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TABLET COLLECTION

SUSANNE PAULUS

This year's report is much different from those of previous years, due to the significant impact of COVID-19 on the object-based research done in the Tablet Collection. Direct consequences were that researchers cancelled visits but asked for photos; professors did not need objects for online classes, but rather needed pictures; and scientific study of tablets became no longer possible. On the positive side, this situation also showed the central importance of the digitization of cuneiform tablets for the future, which will be the red thread of this report.

From fall until winter 2020, it was business as usual in the Tablet Collection. Colton Siegmund, the assistant curator, and I supported research by hosting or providing photos for many outstanding colleagues worldwide including Franco D'Agostino (Rome), Dominique Charpin (Paris), Grant Frame (Philadelphia), Nedal Haj Darwich (London), Mark Garrison (San Antonio), and Jana Matuszak (London). Visitors and colleagues at UChicago studied more than two hundred tablets. Noteworthy is the crucial publication of over thirty-eight Sargonic (Old Akkadian) tablets from Umma by Benjamin Foster (Yale).

Already during normal operations, we saw a trend toward requesting high-quality digital images rather than planning research visits. Now digitization is more crucial than ever, and we were able to bring it up to a new level, thanks to a generous donation by Abhay Parekh. This donation allowed us not only to ramp up our efforts but to purchase crucial equipment. Our volunteers Terry Friedman, Janet Helman, and Toni Smith scanned an additional 682 tablets. Nicole Brandt, a CMES student, supported their work as she located and moved tablets and did quality checks on the scans. Madeline Ouimet, a UChicago undergraduate student, joined the team and focused on image post-production. She transformed tablet scans into composite images showing all six sides of the tablets. She was able to continue this work. In spring, Clara Mikhail, another UChicago undergraduate, joined the efforts after first revamping the Tablet Collection's homepage. Together they added over five hundred new composite images to the Integrated Database, which are already proving to be very valuable for my curatorial work, research on the tablets, teaching, and outreach.

While scanning tablets is a cost-effective and straightforward method, the results do only give an overview with inadequate lighting, and fixed contrast often prevents reading all signs. Therefore, we were looking for better approaches to augment readability. Abhay Parkeh's donation funded the purchase of a dome for Reflectance Transformation Imaging (RTI). RTI is coupled with high-resolution photography, currently the most effective way to digitize cuneiform tablets. The RTI dome photographs tablets with lighting from a significant number of different angles. After post-processing, viewers can change the lighting on the image, allowing them to read the tablet in almost the same way we do by holding it in their hands. We ordered the dome from Custom Imaging, of the University of Southampton, who also build the domes currently used by the Louvre and Yale Babylonian Collection. Sadly, delivery was delayed due to COVID-19.

While digitalization progresses nicely, the importance of better cataloging became apparent: attaching meta information like genre, period, and provenance to our tablet files helps scholars and students to find the tablets that are relevant for their research and that they are interested in publishing. However, only specialists in cuneiform languages can complete those tasks. Foy Scalf and

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Susan Allison provided our team with training for best practices tailored to the needs of the Tablet Collection. Currently, Colton Siegmund has started to catalog the tablets excavated by the Oriental Institute in Nippur. Those tablets are fascinating, as they span a wide range of topics, including Sumerian literature, school texts, private legal archives, and administrative documents. Colton is also attaching records from the excavation file cards (scans provided by Karen Wilson) to augment the available information. During the summer, I trained Madeline Ouimet and Clara Mikhail to research and add metadata when uploading new tablet photos. They are often able to make significant updates and are also adding transcriptions and translations wherever available.

Volunteer Susan Padula continued the storage evaluation of our tablets, checking another 852 objects. Currently, 40 percent of our tablets are housed in acidic paper-glass boxes, which are not suitable for the long-term storage of museum objects of this nature and value. Based on visual inspection, only 16 percent of our tablets are in good condition, while 20 percent are in urgent need of conservation. Furthermore, Laura D'Alessandro, head of conservation, assessed the storage cabinets housing the tablet collection, which are now over seventy years old. She noted that those are in an overall state of disrepair and dysfunction and are not fulfilling modern museum standards. It is especially dangerous that those cabinets do not protect the tablets against water damage, for example, in case of a burst pipe or a sprinkler event. Laura kindly developed a proposal for new storage and housing.

Finally, "Far From Home: Exploring the Application of Non-destructive pXRF Clay Analysis for the Provenance Study of Cuneiform Tablets" was heavily impacted by two significant setbacks. First, the Bruker Titan 800 we used for our study broke and was deemed irreparable. As an interim solution, we were assigned time on the tracer in the Conservation Laboratory. However, this tracer was damaged during fieldwork and was irreparable. Laura D'Alessandro and I went through a lengthy replacement process before object-based analysis became impossible due to COVID-19. Thanks to

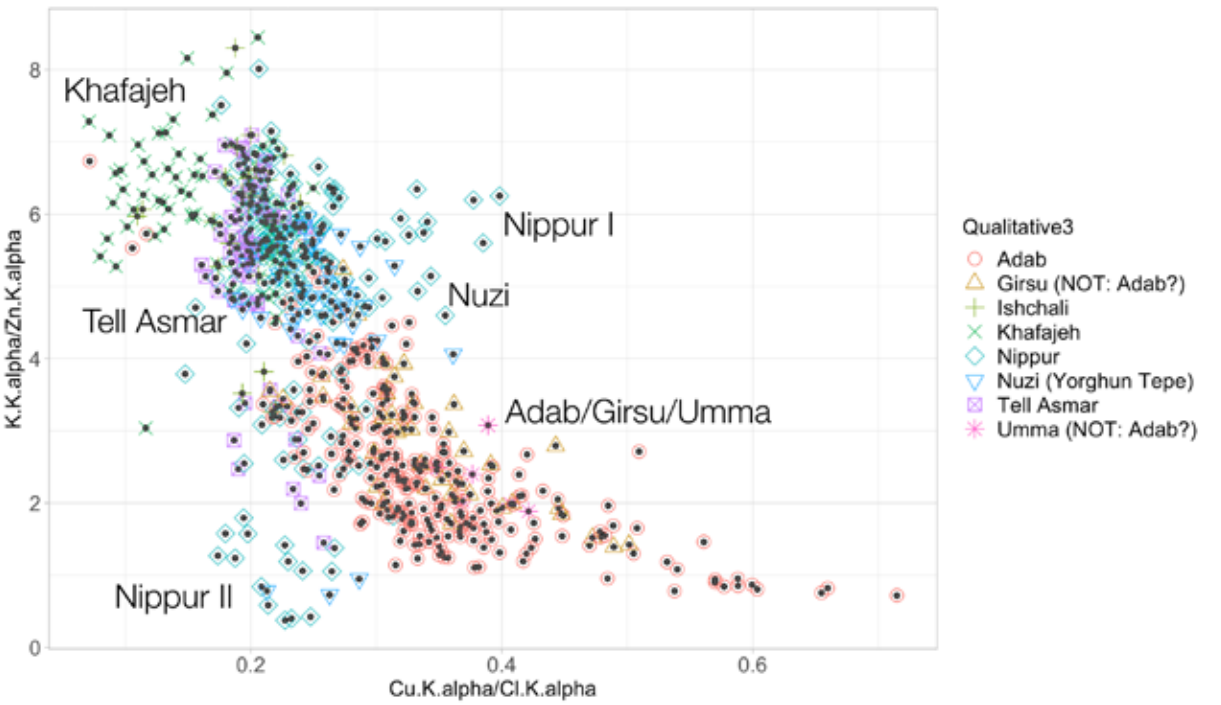

Figure 1. Ratio plot of copper to chlorine and potassium to zinc.

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a generous donation by Al Liventals, the Tablet Collection will have its own portable XRF tracer in the future.

Before those events, we got encouraging results. The team, including Lee B. Drake (XRF analysis and AI, University of New Mexico), Colton Siegmund (metadata and data collection), and Suay Erkusoz (data collection), analyzed tablets from different sites, including Adab, Nippur, Nuzi, Khafajeh, Ischchali, and Tell Asmar. We obtained proof that pXRF is a viable and up-and-coming method for the provenance study of cuneiform tablets. Scatter plots indicate distinct groupings of tablets, with elements such as chlorine (Cl) and copper (Cu) being particularly essential.

Nearby sites like Adab and Nippur (fig. 1), and Khafajeh and Tell Asmar, are distinguishable in the clustering. More significant sites like Nippur (168 ha) can have multiple clay signatures (Nippur I, II fig. 1). An analysis of the metadata showed that various clay signatures could correspond to individual findspots on the site and ancient archives/antique text clusters. Furthermore, a small group of results showed promise to solve contradictions between proposed find circumstance (Adab) and textually assigned provenance (Girsu/Umma), supporting that the tablets were likely produced at Adab.

While scattered plots indicated grouping, overlaps between different groups occurred (fig. 1). The application of machine learning approaches by Lee Drake had better success reaching 90–96 percent accuracy in identifying the provenance of clay tablets by chemical analysis. We presented preliminary results to experts in conservation, scholars, diplomats, and members of law enforcement during a conference at the Smithsonian Institution on Cuneiform Tablets: Origins, Trafficking, and Best Practices for the Future. Katharyn Hanson, our consultant, organized this successful conference after a stimulating brain-storming session in Washington, DC, in early 2019. Our work was also highlighted for a broader audience in a feature article by Mary A. Agner for *Humanities: The Magazine of the National Endowment for the Humanities* 41:1 (2020).

I am eager to reassume work on the tablets, answering research requests that accumulated during the last months, and advancing our digitalization further as soon as it is possible and safe. It is my great pleasure to thank everyone involved in the Tablet Collection last year: our donors, volunteers, staff, and our many colleagues, especially the staff of the OI and my colleagues in Cuneiform Studies.