Eastern Boeotia Archaeological Project, 2018

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This summer I had the opportunity to work as a digital intern on the Eastern Boeotia Archaeological Project at the site of ancient Eleon in Greece under the supervision of Dr. Bryan Burns (Wellesley College) and Dr. Brendan Burke (University of Victoria). While I had enrolled in multiple archaeology courses during my time as an undergraduate at Wellesley College, this was my first experience on an excavation, and I am grateful to the Archaeological Institute of America for supporting my work. The funds from the Jane C. Waldbaum Archaeological Field School Scholarship not only allowed me to participate in my first excavation, but they also provided me with an opportunity to bridge my interest in the Bronze Age and digital humanities.

I spent a large part of my time as an undergraduate exploring the relationship between technology and history, engaging in several projects that required me to think critically about the ethics of this growing field, while simultaneously contributing to it by producing related projects. My work on site allowed me to explore various aspects of an excavation, though my focus was on producing 3D models of artifacts. Our team lived in the town of Dilesi on the Euboean Gulf and carpooled daily in our fleet of conspicuous white cars about half an hour west to site in the village of Arma. Excavation took place on the acropolis in Arma, where the majority of our activity was based in the Blue Stone Structure, a large Mycenaean burial complex with material dating to the same period as the Shaft Grave Era. I spent most mornings on the acropolis excavating with my colleagues, putting my background in theoretical archaeology into practice. In the afternoons, I would work in the apotheke, scanning objects, creating 3D models, and tracking them in my log.

The process of 3D scanning varies a bit based on the type of object that requires modeling. For example, the setup to scan a Grey Minyan amphoriskos is entirely different from

the setup to scan a human cranium. In general, the process involves putting the object on a turntable and slowly rotating it while holding the scanner level. This summer, I was using an Artec Space Spider Scanner and building my models in Artec Studio; the scanner and software are very mobile and can be used to scan a variety of objects. Once an object is scanned from different angles, there are a number of steps that need to be taken to process the data, including editing out any background that the scanner might have picked up, aligning the scan data, and adjusting the texture. Depending on the object, additional steps need to be taken in order to ensure the scan is usable in the future. For example, I had the opportunity to scan two intact, but fragile, vessels from a tomb. One of our conservators warned that I would only have one chance to scan each object, as they were in highly unstable conditions. In order to produce a 3D model that best captured the fragility of each object, I adjusted the scanner's settings to increase its sensitivity. I also had to make sure that Artec Studio didn't autofill every "hole" in the pots, as this is a setting that would radically change the appearance of the model, in favor of one that is less accurate. In the end, I was fortunate enough to have a second opportunity to scan these objects once they were in more stable conditions at the end of the season. This allowed us to fully document the conservation process, while also providing the project with an opportunity to assess the accuracy of the 3D models created with various degrees of sensitivity.

3D models allow users to view an object from every angle, providing people with a greater overall understanding of the object itself, while minimizing handling and increasing accessibility. When creating models, I would always export a high quality STL file of my object without texture, as well as a slightly lower quality OBJ file with texture. The STL file was very useful for looking at the surface of artifacts and human remains to get a better understanding of

an object. A recently excavated pot from a tomb appeared to have had a textile transferred onto it during the decomposition process, and a quick scan preserved this imprint and allowed us to look at a fragile object without excessive handling. The STL was particularly helpful in this case, as it was a monochrome model, so the details were able to stand out without additional visual noise.

I had an interesting project halfway through the season that involved reuniting fragments in Artec Studio. I was given two fragments from the same pot that were not physically joined, though the place where they would have met was clear. For this object, I scanned both fragments in the same project file and aligned them so the edges met as they would physically. I then went through the rest of the normal process, but at the end, I was left with a model that digitally reconstructed fragments, while the physical pieces lay in front of me.

The highlight of my summer of scanning came during my last week on site, when I had the opportunity to scan human remains in situ. The mandible in this burial had teeth nearly perfectly intact, and I was able to set up my laptop, scanner, and power source inside of this trench to model the jaw. The situation was similar to that of the fragile tomb pots I mentioned above; there was really only one opportunity to scan and model. While the pressure to produce a perfect model in this type of situation is very high, there are limitations to scanning. With the tomb pots from above, I was unable to scan the bottoms, as they were too unstable and we could not risk worsening their condition for the sake of imaging. With the mandible in situ, I could not maneuver the scanner through a narrow area of the tomb, and, as a result, I was unable to fully capture every angle of the teeth. Though the software I was using has the ability to fill in the gaps of missing geometry, I often opted not to use this feature. While it would have produced a more complete model, I grappled with the ethics of “inpainting” geometry and texture based on a

computer's judgement of what the model needed. Though there are cases where this was appropriate, there was not a universal standard. Some objects had difficult interiors to capture, like pots with rims that blocked the interior, so for objects of this type, I was more likely to fill in geometry and edit it to ensure accuracy. I would avoid this feature for models like that of the teeth of the in situ mandible, however. As someone in a position of relative power over the way the artifacts and remains of ancient Eleon are depicted, I believe that I owed it to the Mycenaeans to be as accurate as possible in replicating their material.

I am grateful to the Eastern Boeotia Archaeological Project for allowing me to excavate with them this season; without the support of Dr. Burns and Dr. Burke, I would not have been able to explore my niche interest in such a hands-on way. I also want to thank Jordan Tynes, the Manager of Scholarly Innovations at Wellesley College for teaching me how to use the Artec scanner and software. This summer was filled with new friendships, laughter, and, of course, "archaeology themed dance moves," all of which can be attributed to the amazing group of students and volunteers from this season. Finally, I want to once again express my gratitude to the Archaeological Institute of America and the Jane C. Waldbaum Archaeological Field School Scholarship for providing me with financial assistance to make this summer possible.

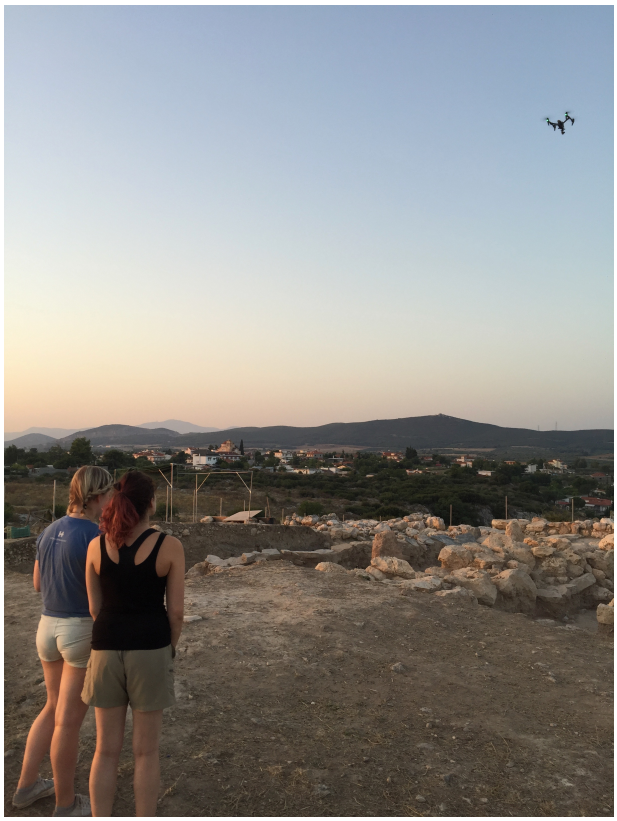
The end of the season means it's time to tarp the site!

Scanning the aforementioned fragile vessel in the apotheke

Lady Wiggles, the unofficial EBAP dog in Dilesi

Our normal ~5:57 AM meeting was disrupted by a sunrise one morning

Scanning the aforementioned mandible in situ



Tech Team: learning about drones from my fellow digital intern, Grace Hellstrom