (representing 22% of the vessels) are coarse stonewares (and thus probably big ones); 13.5% are Thai monochromes and blue and white ware, constituting 10% of the vessels. The largest categories in terms of vessels represented are those of south Chinese monochromes and polychromes, which compose 28% and 34% respectively of the total vessel population.

In east Java, although no excavation data is available, a three-year field school funded by the Ford Foundation from 1991 to 1993 concentrated on the surface survey (*Laporan* 1995). Approximately 100,000 sherds were recovered. Stoneware comprised a relatively small proportion of the ceramics recovered there. It is not clear why this should be so. One possible reason is that in 14th century Majapahit, the Javanese seem to have made many large clay vessels, which performed the same role as the Chinese stonewares, and therefore Chinese stonewares would have been superfluous to their needs.

The provincial museum in Palangka Raya, Central Kalimantan, Indonesia, is named after jars. Kreps (1994; 2003) discussed their importance in the context of what she called 'cultural hybridization'. The importance of the difference between the use of Chinese ceramics in general in Singapore and Riau in the 14th century has also been discussed (Miksic 2000). It is interesting that among the Chinese, Thai, and Vietnamese wares of the Yuan and early Ming (14th and 15th centuries) found in Riau, stoneware was conspicuously rare, and the large jars were almost completely unknown. This suggests that the importance of *balanga* as *pusaka* or heirlooms in Kalimantan may date from the 16th century and later.

One specialized study of early stonewares found in Singapore has been published by Wong Wai Yi, a graduate of the Department of Southeast Studies at the National University of Singapore. Wong (2011) studied sherds of what the original classifiers of the Sarawak stoneware termed 'Kwantung jar' sherds with stamped potters' marks found in the 14th century Fort Canning archaeological site in Singapore and related problems about some ceramic vessels of shipwrecks and their cargoes.

Recent research in Myanmar has finally confirmed the location of a kiln complex in the area near Mottama (Martaban) where the eponymous jars were probably made. U Chan Thar, a resident of Kayin State, told *The Myanmar Times* on 3 and 4 November 2012 that more than 50 pottery furnaces have been uncovered in Mon State since 2004, which were probably used to make large jars, based on sherds found in association with them. Many of these kilns were however found when land was bulldozed for road building. According to Daw Lei Lei Win, Deputy Director of the Department of Historical Research, officials have begun to survey these sites. These reports were subsequently confirmed by a team led by the ceramic specialist Don Hein (Hein 2014).

Historical research has shown that most of these jars were originally made to contain commodities being shipped from lower Myanmar to India, rather than to Southeast Asia (Gutman 2001). No studies of the remnants of these jars found in India have yet been published, but these artefacts have also been reported found in Japan (Nan Kyi Kyi Khai 2009). In Southeast Asia, these jars continue to attract collectors of all types, both traditional and modern. These jars still play a major role in Borneo in particular. They probably are no longer used as currency with which to purchase brides, but in other spheres of life they are perhaps as important symbolically as kris in Java and the Malay realm.

6.6: Conclusion

The cultural and historical significance of Chinese stoneware jars in Southeast Asia is therefore greater than their utilitarian functions might suggest. The study of stonewares made in mainland Southeast Asia has made progress since the 1990s, but further advances are hindered by several factors: the lack of scholars with an interest in the subject, lack of published data, and rapid destruction of archaeological sites. To this, one must add the difficulty of storing these artefacts. The quantity of material involved occupies considerable volume, and therefore requires continuous expenditure. In future, it may be necessary to consider reburial as an option for duplicate sherds. Before this can be done, however, typological studies will have to be conducted to determine which samples must be retained to represent all types and varieties identified.

REFERENCES CITED

- Andaya, B.W. and Andaya L.Y. (2001). *A History of Malaysia*. Basingstoke: Palgrave.
- Ban, K.C., Pakir, A. and Tong, C.K. (eds.) (2004). *Imagining Singapore*. Singapore: Eastern University Press.
- Barker, P. (1993). *Techniques of Archaeological Excavation*. London: Routledge.
- Bland, W. (1837). 'Inscription on the Jetty at Singapore', *Journal of the Asiatic Society of Bengal*, 6, 680-682.
- Borelle, B. (1998). 'Money in 14th Century Singapore', in W. Lobo and S. Reimann (eds.) *Southeast Asian Archaeology* (1-16). Hull: Centre for South-East Asian Studies.
- Braddell, R. (1980). *A Study of Ancient Times in the Malay Peninsula and the Straits of Malacca*. Kuala Lumpur: Malaysian Branch of the Royal Asiatic Society.
- Brown, D.H. (2003). 'A Review of Standards in England for the Creation, Preparation and Deposition of Archaeological Archives', *Archaeological Archives Forum*. See http://archives.archaeologyuk.org/Review_of_Archive_Standards.pdf (last accessed February 28, 2017).
- Brown, D.H. (2007). 'Archaeological Archives. A guide to best practice in creation, compilation, transfer and curation', *Archaeological Archives Forum*.
- Brown D.H. (2008). 'Guidelines for the Development of an Archaeological Resource Centre', *Archaeological Archives Forum*. See http://archives.archaeologyuk.org/aaf_arc_guidance_2010.pdf (last accessed February 28, 2017).
- Brown, D.H. (2011). 'Archaeological Archives. A guide to best practice in creation, compilation, transfer and curation, 2nd edition', *Archaeological Archives Forum*. See http://www.archaeologyuk.org/archives/aaf_archaeological_archives_2011.pdf (last accessed February 28, 2017).
- Buckley, B.M., Lieberman, V.B. and Zottoli, B. (2012). 'Asian Monsoon Extremes and Humanity's Response over the Past Millennium', *American Geophysical Union, Fall Meeting* vol.1, 1-201.
- Chew, E.C.T. and Lee, E. (eds.) (1991). *A History of Singapore*. Singapore: Oxford University Press.

Chen, O.H.L. (2001). *Earth to Earth: An Investigation into the Occurrence of Earthenware Artefacts at the Parliament House Complex Site*. Unpublished MA Thesis, National University of Singapore.

Choo, A.A. (1986). *Report on the Excavation at Fort Canning Hill, Singapore*. Singapore: National Museum Singapore.

Clarke, S. (2008). *Down the Dig: Monmouth—An Adventure in Archaeology*. Monmouth: Clarke Printing.

Collections Trust (2011). 'SPECTRUM'. See <http://www.collectionstrust.org.uk/spectrum> (last accessed February 28, 2017).

Crawfurd, J. (1828). *Journal of an Embassy from the Governor General of India to the Courts of Siam and Cochin China: Exhibiting a View of the Actual State of those Kingdoms*. London: H. Colburn.

Department for Communities and Local Government (2012). 'National Planning Policy Framework'. See http://www.communities.gov.uk/documents/planningand_building/pdf/2116950.pdf (last accessed February 28, 2017).

Department for Communities and Local Government (2010). *Planning Policy Statement 5: Planning for the Historic Environment*. London: Department for Communities and Local Government.

Dupoizat, M. (2007). 'Essai de chronologie de la céramique chinoise trouvée à Si Pamutung, Padang Lawas: Xe-début xive siècle', *Archipel*, 74, 83–106.

Edwards, R. (2012). 'Archaeological Archives and Museum 2012', *the Society of Museum Archaeologists*. See <http://socmusarch.org.uk/socmusarch/gailmark/wordpress/wp-content/uploads/2016/07/Archaeological-archives-and-museums-2012.pdf> (last accessed February 28, 2017).

Edwards, R. (2014). 'Review of the Storage, Access To, and Use of Archaeological Archives In Wales'. See <http://cadw.gov.wales/docs/cadw/publications/reviewofstorageaccessarchaeologicalarchivesEN.pdf> (last accessed February 28, 2017).

Ee, J. (1961). 'Chinese Migration to Singapore, 1896–1941', *Journal of South East Asian History*, 2.1., 33–51.

Freedman, M. (1979). 'Immigration and Associations: Chinese in Nineteenth Century Singapore', in M. Freedman (ed.) *The Study of Chinese Society*. Stanford: Stanford University Press.

Gibson-Hill, C.A. (1954), 'Singapore: Notes on the History of the Old Straits', *Journal of the Malayan Branch of the Royal Asiatic Society*, 27.1, 163–214.

Gutman, P. (2001). 'The Martaban trade: an examination of the literature from the seventh century until the eighteenth century', *Asian Perspectives*, 40.1, 108–118.

Harrisson, B. (1970). 'Classification of archaeological trade ceramics from Kota Batu, Brunei', *Brunei Museum Journal*, 2.1, 114-187.

Harrisson, B. (1982). 'Correlations and types of Vietnamese trade wares: 13th –19th centuries', in C.M. Young, M. Dupoizat, and E.W. Lane (eds.) *Vietnamese Ceramics* (38–48). Singapore: Southeast Asian Ceramic Society/Oxford University Press.

Harrisson, B. and Shariffudin, P.M. (1969). 'Sungai Lumut, a 15th century burial ground', *SMJ*, 1.1, 24–56.

Harrisson, T. (1965). 'Dusun' jars: from Mayfair and Friesland through Cairo to Sabah', *SMJ*, 12.25–26, 69–74.

Hack, K. (2014). 'Framing Singapore's History', in N. Tarling (ed.) *Studying Singapore's Past: C. M. Turnbull and the History of Modern Singapore* (17–64). Singapore: NUS Press.

Harris, E.C. (1989) *Principles of Archaeological Stratigraphy*. See http://www.archaeology.ru/Download/Harris/Harris_1989_Principles.pdf (last accessed February 28, 2017).

Hein, D. (2014). *Ceramic finds and Kilns at Mawlamyine and Kayin State, 14 – 17 March 2014*. Unpublished Report.

Heng, D. (2004). 'Economic Networks between the Malay Region and the Hinterlands of Quanzhou and Guangzhou: Temasik and the Chinese Ceramics and Foodstuffs Trade'. In J. N. Miksic and C.M.G. Low (eds.) *Early Singapore 1300s - 1819: Evidence in Maps, Text and Artefacts* (73–85). Singapore: Singapore History Museum.

Heng, D. (2009). *Sino-Malay Trade and Diplomacy from the Tenth through the Fourteenth Century*. Athens: Ohio University Press.

Heng, D. (2010a). 'Archaeology and Its Role in the Construction of Singapore History'. In K.S. Loh and K.K. Liew (eds.) *The Makers & Keepers of Singapore History* (112–121). Singapore: Ethos Books and Singapore Heritage Society.

Heng, D. (2010b). 'Casting Singapore's History in the Longue Duree'. In J.L. Margolin, K. Hack and K. Delaye (eds.), *Making the Global City: Singapore from Srivijaya to Present* (54–74). Singapore: NUS Press.

Heng, D. (2011). 'Situating Temasik within the Larger Regional Context: Maritime Asia and Malay State Formation in the Pre-Modern Era'. In D. Heng and S.M.K. Aljunied (eds.) *Singapore in Global History* (27–50). Amsterdam: Amsterdam University Press.

Heng, D. and Aljunied, S.M.K. (eds.) (2011). *Singapore in Global History*. Amsterdam: Amsterdam University Press.

Her Majesty's Stationery Office (1990). *Planning Policy Guidance 16: Archaeology and Planning*. London: Her Majesty's Stationery Office.

Hicks, D. and Beaudry, M. (eds.) (2006). *The Cambridge Companion to Historical Archaeology*. Cambridge: Cambridge University Press.

Hull, D. (2011). 'Archaeological archives in Northern Ireland: Legislation, guidance and comparison with other jurisdictions', *Northern Ireland Assembly, Research and Information Service Research Paper, NIAR 621-11*. See <http://www.niassembly.gov.uk/globalassets/documents/raise/publications/2011/culture-arts-leisure/17411.pdf> (last accessed February 28, 2017).

Kao, Aaron (in press). 'The Decorated Earthenware from National Art Gallery Site, Singapore'. 2nd SEAMEO-SPAFA International Conference on Southeast Asian Archaeology, Bangkok 2016.

Ketelaar, F.C.J. (1999). 'Archivalisation and Archiving in Archives and Manuscript', *The Journal of the Australian Society of Archivists*, 27, 54–61.

Krahl, R., Guy, J., Wilson, J.K., and Raby, J. (eds.) (2010). *Shipwrecked: Tang Treasures and Monsoon Winds*. Washington D.C.: Arthur M. Sackler Gallery, Smithsonian Institution; Singapore: National Heritage Board, Singapore Tourism Board.

Kreps, C. (1994). *On Becoming "Museum-Minded": A Study of Museum Development and the Politics of Culture in Indonesia*. Unpublished PhD Thesis, University of Oregon.

Kreps, C. (2003). *Liberating Culture: Cross-Cultural Perspectives on Museums, Curation, and Heritage Preservation*. London and New York: Christina F. Kreps.

Kwa, C.G. (2004). 'From Temasek to Singapore: Locating A Global City-State In The Cycles Of Melaka Straits History'. In J. N. Miksic and C.M.G. Low (eds.) *Early Singapore 1300s - 1819: Evidence in Maps, Text and Artefacts* (124–146). Singapore: Singapore History Museum.

Kwa, C.G., Heng D., and Tan, T.Y. (2009). *Singapore: A Seven Hundred Year History*. Singapore: National Archives of Singapore.

Laidlay, J.W. (1848). 'Note on the Inscriptions from Singapore and Province Wellesley Forwarded by the Hon. Col Butterworth and Col J. Low', *Journal of the Asiatic Society of Bengal*, 17.2, 66–72.

Laporan Penelitian Arkeologi Situs-Kota Majapahit di Trowulan, Mojokerto, Jawa Timur 1991-1993 (1995). Jakarta: Pusat Penelitian Arkeologi Nasional and The Ford Foundation.

Lee, E. (2008). *Singapore: The Unexpected Nation*. Singapore: Institute of Southeast Asian Studies.

Lee, J.T.T. (2013). 'A Presence of the Past: The Legal Protection of Singapore's Archaeological Heritage', *International Journal of Cultural Property*, 20.3, 257–288.

Lim, C.S. (2005). 'Fort Tanjong Katong Raising History Planting Roots Project: Preliminary Site Report'. See http://www.searchaeology.com/v1/html/sg/pdfs/ftk_preliminaryreport1.pdf (last accessed February 22, 2017).

Lim, C.S. (2006a). 'Archaeology as a Critical Source of Examining the Past: The Archaeological Potential of Singapore'. In D. Heng (ed.), *New Insights to Singapore History: Perspectives of Emerging Scholars*. Singapore: National Library Singapore.

Lim, C.S. (2006b). 'Palmer Road Foot Tet Soo Khek Temple Archaeological Research Project Preliminary Site Report', *The Living Heritage: Stories of Fook Tet Soo Khek Temple*. Char Yong (Dabu) Association, Singapore.

Lim, C.S. (2017). *Preliminary Report on the Archaeological Investigations at the National Gallery Singapore*. Nalanda-Sriwijaya Centre Archaeology Unit, Archaeology Report Series No. 5. Singapore: ISEAS - Yusof Ishak Institute.

McKinnon, E.E. (1984). *Kota Cina: Its Context and Meaning in the Trade of Southeast Asia in the Twelfth to Fourteenth Centuries*. Unpublished PhD Thesis, Cornell University.

Miksic, J.N. (1979). *Archaeology, Trade, and Society in Northeast Sumatra*. Unpublished PhD Thesis, Cornell University.

Miksic, J.N. (1985). *Archaeological Research on the "Forbidden Hill" of Singapore: Excavations at Fort Canning, 1984*. Singapore: National Museum Singapore.

Miksic, J.N. (2000). 'Chinese Ceramics and Local Cultural Statements in Fourteenth-Century Southeast Asia'. In N.A. Taylor (ed.) *Studies in Southeast Asian Art: Essays in Honor of Stanley J. O'Connor* (194–216). Ithaca: Cornell University, Southeast Asia Program.

Miksic, J.N. (2013). *Singapore and the Silk Road of the Sea, 1300–1800*. Singapore: NUS Press.

Miksic, J.N. and Low, C.M.G. (eds.) (2004). *Early Singapore, 1300s - 1819: Evidence in Maps, Text and Artefacts*. Singapore: Singapore History Museum.

Miksic, J.N. and Yap, C.T. (1990). 'Fine-bodied white earthenwares of South East Asia: some X-ray fluorescence tests', *Asian Perspectives*, 28.1, 45–60.

Miksic, J.N. and Yap, C.T. (1992). 'Compositional Analysis of Pottery from Kota Cina, North Sumatra: Implications for Regional Trade during the 12th to 14th Centuries', *Asian Perspectives*, 31.1, 57–76.

Miksic, J.N., Yap, C.T., and Hua, Y. (1994). 'Archaeology and early Chinese glass trade in Southeast Asia', *Journal of Southeast Asian Studies*, 25.1, 31–46.

Miksic, J.N., Yap, C.T., and Vijiyakumar (1996). 'X-Ray Fluorescence Analysis of Glass from Fort Canning, Singapore', *Bulletin de l'École Française d'Extrême-Orient*, 83.1, 187–202.

Mranata, B. and Susanto, H. (2012). *Ancient Martavans: A Great Forgotten Heritage*. Jakarta: Himpunan Keramik Indonesia.

Moore, E. (1970). 'A Suggested Classification of Stonewares of Martabani Type', *SMJ*, 18.36-37, 1–78.

Museums Association (2016). 'Code of Ethics for Museums'. See <http://www.museumsassociation.org/download?id=1155827> (last accessed February 28, 2017).

Nan Kyi Kyi Khai (2009). 'The study on Myanmar trade ware: Martaban jar and white dish', *Kanazawa University Repository for Academic Resources Departmental Bulletin Paper*, 30, 101–136.

Nixon, T., McAdam, E., Tomber, R., and Swain, H. (eds.) (2002). *A Research Framework For London Archaeology 2002*, London: Museum of London. See <https://archaeologyinlondon.files.wordpress.com/2016/04/research-framework-for-london-archaeology-mola-2002.pdf> (last accessed February 28, 2017).

Orser, C.E., Jr. (2004). *Historical Archaeology*. 2nd edition. New Jersey: Prentice-Hall.

Orser, C.E., Jr. (2010). 'Twenty-First-Century Historical Archaeology', *Journal of Archaeological Research*, 18.2, 111–150.

Perrin, K. (2002). 'Archaeological Archives: Documentation, Access and Deposition. A Way Forward'. London: English Heritage

Perrin, K., Brown, D.H., Lange, G., Bibby, D., Carlsson, A., Degraeve, A., Kuna, M., Larsson, Y., Palsottir, S.U., Stoll-Tucker, B., Dunning, C., and Rogalla Von Bieberstein, A. (2014). *A Standard and Guide to Best Practice for Archaeological Archives in Europe: EAC Guidelines 1*. Namur: Europae Archaeologiae Consilium. See http://archaeologydataservice.ac.uk/arches/attach/The%20Standard%20and%20Guide%20to%20Best%20Practice%20in%20Archaeological%20Archiving%20in%20Europe/ARCHES_V1_GB.pdf (last accessed February 28, 2017).

Shepard, A.O. (1974). *Ceramics for the Archaeologist*. Washington, D.C.: Carnegie Institute of Washington, Publication 609.

Society of Museum Archaeologists (1993). *Selection, Retention and Dispersal of Archaeological Collections: Guidelines for use in England, Wales and Northern Ireland*. See <https://www.swfed.org.uk/wp-content/uploads/2015/05/selectionretentiondispersalofcollections1-SMA.pdf> (last accessed February 28, 2017).

Southport Group (2011). 'Realising the Benefits of Planning-led Investigation in the Historic Environment: A Framework for Delivery'. See <http://www.lse.ac.uk/geographyAndEnvironment/research/london/pdf/southport.pdf> (last accessed February 28, 2017).

Stulemeijer, R. (2011). 'Provenance Research on 14th-Century Greenware Found in Singapore', *Nalanda-Sriwijaya Centre Working Paper No. 9*. See https://www.iseas.edu.sg/images/pdf/nsc_working_paper_series_9.pdf (last accessed February 22, 2017).

Tan, E.H.C. (1998). *The Singapore Story: A Learning Nation: A Select Bibliography*. Singapore: National Reference Library and National Library Board.

Tanjong Pagar Consultative Committee (1989). *Tanjong Pagar: Singapore's Cradle of Development*. Singapore: Tanjong Pagar Consultative Committee.

Trocki, C.A. (1976). 'The Origins of the Kangchu System 1740–1860', *Journal of the Malaysian Branch of the Royal Asiatic Society*, 49.2, 132–155.

Trocki, C.A. (1990). *Opium and Empire, Chinese Society in Colonial Singapore, 1800-1910*. Ithaca: Cornell University Press.

Turnbull, A. (2009). *A History of Modern Singapore 1819 – 2005*. Singapore: NUS Press.

Tweedie, M. W. F. (1953). 'The Stone Age in Malaya', *Journal of the Malayan Branch of the Royal Asiatic Society*, 26.2, 3–90.

Ueda, K. (2015). *An Archaeological Investigation of Hybridization in Bantenese and Dutch Colonial Encounters: Food and Foodways in the Sultanate of Banten, Java, 17th-Early 19th Century*. Unpublished PhD Dissertation, Boston University.

Westman, A. (ed.) (1994). *Archaeological Site Manual*, Third Edition. London: Museum of London. See <http://www.thedigsite.co.uk/assets/molasmanual942.pdf> (last accessed February 28, 2017).

Walker, I.C. (1967). 'Historic Archaeology—Methods and Principles', *Historical Archaeology*, 1, 23–34.

Wheatley, P. (1973). *The Golden Khersonese: Studies in the Historical Geography of the Malay Peninsula before AD 1500*. Connecticut: Greenwood Press.

Williams-Hunt, P.D.R. (1951). Recent Archaeological Discoveries in Malaya (1945-50). *Journal of the Malayan Branch of the Royal Asiatic Society*, 24.1, 186–191.

Wong, L.K. (1978). 'Singapore: Its Growth as an Entrepôt Port, 1819–1941', *Journal of Southeast Asian Studies*, 9.1, 50–84.

Wong, W.Y. (2011). "Kwantung jar" sherds with stamped potters' marks found in the 14th century Fort Canning archaeological site, Singapore and related problems about some ceramic vessels of shipwrecks and their cargoes'. In National Maritime Museum of China, Shanghai (ed.) *Navigation: Trace of Civilization* (80–114). Shanghai: Shanghai Guji Chubanshe.

Xin, G.C. (2016). 14th Century Chinese Trade Ceramics and Urbanization in Southeast Asia – A Case Study of Early Singapore. Unpublished PhD Dissertation, National University of Singapore. <http://scholarbank.nus.edu.sg/handle/10635/122571> (last accessed February 28, 2017).

Zaine, C. (1967) 'Early Chinese Stonewares Excavated in Sarawak', *SMJ*, 15.30-31, 30–90.

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APPENDIX A: WORKSHOP POSTER

The NSC ARCHAEOLOGY UNIT Workshop

Archiving Archaeological Materials

date:

25th

November 2014

time:

0900hrs to 1330hrs

venue:

The Salon,
National Museum of Singapore

address:

93 Stamford Road, Singapore 178897

THIS WORKSHOP IS
BY INVITATION ONLY

ABOUT THE WORKSHOP

The uncovering of a country's past through archaeological investigations often results in vast quantities of artifacts and other materials. Prior to the excavation, it is not possible to project the yield of a site, and archaeologists throughout the world are frequently faced with the challenge and dilemma of what objects to collect during the excavations, copiously aware that their actions will determine the future archival record.

Singapore is no exception and archaeologists working in the city-state are faced with the surmounting challenges of seeking sufficient resources to address processing and analyzing the backlog of artifacts, and creating an accessible platform for other researchers and lay public to the collection. Essentially confronting what becomes of the materials in the post-excavation phase, and how relevant and accessible are the archaeological collection to the historical narrative of Singapore.

For the last three decades, archaeologists have been quietly excavating the island's past, but because little attention was previously focused on the ownership of recovered artifacts, archaeologists are ethically charged to be the custodians of the finds and continue to exercise this stewardship. Over the years, several museums in Singapore and the National Heritage Board have accessioned archaeological finds as part of the National Collection. These were generally selective in nature, pertaining to exhibition in museum galleries.

Notwithstanding that the artifact collection forms part of Singapore's national identity and historical conscience, all archaeological materials should be available for future re-interpretation and re-examination. Hence, it is crucial to ensure that post-excavation and archiving processes are comprehensively created and coherently curated to enable them to be safeguarded and usable in the future. This workshop on Archiving Archaeological Materials addresses surrounding and rising issues on the processes and curation of the excavated materials.

WORKSHOP SPEAKERS



Associate Professor Derek Heng
Head, Nalanda-Sriwijaya Centre ISEAS,
Yale-NUS College



Associate Professor John N. Miksic
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Mr. Lim Chen Sian
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APPENDIX B: WORKSHOP PROGRAMME



**WORKSHOP ON
ARCHIVING ARCHAEOLOGICAL MATERIALS
25 November 2014
National Museum of Singapore**

**26 November 2014
ISEAS**

**PROGRAMME
(as of 6 November 2014)**

Tuesday, 25 November 2014

8.45 am – 9.00 am	Registration
9.00 am – 9.10 am	Welcome Remarks <i>Associate Professor Derek HENG</i> Head, Nalanda-Sriwijaya Centre, ISEAS; and Yale-NUS College, National University of Singapore
9.10 am – 9.35 am	Presentation 1: Classification of Stoneware Ceramics in Singapore Presenter: <i>Professor John MIKSIC</i> Southeast Asian Studies Programme, National University of Singapore
9.35 am - 10.00 am	Presentation 2: Unearthing the Law: The Legalities and Ownership of Cultural Artefacts and Archaeological Remains Presenter: <i>Dr Jack Tsen-Ta LEE</i> Assistant Professor, School of Law, Singapore Management University
10.00 am - 10.25 am	Presentation 3: Historical Research in Singapore and the Place of Archaeology Presenter: <i>Associate Professor Derek HENG</i> Head, Nalanda-Sriwijaya Centre, ISEAS; and Yale-NUS College, National University of Singapore
10.25 am - 10.45 am	Discussion
10.45 am - 11.00 am	Coffee
11.00 am - 11.25 am	Presentation 4: Frameworks for Managing Archaeological Archives and Collections in the UK Presenter: <i>Mr Duncan BROWN</i> Head, Archaeological Archives, Heritage Protection, English Heritage, London

11.25 am - 11.50 am	Presentation 5:	The Archaeological Archive and Post Excavation Process: From Frustration to Publication
	Presenter:	<i>Dr Frank MEDDENS</i> Director, Post-excavation projects, Pre-Construct Archaeology, London
11.50 pm - 12.15 pm	Presentation 6:	State of Archaeological Methods and Practices in Singapore
	Presenter:	<i>Mr LIM Chen Sian</i> Visiting Fellow, Archaeology Unit, Nalanda-Sriwijaya Centre, ISEAS
12.15 pm - 12.35 pm	Discussion	
12.35 pm - 12.45 pm	Break	
12.45 pm - 1.30 pm	Forum	
1.30 pm - 1.35 pm	Closing Remarks <i>Associate Professor Derek HENG</i> Head, Nalanda-Sriwijaya Centre, ISEAS; and Yale-NUS College, National University of Singapore	
	<i>Mr LIM Chen Sian</i> Visiting Fellow, Archaeology Unit, Nalanda-Sriwijaya Centre, ISEAS	
1.35 pm - 2.30 pm	Lunch	
3.00 pm - 5.00 pm	Visit to Heritage Conservation Centre, NHB	
6.30 pm - 8.00 pm	Welcome Dinner	

Wednesday, 26 November 2014

9.30 am - 10.00 am	Visit to ISEAS facilities and library
10.00 am - 12.30 pm	Artefacts Handling Workshop for AU
12.30 pm - 2.00 pm	Lunch
2.00 pm - 3.00 pm	Discussion on Post-Excavation Processes
3.00 pm	End
7.00 pm - 8.30 pm	Public Lecture at National Museum of Singapore Digging the Urban Landscape: Complexities of Interpreting and Presenting Archaeology in London and Singapore
	<i>Dr Frank MEDDENS</i> Director, Pre-Construct Archaeology, London
	<i>Mr LIM Chen Sian</i> Visiting Fellow, Archaeology Unit, Nalanda-Sriwijaya Centre, ISEAS

