

herculaneum archaeology

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The Eighth Herculaneum Congress

29 September–2 October 2022

Bob Fowler

Chairman of Trustees

The Herculaneum Society

Pandemic or no pandemic the Friends were determined to gather in Herculaneum in 2022. Sadly, we did have several Covid-cancellations in the lead-up, but more than 40 Friends eventually arrived at the Villa Signorini for the eighth instalment of this venerable tradition.

Perhaps the most remarkable thing about this Congress was the weather. Doomsday had been predicted by every forecaster both domestic and foreign—rain, thunder and lightning of Biblical proportions. There had indeed been serious floods in Campania the week before. But apart from some activity at night, and some short, sharp bursts during the day, the weather was gloriously sunny with temperatures in the low 20s.

On Wednesday evening there was an informal kick-off over drinks and nibbles. The Director of the Archaeological Park, Dr Francesco Sirano, greeted us at the Signorini, and spoke with many members. Also on Wednesday the undersigned presented a brief overview of the site and the history of its excavations, to orient new members and refresh the memory of others (if needed!).

Thursday the Congress proper kicked off with a full agenda

for the day. In the morning Domenico (Mimmo) Camardo, longstanding archaeologist with the Herculaneum Conservation Project (HCP), explained the new excavations he is directing on the ancient shoreline, which recently brought another skeleton to light. Eventually visitors will be able to follow the shoreline from the main site across to the Villa of the Papyri. This too we visited, even going up to the atrium level and sticking our heads into the Bourbon tunnel that leads to the Library (give me a pickaxe, I always think when I see that). “No one but the Friends is allowed up here,” said Mimmo: *nota bene*. A pause to consume packed lunches; then split into two groups (later swapping), one for the ancient theatre and one to visit the House of the Gem, inspect the delicate wood restorations on the Decumanus Maximus, and look into the Custodian’s Room. Our guides here were Dr Stefania Siano and Dr Elisabetta Canna, both of the Park. All three guides were simply outstanding and we thank them for making their time freely available for the Friends. Visitors’ access to the theatre has been much improved since we were last there in 2018. The House of the Gem, newly restored and opened only on a restricted basis, includes a superb mosaic among other things. Of particular interest to the Society was the Custodian’s Room, where Maiuri found the skeleton of a man lying face-down on his bed. Because of the position of the room just inside the door, he has been dubbed the “Custodian.” Our considerable financial contribution enabled the Director to apply to the Ministry under their “ArtBonus” scheme for the balance of the funds needed to re-open the room after decades of closure, some €200,000 in total. The project includes full bioarchaeological analysis of the skeleton and its vitrified brain matter (see *Herculaneum Archaeology* Issue 25), re-



Clockwise from top left: The path down to the Villa of Papyri; Exploring the atrium of the Villa; The Bourbon tunnel leading to the library of the Villa where the majority of the carbonised papyri scrolls were discovered; On the entrance ramp to the Villa



construction of the face, completion of the excavation under the bed, restoration and conservation of all surfaces, and an enhanced visitor experience including informative signage and 3D headsets.

In the early evening three superb talks covered different aspects of Herculaneum archaeology. Alessia Lavorante, PhD student at the University of Naples “Federico II” and holder of a Society bursary, set out the results of her preliminary work on one of the oldest papyri found in the Villa, a copy of Epicurus’ *On Time* quite possibly written in the philosopher’s own lifetime. This was a stunning reconstruction, an absolute model of papyrological sleuthing. Dr Ascanio D’Andrea, head of IT with the HCP and one of the world’s leading experts on data management for heritage sites, explained his work on a transformative digital platform which will incorporate masses of data on the entire site of Herculaneum, enabling many avenues of new research, 3D visualisations and rewarding interactive experiences for lay users. Finally, Prof. Brent Seales of the University of Kentucky, who has addressed the Society on several occasions, introduced the large project funded by the Andrew Mellon Foundation taking place in conjunction with the Officina dei Papiri for imaging and digitising the thousands of papyri, recording the metadata and providing manifold ways of interacting with this massive trove of information. The Society is assisting with this project, and the young scholars working on it were

present in person and introduced by their supervisor, Dr Federica Nicolardi, herself a former holder of a Society bursary. We are grateful to all of these speakers, and particularly to Brent Seales who made the trip from the States specifically for this event. We could not let Brent go, of course, without updating us on the quest for the Holy Grail, that is the ability to scan and read the rolled-up papyri non-invasively. His team has reached a level of about 80% accuracy in distinguishing ink from papyrus, and designed some clever enhancements of the results to aid readability. The Grail is within arm’s reach. This intellectual feast was followed by a physical one, very welcome after a long day (if somewhat late by the time we sat down to eat!).

On Friday morning people had free time to explore the site on their own including the Boat Pavilion and the stunning “SplendOri” exhibition of jewellery and precious artefacts found on the site. In the afternoon we boarded a coach for Oplontis, then Boscoreale. Our original plan had been to visit only the latter, but we learned that the antiquarium was closed. The villa rustica, however, was open. (In 2016 when we last visited, the antiquarium was open but the villa was closed.) Since the villa would not take long to see, we added Oplontis with the so-called Villa of Poppaea (Nero’s second wife). There are fabulous frescoes to see there, but close inspection of many of them was frustrated by the severe restrictions the custodians have placed on visitor movement.



The recently excavated ancient shoreline of Herculaneum with the *fornici* (so-called boathouses on the right). Once fully excavated the area will be covered in volcanic sand thus recreating the ancient beach.



Speakers on the first day of the Congress (from left to right): Alessia Lavorante, Dr. Ascanio D'Andrea and Prof. Brent Seales

Consequently, the tour took much less time than expected. In Boscoreale, by contrast, we had a pleasant surprise in that one of the local guides came along to show us the villa; a fount of knowledge, he patiently answered many questions and brought the ancient farmhouse to life.

Saturday took us to Aeclanum, a late antique site an hour northeast of Vesuvius where our old friend Dr Ferdinando De Simone greeted us. The site is a laboratory for studying the transformation of Roman society from ancient times to medieval. It includes among other things an immersive stone baptismal font, one of the few surviving from this time. Ferdinando, who has conducted excavations and published a thorough study in the *Journal of Roman Archaeology*, obliged us with his usual enthusiastic and supremely well informed tour. We repaired from there to the trattoria Da Cucchiarone in the picturesque hilltop town Mirabella Eclano, consuming a magnificent feast before returning to Ercolano.

In the evening trustee Gianluca Del Mastro arranged a tour of the delightful Casina dei Mosaici near the seashore in the grounds of the Villa Favorita (where we were greeted by a

serene, idyllic sunset over Ischia). Gianluca is President of the Foundation which oversees all of the historic villas in the Vesuvian area. He is also mayor of Pomigliano d'Arco, which job has seen him in recent weeks coping with the victims of flash floods in Campania. In the midst of all of this he maintains his work as one of the world's leading papyrologists and a professor at the University of Campania. We are very grateful to him for arranging this gratifying conclusion of the formal Congress, complete with the most scrumptious delicacies, Campanian wine, and an exhibition of works by the Korean artist Jeong-Yoen Rhee. The Society was pleased also to welcome on this occasion the Deputy Mayor of Ercolano, Signore Luigi Luciano.

The traditional "extra day" this year entailed bussing into the hills again to explore the medieval town of Casertavecchia, with its Lombard castle and amazing Romanesque cathedral of St Michael, which uses columns from Roman buildings in its nave, and sports a pulpit with dazzling, delicate mosaics whose design would not be out of place in a North African mosque – such was the exchange of artistic influence in the period. Serendipitously it was also the festival weekend of St Michael, so the church bells rang out joyously, and families



Villa of Poppaea, Oplontis



One of the Villa's many richly fresco-decorated rooms



Villa Regina, Boscoreale

brought their babies dressed in pure white to be baptised in the ancient church. Splendid restaurants with breathtaking views over the valley provided a leisurely lunch before we boarded the coach to travel to Caserta and its royal palace (a UNESCO World Heritage Site), which the Bourbon kings built in the eighteenth century to rival Versailles. It being the first Sunday of the month, however, entrance was free, and so many visitors had already arrived that capacity had been reached and we were denied entrance. So we repaired back to Ercolano, perhaps not too regretfully, to recover from the Congress as a whole, and look forward to the next one in two years' time.



Clockwise from top left: Climbing the gradual incline to the ancient Roman colony of Aeclanum; Ferdinando de Simone (in white shirt) commenting on the discovery and preservation of the large bath house mosaic; Dwellings; A baptismal font in the shape of a Greek cross with steps dating back to the age of Emperor Justinian



The wine cellar of 18 *dolia* with a total capacity 10,000 litres



Cast of a petrified pig found in one of the rooms of Villa Regina



Charcoal Graffiti in Herculaneum

Dr. Jacqueline DiBiasie-Sammons
Assistant Professor of Classics
University of Mississippi
dibiasie@olemiss.edu

Although they have appeared in the news recently, charcoal graffiti have been mostly ignored in scholarship since few of them remain extant and many were partial when first documented, leaving us with unsatisfying readings. Nevertheless, this type of inscription was likely ubiquitous in the ancient world as charcoal was easy to find and use. Traditional bibliographic sources such as the *Corpus Inscriptionum Latinarum* (*CIL*) contain few drawings of charcoal graffiti (just two for Herculaneum) and many errors, which hampers our understanding of this type of inscription. In a recent article,* I re-evaluated the charcoal graffiti of Herculaneum using the *CIL* and the archival research materials of Matteo Della Corte, the epigraphist who first documented these inscriptions in the 1920s-1940s, which are now held at the Getty Research Institute (Malibu, CA). These archival materials and drawings allow us, in many cases, to understand the visual representation of these charcoal graffiti for the first time. From these materials and an analysis of the *CIL*, I determined that rather than 33 charcoal graffiti as recorded in the *CIL*, there were actually 42 known inscriptions written in charcoal (including one possible charcoal handprint I discovered on-site).

Charcoal graffiti differ from inscribed graffiti in three ways: size, handwriting, and visual impact. They were, on average, three times larger than inscribed graffiti. This caused them to stand out in the visual landscape in a way that the small, discreet inscribed graffiti usually do not. While it is fairly easy to miss an inscribed graffiti while walking through the city (even today!), it was not possible to overlook a charcoal graffiti in the same way. In addition, because of the charcoal medium, it was much easier to write in curved, flourishing shapes than is typical of most inscribed graffiti. The elegant paleography of many of the charcoal graffiti is not at all evident from the *CIL* which provides only two drawings of these fascinating inscriptions.

One feature that had not previously been explored is the presence of mixed media inscriptions at Herculaneum, i.e., graffiti written with two different media (incision, charcoal, chalk, or ochre). There are several instances of the same message written in two different media or one message started in one medium and finished with another. I suggest that these examples indicate the inhabitants of Herculaneum played with the medium of the graffiti in the same way as they played with the text itself (using wordplay, parodies, and verbal games).

Charcoal graffiti appear throughout Herculaneum, but concentrate in the baths, *tabernae*, and the ramp leading from the ancient shoreline to the city. The baths are well preserved and there is a great quantity of graffiti of all types here. The cooking and heating elements at the baths and *tabernae* could have provided the charcoal necessary for writing the inscriptions. I found that while about 50% of the inscribed graffiti were written in domestic spaces, only 31% of charcoal graffiti were in domestic spaces. But, when charcoal graffiti were written in a house, most (69%) were located in an upper floor or connected with a latrine. Very few were located in the most visible, accessible, and public-facing rooms like the atrium and peristyle, which are where most of the inscribed graffiti are located. I suggested that the change in distribution is due to the unwritten rules against writing conspicuous charcoal graffiti in the public areas of the home such as the atrium and peristyle.

While charcoal graffiti do differ in their style and location from inscribed graffiti, they contain more or less the same types of messages. Names, greetings, and drawings are common, as they are for inscribed graffiti as well. The great quantity of greetings in charcoal suggests to me that these messages are not quite as ephemeral as has been suggested, since a greeting in charcoal must stay around long enough for the recipient to read it (and perhaps respond).

These precious few charcoal graffiti from Herculaneum provide many insights about a type of writing that likely once filled the walls of many cities of the ancient world. These charcoal inscriptions indicate that the inhabitants played with the style of their writing, just like they played with the texts themselves. Visitors and inhabitants of ancient Herculaneum would have been bombarded by these large, vibrant texts in nearly every space in the ancient city. This research also shows that the people of Herculaneum were keenly aware of the visual impact of different media, as they, for the most part, did not write charcoal graffiti (or erased it) in the public-facing rooms of the house. The presence of mixed media graffiti also indicates this awareness of the materiality of ancient inscriptions. Finally, this article proves the necessity of a thorough and skeptical research process when trying to understand ancient graffiti. Only with Della Corte's field notebooks and archival materials was I able to understand the visual impact and paleography of the charcoal inscriptions.

*"Qui carbone rudi putrique creta scribit: The Charcoal Graffiti of Herculaneum," *American Journal of Archaeology* 126 (2022) 385-410

Towards a new edition of Epicurus, *On Time* (PHerc. 1413/1416)

Alessia Lavorante
PhD Student
University of Naples Federico II

[Editor's note: This is an edited version of the talk Ms Lavorante gave to the Society at the Villa Signorini, Ercolano, on 29 September 2022 during the Eighth Congress.]

The Herculaneum scroll consisting of *PHerc.* 1413 and 1416 occupies a special place in the Herculaneum collection and among the papyri that transmit Epicurus' *On Time*. The partly preserved upper margin shows that the fourteen surviving fragments, which were unrolled in 1808 and registered as *PHerc.* 1413, preserve the upper part of the innermost *midollo* (core) of the book roll. Only recently, in 2011, Gianluca Del Mastro identified the handwriting of the three pieces stored in frame 5 of *PHerc.* 1416 as what is left of the lower part of the same scroll.

With this paper, I would like to present some preliminary results of my work on a new edition of the whole *volumen*. These concern mainly the reconstruction of the surviving pieces, the layout, and the palaeography of the two papyri, a necessary prelude to transcription and commentary. A new comprehensive edition of this book has been a long-standing *desideratum*. It has to draw on methods for reconstructing a Herculaneum scroll which have become standard since the 1990s, and to profit from recent technological achievements, starting with the multi-spectral images up to the brand-new microscopes and the forthcoming application of 3D imaging techniques. Moreover, a new edition is eagerly awaited for two further reasons. Firstly, the specific topic of the book: up to now we have possessed very little information on the Epicurean conception of time. The commentary will need to consider all the relevant, but still unexplored aspects of Epicurean doctrine and Hellenistic philosophies on this subject. It should also be noted that the literary form of the text is peculiar. Certain marks guiding its reader are particularly common in ancient dialogical texts, which suggests that the book may have been written as a dialogue.

The other reason for a new edition is the antiquity of the papyrus. The character of the handwriting suggests that it belongs to the earliest core of the library. It may actually be the oldest papyrus in the whole collection, going back to the first half of the 3rd century BC, which is to say possibly during Epicurus' own lifetime.

The multi-spectral images, which have been available to

scholars from 2000 onwards, were extremely helpful for this kind of investigation. I am the first person to be able to use them systematically, and the increased readability has permitted detailed analysis not only of the handwriting, but also of the *mise en page* (layout) of the text. Hitherto, attention was paid only to graphic features of the handwriting, and the sole element related to the *mise en page* that had been noticed was the text's narrow columns. My research on this papyrus has clarified specific bibliographical aspects and provided additional details concerning the most ancient papyri that we know of (i.e. also outside the Herculaneum library), which is important in view of the shortage of parallels for book production in the early Hellenistic period.

The starting point for my edition was to collect all the inventory and material data relating to *PHerc.* 1413/1416. I was able to trace the history of the papyrus thanks to the analysis of the ancient Inventories stored at the Officina dei Papiri, which record information on the unrolling and the state of conservation of the papyri over time. In particular, I found that the current *PHerc.* 1413 does not match the measurements of the papyrus that had been registered under this number in the Inventory of 1782, the most ancient Inventory in our possession. The inventory number seems to have undergone a change. Probably, our papyrus was previously inventoried, in its still closed state, under the number 1417. Giuliana Leone has demonstrated that it is only since 1808 (the year when our papyrus was unrolled and labelled as *PHerc.* 1413) that the inventory number 1417 was given to the lower part of another papyrus, the 28th book of Epicurus' *On nature*. Moreover, on the basis of the data I collected, it is reasonable to assume that the original scroll was broken at least into two halves, which became separated from each other before being unrolled and catalogued; this is the reason for the two different numbers 1413 and 1416.

As a next step, I focused on the reconstruction of the scroll. For this purpose, the fragments of *PHerc.* 1416, containing remains of the lower part of the *volumen*, offered rather limited insights due to their poor state of preservation. Much more fruitful was my analysis of the morphology and the damage sustained by the fourteen pieces of the upper part of the scroll, *PHerc.* 1413. These are preserved in four frames whose correct order is 2-3-4-1, as was suggested by the first editors. This order was verified by my reconstruction of the *volumen*, in which I placed all the pieces on the basis of the width of the volutes (a volute being one complete circumference of the scroll, whose measurement progressively decreases towards the scroll's innermost part). I was able to recognise and measure all the pieces of a given volute thanks to the regular recurrence of transverse fractures in them descending from right to left. This type of damage regularly repeats itself in a similar shape and in the same position in each volute. The distance between two fractures

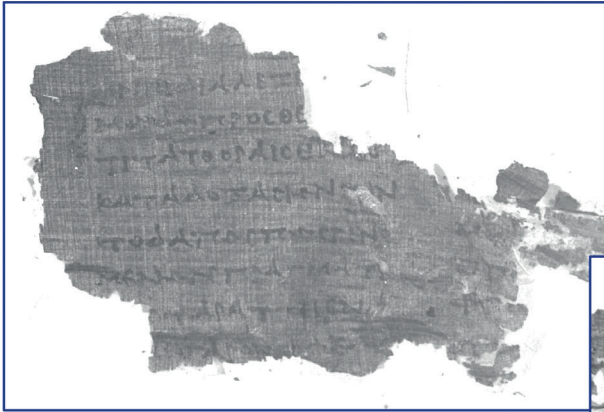
therefore provides the width of the volute.

Where the papyrus is preserved, I noted a decrease of 1 mm between one volute and the next. This decrease was taken into account in calculating the width of incomplete volutes and allowed a rough estimate of the number and extension of the lost volutes.

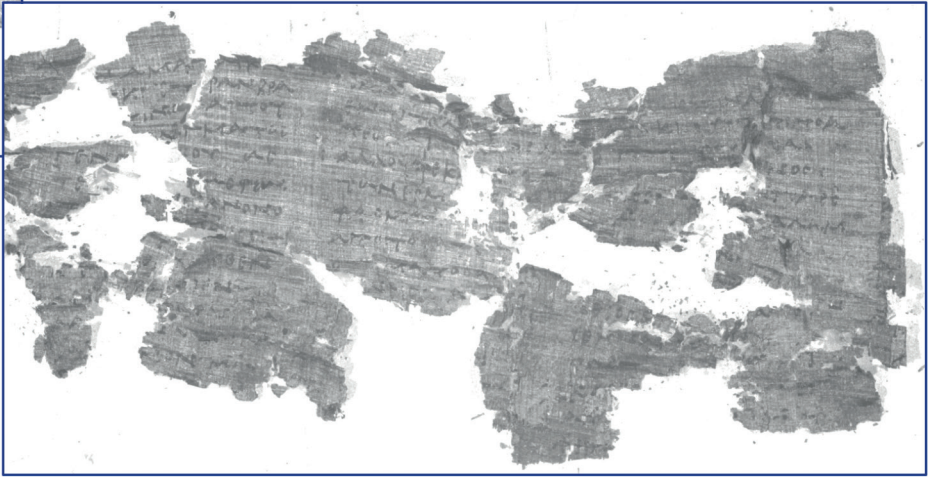
The next step involved collecting the data related to the *mise en page* of the text, with the aim of comparing them with the measurements within the virtual *maquette* (mock-up of the entire *volumen*). The fairly undisturbed stratigraphy of the pieces made it easier to identify the left and right margins of the columns and, in most cases, to measure the width of the so-called *specchio di pagina* (a column plus the intercolumnar space beside it). In measuring and collecting these bibliological data, however, I realized that this dimension does not remain constant throughout the reconstructed roll. Furthermore, in the last piece of frame 3 and the first two pieces of frame 4, I detected a variation in the overall appearance of the handwriting.

I came across this problem when I first attempted to make a virtual reconstruction by entering the width of the volutes and an average width of the *specchio di pagina* into the mock-up in Photoshop, disregarding measured variations. This reconstruction did not work at all. In several cases the virtually assumed intercolumnar spaces were located in the middle of the columns. Only when I accurately entered the data I had obtained (i.e. the width of the volutes and the variations in the width of the columns and intercolumnar spaces, as I had gauged them) I realized that my established order, succession and distance between the pieces of the papyrus were indeed correct and that no mistakes had been made in the reconstruction, but that the *mise en page* of the text changes in the middle of the scroll, precisely in the place where I believed I had seen a change in the handwriting.

If this variation had been in the final part of the scroll, one would assume that the scribe, heading towards the end of the book, had adjusted his spacing fearing that otherwise the book roll would not have been sufficient for the whole text. This feature occurs in many Hercu-

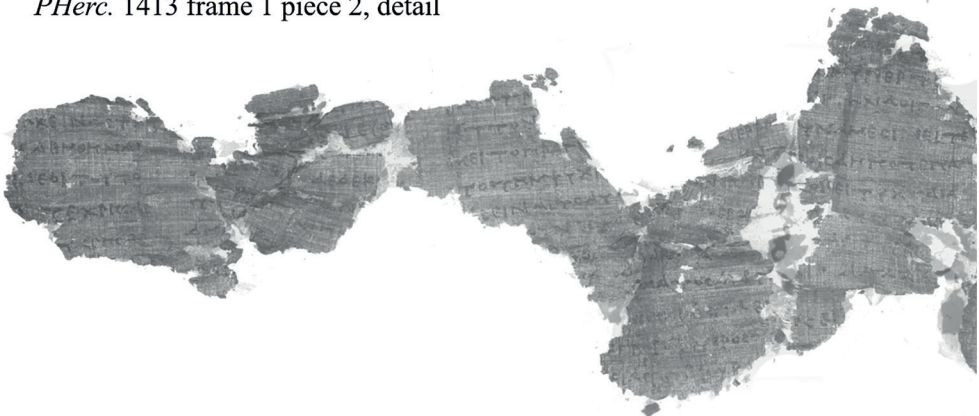


Hand A
PHerc. 1413 frame 2 piece 3, detail

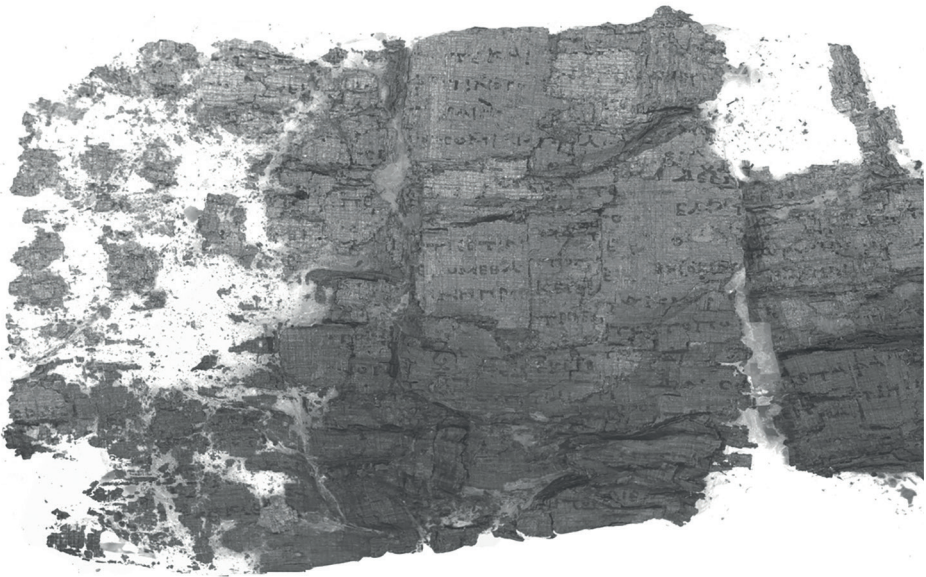


Hand B
PHerc. 1413 frame 4 piece 1, detail

PHerc. 1413 frame 1 piece 2, detail



PHerc. 1416 frame 5 piece 1, detail



laneum scrolls which were written in one hand. However, it is quite unusual that one scribe changes the way he is copying the text only in a specific portion of a scroll, in the middle, and then resumes the same starting handwriting style and *mise en page* up to the end of the copy. Was it possible that PHerc. 1413/1416 was written by two different scribes? What initially seemed to be mere speculation was confirmed by an accurate examination of the layout of the text and by further palaeographic analysis.

I ascertained that one scribe wrote the beginning and end of the scroll, and another wrote the middle. In both the beginning and final parts the handwriting is neat, the right margin of the column is observed and the interlinear space is 3 mm. The *specchio di pagina* is 46-43 mm in width and the *intercolumnium* is always 8 mm. The number of letters in each line varies between 13 and 19. The handwriting is rigorously bilinear and omega is always traced in the archaic form.

On the other hand, the handwriting of the central portion of the scroll is more disorderly, as shown by the non-alignment of the right margin of the column. The vertical distance between lines is reduced to 2 mm, the *specchio di pagina* is smaller (43-40 mm), and the *intercolumnia* are reduced to about 5 mm. The number of letters in each line rarely reaches more than 15. The form of the letters expands in width, the bilinear system is not always respected and sometimes *omega* is traced with a faster stroke and in a form very close to the modern form.

A comparison of identical sequences of letters and words

also leads one to diagnose two different hands. Since they are almost certainly contemporaneous, nothing suggests a later restoration of the book. The different handwriting concerns as much as 2 m of papyrus. I would rather guess that, for unknown reasons, the first, probably senior, scribe (hand A) had entrusted another scribe (hand B) with the work of copying, but most probably only for a limited time. Since the *mise en page* of the text, the script and the colour of the ink in the final section of the book do not differ from that of the first section, the first scribe (hand A) probably resumed his work, taking over from scribe B and continuing until the end of the book.

I was able to reconstruct the succession of 150 columns: hand A copied the first 61 columns; columns 62-109 were copied by hand B, while columns 110-150 were again copied by hand A. In frame 4, piece 3, within the same piece and from one column to the next one (columns 109 and 110), we can see the switch from one hand to the other, when hand A returns until the end of the preserved text.

We cannot know whether hand B had copied other portions of the text at the beginning or at the end of the book, because I could reconstruct only about 7 m of the papyrus. Judging by other scrolls of Epicurus, it must have been much longer. However, since most of the preserved text was copied by hand A and since the last measurable volute is only about 3.7 cm wide, it is reasonable to infer that hand A brought the copy of the text to the end, probably with the aim of claiming credit for the work carried out (a similar case was supposed by Del Mastro for PHerc. 1669).

To have ascertained that two different hands copied this text is an important result, because our fragmentary documentation has often led to doubts about the presence of two different hands in the same scroll, especially in the oldest papyri. The copy of a precious *volumen* was usually made by a single scribe, but this might not always have been the case, and the Herculaneum collection, by providing complete *volumina* rather than single pieces of a papyrus, allows us to explain such occurrences in a larger context.

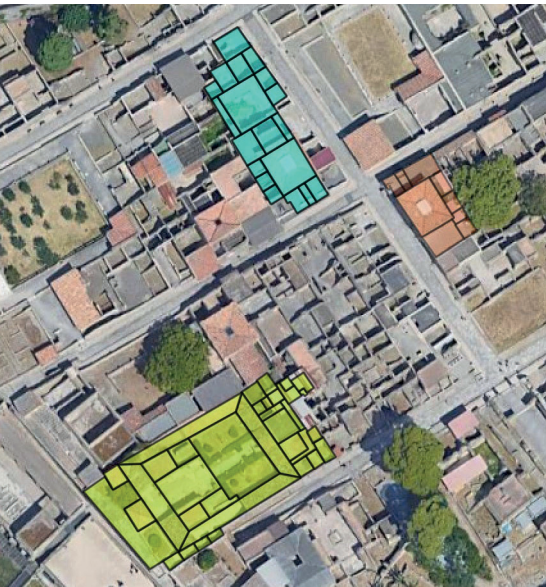
Practical Applications of Free, Open Source Software for Conducting Geocoded Domestic Decoration Data Onsite

Brittany Proffitt
PhD Student in Classics, Archaeology and Religion
University of Missouri, Colombia

My research focuses on the spatial and social relations involved in elite domestic decoration in Herculaneum and Pompeii, especially the location and techniques involved in ancient restoration work. One method of research is to gather precise geocoded data about the decorative features in a sample set of houses, and to use data mapping software to map those features onto a layout of the house. This type of data recording allows the researcher to examine locations and interactions between different elements without needing to be physically at the site in question. However, the commercial software available for such data gathering is often prohibitively expensive for individual researchers and students. To that end, my research goals this summer were twofold: a) To gather geocoded decoration data from a sample set of elite houses in Herculaneum and Pompeii that could be studied offsite; b) To conduct a proof of concept using free, open source software to demonstrate the potential efficacy of such technology for other field researchers without access to sufficient funding or other technologies.

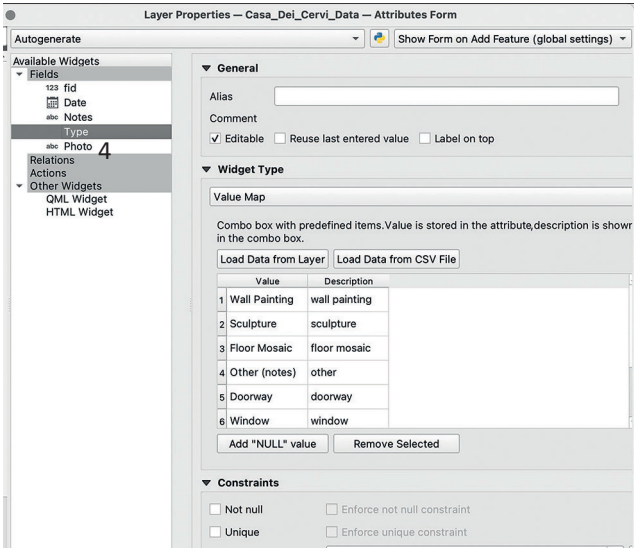
Thanks to the American Friends of Herculaneum’s scholarship, I was able to spend a week in Campania gathering data and testing open source data mapping solutions, successfully demonstrating the feasibility of these software for low-cost field research. My research involved a preparation phase offsite and a subsequent data gathering phase onsite, using two separate open source software. For my preparation phase, I utilized QGIS (a free, open source geographic information system desktop software alternative to ArcGIS) to create floor plans of each house I intended to study while onsite. The final result was an editable floor plan layer for each individual house, which would allow me to create data points within the space of the house (Fig. 1).

Fig. 1



The second phase of my data gathering used the open source Mergin Maps Input app. This app was installed onto my cellphone and on my desktop QGIS software via a plugin. This allowed changes to the map in either location to be synced in real time. I was able to create editable data layers for each house in QGIS, allowing me to add points to the floorplans while in the field. In addition, the Mergin Maps Input desktop plugin was highly customizable, allowing me to create a data form (Fig. 2) to collect additional information.

Fig.2

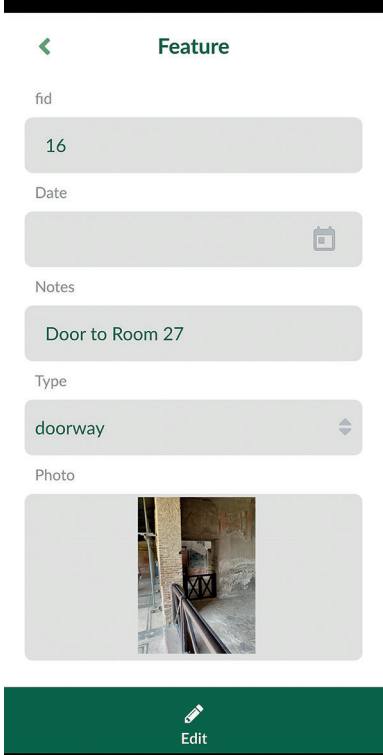


Once onsite, I utilized the GPS on my phone to record decorative elements in each sample house using the Mergin Maps Input app. I was able to record datapoints (Fig. 3, Casa dei Cervi (IV.21), Herculaneum), including categorization, notes, and an associated photo taken on my phone in realtime and attached to the datapoint (Fig. 4).

Fig. 3



Fig. 4



Once the data was gathered, it was possible to filter the datapoints by type in QGIS, as shown in Fig. 5, displaying only the datapoints associated with sculpture in the Casa dei Cervi.

An Archaeometric Analysis of Structural Mortars from the Sanctuary of Venus, Pompeii

Caitlyn Pallasa
Classical Archaeology MA Program
University of Missouri, Colombia

For my MA thesis, I am working at Pompeii, a UNESCO World Heritage Site, to examine the Roman concrete used to construct the Temple of Venus. Concrete construction played a major role in the architectural development of the sanctuary, but to date there has not been extensive analysis of the mortars employed in the various parts of the complex. This is why my research is crucial to the sanctuary, as my MA thesis will offer the first comprehensive reassessment of the remains from the sanctuary. For my research, I will be using a variety of scientific analyses to examine the concrete from Pompeii. Through these analyses, I hope to discover the composition of the concrete, the aggregates that were used to create the concrete, hydraulic properties of the concrete, the types of concrete used on site and where the different types of concrete were used, and how the concrete evolved both in terms of composition and use at the site from the Samnite period (late 4th c. BCE to late 2nd c. BCE) to the Flavian period (69 CE until the eruption in 79 CE).

Fig.5



I was able to meet both of my research goals this summer. First, I gathered a detailed map of decorative features within my sample set of elite houses in Pompeii and Herculaneum, which will allow me to examine the spatial relationships between decorative elements as part of my research. Second, I demonstrated that by using the free, open source software QGIS and the Mergin Maps Input app, it is possible to create detailed datasets in the field without having to purchase cost-prohibitive software and technology. This proof of concept opens many doors within the field of archaeology and beyond, allowing researchers to create cutting-edge datasets that will make their research competitive and innovative, without facing financial restrictions.

For my analyses, I will first use Raman microscopy to examine the density and porosity of the concrete used throughout the Sanctuary of Venus. Following this, I will take 30 samples from the sanctuary to analyze at U. of Missouri’s electron microscopy core (EMCore) facility and research reactor (MURR). At EMCore, I will use scanning electron microscopy coupled with energy dispersive spectroscopy (SEM-EDS) to determine the compositions of the different raw materials within the mortar matrix. Additionally, I will use the high-resolution images and elemental maps produced from this analysis to identify the different layers of concrete and the aggregates used at the sanctuary. Any particularities identified with SEM-EDS, I will examine at MURR with laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) to determine the trace elemental compositions of the particular components in the mortar matrix. Afterwards, I will use nuclear activation analysis (NAA) which will complete the elemental analysis for the remaining portions of the samples. The final analysis for my thesis research will be accelerated mass spectrometry (AMS), as I will be radiocarbon dating approximately half of my samples. When the analyses are completed in March 2023, I will be able to interpret the differences in composition and quality of the concrete used at the site to determine the changes and evolution of concrete at the site from the Samnite period to the Flavian period. I am very grateful to have received the AFoH Scholarship, as the scholarship has significantly lessened the fiscal burden of the archaeometric analyses, especially that of the radiocarbon dates.



Some of the treasures from the SplendOri exhibition currently on show at the Antiquarium, Herculaneum.

A statue of Pelephoros/Demeter (Ancient Greek Goddess of the Harvest) discovered at the Villa of Papyri in 1997. There is evidence of red pigment on her hair (above).

Mosaic (top right)

Carbonised wooden table with glass bowls and metal ladles (bottom right)

All the photographs in this issue of *Herculaneum Archaeology* (apart from the images supplied by Alessia Lavorante and Brittany Proffitt) were taken by Peter Spital, long-standing Friend of the Society, during the Eighth Herculaneum Congress.

The Herculaneum Society
Ioannou Centre for Classical & Byzantine Studies
66 St Giles, Oxford OX1 3LU, United Kingdom

For more information about the Society, or if you have any comments, suggestions or ideas for articles for the next edition of *Herculaneum Archaeology*, please feel free to contact the office at:

herculaneum@classics.ox.ac.uk or

krystyna.cech@classics.ox.ac.uk

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