THE POMPEII ARTIFACT LIFE HISTORY PROJECT- NEW METHODOLOGICAL APPROACHES AND ILLUSTRATIVE RESULTS

J. Theodore Peña and Caroline Cheung
Department of Classics/Graduate Group in Ancient History and Mediterranean Archaeology
University of California, Berkeley

In this presentation Carline Cheung and I report on some of the work of the Pompeii Artifact Life History Project, or PALHIP, describing some of the methods that the project has been employing to study portable material culture at Pompeii and its environs and illustrating these by briefly presenting some our results.

PALHIP is a long-term research initiative being carried out under my direction by the University of California, Berkeley with the authorization of the Soprintendenza Speciale per i Beni Archeologici di Pompei, Ercolano e Stabia. The project's aim is to elucidate aspects of the life history of portable material culture at Pompeii and its environs including manufacture, acquisition, use, storage, maintenance, reuse/recycling, and discard - through the detailed characterization of selected sets of materials recovered in various past excavations. The team is small, consisting of no more than five persons, and our approach is by and large fairly low tech, involving for the most part simply the careful autopsy of the materials.

Each of the studies carried out as part of PALHIP is represented as a distinct sub-project. During its first five seasons - 2012-2015 - PALHIP has initiated and in some cases completed five such sub-projects. These include:

Sub-Project 1: The study of the artifact assemblage recovered at the Villa Regina a Boscoreale, a modest farmhouse 1.2 km NNW of Pompeii, including both those recovered in use-related contexts and artifacts recovered as surface scatter in the surrounding vineyards;

Sub-Project 2: The study of artifacts recovered in refuse deposits on the surface of the unnamed street that defines the western side of Insula IX.12 – the so-called *Insula* of the Casti Amanti – and in three sub-sidewalk cesspits from this street and the street that defines the eastern side of the block;

Sub-Project 3: The study of the artifacts recovered in four extra-mural trash middens deposited against the outer face of the Pompeii fortification wall in the area between Tower 8 and the Nola Gate;

Sub-Project 4: The study of eight *dolia* found on the surface in the market garden/orchard that occupies most of *Insula* I.22;

and Sub-Project 5: the study of a sample of the ca. 1200 amphoras – almost exclusively used Dressel 2-4s - found stacked and awaiting refilling - presumably with wine - in the courtyard of Oplontis Villa B, a warehouse facility located ca. 1.8 km WNW of Pompeii. This sub-project is being carried out in collaboration with and under the permit issued to the University of Texas Oplontis Villa B team directed by John Clarke and Michael Thomas.

Sub-Projects 1, 3 and 4 have been completed. Sub-Project 2 was blocked by a bureaucratic snafu in 2014. We plan both to continue it and to complete Sub-Project 5, begun this past summer, during our upcoming 2017 field season.

With these sub-projects completed we will have detailed information regarding one mixed set of artifacts from a use-related residential context – the Villa Regina; sets of special-use containers from use-related economic contexts – the *dolia* from *Insula* I.22 and the amphoras from Oplontis Villa B; and mixed artifactual refuse from an urban provisional discard context – the *Insula* of the Casti Amanti cesspits, a concentrated urban context – the Tower 8/Nola Gate middens, and both a broadcast urban context and a broadcast rural context, namely, the *Insula* of the Casti Amanti street deposits and the Villa Regina vineyard scatter, respectively. My thought at present is to expand our evidence from use-related residential contexts in 2018 and beyond by studying sets of materials from one or more dwellings inside the walls of Pompeii. I should note that the *Insula* I.22 *dolia* sub-project is the subject of a poster by Caroline Cheung and Gina Tibbott at this very moment at this very conference, and we will accordingly refrain from saying anything about it in this talk.

As our work has progressed over five study seasons and as we have turned our attention to the documentation of substantially different sets of materials from different kinds of contexts that present specific problems and analytical opportunities our methods have been in a process of ongoing evolution.

For our first season in 2012, where our intention was to focus on the detailed description of a small number of mostly intact objects from use-related contexts at the Villa Regina, we developed a database that contained seven thematic tabs dedicated to basic information, graphic documentation, measurements, manufacturing process, use alterations, texts, and special analyses. In light of our 2012 experience we revised this database, and in 2013 deployed this revised version, which we term our "Object Database," to add to and improve our descriptions of these objects. Since then we have employed this database for our work with the *Insula* I.22 *dolia* and the Oplontis Villa B amphoras, where the task at hand has been of a similar nature.

For our work with the *Insula* of the Casti Amanti street refuse deposits in 2013 we drew up a database devised to permit us to carry out a rapid, low level census of the variety and amount of materials in individual stratigraphic units. This database, which we refer to as our "Deposit Database," has five thematic tabs, and allows us to record basic information and counts, weights and mean weight of item for a wide variety of mostly highly fragmentary materials, including high-end tableware pottery, other pottery, other portable artifacts, and architectural materials.

Our work with the Tower 8 middens materials, initiated in 2014, presented something of an intermediate challenge, in that we faced the need to generate detailed documentation for a large number and wide array of objects of widely differing degrees of completeness – though for the most part highly fragmentary - all originating in what was, in effect, a single depositional context. We accordingly drew up a third database that we term our "Fragment Database." This is a radically streamlined version of the Object Database that permits us to produce detailed documentation for specific objects in a record without multiple tabs. We have shifted over to the use of this database for our ongoing work with the surface scatter materials form the Villa Regina vineyard, where the task is an analogous one.

While the main final synthetic product of PALHIP will be a book-length essay that draws on our results to discuss various aspects the life history of portable material culture at Pompeii, we are accumulating massive amounts of data that we would like to make available to the scientific community. For this we intend to mount our basic results, including versions of the databases just described, on *RES ROMANAE* (http://resromanae.berkeley.edu/), the recently launched website for the lab that I direct, the University of California Roman Material Culture Laboratory, or RMCL. The content of *RES ROMANAE* will be permanently archived through the *California Digital Library*. As pilot projects for the on-line presentation of data we have mounted on *RES ROMANAE* the data for another project that I have directed, *La Creta Fatta Concreta – the Italian Ceramic Clay Project*, and this upcoming semester we will begin doing the same for the data from the *Palatine East Pottery Project*. The presentation of the Palatine East data, in particular, will provide us with highly valuable experience on which we will be able draw for the presentation of the PALHIP data, which we plan to initiate during the 2017-2018 academic year.

I will now illustrate some of the results that we have obtained by briefly discussing some of he evidence that we have collected bearing on the use of items of portable material culture.

With regard to items in bronze, we have found evidence that these regularly bear evidence of use alteration – often quite dramatic damage, in fact - even when recovered in use-related contexts, suggesting the tendency to retain these valuable objects in use, if not to go lightly on them when actually utilizing them. Thus, the three bronze items being held in the storeroom at the Villa Regina include a bucket with a rich swarm of dents around its maximum diameter and across its floor – damage apparently caused from being repeatedly dropped down a well, a practice evidenced by the cast of a fiber cord preserved in the oxidized iron of its handle; a pitcher with a body again marked by repeated denting and that had been patched with lead several times and that had had its handle replaced; and a tripod lamp stand that had had its legs wrenched off. Again, recovered in the Tower 8 middens were a ca. 12-cm long needle – perhaps destined for working some heavy textile or leather – that had had its shaft bent and then had the end of its eyelet snapped off, and this thumb-shaped thumb rest that had separated from the handle of a bronze vessel. Somewhat unexpected, however, was the large number of petty bronze objects of various kinds and fragments thereof that made their way into both the Tower 8 middens and the refuse that accumulated in the street to the west of the *Insula* of the Casti Amanti. One might have thought that these objects would have been collected so that the bronze that they contained could be recycled.

With regard to pottery, the cooking vessels from the storeroom at the Villa Regina tell an interesting tale, with the multiple examples of the two main forms, the cookpot, and the casserole, showing clear patterns of sooting and incrustation that point to two distinctly different methods of use. The cookpots show white powdery ash transfer on the underside of their base and lower wall, a small zone above this free of any surface deposit, then thick sooting on their middle and upper portion. Their interiors do not display any incrustation. Since soot transfer occurs from contact with the tips of flames, this suggests that these vessels were set directly atop embers when used.

With the casseroles the whole of the exterior is covered with dense sooting, indicating that these vessels were regularly set atop a cooking stand of some kind. Their interiors show a light brown incrustation on the floor – presumably accumulated residue of their content, and a band of whitish incrustation on the wall a short distance below the rim – presumably a deposit of water-derived calcium carbonate marking the level to which they were generally filled for use. One of the casseroles with particularly heavy sooting had a sizable fissure that passed directly through the wall, with a white incrustation of this kind present on the exterior immediately below the crack. This demonstrates that this vessel remained in use right up to the verge of catastrophic failure and was then put away again, presumably for possible further use.

With regard to amphoras, our work at Oplontis Villa B produced some exceptionally interesting evidence regarding practices in the use of the Dressel 2-4 amphora. Some of the used examples of this container found stacked in inverted position under the portico surrounding this facility's courtyard apparently for refilling with wine still retained an intact cork stopper in their neck. The explanation for this somewhat surprising fact emerged from our careful examination of the walls of these vessels. At least three, and perhaps as many as eight of the 33 examples of this container type that we examined had had at least one and perhaps as many as four small holes drilled into their lower wall, through which they had apparently been emptied of their content, with the stopper presumably left intact. In each of these cases the holes had then been plugged, at least in some instances and most likely all of them by having a potsherd shaped into a disk with a diameter matching that of the hole by abrading its edges, jammed into the hole, and then sealed by being covered with a powdery substance that appears to be either raw clay or raw clay mixed with plaster. The presence of these patched containers in the Villa B amphora stacks indicates that they had been employed in this patched condition for the packaging of wine, in some cases perhaps on multiple occasions. How widespread this practice might have been is at present entirely unclear, although it invites students of Roman amphoras and the Roman wine industry to rethink some of our assumptions about how amphoras were used.

I will now turn over the lectern to Caroline Cheung, who will speak about one of the methods that we employed to document the Oplontis Villa B amphoras this past summer.

One of the ways in which we characterized the Oplontis Villa B amphoras was by employing a structured light scanner to produce a 3-D model of the vessel.

The instrument employed for this operation is the Structure Sensor Scanner. This device, developed and produced by Occipital, is a compact unit that attaches to a fourth generation iPad and expands upon the iPad's built in camera to capture the data to produce the 3-D model.

We employed a portable router on site to connect both the iPad and a host laptop to the same network, thereby enabling both iPad and scanner to communicate directly with the laptop via a program called Skanect. This method proved advantageous in that the laptop's processing capabilities for the 3D model were much greater than those of the iPad.

To scan an amphora we set it on a tabletop in a horizontal position, supporting it in a cradle to prevent any rolling. To capture the scan the person operating the device simply points the scanner at the amphora, activates Skanect's capture function, and slowly orbits the amphora sweeping the scanner's aperture over the surface of the vessel. The orbiting element is crucial, since the device employs motion sensors to organize the data spatially. We very quickly observed that, despite the manufacturer's disclaimer that the device is not suitable for scanning the inside of hollow objects, the scanner does a creditable job of capturing the interior wall of an amphora thanks to its infrared sensor, and with sufficient investment of time and effort it was in fact possible to capture most of the inner wall of the amphora by carefully aiming the scanner into the vessel's mouth and performing a thorough sweep of the interior. The capture process typically required anywhere from 5 to 15 minutes depending upon the thoroughness and deliberateness with which the operator scanned the container's surface and the number of times that he/she chose to orbit it. Having completed the scan, we rotated the amphora 180 degrees in the cradle and repeated the process, thereby obtaining a scan of the other side of the vessel which we could later align with the first scan to obtain a 3-D model of the entire amphora.

We found that capturing complicated angles as present around the mouth and handles could prove somewhat tricky, and we thus scanned features of this kind with particular deliberateness and thoroughness. Although the software includes a color-coded visualization feature that permits the operator to monitor which parts of the object he/she has captured, it sometimes happened that small gaps in coverage went unnoticed until after the scan had been completed. As there is no way to reopen the scan to add in missing data of this kind, this necessitated repeating the scan. The scanner also sometimes proved temperamental in bright sunlight, drifting inexplicably and uncontrollably and requiring that we abort the scan and start anew.

Processing the scans is a complicated process that we are still in the process of mastering and exploring. Skanect can be used to edit the scan, for instance, cropping out the parts of the cradle and tabletop that wound up being captured. Skanect permits the scan to be saved in a file format that allows it to be opened and edited in MeshLab, a powerful shareware program that permits the visualization and manipulation of 3-D models. We employ MeshLab to align the two scans of each container to produce a single 3-D model of the vessel. The resulting model is impressively detailed, capturing not just major features, but also minor surface blemishes, such as the patches sealing the plugged tap holes previously mentioned. We employed Meshlab's measurement feature to evaluate the accuracy of the models, and found that once we had developed a good sense of how to capture a scan the resulting model had dimensions very close to those of the amphora. In one instance, for example, we measured the height of the amphora directly as 98.2 cm, and measured the same dimension on the 3-D model as 98.0 cm. It was thanks to Meshlab's so-called x-ray visualization feature, which renders the exterior of the scanned object transparent, that we came to appreciate the scanner's impressive ability to scan the interior of an amphora. While we need to do much more exploration of our results, our preliminary appreciation is that this approach can be used to produce an accurate 3-D model of the exterior and much of the interior of an amphora. Among other things, it should be possible to import such a model into AutoCad and employ it to produce a profile drawing of the amphoras and to calculate its capacity.

Thank you.