Report on the Excavations at Elephantine by the German Archaeological Institute and the Swiss Institute from Autumn 2021 to Spring 2022[*]

Martin Sählhof, Sylwia Buławka, Gersande Eschenbrenner Diemer, Omar Kassab, Jiří Kmošek, Manuela Lehmann, Claire Malleson, Amandine Merat. Martin Odler, Mary F. Ownby, Johanna Sigl, Cornelius von Pilgrim and Elisabeth Wegner[**]

Abstract

The 50th season 2021/22 included fieldwork on the Kiosk of Amasis, rock inscriptions, House H55 and workshop H210. Site management measures involved backfilling of trenches and consolidation of mud-brick structures in the central area of the settlement mount, in Area XXIX and Area VIII. Study of objects and finds from the excavations of House H169, House H55, and workshop H210 continued. Archaeobotanical studies started on assemblages from various excavations of previous seasons. Petrographic analyses on ceramic samples and metallurgical studies on finds and samples from contexts of H169 were carried out on site and in the IFAO laboratories.

---

[*] We thank the Ministry of Tourism and Antiquities (MoTA) and all the members of the Aswan Inspectorate for their continued support, in particular the General Director of Aswan and Nubia Dr. Abd el-Moneim Said, the General Director of Aswan Shazli Ali Abdel Azim, the Director of the Missions Department of Aswan and Nubia Hany Salah, the Chief Inspector of Elephantine Asmaa Sediq, the Chief Inspector of the find magazines in Elephantine Mahmoud Abdellah Abdallah, the season's inspectors Eman Abuhagag Ibrahim, Huwaida Mohamed Ahmed Ibrahim, Manal Mohamed Hussein, Moataz Sayed Ibrahim and Omneia Mohamed Abdallah, as well as the inspectors in the central magazine of Aswan Zainab Elsayed Ghaleb and Rasha Badawy El Tayb.

[**] Members of the team were the building archaeologist M. Sählhof (Cairo), the Egyptologists, M. Adel William (Cairo), B. Bader (Vienna), J. Budka (Munich), F. da Silva Lozada (Cairo), G. Eschenbrenner Diemer (Lyon), P. Heindl (Munich), M. Lehmann (Berlin), C. Malleson (Beirut), A. Merat (Nice), M. Müller (Basel), M. Odler (Vienna), St. J. Seidlmayer (Cairo), M.-K. Schröder (Cairo), C. von Pilgrim (Cairo), E. Wegner (Cairo), the archaeologists S. Bulawka (Warsaw) and B. von Pilgrim (Cairo), the architect O. Kassab (Cairo), the archaeometallurgist J. Kmošek (Prague), the museologist V. Boyer (Paris), the draftsperson O. Stephan (Munich) and the photographers B. Ezzat (Cairo) and P. Mora Riudavets (Barcelona). The work would have been impossible to be done without the teams from Quft and Elephantine under the direction of Ahmed el-Amir acting for Rais El-Amir Sadiq.

Contents

1. Introduction

The 50th season of the German Archaeological Institute Cairo (DAI) in cooperation with the Swiss Institute for Architectural and Archaeological Research on Ancient Egypt in Cairo (SIK) on the site of Elephantine begun on 30th October 2021 and continued till March 17th 2022[1].
Fieldwork focused on the architectural study and resurvey of the Amasis Kiosk (26th Dynasty), east of the 18th Dynasty Satet Temple. The kiosk building was documented with methods of building archaeology in manual drawings and SfM-photogrammetry. Inscriptions of the kiosk and on other building parts of Amasis stored in the lapidaries were epigraphically surveyed by St. J. Seidlmayer.
For the analysis of colour remains on rock inscriptions, non-invasive test measurements have been undertaken, using a portable X-Ray Fluorescence (pXRF) device. Preliminary results on samples of New Kingdom inscriptions indicates that parts of them possibly feature red colouring.
Site management measures focused on the maintenance of the archaeological site (fig. 1). This included the continuation of backfilling excavation trenches and consolidation of mud-brick walls in the central and north-eastern area of the settlement mount, and the repair of wall copings of Middle Kingdom houses. In preparation for a new presentation to the general public, sample panels were set up next to the foundation blocks of the 18th Dynasty Satet Temple. Partial reconstructions of the northern pronaos wall of the late Khnum Temple and of mud brick walls in Area XXIX and Area VIII were done by the Swiss Institute[2].
The study of finds from excavations of house H169 (Middle Kingdom) house H55 (New Kingdom) and workshop H210 (30th Dynasty) continued on pottery, textiles, lithics, wood, and further small finds. Botanical finds from previous excavations dating between the Early Dynastic Period and the New Kingdom were studied for the first time as a coherent group to track changes in the assemblage through time. Samples of metal finds and ceramics from the Realities of Life projects' (RoL) excavations were transported to Cairo for metallurgical and petrographic analyses in the IFAO laboratory.

(M. Sählhof)

Fig. 1: Plan of the archaeological site of Elephantine (P. Kopp, O. Kassab, and M. Sählhof, © DAI Cairo).

Reorganisation of the Magazines

In the magazines below the Annex Museum, boxes were condensed to gain additional space. As for the past seasons, the focus was on the reduction of wooden pottery boxes stored in the magazine below the 18th Dynasty Satet temple; this was achieved by sorting and filling the pottery sherds into large bags (*shewallat*). A total amount of 87 bags with pottery sherds from more than 2000 find contexts was packed and sorted. Furthermore, registration and study of finds kept in the storerooms of the annex magazine continued.

(E. Wegner)

2. Works of the German Archeological Institute

2.1 Fieldwork

2.1.1 Amasis Kiosk

East to the 18th Dynasty Satet Temple stands the partial reconstruction of a small columned building (fig. 2) inscribed with the royal titular of Amasis (26th Dynasty). Since the 18th Dynasty Satet Temple was replaced in the Ptolemaic Period by a new building, reusing also some Amasis components in the foundations, the Amasis building must have been built within the architectural context of the 18th Dynasty temple. The preserved Amasis components allow the conclusion that, in terms of layout and typology, they belong to a kiosk building that formed the spatial link along the processional route from the 18th Dynasty Temple to the eastern bank of the Nile (fig. 3).

Fig. 2: SfM-Model of the reconstructed Amasis Kiosk, looking south-east (M. Sählhof, © DAI).

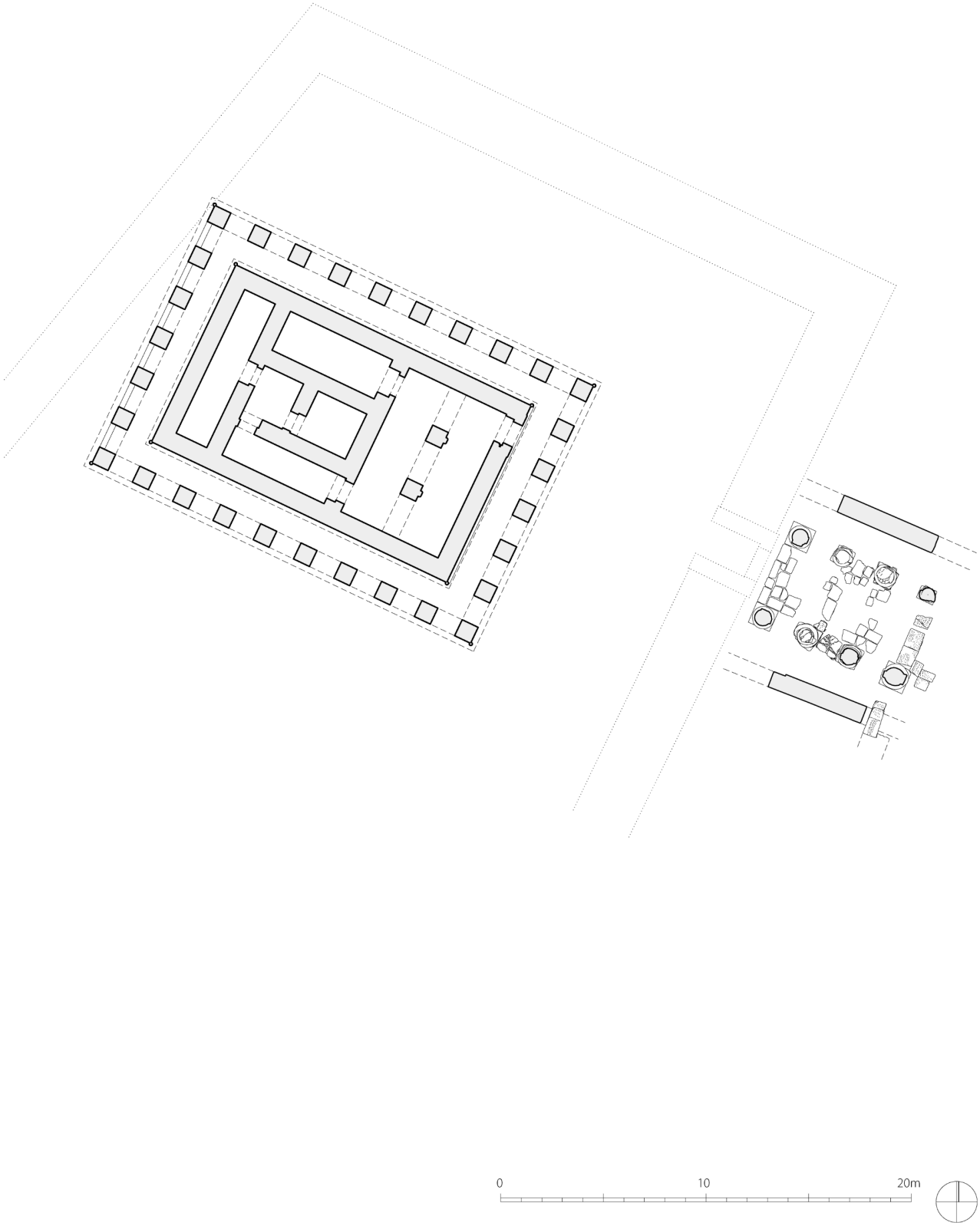

Fig. 3: Location of the Amasis Kiosk east of the 18th Dynasty Satet Temple. Original scale 1:200 (plan: M. Sählhof, © DAI).

The reconstruction of the kiosk was built in the 1990s with an arrangement of 2 x 4 columns on a rectangular plan, integrating bases and shafts of fluted limestone columns. Remains and traces on bases and shafts clearly show that screen walls decorated with a torus and cavetto cornice were placed in the intercolumniations. The 20-sided shafts taper significantly upwards, where they end in regularly carved surfaces as supports for the upper shaft ends and capitals (fig. 4). Different to the polygonal pillars known from Egypt, these shafts have concave carvings divided vertically by narrow ridges, not dissimilar to Doric fluting. No associated components have been found from the upper shaft ends, capitals, and entablature. Inscriptions are applied as vertical lines on two opposite sides of each of the column shafts, naming either Satet, Anuket, Miket, and Khnum among the locally worshipped deities. The only exception is one shaft fragment, which clearly belongs in a corner position by the remains of screen-walls and inscriptions that stood at right angles to each other (fig. 4).

Fig. 4: Component Elephantine S1, Face d with reconstructed base below (photo: B. Ezzat, © DAI).

Fig. 5: Component Cairo F2, Face a, now at the Egyptian Museum, Cairo (photo: B. Ezzat, © DAI).

The location of the reconstructed Amasis Kiosk was determined by a column base remaining *in situ* and two other toppled bases found by DAI excavations within the area[3]. Spacing of columns resulted from a screen-wall pedestal adjoining the *in situ* base to the eastern side. Two

of the column shafts integrated in the reconstruction were found during the dismantling of the pronaos foundations of the Ptolemaic Satet temple[4], three other shaft fragments were most likely found in the area of the Satet Temple during French excavations at the beginning of the 20th century[5]. The French excavations also yielded four other shaft fragments, brought from Elephantine to the Egyptian Museum in Cairo and are not part of the physical reconstruction on site (fig. 5)[6].

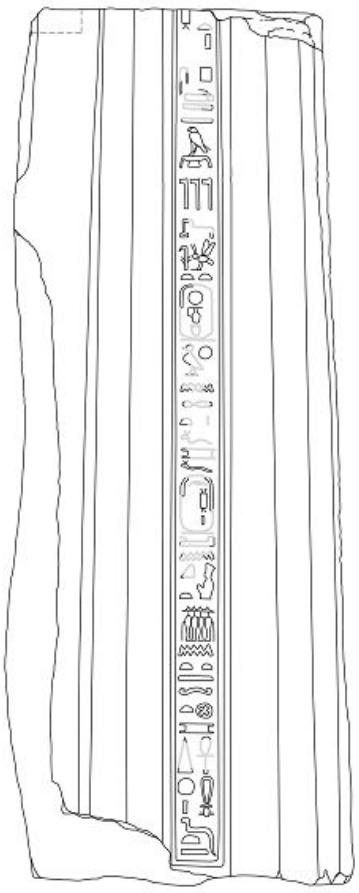

Fig. 6: Component Elephantine S1, Face d.
Original scale 1:20 (drawing: M. Sählhof, © DAI).

In spring 2022 the Amasis Kiosk was resurveyed, which resulted in hand drawn plans, and additionally the kiosk was documented by SfM-Photogrammetry (fig. 2). Single components were recorded by hand drawings that also include the documentation of their very inscriptions (fig. 6). Simultaneously an epigraphic survey by St. J. Seidlmayer recorded the inscriptions holistically for the first time[7]. Additionally, after the end of the season the components in the Cairo Museum were documented by the same methods. In perspective, this research should lead to a new reconstruction proposal for the Amasis Kiosk considering all known components in Elephantine and Cairo, as well as their inscriptions. In coordination with the MoTA and the Egyptian Museum Cairo, the possibilities of returning the components kept in the Museum to Elephantine are to be discussed.

(M. Sählhof)

2.1.2 Analysis of Colour Traces on Rock Inscriptions

In preparation of a new project on the analysis of colour remains on rock inscriptions, there have been some test measurements undertaken at the site of Elephantine, using a portable X-Ray Fluorescence (XRF) device[8].

XRF spectroscopy is a non-invasive method that allows the detection of chemical elements in a number of samples like metals and minerals. Its operating mechanism is based on the physical principle of X-rays that are stimulating the electrons of various elements to fluoresce when being emitted with a certain electric potential. The radiation reflected by the fluorescent electrons creates specific energy spectra, which are analysed by the XRF detector by determining the different components of the sample, respectively.

Fig. 7: Taking a sample with a portable XRF analyser inside the 18th Dynasty temple of Satet on Elephantine Island (photo: B. Ezzat, © DAI).

The trial measurements aimed at testing the potential of this method in the field, regarding its applicability and the significance of its results in terms of colour pigments. For this purpose, the samples chosen comprised of relief surfaces with well-preserved colour remains within the late Khnum temple precinct and the 18th Dynasty temple of Satet (fig. 7), as well as rock inscriptions in the front area of the Khnum temple.

All spectra of the analysed colour pigments in the temple areas exhibit higher concentrations of iron (Fe) and calcium (Ca) (fig. 8). Calcium is not only related to the white foundation layer made of calcite or gypsum, which preceded the actual colour application[9], but is also a component of other colour variations[10]. Peaks of the elements iron (Fe) and copper (Cu), as well as quantities of orpiment (As) and potassium (K) characterise the spectra of the measured blue and green pigments. Although commonly employed for the creation of bright yellow hues and golden shades, as can be found in larger quantities and in combination with potassium (K) within green pigments[11], the peaks of iron (Fe) and potassium (K) could also suggest the use of green earth[12]. Within the XRF spectra of red and yellow colour pigments, iron (Fe) presents the highest amplitude, pointing to the use of red and yellow ochres[13].

On the contrary, the measurements conducted on rock inscriptions have clearly shown the limits and difficulties of this method. First of all, it seems unlikely that the XRF device is sensitive enough to detect colour pigments that are not evidently visible to the naked eye. Secondly, the majority of the rock inscriptions at the First Cataract are carved into the local granite varieties that naturally include calcitic, potassic, and ferreous minerals, like potash feldspar; peaks for calcium (Ca), iron (Fe), and potassium (K) will most likely occur each time within the measured

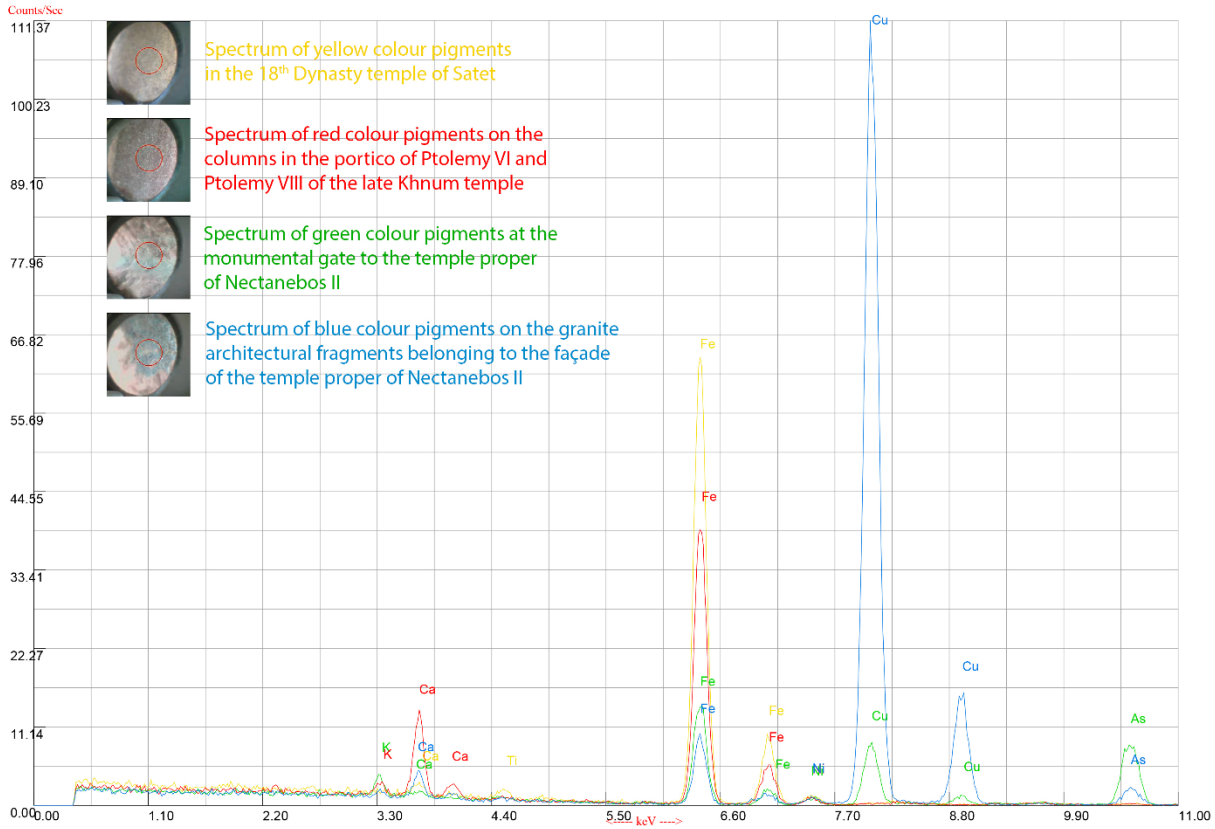

Fig. 8: XRF spectra of the sampled blue, green, red, and yellow colour pigments (E. Wegner, © DAI).

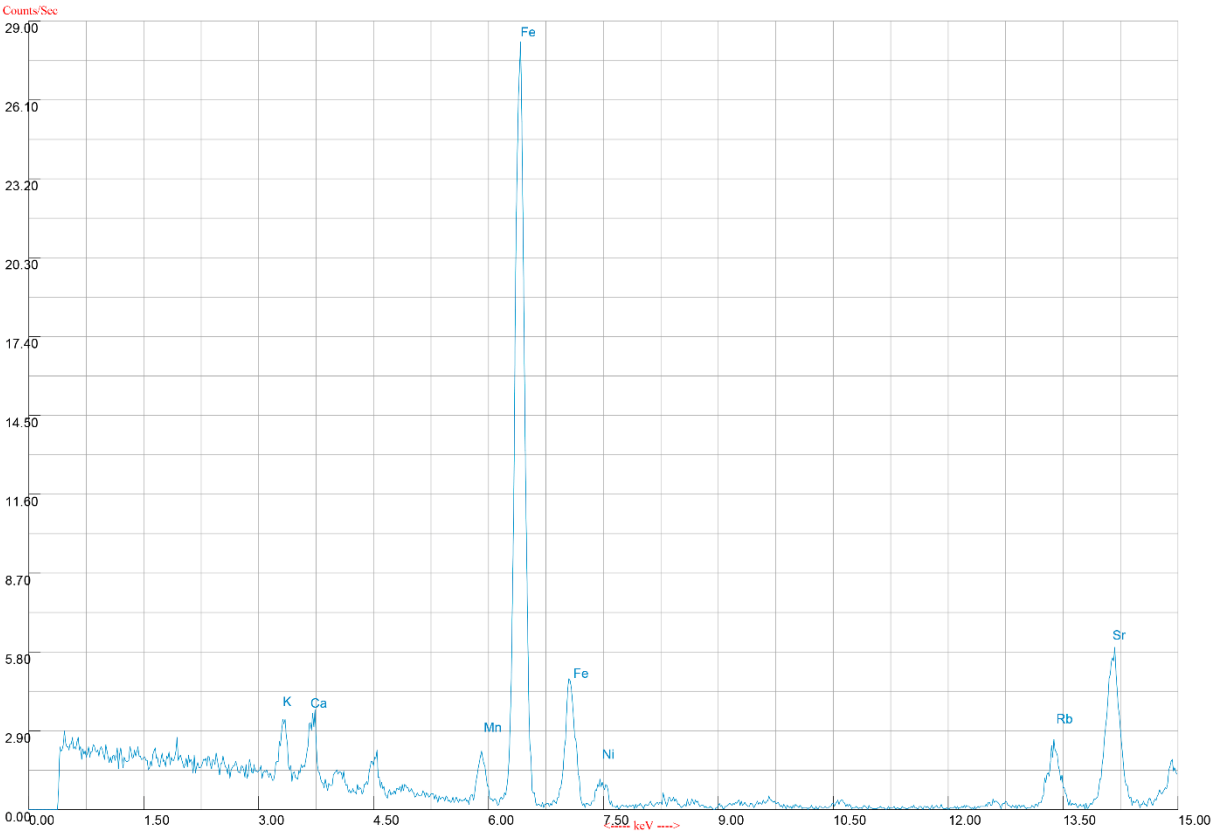

Fig. 9: Spectrum of a test shot with the XRF device on plain, undecorated pink granite (E. Wegner, © DAI).

energy spectra (fig. 9)[14]. This, in turn, will make it difficult to distinguish the elemental ratio especially of calcitic and ferreous colour pigments, like gypsum or red and yellow ochres, from the natural elemental composition of the granite.

Though facing a somewhat challenging starting point for the usage of XRF in relation to the project's objective, there is an additional non-destructive and completely contact-free method to detect colour remains on rock inscriptions: Decorrelation Stretch (DStretch) is an image editing tool that manipulates the colours of digital photographs. With this method, possible traces of colour can be visually highlighted using the imaging processing software.

Fig. 10: Digital photograph of the inscription of the priests Amenemhat and Amenmesse before (left) and after (right) using DStretch (photo and processing: E. Wegner, © DAI).

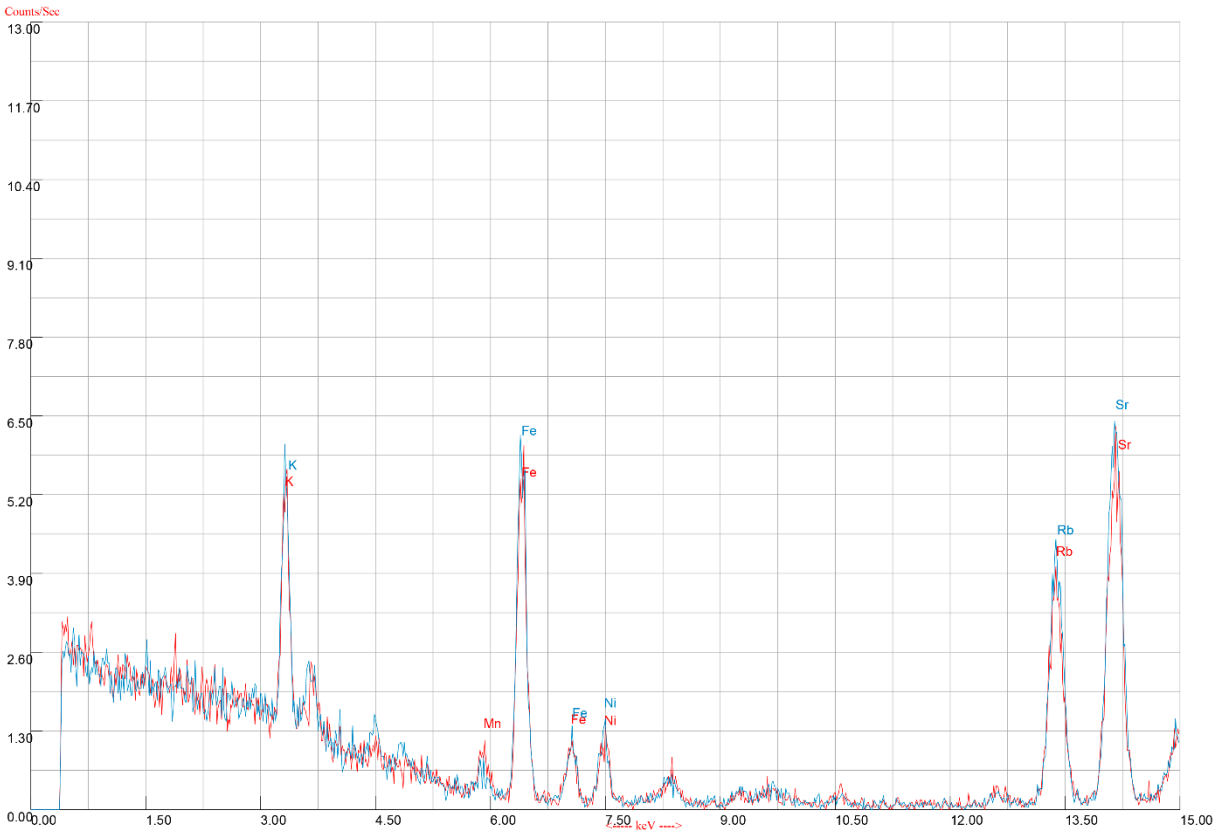

Fig. 11: XRF spectra of two samples taken from the same spot on the left leg of the figure of Amenemhat, one with (blue spectrum) and one without (red spectrum) helium flush (E. Wegner, © DAI).

The combination of both XRF and DStretch might yield unexpected results. In case of the sampled rock inscriptions on Elephantine Island, for instance, the application of DStretch on the New Kingdom inscription of Amenemhat and Amenmesse, both priests of the god Month, in the front area of the Khnum temple indicates that legs and feet of the right figure of Amenemhat possibly feature red colouring (fig. 10). So far, the XRF spectra are inconclusive, but hopefully further measurements will shed light on this assumption (fig. 11).

(E. Wegner)

2.1.3 Heritage Conservation and Site Management

Heavy rain in the Aswan region overnight from the 12th to the 13th November, 2021 caused flooding and damage at the archaeological site of Elephantine[15]. Especially affected by the rain were mud-brick structures, resulting in breakoffs and partial collapses of walls, as well as erosion to open excavation trenches and unprotected profiles (fig. 12). In addition to structural damages, rainwater eroded the surfaces of mud brick walls exposed to driving rain from the southeast direction (fig. 13). Water also collected on tops of walls, from where it flowed down the vertical surfaces, eroding plaster and masonry in its path (fig. 14).

This array of damages occurred throughout the archaeological site. Breakoffs of mud-brick masonry continued during the following days as a result of the drying process. Emergency measures were deployed to walls at risk of collapse as interventions of structural support and consolidation to prevent their degradation (fig. 15). Backfilling of excavation trenches as a critical action and widening its reach to protect exposed archaeological and architectural heritage was prioritized as site management interventions.

The extent of damages inflicted upon the archaeological site's stone structures and their painted surfaces, such as temples and other buildings, cannot be fully assessed at the time being. Nubian sandstone in particular showed a high degree of moisture penetration (fig. 16). Here too, in consequence of the drying process, new damage patterns such as salt efflorescence can be observed. Intensive monitoring, consolidation, and conservation works will have to be continued as an integral part of fieldwork in the upcoming seasons. Long-term measures for the sustainable protection of the archaeological and architectural heritage, also in context of a regional climate change, will be integrated into the Elephantine site management concept.

Fig. 12: Partially collapsed mud-brick walls and excavation profiles in the central area of the settlement mound, looking north (photo: M. Sählhof, © DAI).

Fig. 13: Erosion of mud-plastered surfaces exposed to rainfall on the reconstructed Old Kingdom Mastabas, looking south (photo: M. Sählhof, © DAI).

Fig. 14: Erosion of mud-brick masonry and plaster at the Sanctuary of Heqa-Ib, looking south (photo: M. Sählhof, © DAI).

Fig. 15: At House M14, the western wall is supported with a facing shell, looking north-west (photo: O. Kassab, © DAI).

Fig. 16: 18th Dynasty Satet Temple, with stone components soaked by rainwater, looking west (photo: M. Sählhof, © DAI).

Maintenance and Conservation

Backfilling of excavation trenches and profiles, which had already begun in the 2020 spring season, was resumed in the 2021/22 season[16]. Backfill material was sourced from excavation heaps north-west of the settlement mount. These preventative measures were intensified in the aftermath of the November 2021 rainfalls and concentrated on the central area of the settlement mount to protect and preserve exposed and vulnerable archaeological and architectural heritage at risk.

Further maintenance measures involved consolidation of mud-brick walls of Middle Kingdom houses in the north-east of the settlement mount (Houses H46, H47, H49, H68, H69, and H70). Wall copings dating from the 1990s were repaired, insofar as missing bricks and gaps were supplemented and loose or damaged bricks were replaced. The bricks used for these repairs were produced on site using local Nile mud with additions of hay and sand. The contemporary supplementary bricks were molded to the same size as those produced in the 1990s, with dimensions of 24 x 12 x 6 cm.

The mud-plaster finish on the reconstructed Temples of Satet dating to the Old Kingdom, the First Intermediate Period, and the Middle Kingdom (11th Dynasty, Mentuhotep II) were damaged and eroded by rainwater. Conservation measures were carried out on these buildings through moistening the damaged plaster remains and roughing them up (fig. 17), to then apply a new layer of mud-plaster in a final step (fig. 18).

Fig. 17: The 11th Dynasty Satet Temple (Mentuhotep II); Repairing of the mud plaster surface: the old, eroded surface (right), moistening and roughening (middle), and finally re-plastering (left), looking west (photo: M. Sählhof, © DAI).

Fig. 18: 11th Dynasty Satet Temple (Mentuhotep II) after conservation, looking north-west (photo: B. Ezzat, © DAI).

Presentation and Information

One of the biggest shortcomings at the site is its inability to communicate with its visitors: whether to narrate histories, or to direct them through its pathways to the next relevant stop. To tackle this inadequacy, a bilingual signage system, in Arabic and English, was developed to present the archaeological heritage and the most recent excavation results to the public.

The information content was developed in 2020 then refined and reviewed on site in autumn 2021. The panels assist visitors in comprehending what is on display through the combination of texts, plans, visual reconstructions, and other complimentary illustrations and detail photographs creating a didactic museography.

A systematic spatial arrangement of information panels was developed to lead visitors to explore the archaeological site along a variety of guided paths. Before the final installation of this visitor infrastructure, sample panels were set up in December 2021 in proximity to the foundation blocks of the 18th Dynasty Satet Temple (fig. 19). This location was selected for multiple reasons: firstly, the ground in this area is chiefly constituted of backfill, so that archaeological finds and structures are not to be expected in the shallow foundation depth of the panels. Secondly, the panel prototypes can be assessed within the context of the archaeological site in a diverse and changing landscape. Different building materials and backgrounds, such as reconstructed temple buildings to the North and East and the settlement mount to the South, enable a wider evaluation of the compatibility of the panels with the archaeological site, judging them against both their close and distant contexts. Lastly, the area allows for free circulation, becoming a testing ground of visitor behavior and interaction with the panels.

Three sample panels serving different functions were installed: a vertical standing information board, a lower standing information panel with an inclined surface, and a wayfinding pole (fig. 20). The information boards provide ample space on both their sides and will be primarily used in entrance and transition areas, signaling the beginning of a thematic zone. These boards provide an overall introduction to the theme and its enlisted monuments, via introduction texts and overview plans and drawings. They also serve as wayfinding anchors at the site's peripheries to provide uncoded directional guidance.

Information panels with inclined surfaces contain information exclusive to individual monuments and further points of interest, allowing visitors to simultaneously comprehend what is on display while relating the information to their immediate context. Wayfinding posts display the coded numbers and directions of individual information panels, streamlining and easing navigation and movement between these points.

Fig. 19: Test panels as part of the new information infrastructure (centre), looking north (photo: M. Sählhof, © DAI).

Fig. 20: Test panels, from left to right: area information board, monument panel, wayfinding pole, looking north-west (photo: M. Sählhof, © DAI).

The installed test panels hold placeholder text and layout trials and serve the purpose of assessing production materials and technologies under the local climate conditions over an extended period of time. The future assessment will help inform the specifications for final production in terms of material, design, and colour, and the sample panels will then be removed from the site and replaced.

(M. Sählhof and O. Kassab)

2.2 The Realities of Life Project[***]

2.2.1 Overview

The "Realities of Life" project (RoL) was established in autumn 2013 as part of the research of the German Archaeological Institute Cairo on Elephantine Island, Aswan[17]. Excavation was carried out between 2013 and 2018 in the north-western part of the ancient settlement. Parallel to this excavation work, find processing began on site and efforts were made to connect with suitable laboratories in Egypt for scientific analysis of chosen samples of soil, pottery, metal, and other materials. The aim of the combined archaeological and archaeometric work is to get a multi-perspective view on found objects, never forgetting the archaeological context they came from. Through this approach we hope to reach a deeper understanding of the meaning and use of objects in the first Nile cataract area in past times.

[***] The Realities of Life team was in the field this season with the following members: M. Adel William, F. da Silva Lozada, J. Kmošek, A. Merat, M. Odler and M.-K. Schröder. Laboratory work has be conducted at *Institut français d'archéologie orientale* (IFAO) in Cairo by J. Kmošek, M. F. Ownby, M Odler and G. Mutri. At the home office in Germany, P. Kopp and J. Sigl worked with F. da Silva Lozada and M. Adel intensely on the structuring of the excavation database and the transfer of data into the sustainable and publicly available database services of the German Archaeological Institute, iDAI.field. Our sincere thanks go to our D. el-Meliegy, A. Nageh and their colleagues of the Centre of Research and Conservation of the Ministry of Tourism and Antiquities (MoTA) for supporting our sample transport from site to the laboratory, and to N. Mounir and A. Quiles of IFAO Cairo for the preparation of sample for analysis and the provision of the laboratory equipment to study them. We are sincerely grateful for the administrative work and financial support of the endeavour to the German Archaeological Institute's director St. J. Seidlmayer and the Elephantine project's field director M. Sählhof. For their assistance of our work on site and in the excavation house we thank the workmen A. El-Amir and K. Serag and the house staff H. Ahmed, M. Saleh, O. Mohamed and R. Abd el-Hafiz. We are grateful for the support by the local inspectors of the MoTA, especially by M. Abdallah Abdellah.

Fig. 21: Plans of late Middle Kingdom buildings in the northwestern town of Elephantine and photographs of the best-preserved building phases of House 169 (plans P. Kopp, modified by J. Sigl, © DAI; photos P. Kopp, © DAI).

About half of the research area of the RoL project on Elephantine Island consisted of highly disturbed settlement remains, but in the second excavated trench (outlined with work years in fig. 21) House 169 (H169), a large residential building provided a well-preserved stratigraphic sequence of around 150 years of occupation dating to the late Middle Kingdom to early Second Intermediate Period (mainly late 12th to late 13th Dynasties, ca. 1800–1650 BCE)[18]; the trench also provided a large corpus of find materials and sampling ground to answer the project's

research questions[19]. The study of these materials was the focus of the team's research in the past years. Next to these research efforts, the RoL project co-director Peter Kopp started the transfer of the collected excavation data to the German Archaeological Institute's platform iDAI.field for sustainable storage and open accessibility[20]. This report will give a short summary of the most recent work on ceramic, textile and metal finds, which were studied in the field storage room and in the laboratory at IFAO, Cairo in autumn 2021 and spring 2022.

(J. Sigl)

2.2.2. Ceramic Petrography – Methods, Samples, and Results

Petrographic examination of Middle Kingdom pottery from the RoL project on Elephantine Island has sought to better understand the production of pottery within this multicultural community[21]. Significantly, characterizing the local resources exploited and paste recipes employed will provide information on identity, use, ceramic technology, and how the community was impeded in the larger landscape. Towards these goals, petrographic analysis firstly aimed to characterize the raw materials employed and the paste recipes created. Secondly, the analysis sought to clarify for the ceramists the consistency of the on-site fabric groups and their relationship to each other. For the current study, more Nubian style vessels were examined to better elucidate their production and possibly identify any vessels made in Nubia, in the area south of the Aswan region.

Methods

The methods employed are those that are standard for ceramic petrography[22]. For each thin section examined, its colour in plane (PPL) and cross polarized (XPL) light was noted, an estimate was made for the frequency of inclusions relative to clay matrix, and the sorting of the inclusions was specified. The minerals identified in the thin section were listed by those that represent the main inclusions, and those that are less common. For the inclusions, both their general shape and size range were noted.

Material

Thirty-six sherds were analyzed (table 1). They were selected on site by the RoL project's ceramicists, Leslie A. Warden and Marie-Kristin Schröder, to cover most of the fabric classes utilized in pottery analysis at the site[23]. Some samples were also chosen as they were of Nubian style, while the Egyptian style vessels continued to focus on bread moulds with a few other functional types as well[24]. Table 1 lists the samples and the petrographic group to which they belonged[25]. All were made with Nile clay, but the other constituents could show some variation. The samples belonging to three sub-groups of the main Nile clay petrofabric are discussed below[26].

IFAO #	Vessel No.	Description	Fabric	Petrographic Group
11026	44501Q/u-1-2	fine ware: monochrome	ELN1	Nile with OPL
11027	44501N/s-1-1	fine ware: black-topped	ELN1	Nile with OPL
11028	43501E/r-1-1	cooking vessel with horizontal hatching	ELN1	Nile with OPL
11030	44501B/e-1-5	fine ware: black-topped	ELN1	Nile with sand, <OPL
11031	44501B/e-1-6	cooking vessel, undecorated	ELN1	Nile with OPL
11034	43501I/m-1-1	fine ware: black-topped	ELN1	Nile with OPL
11035	43501I/m-1-2	cooking vessel: hatched	ELN1	Nile with OPL, <limestone
11037	43501G/b-1-1	cooking vessel with horizontal hatching	ELN1	Nile with OPL, <limestone
11039	45502F/q-1-1	cooking vessel with vertical hatching	ELN1	Nile with OPL
11040	45502F/q-1-4	cooking vessel with diagonal hatching	ELN2	Nile with OPL
11042	45502F/q-1-3	cooking vessel, undecorated	ELN2	Nile with OPL
11044	45502B/k-1-1	fine ware: black-topped	ELN2	Nile with OPL, <limestone
11046	45502H/b-1-3	cooking vessel?	ELN2	Nile with OPL
11047	45502F/q-1-6	cooking vessel, hatched	ELN1	Nile with OPL
11048	45502F/q-1-5	fine ware: black-topped	ELN1	Nile with limestone, <OPL
11049	45502L/k-2-2.1	fine ware: black-topped	ELN1	Nile with OPL
11050	46501O/i-1-1	fine ware: black-topped	ELN1	Nile with limestone, <OPL
11051	46501O/i-1-2	cooking vessel, hatched	ELN1	Nile with OPL
11052	46501O/i-1-3	cooking vessel, hatched	ELN1	Nile with OPL
11053	46501O/i-1-4	cooking vessel, hatched	ELN1	Nile with OPL
11064	44501F/c-1-22	Bread Mould (E1)	NSI	Nile with OPL
11067	44501F/c-1-26	Bread Mould (E1)	NSI	Nile with OPL
11068	44501F/c-1-25	Bread Mould (E2)	NSI	Nile with OPL
11071	44501F/c-1-28	Bread mould with flat top	NSI	Nile with OPL
11075	44501F/c-1-32	Aprt bread mould	NSI	Nile with limestone, <OPL
11076	46501B/b-1-115	Aprt bread mould, with lining	NSI	Nile with limestone, <OPL
11078	46501B/b-1-117	Cylindrical bread mould	NSV	Nile with OPL
11080	46501B/b-1-119	Cylindrical bread mould, no hole	NSV	Nile with OPL
11081	46501B/b-1-120	Cylindrical bread mould, no hole	NSV	Nile with OPL
11129	43501H/k-1-22	Egyptian cooking pot in imitation of Nubian form	NSIV	Nile with limestone, <OPL, <grog
11136	43501H/p-1-6	Egyptian cooking pot in imitation of Nubian form	NSIII	Nile with OPL
11167	43501H/k-1-27	Carinated vessel with incised wavy decoration exterior	NSIII	Nile with OPL
11177	43501H/q-1-10	Carinated cup with 2 incised lines	NSIII	Nile with OPL
11187	43501H/s-1-9	Bowl with double line, slightly restricted	NSII	Nile with OPL
11188	43501H/s-1-10	Medium coarse bowl	NSII	Nile with OPL
11189	44501H/e-1-38	Jar with rolled rim	NSII	Nile with OPL

Table 1: Sample list (M. F. Ownby, © DAI).

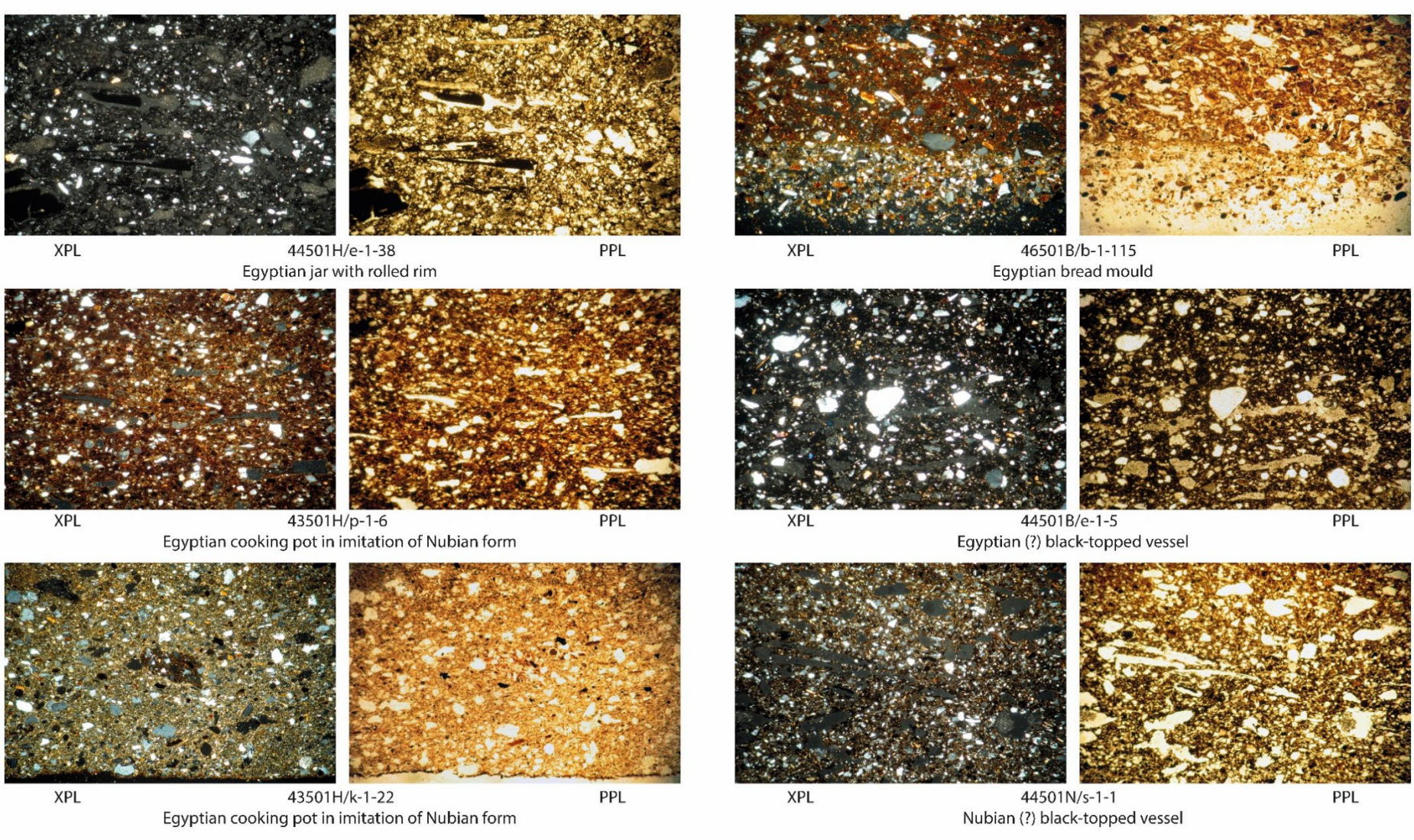

Fig. 22: Petrographic images of samples of the RoL project (each photographed at 40x magnification; photos M. F. Ownby © DAI).

Results

Nile Clay with Plant Remains

Many of the Nubian style vessels featured a common paste of Nile clay with plant remains. For two fine ware vessels, 44501Q/u-1-2 (IFAO 11026) and 44501N/s-1-1 (IFAO 11027; fig. 22), the clay was particularly fine and lacking in medium to coarse-sized grains. The firing was notable for being mostly reduced, producing dark brown fabrics, while the temperature was probably between 800°C and 850°C. Furthermore, the plant remains may have already been ash when added to the clay paste.

However, the Nubian style cooking vessel samples 43501E/r-1-1 (IFAO 11028), 44501B/e-1-6 (IFAO 11031), 45502F/q-1-1 (IFAO 11039), 45502F/q-1-4 (IFAO 11040), 45502F/q-1-3 (IFAO 11042), 45502H/b-1-3 (IFAO 11046), 45502F/q-1-6 (IFAO 11047), 46501O/i-1-3 (IFAO 11052) and 46501O/i-1-4 (IFAO 11053) were made with a coarser Nile clay with natural sand-sized inclusions (including more volcanic rock fragments) and some plant remains, most likely as ash. The firing was more oxidizing, with a lower firing temperature below 800°C. Sample 45502H/b-1-3 (IFAO 11046) in this group has more common sand. Related are fine ware samples 43501I/m-1-1 (IFAO 11034) and 45502L/k-2-2.1 (IFAO 11049), although the latter was probably fired between 800°C and 850°C with a short period of full oxidation.

One Nubian style cooking vessel, 43501I/m-1-2 (IFAO 11035), contained some plant remains (likely ash), and minor sand and limestone inclusions that could be natural to the clay. The firing temperature was probably around 800°C in a slightly oxidizing atmosphere. Similar were cooking pots 43501G/b-1-1 (IFAO 11037) and 46501O/i-1-2 (IFAO 11051), and fine ware vessel 45502B/k-1-1 (IFAO 11044) with more sand-sized inclusions. All were of Nubian style. Also within this petrographic group are Egyptian forms that were often fired in a mostly oxidizing environment between 800°C and 850°C. This includes the bread moulds 44501F/c-1-22 (IFAO 11064), 44501F/c-1-26 (IFAO 11067), 44501F/c-1-25 (IFAO 11068), 44501F/c-1-28 (IFAO 11071), 46501B/b-1-119 (IFAO 11080), and 46501B/b-1-120 (IFAO 11081) that also contained plant remains but likely not ash. Similar is bread mould 46501B/b-1-117 (IFAO 11078), but the firing temperature is lower, likely from 750°C to 800°C.

An Egyptian cooking pot in imitation of a Nubian form, 43501H/p-1-6 (IFAO 11136; fig. 22), had a similar paste with Nile clay and some plant remains. However, the firing was around 800°C. Related are a carinated vessel, 43501H/k-1-27 (IFAO 11167), a bowl, 43501H/s-1-9 (IFAO 11187), and medium bowl, 43501H/s-1-10 (IFAO 11188), all with firing temperatures below 800°C. Having a similar firing temperature is carinated cup 43501H/q-1-10 (IFAO 11177), although the paste for this vessel also has rare limestone inclusions. A jar, 44501H/e-

1-38 (IFAO 11189; fig. 22), is also a Nile clay with plant remains, but was reduce fired at a very high temperature (>850°C) leaving a bloated fabric with common round air bubble features.

Nile with Sand

One sherd has a paste with more common sand-sized inclusions, although these often appear natural to the clay. Sample 44501B/e-1-5 (IFAO 11030; fig. 22), a Nubian style fine ware, has this paste with rare plant remains (possibly ash). The firing temperature was likely from 800°C to 850°C in an incompletely oxidizing atmosphere (some oxygen but not a lot).

Nile with Calcareous Material

A few samples were composed of a Nile clay with limestone. Samples 45502F/q-1-5 (IFAO 11048) and 46501O/i-1-1 (IFAO 11050), both Nubian style fine wares, had this paste with a minor amount of sand that could be natural to the clay. Along with the likely added limestone, rare plant remains, probably as ash, were also added. The vessels were fired to around 800°C in a mostly unoxidized atmosphere.

Egyptian bread moulds 44501F/c-1-32 (IFAO 11075) and 46501B/b-1-115 (IFAO 11076; fig. 22) had a Nile clay and limestone paste with some plant remains (not ashen). The firing temperature was likely below 800°C in a mostly oxidizing atmosphere, possibly to prevent limestone decomposition and subsequent rehydration (i.e., spalling).

Related is an Egyptian cooking pot imitating a Nubian form, 43501H/k-1-22 (IFAO 11129; fig. 22). The paste is Nile clay with some limestone, and rare plant remains and grog. The firing temperature was also low and both surfaces have a red clay slip.

Discussion

While the current study examined 36 samples, a previous petrographic analysis looked at 35 samples[27]. This discussion will focus on the results of both, covering 75 samples in total if the results from four bread moulds studied in 2018 are also included[28]. The first research question examined based on the cumulative petrographic data is how the on-site fabric groups compare within themselves and to the other groups.

For the Nile clay fabrics, the petrographic results indicate some variability within each group and commonalities among them[29]:

- NSI: sixteen sherds; fourteen are Nile clay with plant remains (two have ash and three have some limestone) and two are Nile clay with limestone and lesser plant remains.

- NSII: five sherds all of Nile clay with plant remains, two also had rare limestone.
- NSIII: five sherds; four are Nile clay with plant remains (one also has rare limestone), and one is Nile clay with sand.
- NSIV: four sherds; three are Nile clay with minor plant remains (one has rare limestone) and one of Nile clay with limestone and uncommon plant remains and grog.
- NSV: nine sherds (all from cylindrical bread moulds) of Nile clay with plant remains (one has rare limestone).
- ELN1: eighteen sherds; sixteen are Nile clay with plant remains and ash, one is Nile clay with sand, rare plant remains and ash, and one is Nile clay with limestone, rare plant remains and ash.
- ELN2: six sherds; four are Nile clay with plant remains and ash (slightly coarser and more frequent plant remains than ELN2), one has this paste but with rare limestone, and one is Nile clay with sand.

The second research question was to examine the utilization of specific paste recipes for particular vessel forms, especially those of Nubian style. While differences in Nile clay relating to source location can be difficult to specify, some attempt was made to determine if there were notable mineralogical distinctions that could suggest if certain samples were made with Nile clay from south of Aswan ("Nubian") or more likely from north of Aswan ("Egyptian"). Further technological features were of interest, that could relate both to the traditions for communities of potters making the vessels and the functions of the pots.

- Fine ware vessels: these were dominantly produced from Nile clay with plant remains (likely ash). However, two samples (44501Q/u-1-2 / IFAO 11026 and 44501N/s-1-1 / IFAO 11027, fig. 22) had a very fine Nile clay with few volcanic rock fragments, while others were composed of a coarser Nile clay with notable volcanic rock fragments and microcline. The latter could reflect the production of vessels with "Egyptian" Nile clay around the Aswan area, which would be enriched with volcanic rock fragments and microcline (from granite) due to the proximity of volcanic and igneous formations in the Eastern Desert. Further, a study of Nubian Pan-Grave and C-Group vessels from Lower Nubia indicated a preference for very fine Nile clay pastes[30]. The two outlier fine ware samples may have been made in Nubia, but this attribution requires additional research.
- Nubian cooking vessels: most cooking pots were produced of a slightly coarse Nile clay with plant remains (probably ash). The Nile clay appears more similar to the "Egyptian" type described above, possibly indicating the use of raw materials within the Aswan

region. Interesting is the similarity of pastes for cooking vessels and fine ware ceramics, including those with minor limestone.

- Bread moulds: these were predominantly made of a coarse Nile clay with plant remains (not ash) and rare micritic limestone. The clay appears to have an increased amount of volcanic rock fragments, plagioclase, and amphibole, with less microcline and zoisite compared to that for the cooking vessels. This could suggest a slightly different source for the raw materials. Furthermore, two vessels have limestone added to the Nile clay, 46501B/b-1-115 (IFAO 11076; fig. 22) and 44501F/c-1-32 (IFAO 11075).
- Egyptian cooking pots: two samples derive from Egyptian cooking pots that imitate a Nubian form. While both are Nile clay with some plant remains, 43501H/k-1-22 (IFAO 11129; fig. 22) has common limestone and rare grog, while 43501H/p-1-6 (IFAO 11136; fig. 22) lacks these inclusions.
- Other: five samples derived from other vessel forms including a carinated vessel, carinated cup, two bowls, and a jar. All were produced of a Nile clay with plant remains, with firing temperatures around 800°C, although most were in oxidizing conditions. The jar sample, 44501H/e-1-38 (IFAO 11189; fig. 22), is a notable exception having been highly fired in a completely reduced atmosphere.

Conclusions

The current research has provided additional clarity on the paste recipe differences between the Egyptian and Nubia traditions of pottery for Middle Kingdom Elephantine. The presence of ash for Nubian fabrics relates to a long-standing use of this material for pottery production in Nubia. Ash in Egyptian ceramic pastes is mostly unknown. Beyond this, there is the possibility of two Nubian styles vessels having been made in Nubia due to some petrographic differences in the Nile clay employed. Finally, while the differences amongst the on-site ceramic fabric series categories was less notable petrographically, this is likely due to the small amount of material analyzed, both on the slide and in terms of sample numbers. Moreover, at a microscopic level, plant remains can appear more common especially when in the fine-sized category.

(M. F. Ownby)

2.2.3 Textiles

During the period from 26th of February until 10th of March 2022, the study of the textiles excavated in House 169 (H169) on Elephantine was undertaken, as part of the Realities of Life project.

Procedures Established and Study

The material, excavated during seasons 45, 46, 47 and 48, was stored in a large box in the Elephantine magazine where the study took place. The first step to the overall preparation of the research was to go through the box to sort the different bags it contained by findspot, in order to identify and isolate the H169 textiles, which were the focus of this season's work. The second step was to create a database template dedicated to the textiles, but also in adequation with the general DAI online database that it will be uploaded to at the end of the study. The resulting Excel Textiles database is divided into five sections:

- 1. Storage (box and bag numbers, and re/housing of the sample).
- 2. Excavation details (features, find number, sub-item, ID Find, architectural unit, room, area, context, date).
- 3. General description of the samples (number of textiles/fragments, description, mention of any attached object or material (if applicable), analysis needed, function/usage/reuse, parallels, notes/comments).
- 4. Measurements.
- 5. Technical analysis (weaving structure, warps, wefts, any specific technical or decorative features (fringes, selvedges, borders, etc.).

There were 100 bags of textile samples from H169, which contained from one to 50 fragments; in total there were ca. 850 fragments to be examined. Each bag containing samples from H169 was then opened and at first the textiles were preventively conserved by removing any dust, deposit, or foreign material from their surface using soft brushes. Each fragment was then measured, before a complete technical analysis was carried out and recorded in the Excel database. After they were laid out on a white background, general and detailed shots of the samples were taken, using a Lumix camera and scale, and the generated pictures were saved in dedicated folders as study documentation. Each set was finally rehoused to measure in acid-free tissue paper and placed in acid-free plastic bags of varied, fitted sizes. Feature, find, and sub-item numbers were inscribed using a pencil on the outer side of the tissue paper to facilitate with an easy identification of the items in the bag, this limiting unnecessary handling that could cause damage to the textiles in the future.

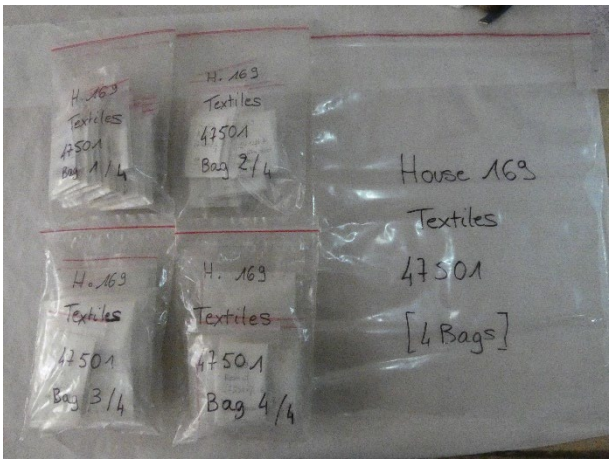

Fig. 23: Rehoused textiles in bags after study for easy handling and localization (photo A. Merat, © DAI).

The smaller bags were placed in four larger bags, one for each of the excavation seasons that provided textile samples (45502, 46501, 47501 and 48501; example in fig. 23), while four samples were kept and stored separately, with the hope that dye and fibres scientific analysis could be carried out on them in the future. The five bags were finally placed back in magazine box number 4912, dedicated to the textiles from House 169, for long-term storage. The Excel database together with the photo documentation generated were handed over to Fernanda da Silva Lozada at the end of the study, on March 10th 2022, for her to upload to the General DAI online database.

Conditions and Provenance of the Textiles

Textiles from H169 from the 100 bags (hereafter called assemblages) mostly consist of small fragments, heavily deteriorated, torn, ragged, creased, burnt, or attached to clay, of average measurements of 2–12 cm long by 0.5–6 cm wide. The great majority come from Room 8 (R08, see fig. 21; thirty-seven assemblages) and Room 4 (R04; twenty-eight assemblages), while the rest is spread as follows: eleven assemblages from Room 7[31], seven from Room 9 (R09), six from Room 5 (R05), three from Room 3 (R03), one large assemblage of circa thirty fragments from Room 10 (R10)[32], and seven assemblages with no room number. Even though the whole sample of 850 fragments came from all building phases of the house, these will not be distinguished in the following preliminary discussion, but the assemblage will be looked at as one group. Further studies are planned to provide more detailed data.

Technical and Decorative Features

Fibres and Threads

The study of the circa 850 samples confirmed the first observation made during the sorting of the textiles, that linen, the sovereign fibre in Egypt coming from domesticated flax (or *linum usitatissumum*)[33], seems to have been the only fibre used (or at last preserved) in H169. Representative of the Egyptian textile tradition at the time[34], it was exclusively used undyed here (with natural shades ranging from light beige to dark brown[35]) or it was bleached[36], with the exception of one sample showing traces of red dye (47501V/d-6) and one sample possibly

of red paint (46501D/a-7)[37]. Yarns were spun in the S-direction after the Egyptian tradition of spinning and splicing[38]. Warps and wefts were mostly single yarns, but also sometimes made of paired S-spun yarns or S2s threads[39].

Weaving Structures[40], Selvedges, and Borders

The most common weaving structure found in H169 is the faced-weave, seen in 66 assemblages, identified as warp-faced weave in 11 assemblages, weft-faced weaves in five assemblages, and a piled faced-weave (48501A/c-2-6)[41] in one assemblage. Plain weave was seen only once and half-basket weave three times. Selvedges were seen in 12 assemblages, and were simple selvedge in six of them, reinforced selvedge in the other six[42]. Borders were identified in 12 assemblages and were starting borders in four of them and fringed end-borders[43] in nine of them[44]. The remaining 10 assemblages consist of ropes[45] and nets[46].

Decorative Features

The vast majority of the textiles from H169 are plain, with no evidences of decoration, with the exception of one sample dyed in red (47501V/d-6, see fig. 24), one sample painted in red (46501D/a-7), and eight samples with self-bands[47].

Fig. 24: Preliminary photographic documentation of textiles from House 169. Note the red dyed fragment in the bottom right corner of the 47501V/d-6 assemblage (photos A. Merat, © DAI).

Production and Use/Reuse

Textiles found in H169 are representative of the Egyptian textile production at the time. The discovery of needles, a spindle, a shuttle, and possibly a beating sword[48] in copper and wood may indicate that there was a textile activity (including spinning and weaving), both inside H169 and outside in the courtyard (R04), most likely to be domestic activity rather than from a workshop setting. However, most finds from the building came from fill or levelling layers, meaning that it may have been introduced from the surrounding area into the house.

To know whether or not the textiles found in H169 were also produced there remains, of course, impossible, as is the function/reuse of the majority of these textiles, due to the poor condition of preservation. Nevertheless, the finesse and quality of the weavings speaks in favour of clothing items and household textiles, rather than so-called utilitarian textiles such as saddles, carpets, or sails[49].

Fragments of nets[50] were found several times in R04, R08 and R05. However, the thinness and delicatesse of the threads and interlacing suggests that these were most likely for household purposes, such as pot decoration or hairnets, rather than for fishing or hunting. In addition, several textile samples could possibly be identified as binding material. These are fragments of ropes[51] (R04) and ribbons, cut out of fabrics that were twisted and knotted[52] (R04 and R09).

Further research on the textiles from H169 will be carried out in the next months, with the hope to gain a better understanding of their manufacture, use, and re-use within the household, but also within the settlement; the remaining excavated units will be studied in the future for the RoL project, which should shed light on the textile fragments to this issues and research questions at hand[53].

(A. Merat)

2.2.4 Metal Studies on Site and at IFAO Laboratory

In the days from 27th November to 2nd December 2021, archaeometallurgist Jiří Kmošek (Institute of Science and Technology in Art, Academy of Fine Arts Vienna, Austria) and Egyptologist Martin Odler (Czech Institute of Egyptology, Faculty of Arts, Charles University, Prague) participated at the DAI mission on Elephantine Island.

The focus of our study was archaeometallurgical material that was found from the 43rd to the 48th seasons of the mission, within the framework of the Realities of Life project (RoL). The material is datable to the Middle Kingdom (the 11th to 13th Dynasties) with a few pieces from the Second Intermediate Period levels above[54]. There are more than 700 excavation numbers,

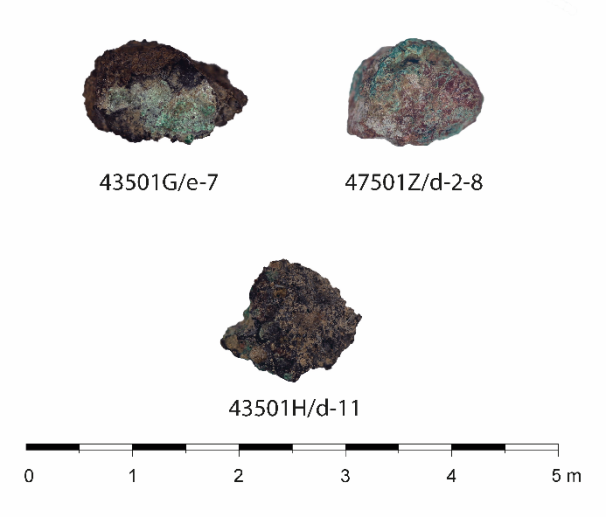

Fig. 25: Fragments of copper mineral (47501Z/d-2-8), prill (43501G/e-7), and slag (43501H/d-11) from the RoL project's excavation (photos from and with permission of M. Odler).

although the material is generally rather small in size. A portable X-ray fluorescence machine Niton XL3, property of the German Archaeological Institute, was operated by Jiří Kmošek, and a selection of the material was analysed. Almost 500 unique spectra were produced and material from all stages of the metal production was identified, from the ores, through the prills and slags (i.e., metallurgical waste), to the finished artefacts (fig. 25). A chemical composition of the artefacts and their fragments was thus established, informing back the typological distinctions of the excavated material. The specific alloys represented are predominantly arsenical coppers, typical of the Middle Kingdom, and there are also tin bronzes, marking its incipient general use in the ancient Egypt[55]. All measured samples were also weighed and described, and in combination with the archaeological contexts, a diachronic and synchronic synthesis can be produced. 48 samples were selected for further study at the IFAO archaeometric laboratory and will provide further scientific information.

In the days from the 19th February to the 3rd March 2022, Martin Odler continued with the work at Elephantine. A selection of the 48 samples to be transported eventually to the IFAO Archaeometric laboratory was documented in detail. The main focus of the two-week work period was photographic documentation of all the analysed specimens from the last year, and additional photographic documentation of the selected pieces that were not analysed. All the included objects were weighed, and the total weight of the RoL metallurgical corpus is 850.5 grams. Now the corpus is documented both by archaeometallurgical technique, but also as an archaeological artefact, providing information on the forms and colours of the objects. The photographs were handed over to the mission and a dataset was prepared, which was subsequently checked against the main database records by Fernanda da Silva Lozada. The dataset will serve for further analyses and eventual publications. The next phase of the work is a study of the selected samples at the archaeometric laboratory of IFAO in Cairo. 48 samples were transported to Cairo in early March 2022, approved and carried out by the inspector of the Ministry of Tourism and Antiquities. Jiří Kmošek already started the work at the IFAO

laboratory on the sample preparation for further study, using a metallographic microscope and, eventually, a scanning electronic microscope.

When completed, this study, which is the first of its kind and scope in Egyptian archaeology, will demonstrate the important role of meticulous settlement excavations. Elephantine will become one of the most important sites for the understanding of copper metallurgy not only in Middle Kingdom Egypt, but also in Bronze Age Egypt in general. The team is also working on the Early Bronze Age Old Kingdom settlement material from Giza and Late Bronze Age material from Tell el-Retaba, completing the survey of the Bronze Age Egyptian copper metallurgy, especially from settlements[56]. The corpus from Elephantine will help to demonstrate how even the minute recovered settlement remains can help in our understanding of the ancient *chaîne opératoire*, in this case of copper and its alloys.

(J. Kmošek and M. Odler)

2.3 Archaeobotanical Studies

During the winter season 2021, between 4th and 9th December, remains in 16 of the 59 boxes of "botany" materials stored in the Elephantine excavation magazine were studied.

The boxes contained materials from the 14th to 27th, 39th, and 42nd campaigns. Boxes were selected at random, but an attempt was made to check boxes from each phase of occupation on the island from the Early Dynastic to the New Kingdom. The number of bags in each box varied a lot, but 887 bags were checked in total. The overwhelming majority of bags contain only wood and twigs, which were not identified.

Many of the identified plants (table 2) are commonly found throughout Egypt, and through most phases of Egyptian history, a few specimens are most likely to be intrusive modern items, e.g. hazelnut and loquat. Dom palm, argun palm, sycamore fig, and desert date are all reasonably ubiquitous in samples on Elephantine: the island must have had a large number of these trees present though most of its history, but only dom palm is common now. Carob, persea, and Nile acacia are less common but not rare, and acacia still grows on the island.

The discovery of large quantities of what appears to be African olive (or African elemi) is very interesting. This is a tropical African forest species, with edible oil-rich seeds, native to Angola, Cameroon, Ethiopia, Ghana, Guinea-Bissau, Liberia, Mali, Nigeria, Senegal, Sierra Leone, Sudan, Tanzania, Togo, Uganda, and Zambia. The seeds are used in traditional medicine for treating diabetes, fever, constipation, diarrhoea, dysentery, stomach complains, roundworm and

other parasites, rheumatism, malaria, various pains including post-partum, sexual infections, leprosy, and ulcers[57].

Persea	*Mimusops laurifolia* [Forssk.]
African olive	*cf. Canarium schweinfurthii* [Engl.]
Hazelnut	*Corylus* sp.
Loquat	*cf. Eriobotrya japonica* [(Thunb.) Lindl.]
Carob	*Ceratonia siliqua* [L.]
Nile acacia	*Acacia nilotica* [(L.) Delile]
Sycamore fig	*Ficus sycomorus* [L.]
Desert date	*Balanites aegyptiaca* [Delile.]
Wild radish	*Raphanus raphanistrum* [L.]
Christ's thorn	*Zizyphus spina-christi* [(L.) Desf.]
Olive	*Olea europaea* [L.]
Garden cress	*cf. Lepidum sativum* [L.]
Date palm	*Phoenix dactylifera* [L.]
Dom palm	*Hyphaene thebaica* [(L.) Mart.]
Argun palm	*Medemia argun* [(Mart.) Württemb. ex H.Wendl.]
Castor	*Ricinus communis* [L.]
Bitter vetch	*Vicia ervilia* [(L.) Willd]
Bitter melon	*Citrullus lanatus* [(L.) Schrad.]
Sea ambrosia	*Ambrosia maritima* [L.]
Halfa	*cf. Desmostachya bipinnata* [(L.) Stapf in Dyer]
Tigernut / chufa	*Cyperus esculentus* [L.]
Linen / flax	*Linum usitititissimum* [L.]
Coriander	*Coriandrum sativum* [L.]
Hulled 6-row barley	*Hordeum vulgare* [L.]
Emmer wheat	*Triticum turgidum ssp. dicoccum* [(Shrank) Thell.]

Table 2: List of taxa identified (C. Malleson, © DAI).

The shells of the seeds were present in just three samples, but in large quantities in one late Old Kingdom – First Intermediate Period context (25102C/a, fig. 26). This strongly suggests a one-off import of this plant, perhaps brought into Elephantine from areas of "Nubia" in modern Sudan. This same context also contained an exceptionally large number of the usually-rare date palm. This is particularly interesting as date palm is thought not to have been fruit-producing in Egypt before the Middle Kingdom. During the Old Kingdom, date palm was present, but without manual fertilization, the palms produce only small quantities of fruits. Current thinking is that manual fertilization was introduced during the Middle Kingdom[58]. This means that these stones are evidence of "special" circumstances. This context is within the Heqaib shine, which

allows us to infer that this collection of rare and importuned fruit plants was “ritually” placed within the shrine, perhaps as an offering[59].

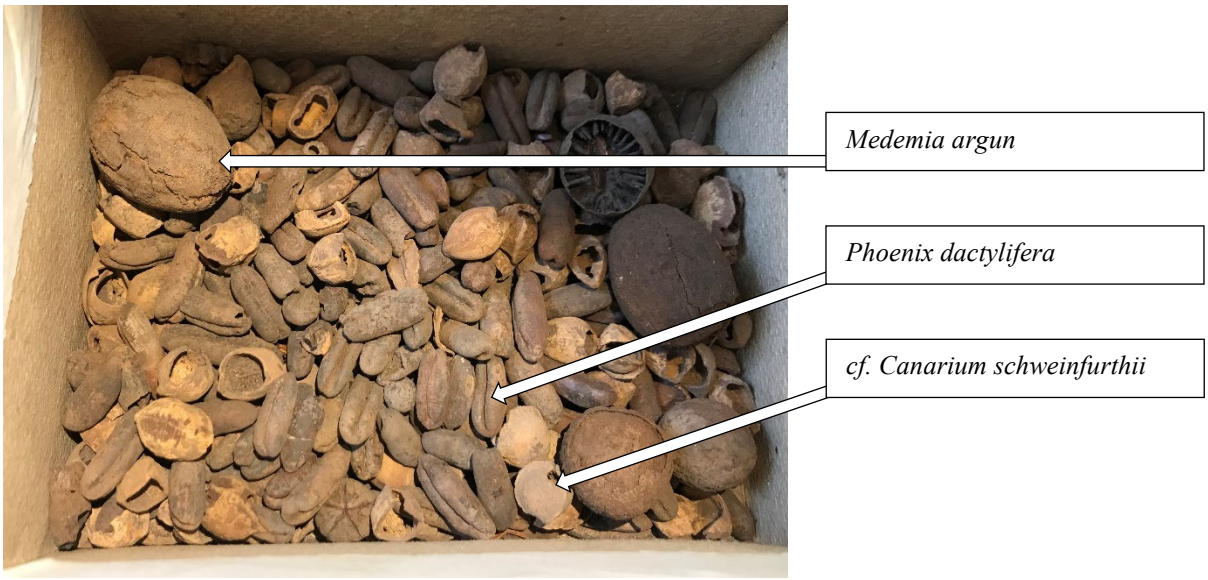

Fig. 26: Box containing a mix of specimens from context 25102C/a (photo: C. Malleson, © DAI).

At present, there is insufficient data to reliably track changes in the assemblage through time, but some initial observations can be made. Argun palm, desert date and Christ’s thorn all occur in all phases, from the Early Dynastic to the New Kingdom. Dom palm and figs seem to appear in the Middle Kingdom with no specimens from the Early Dynastic or earlier Old Kingdom, whilst carob occurs largely in the Old Kingdom then vanishes.

(C. Melleson)

3. Works of the Swiss Institute

3.1 Fieldwork and Site Management

After the completion of the excavations in the area of the Khnum temple, the Swiss Institute began, in addition to processing the find material in the magazines, with preliminary measures for the site management in the former excavation areas. The work in the field initially concentrated on the area north of the Khnum temple (Area XXIX and Area VIII).

In the exceptionally well-preserved House 55 (H55), the excavation debris deposited in the immediate vicinity was backfilled until the floor level of the most recent building phase was reached. This was followed by backfilling of the area along the northern side of the temple, located upslope to the east of H55 (fig. 27), where building structures from the Middle Kingdom

Fig. 27: View on H55 and Area XXIX in the back. Rebuilt terrace wall at the right side (photo: C. von Pilgrim, © SIK).

Fig. 28: Rebuilt corner of pronaos of the Khnum Temple next to the foundations of the inner temple enclosure wall and of Temple A (left side) (photo: C. von Pilgrim, © SIK).

to the late Roman period had been uncovered (Area XXIX). There, a paved processional street from the early 26th Dynasty represents a spectacular and hitherto unique feature in Elephantine[60], but for conservation reasons it was decided to cover it up again as well, since the whitewashed mud plaster of the adjacent buildings cannot be permanently consolidated against the effects of the weather. Moreover, it seemed appropriate to finally present a coherent setting of excavation results that would reveal a section of this town area with building structures that were as contemporaneous and linked to each other as possible.

The excavation trenches were therefore backfilled with the excavated material deposited nearby to a level that roughly corresponds to the level during the time when the Temple of Khnum was built in the 30th Dynasty. As a result, the lowest preserved foundation layer of the inner temple enclosure wall remains visible, as do the stone foundations cut from it of the temporary temple A, which had only been erected for the time of the construction work on the new temple (fig. 28)[61].

In ancient times, this area of the town sloped sharply to the north and west, so that the buildings were cut into the slope. In the course of time, the slope shifted to the north and west in order to gain an ever-larger horizontal building surface in the city centre. Many walls to consolidate the stepped terrain were destroyed in the course of the many construction activities in this area. In order not to obscure the appearance of the site with new walls, it therefore seemed reasonable to take the course of older walls into account when building new terracing walls and to restore the original ones as far as necessary to level the terrain.

To stabilise the difference in level to the inner floor level of the Khnum temple, the north-west corner of the pronaos was therefore rebuilt as a dry-stone wall. The wall edge was already erected many years ago as a temporary terracing wall. However, it proved to be too unstable, especially as it was built on loose rubble, so it had to be renewed. For this purpose, as with the earlier construction, only small-format ashlars (exclusively sandstone) were reused, all of which probably originated from the destruction of the temple in late antiquity. On the outside, the joints were then sealed with mud mortar (fig. 29).

A short section of a terrace wall from the early 26th Dynasty was rebuilt to limit the terrain stepping towards the lower-lying H55 in the west. In accordance with its original construction, it was built as a dry-stone wall from smaller, undressed granite blocks (fig. 27).

Finally, at the northern break in the terrain, breaches in the rear wall of the workshop building H210, which was cut into the mound as a terraced house, were closed with sundried mud bricks and the wall was raised by a maximum of four courses of bricks (fig. 29).

Fig. 29: Back wall of workshop H210 after repair and backfilled excavation area behind (photo: C. von Pilgrim, © SIK).

During the modelling of the excavation site, the archaeological documentation was re-checked and, if necessary, completed. The documentation of the strata profiles at the northern edge of the transportation route leading directly west of workshop H210 to the Khnum temple was accompanied by a detailed examination of its stratigraphic connection to the building phases of the workshop. This confirmed that the transportation route was already constructed in Saite times and initially cut into the settlement slope in a step-like manner.

Additional re-investigations referred to the building context of the rear wall of H55 in the latest building phase b, when a three-room living unit of the house had been separated and extended to the east.

After the previous excavations provided decisive indications for the location of the Khnum temple district in the Middle Kingdom, the consideration of older excavation results raised the question of the connection with the adjacent district of the Satet temple and, in particular, its southern side entrance. Although this was uncovered by the French mission over a hundred years ago, it always remained unrecorded in detail. The analysis and documentation of the multi-phase construction of thresholds that has now been carried out was also extended to the outside of the gate to complement investigations carried out there in earlier years.

3.2 Study of Objects

The processing of the finds continued to concern the pottery and small finds of the late Middle Kingdom and the Second Intermediate Period from the excavations at the northern town wall (Area XXXVI) [62] as well as the rich spectrum of finds from H55.
S. Bulawka made significant progress in recording the flint tools from H55 and the waste of their manufacture (s.b.), while M. Lehmann worked on the other groups of small finds from the same house (s.b.).
After supplementary analyses of wood objects from H55, G. Eschenbrenner-Diemer began working on the wood chippings from workshop building H210 from the 30th Dynasty. Wood splinters dominate especially in the early phases of the workshop. The direct proximity to the temple construction site at the same time suggests that these may have been objects needed in the construction of the temple.

(C. von Pilgrim)

3.2.1 The Lithic Assemblage from H55

In November and the early days of December 2021, the documentation of the lithic artefacts of H55 at Elephantine continued. Studies on this material began earlier in the spring of 2020[63]. The flints were discovered during excavations conducted by the Swiss Institute in previous years[64]. H55 is located in Area VIII in Elephantine and is a residential building dating to the late 17th and early 18th Dynasty with five building phases (a-e). The ground floor of the building was taken up by a workshop.
During this season, 696 pieces of lithics were studied, with a total weight of 7.66 kg. Studies of the assemblage focused on the *chaîne opératoire* approach and on the comparison to previously analysed lithic artefacts from Egypt[65]. The raw material was macroscopically examined to be able to align the results with those of earlier works from Elephantine[66]. All artefacts were documented in detail: listed, described, measured, photographed, and a selection was drawn.

<u>Raw Materials</u>

The raw materials analysed this season could be divided into three groups: chert, carnelian, and quartzite. In order to identify and classify the types of raw materials, the following macroscopic criteria were taken into account: colour (according to Munsell Soil Color Charts), cortex (colour, thickness, smoothness), luster, texture, and transparency.

Chert was used for 99,6% of the assemblage studied in 2021. Only two objects were made of carnelian and one was quarzitic. All three were found in building phase b. 101 chert pieces (14.5%) were burned or heated to such an extent that further identification was not possible. Cherts were divided into subgroups according to previous studies for the site materials[67]. Further 7.5% of the chert set could not be specified. A larger part of 67.1% could be divided into more variants. Raw materials of this group are beige, greyish, or light brown to brown in colour, with a smooth, weathered cortex of 1-3 mm. They have a mottled structure, either light banded or with small inclusions, and are matt and non-transparent. Most of the examples of this group were located in layers belonging to building phase b. The second most numerous group (6.7%) was a variant with pinkish-beige colour, a thin, smooth cortex, and an inhomogeneous texture. Their structure is mottled with a matt and a non-transparent surface. However, for a more detailed result microscopic examination should be undertaken in the future.

Analysis of the Lithic Assemblage

An overview of the 696 chert artefacts analysed this season is given in Table 3. The assemblage is presented according to building phases and locations inside H55. By synthetizing the data, it was possible to observe technological changes or developments within particular time periods. The lithics were divided into four main groups: cores, debitage, tools, and natural nodules/fragments of nodules. Among the elements of debitage the following types can be distinguished: flakes, blades, technical flakes/blades (including crested blades/flakes), burin spalls, chips (flakes less than 15mm), and waste pieces. Tools included sickle blades, scrapers, endscraper, retouched flakes/blades, notched flakes/blades, burins, perforators, pounders, grinders, and combined tools (combination of several tool forms). A large percentage of the analysed pieces of the assemblage were simple flakes or blades with traces of use. They were categorized as tools.

The largest number of lithic artefacts by far was found in building phase b, with 470 objects, followed by phase d, with 71 examples, and phase c, with 25 examples. However, there were also examples found within mixed layers. Only one flake of building phase e was discovered.

Among the archaeological layers of building phase d, 71 lithic objects were identified (10.2% of the whole assemblage studied during this season). This assemblage contains: 4 cores and 25 tools. The latter can be divided into the following types: 17 debitage pieces with traces of use; two sickle blades; one core tool; two pounders; one combined tool; one retouched flake and one notched flake. The remaining part of the collection consists of debitage. The largest part was found within rooms C and K[68].

Building stage	Room	Cores	Debitage								Tools																				Natural fragments/nodules	Sum	
			Flakes	Blades	Blades/flakes	Crested fl./bl.; technical fl./bl.	Burin spalls	Splintered piece	Chips	Waste	Used flakes	Used blades	Used blades/flakes	Used chips	Waste-traces of use	Natural flint fragment with traces of use	Retouched flakes	Retouched blades	Retouched waste	Notched flakes	Notched blades	Sickle blades	Perforators	Scrapers	Burins	Endscrapers	Core tools	Pounder	Pounder/grinder	Bifacial tools	Combined tools			
a	A		2			1					1														1							5	
	C											1																				1	11
	M																													1		1	
	South		4																													4	
b	A	3	25	1		2				2	18	4	2			1	1				1	1						1				62	
	C	8	47	1		1			5	6	35	9	3		1		2		1	3		2		2		1	1	1	1	4	4	139	
	D	3	26	2		1			10	19	30	7	2	3						1		1					2	3	1		1	3	115	
	D_E											1	1																				2	
	E		3						1	2	2									1													9	
	F		1																													1	470
	H		11		3				10		3												1									28	
	K		57	2		1	1		4	3	9	2	2			1						2					3	5	1		1	3	97	
	L		1				1																				1					3	
	M		2								5	1					1			1											2	1	13	
	N		1																													1	
bc	D		8	2	1				1	8	7	2		1			1	1				1						1			2	37	37
bd	L																											1				1	1
c	A	2	5			1					3	2			1													1				15	
	C	1	3								1		1														1					7	25
	F	1	2																													3	
cd	A	1	8	1					2	2	6	1	4															1				26	
	C			1							1																	1				3	31
	F		1									1																				2	
d	A		3								3																				1		7	
	C	1	11						1	2	7						1					2					1	2					28	
	D	2	1								1																						4	
	E		4						1			2																					7	
	F		4									1																					5	71
	H									1																							1	
	K	1	9	1	1			1			1									1													15	
	L		2																														2	
	M										1	1																					2	
e	D		1																													1	1
below H55	A		2		1				2		4	1										1											11	
	AC					1					1											1						1			1		5	
	C		3							1	2																						6	49
	CD		1							1	1	2										1											6	
	D		6	2		1			1	2	2																						14	
	F		2								1	2																2					7	
Sum		23	256	13	6	9	2	1	38	49	145	40	15	4	2	2	6	1	1	7	1	12	1	2	1	1	9	20	3	1	12	13	696	

Table 3: The lithic assemblage from House 55 by building phase (S. Buławka, © SIK).

Building phase c revealed 25 lithic artefacts (3.6 %). They consisted of four cores, 11 examples of debitage, and 10 tools. The latter can be further subdivided into eight artefacts of debitage with traces of use, including one pounder and one core tool. The lithic assemblage of this phase was discovered mostly within room A.

The largest amount of material studied during this season originates from phase b. There were 470 lithic artifacts discovered in total (67.5%). This material consists of 14 cores and 252 examples of debitage. Tools can be further subdivided into 142 artefacts of debitage with traces of use: five retouched flakes/blades; seven notched flakes/blades; six sickle blades; one perforator; two scrapers; one endscraper; seven core tools; ten pounders; three pounder/grinders; one bifacial tool fragment; eight combined tools and eleven natural chert fragments. Lithic artefacts of this phase were mostly found in rooms C, D, and K.

Building phase a of H55 contained eleven objects of lithics (1.6 %): seven examples of debitage and four tools that consist of two artefacts of debitage with traces of us: one burin and one combined tool. They were found most prominently in room A.

The production techniques noted among the collected material consists mostly of flake technology; less often are blade technology, core technology, bipolar technology, and bifacial technology attested. The latter manufacturing method, however, was most probably not applied by the building's occupants, as only one fragment with this technology was found. A large number of small flakes are present in the assemblage, from their production heavily worked microcores are preserved. Numerous plungins and hinges are visible on the debitage. Among the studied material, 116 artifacts (16.7% of the total studied during this season) were burned or heated. Most of these (78 pieces) were found in building phase b. Traces of red pigments were found on 17 lithic objects, of which not less than 12 pieces were also found within building phase b of H55.

Conclusions

H55 most likely included a workshop within the ground floor in which wooden material was also worked on. The amount of debitage shows that lithic material was also produced here. The main areas of manufacture for lithics were rooms A and C, the courtyard. Debitage elements and cores were also found in room D from the later phase of the building. The most abundant raw material was chert, especially a variant of it that was locally collected. However, lithic artifacts of carnelian and quartzite were also found among the material. The production techniques of all the artefacts were rather simple. Flake technology predominated, although some examples of other techniques are present as well.

This shows that the workshop had a multifunctional character, producing objects from different materials at the same time. Among the finished lithic products were flakes and blades with retouching, also notched, sickle inserts, perforators, burins, scrapers, endscraper, core tools, pounders, and grinders. Some of the tools had traces of red pigments, which suggests that they were probably used for pigment processing. Sickle blades show signs of use by a characteristic gloss on working edges. Also, perforators of various shapes are noticeably blunted. Such tools may have been used for drilling/perforating various types of fabric or raw material. Many of the tool types present in H55 at Elephantine are already known from publications of other Egyptian archaeological sites from the same time period[69]. Additionally, small flakes found in large numbers within the building may have served as composite tools or arrow components.

However, further study of the material, including use-wear analysis, should be conducted to confirm this hypothesis.

The results of studying the lithic materials during this season coincide with those of the previous season. However, they still require further work. Combining the results from all study seasons will give a broader picture of this lithic collection. Studying the entire assemblage of lithics and comparing it with the results of the study of room inventories consisting of objects made of other materials will allow us to narrow down the function of individual rooms within H55 and confirm the activities performed in them.

(Sylwia Buławka)

3.2.2 Analysis of Wood from H55 and H210

The study of the wood took place from 10th to 21st February, 2022. The analyses focused on two specific sectors: first, the H210 artisanal area with the analysis of wood chips found in abundance and alternating with layers of diorite cutting off-cuts (30th Dynasty); and second, H55 with the identification of the wood species used for the manufacture of various objects (late 17th and early 18th Dynasties)

Analytical Protocol Used

The wooden chips found in workshop H210 are particularly abundant but have a poorly preserved anatomical structure, making it very difficult to identify the species used. However, the abundance of wood chips has made it possible to increase the number of samples taken and to gather precise images of the different species.

For the majority of samples (H210 and H55), small samples (2 mm) were removed from every object/wooden chip assemblages whose anatomical structure was preserved. Standard procedures were followed for examination under the optical microscope and identification of the samples: rehydration of the samples and preparation of thin sections for tangential, transverse, and radial examination. In the case of very dense wood, for example for the fragments of bark isolated in the various batches that could be identified for each archaeological stratum, these could be boiled in order to facilitate removal by softening the wood, and thus facilitating the cutting of thin strips. This analytical protocol was developed at the Jodrell Laboratory in Kew Gardens and consists of boiling wood samples of varying densities before sampling with a microtome. This technique was adapted to the Egyptian terrain allowing the collection and identification of species that could not have been analysed without this process.

Comparisons were made with thin sections of wood in the scientific reference collections at Jodrell Laboratory in Kew Royal Botanic Gardens and using the Inside Woods Database[70] online.

The Artisanal Area H210

The major part of the spring 2022 season focused on the study of dozens of wood shavings discovered at regular intervals in workshop H210. Connected to the temple of Khnum, as well as to the northern port of the site, by a huge route in the reign of Nectanebo II, this artisanal area was partially excavated by the Frenchman Clermont-Ganneau in 1908, who identified it as "la maison de quelque artiste"[71], with regard to the discovery of several "pithoi" inscribed in demotic. The excavations (2017-2018) carried out under the direction of C. von Pilgrim made it possible to understand that this area was initially used as a stable and was then used alternately and over a continuous period of time as a woodworking area and a diorite working area, due to the numerous cuttings discovered in successive layers. Additionally, ironworking was also identified. It is interesting to note that the wood shavings in the oldest layers do not mix at all with the diorite cuttings, which show successive but not contemporary activities. Later the successive archaeological layers show a mixture of both wood chips and diorite, raising the question of the development of the organisation of the craft activities that were carried out in H210.

In view of the abundance of wood chips found in workshop H210 (several hundred pieces) and in order to have a clearer idea of the conditions in which they were preserved (and the species used), priority was given to the chips found in the oldest strata (47704Z and 47704S), which were considered the most informative. Each bag was examined and the different types of wood were sorted by colour and appearance. Following this sorting, several specimens from each batch were analysed to obtain a representative sample of each type of wood.

The wood found in each stratum was collected in plastic bags without distinguishing according to the colour of the wood or its type (hardwood, bark, branches). This first selection corresponds to a set of ten bags filled with fragments of various sizes and colours, the processed chips not exceeding 5 cm in length. The bark fragments are omnipresent, some pieces of wood are still completely raw, with the outer bark (suber) still being in connection with the inner bark (liber) (fig. 30).

A first sorting was made in order to gather the samples by type of wood (fig. 31): "golden yellow" wood; light, fibrous yellow wood; dense and darker woods; burnt wood; bark; and

twigs. These different categories were kept within each bag, with each group being separated into its own plastic bag.

Fig. 30: Outer bark (suber) in connection with inner bark (liber) (photo: G. Eschenbrenner Diemer, © SIK).

Fig. 31: Classification of wood chips and fragments by type (bag 47704 Z/e-3) (photo: G. Eschenbrenner Diemer, © SIK).

Fig. 32: Bevelled chips, three different sizes (photo: G. Eschenbrenner Diemer, © SIK).

The vast majority of these chips, which vary in size from 2 to 5 cm, are bevelled at each end (fig. 32).

I contacted Christophe Picod, a woodturner in the Jura region of France, to help figure out what this type of chip could be. He immediately identified sawing offcuts that allow the size of the piece of wood to be adjusted at an angle. Among these numerous chips, the time-consuming analysis (a representative sample was analysed within each defined group) showed that only three samples (47704S/a-4_2; 47704S/d-3_2 and 47704Z/a-2_7) are imported coniferous wood, generally used for the manufacture of small objects. On the other hand, the summary table of the analysis results (table 4a and table 4b) shows the predominance of acacia wood[72] of which five different local species could be identified. These are *Vachellia tortilis* (Forssk.) Hayne subsp., *raddiana* (Savi) Brenan, *Vachellia gerrardii* Benth., Viennent ensuite *Vachellia nilotica*, and *Vachellia laeta* R.Br. Only one sample (47704S/a-4_10) was identified as *Faidherbia albida* (*Acacia albida*). Due to the poor preservation of many of the chips, only the genus *Vachellia* sp. could not be further identified by species. This identification, although less precise, does not obscure the massive and almost unique use of these different species of *Vachellia* (acacia) in workshop H210. The last three samples showed the presence of *Tamarix* sp., a species that is also local but not used much in this workshop.

In all, the high amount of the genus *Vachellia* and the identification of five different species of acacia, the abundance of bark fragments having been removed from the wood to be worked (in the process of being prepared), and the systematic technique used to cut these woods (leaving bevelled shavings as off-cuts) suggests a specific industry linked to the massive use of wood from *Vachellia* (acacia); this activity is recurrent throughout the occupation of workshop H210.

Archaeological no.	Condition	Protocol	Results
47704S/a-4_1	too damaged		unidentifiable
47704S/a-4_2	badly damaged		*Cupressus* sp. ?
47704S/a-4_3	quite good		*Vachellia tortilis* (Forssk.) Hayne subsp. *raddiana* (Savi) Brenan
47704S/a-4_4	badly damaged		*Tamarix* sp.
47704S/a-4_5	too damaged		unidentifiable
47704S/a-4_6	badly damaged		*Vachellia nilotica*
47704S/a-4_7	badly damaged		*Vachellia nilotica*.
47704S/a-4_8	badly damaged		*Vachellia nilotica*
47704S/a-4_9	quite good		*Vachellia gerrardii* Benth.
47704S/a-4_10	quite good		*Faidherbia albida* (*Vachellia albida*)
47704S/b-2_1	badly damaged		*Tamarix* sp.
47704S/b-2_2	quite good		*Vachellia gerrardii* Benth.
47704S/b-2_3	quite good		*Vachellia gerrardii* Benth.
47704S/c-3	too damaged		unidentifiable
47704S/d-3_1	too damaged		unidentifiable
47704S/d-3_2	badly damaged		*Cupressus sempervirens*
47704S/d-3_3	badly damaged		*Vachellia* sp.
47704S/e-1_1	badly damaged		*Vachellia nilotica*
47704S/e-1_2	quite good		*Vachellia tortilis* (Forssk.) Hayne subsp. *raddiana* (Savi) Brenan
47704S/e-1_3	quite good		*Vachellia gerrardii* Benth.
47704S/e-1_4	too damaged		unidentifiable
47704S/e-1_5	quite good		*Vachellia gerrardii* Benth.
47704S/e-1_6	quite good		*Vachellia tortilis* (Forssk.) Hayne subsp. *raddiana* (Savi) Brenan
47704S/e-1_7	badly damaged		*Vachellia* sp.
47704Z/a-2_1	quite good		*Vachellia tortilis* (Forssk.) Hayne subsp. *raddiana* (Savi) Brenan
47704Z/a-2_2	too damaged		unidentifiable
47704Z/a-2_3	badly damaged		*Vachellia* sp.
47704Z/a-2_4	badly damaged		*Vachellia nilotica*
47704Z/a-2_5	too damaged		unidentifiable
47704Z/a-2_6	quite good		*Vachellia tortilis* (Forssk.) Hayne subsp. *raddiana* (Savi) Brenan
47704Z/a-2_7	badly damaged		*Coniferous (Taxus baccata ?)*
47704Z/b-2_1	quite good		*Vachellia laeta* R.Br.
47704Z/b-2_2	badly damaged		*Tamarix* sp.

Table 4a: H210 sampling, part 1 (G. Eschenbrenner Diemer, © SIK).

Archaeological no.	Condition	Protocol	Results
47704Z/b-2_3	badly damaged		*Vachellia nilotica*
47704Z/d-2_1	too damaged		unidentifiable
47704Z/e-3a_1	quite good		*Vachellia tortilis* (Forssk.) Hayne subsp. *raddiana* (Savi) Brenan
47704Z/e-3a_2	quite good		*Vachellia tortilis* (Forssk.) Hayne subsp. *raddiana* (Savi) Brenan
47704Z/e-3a_3	quite good		*Vachellia tortilis* (Forssk.) Hayne subsp. *raddiana* (Savi) Brenan
47704Z/e-3a_4	quite good		*Vachellia tortilis* (Forssk.) Hayne subsp. *raddiana* (Savi) Brenan
47704Z/e-3a_5	quite good		*Vachellia tortilis* (Forssk.) Hayne subsp. *raddiana* (Savi) Brenan
47704Z/e-3a_6	quite good		*Vachellia tortilis* (Forssk.) Hayne subsp. *raddiana* (Savi) Brenan
47704Z/e-3a_7	quite good		*Vachellia tortilis* (Forssk.) Hayne subsp. *raddiana* (Savi) Brenan
47704Z/e-3a_8	badly damaged		*Vachellia* sp.
47704Z/e-3a_9	badly damaged		*Vachellia nilotica*
47704Z/e-3a_10	badly damaged		*Vachellia* sp.
47704Z/e-3a_11	badly damaged		*Vachellia nilotica*
47704Z/e-3a_12	badly damaged		*Vachellia* sp.
47704Z/e-3a_13	too damaged		unidentifiable
47704Z/e-3a_14	too damaged		unidentifiable
47704Z/e-3a_15	badly damaged		*Vachellia* sp.
47704Z/e-3a_16	quite good		*Vachellia laeta* R.Br.
47704Z/e-3a_17	quite good		*Vachellia laeta* R.Br.
47704Z/e-3a_18	quite good		*Vachellia laeta* R.Br.
47704Z/e-3a_19	quite good		*Vachellia laeta* R.Br.
47704Z/e-3a_20	quite good		*Vachellia gerrardii* Benth.
47704Z/e-3a_21	too damaged		unidentifiable
47704Z/e-3a_22	quite good		*Vachellia gerrardii* Benth.
47704Z/e-3a_23	quite good	bark (boiled)	*Vachellia tortilis* (Forssk.) Hayne subsp. *raddiana* (Savi) Brenan
47704Z/e-3a_24	quite good	bark (boiled)	*Vachellia tortilis* (Forssk.) Hayne subsp. *raddiana* (Savi) Brenan
47704Z/e-3a_25	quite good	bark (boiled)	*Vachellia tortilis* (Forssk.) Hayne subsp. *raddiana* (Savi) Brenan
47704Z/e-3a_26	quite good		*Vachellia gerrardii* Benth.
47704Z/e-3a_27	quite good		*Vachellia gerrardii* Benth.
47704Z/e-3a_28	quite good		*Vachellia gerrardii* Benth.

Table 4b: H210 sampling, part 2 (G. Eschenbrenner Diemer, © SIK).

Before any conclusions can be drawn, it is essential to continue and complete the analysis of the wood chips found in this workshop. It is therefore essential to study this material in greater depth in an attempt to identify which activity was carried out in this workshop.

The shapes of the wood chips, all cut off obliquely, and their wood species suggest the preparation of raw cut wooden blocks that may have been used later for different activities. First, the immediate proximity of H210 to the temple suggests that the pieces of wood prepared in this workshop could have been used as part of the construction/maintenance of the temple, or the daily activities within it. However, the almost exclusive identification of different varieties of acacia, a local wood of very good quality, leaves a specific activity linked to the use of this type of wood reserved for specific works.

Considering this, a second hypothesis can be proposed. Could the manufacture of these wooden pieces be linked to the construction of river vessels of the *baris* type, used in the Late Period? Indeed, the work of A. Belov[73] highlighted the construction techniques of this type of boat by comparing Ship 17 found at Tônis-Heraclion with Herodotus' description of the construction of a *baris* (*History* 2.96). The hull of this type of river (not maritime) craft is made of wooden planks that are always acacia[74], assembled like a "brick wall"[75]. This technique was already known in the Pharaonic period, for example in the tomb of Khnumhotep at Beni Hassan[76]. The assembly of these planks is done obliquely and therefore requires sawing of the wooden pieces, this operation being at the origin of bevelled shavings like those discovered in workshop H210. Moreover, the existence of a "boat house" at Elephantine in the Late Period is known thanks to papyrus P.Cowley 26[77] (Cairo, Egyptian Museum SR 3432), which describes a shipyard where *baris* boats were repaired. Could such an activity be envisaged in the H210 workshop? Although far from the banks of the Nile, this workshop had direct access to the route leading to the northern port of Elephantine Island. If the activities related to the repair of the boats were carried out in the vicinity of the river, could the wooden pieces necessary for this activity have been prepared elsewhere, say in the city? This suggested hypothesis should not question the possibility that this workshop developed a completely different craft activity. The repeated succession between woodworking and diorite working raises further questions.

Preliminary Conclusions and Research Perspectives for the H210 Workshop

The most abundant categories were found to be “golden yellow” wood corresponding to *Vachellia nilotica* and *Vachellia raddiana*, bark fragments (the majority being *Vachellia raddiana* bark) and “darker dense wood” corresponding to *Vachellia gerrardii* and *Vachellia laeta*. These different species were all present in Egypt and none was imported.

The omnipresence of bark fragments, the presence of wooden pieces in the process of being prepared[78], the boards, and the off-cuts highlight the different stages of woodworking carried out in this workshop: the raw wood was prepared (the bark and branches removed) and then the hardwood was worked (the boards were bevelled and sawn to their desired size). Moreover, the absence of even fragmentary manufactured objects among the multitude of chips suggests that this was not a workshop for the manufacture of smaller objects but rather a place for the preparation of calibrated wood blocks or planks, as evidenced by the regularly sized chips. Only the game board found in the workshop stands out in comparison to the cuttings and highlights an aspect of the daily life of these craftsmen. It appears to have been made from coniferous wood.

First and foremost, the study of these wood chips should be continued in order to find out whether the same species are used systematically over time and whether the woodworking techniques are similar. In parallel, the study of shipbuilding will be deepened by consulting the work done on the construction of other boats found in Egypt. For example, if acacia wood is known to be used extensively in shipbuilding, it will be useful to know which species of the genus *Vachellia* are mainly identified in order to compare these data with those collected for workshop H210. This data will be useful in obtaining comparative information on the wood species and manufacturing techniques used in the construction of these boats.

The Woods of H55

In the spring of 2020, a campaign to study the various pieces of wood found in H55 made it possible to identify the various species and uses made of the wood material (fuel, pieces of furniture, tools for making bows and arrows, etc.). Several fragments of manufactured objects as well as an impressive worked plank (44603 Ka-1) that had not been analysed in 2020 were analysed in 2022 (table 5).

Find no.	**Condition**	**Type**	**Results**
45602E/K-1	too damaged	Fragments of the wood and plaster ceiling, collapsed and deteriorated, fragments too fragile to remove for study at this time.	unidentifiable
45603K/a-1	quite good	massive plank from boat?	*Vachellia* sp.
46701M/e-3	too damaged	traces of gold leaf	unidentifiable
47701M/e-3	damaged structure (to be repeated)	Worked wood	to be identified
47701M/g-14	to be checked	worked wood with red pigment	*Mimusops laurifolia ?*
47701Q/d-1	quite good	stopper	*Ficus sycomorus*
47701Q/e-5	quite good	furniture leg, zoomorphic	*Ziziphus spina christi*
47701Q/f-5	quite good	worked wood: piece of box?	*Vachellia nilotica*
47702Q/a-4	quite good	worked wood from piece of furniture?	*Ziziphus spina christi*

47702W/a-16a	quite good	wood chip with trace of tool	*Vachellia* sp.
47702W/a-16b	quite good	wood chip, worked with ttraces of gesso	*Tamarix* sp.
47703E/a-18	quite good	small stake	*Vachellia*sp.
47703L/c-18_1		worked wood	to be identified
47703L/c-18_2	quite good	worked wood	*Cedrus libani*
47703L/d-1	too damaged	piece of box	unidentifiable
47703L/m-11	quite good	worked wood	*Tamarix* sp.
47703L/o-1	quite good	worked wood?	*Ficus sycomorus*
47703L/o-10	too damaged	With thin layer of gesso painted yellow	unidentifiable
47704T/d-10		miniature pot	to be identified
17502H/a-3763	quite good		*Cedrus libani*

Table 5: Wood species from H55 (G. Eschenbrenner Diemer, © SIK).

Conclusions and Research Perspectives

The wooden artefacts found in H 55 have now all been anatomically analysed, although some of them need to be re-sampled in order to verify certain results. The presence of good quality local species of the type *Ziziphus spina christi* for the production of furniture highlights the access to quality goods within this house. These analyses complement the study carried out in 2020. The diversity of species identified and the uses to which wood is used in H55 are a unique source of knowledge. In order to clarify its original function, plank 45603K/a-1 will be studied in depth. The data collected will be put into perspective with the documentation related to shipbuilding in order to verify the hypothesis that it could be a replaced ship's plank. The technical and anatomical analysis of the timbers found in H210 and H55 is to be continued during the next season.

(G. Eschenbrenner Diemer)

3.2.3 Small Finds from H55

The work on documentation and analysis of small finds from H55 on Elephantine (Area VIII) was continued this season: about 1300 objects were studied and over 300 objects were drawn. H55 is a building that can be dated to the late 17th and early 18th Dynasty. The dwelling was used as a workshop and is located directly south of the Heqaib sanctuary. The objects in focus were excavated either within H55 or in a rubble layer above the house dating to the mid-18th Dynasty[79].

In addition to the documentation of the objects, the aim of this research is to identify room functions and different production types taking place in this building through the different building phases b-e.

One of the main objectives this season was the study of the abundant stone objects from this building and workshop, many of them stone tools. However, due the huge amount (about 1500 objects total) the study of this object group could not yet be finished. Therefore, the results presented here are only preliminary.

Among others, the following groups of tools can be identified: small spheres and cones, abrasive stones, smoothers, polishers, and grinding stones along with hand mills, palettes, whetstones, hammerstones, pigment stones, weights, and pestles (fig. 33). Hammerstones and grinding stones together with hand mills are the most common tools.

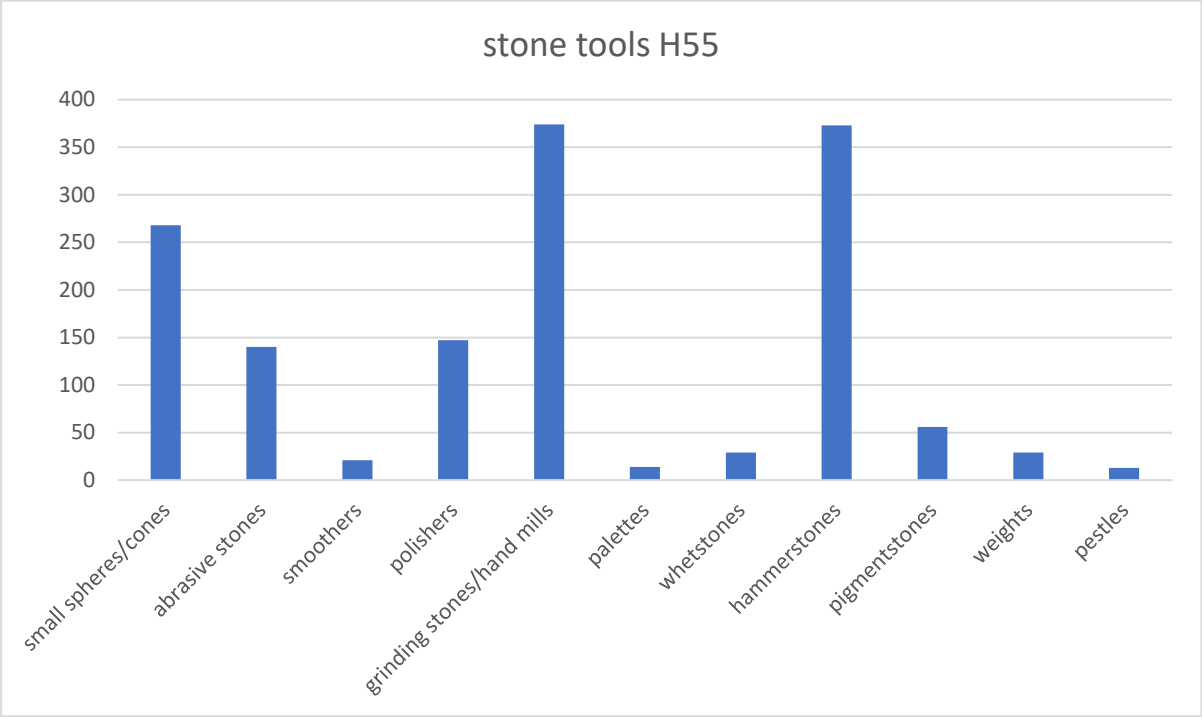

Fig. 33: Stone tools by types from H55 (diagram: M. Lehmann, © SIK).

Small sandstone spheres and cones (fig. 34) were found frequently among the material. 203 spheres and 65 cones were identified so far. Many of these objects show flattened sides, sometimes with remains of pigments, and percussion or striation marks indicating that these objects were used as tools.

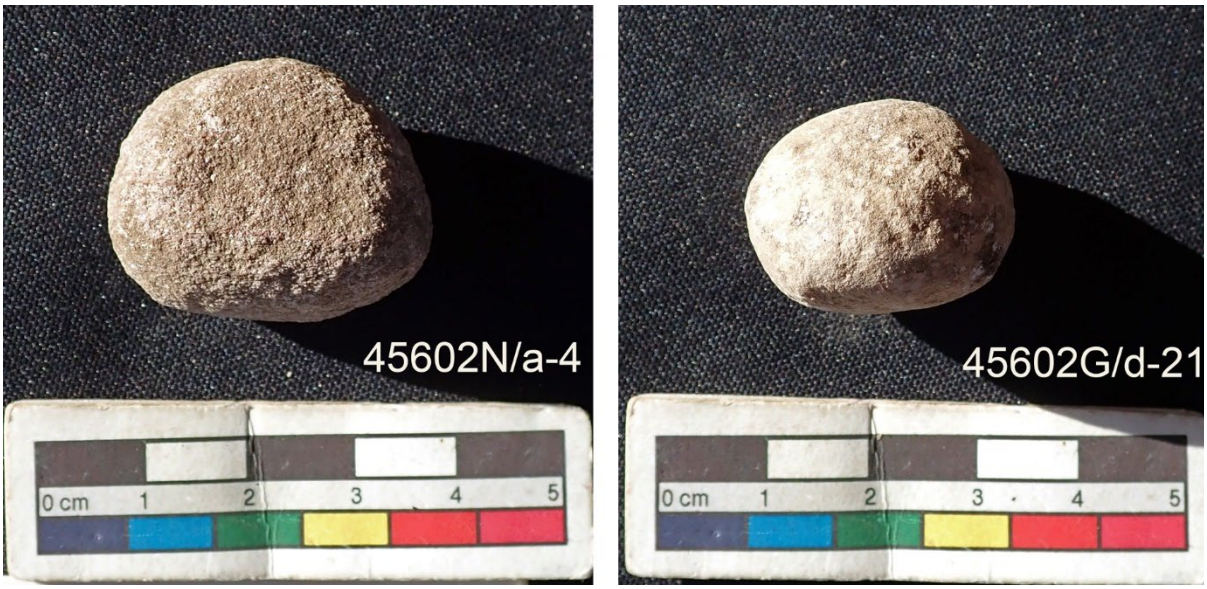

Fig. 34: Sandstone (left) and limestone (right) spheres (photos M. Lehmann, © SIK).

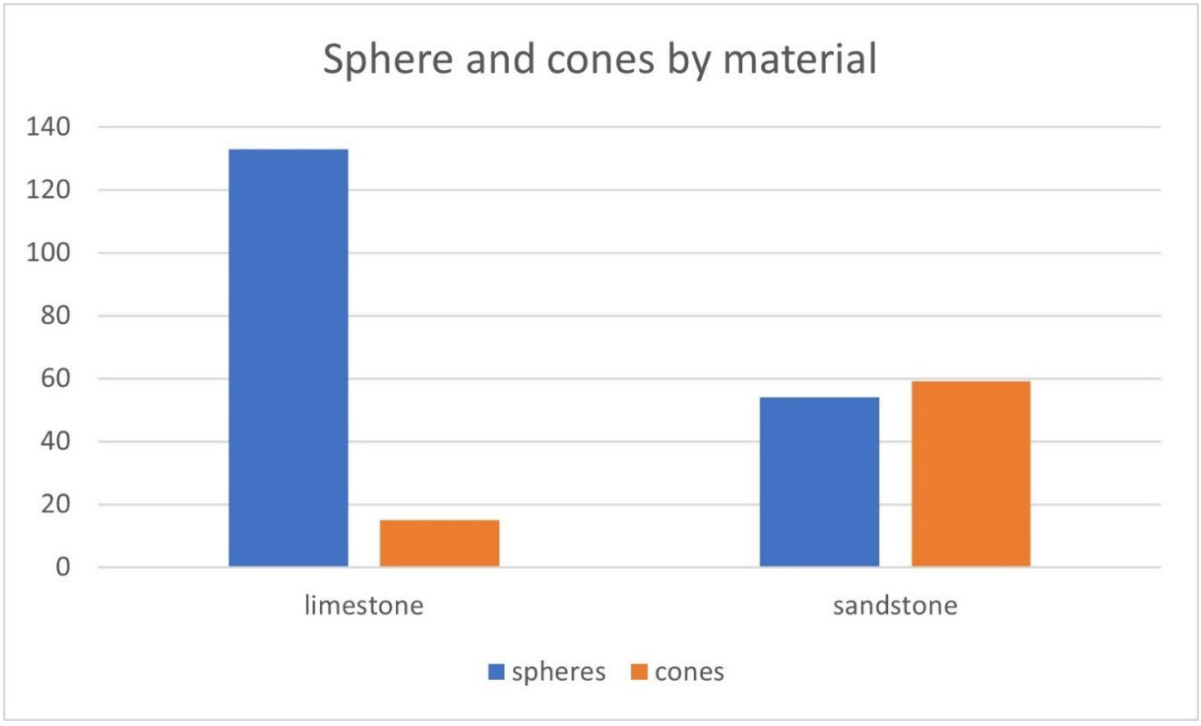

Fig. 35: Small spheres and cones by material (diagram: M. Lehmann, © SIK).

These objects are made of sandstone or limestone, with limestone dominating the material of the spheres (133) and sandstone dominating under the cones (50) (see fig. 35).

The friable sandstone material is comparable to sanding paper and works well as a smoother or polisher and might have been used to work the surfaces of wooden objects[80]. The finer limestone might have been used for similar purposes.

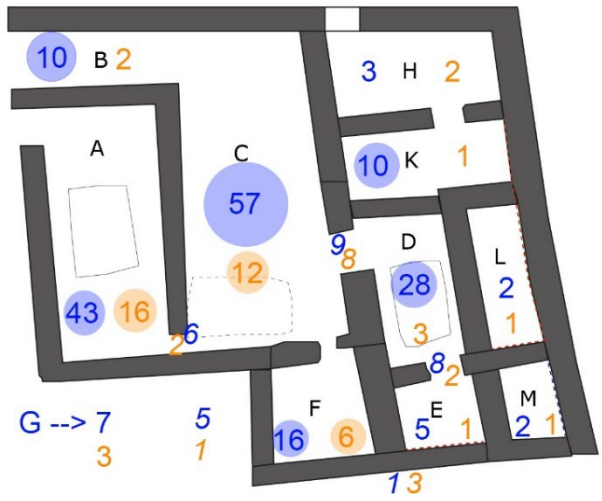

Fig. 36: Spheres (blue) and cones (orange) as dispersed in the rooms of House 55 (graphic: M. Lehmann © SIK).

Plotted by rooms, the small spheres were mostly found in the rooms A and C, which were the main working rooms of the house. However, a higher number was documented in rooms D and F and ten objects were recorded also for rooms B and K; all other rooms had at least two examples (fig. 36, blue). The cones were mostly found in rooms A, C, and F, with at least one example found in each other room (fig. 36, orange). The highest amount in total was found in room C, with 69 of these objects, followed by room A with 59.

About 140 abrasive stones were identified among the stone tools of H55 and so far, 90 of them could be recorded in detail. They usually consist of one or more flattened and smoothed sides. The surfaces are more often flat or convex than concave, suggesting a use on flat objects more often than on rounded ones.

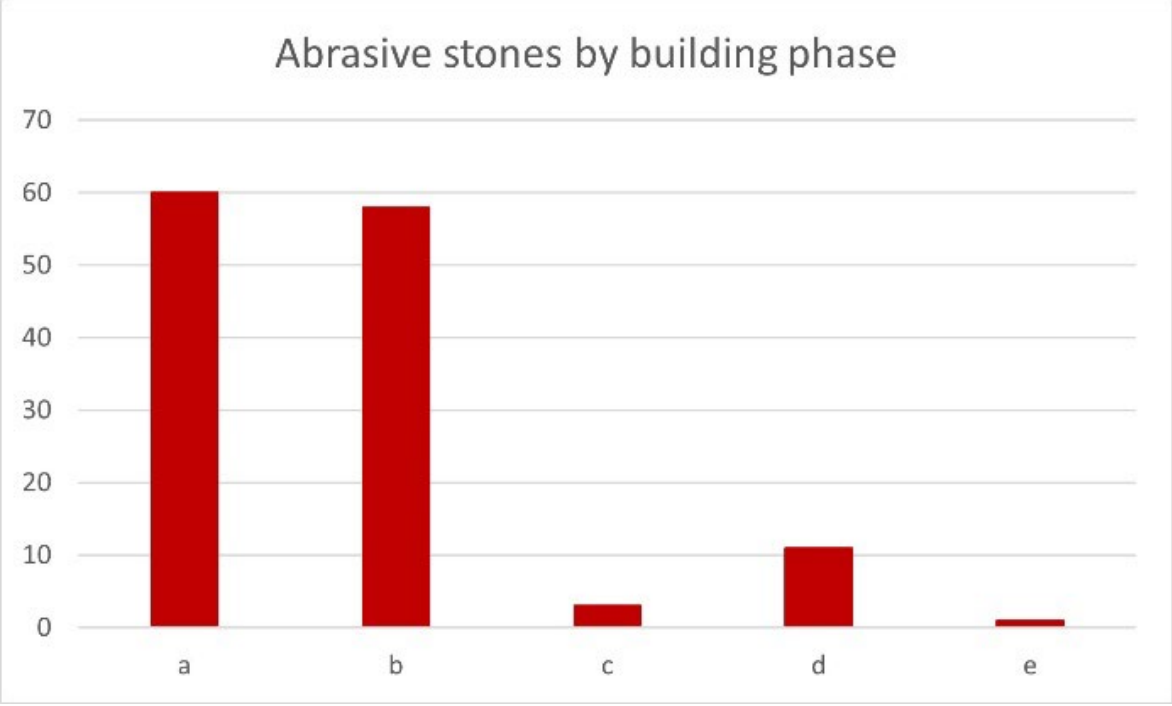

Fig. 37: Abrasive stones by building phase (diagram: M. Lehmann, © SIK).

They are almost all made of sandstone with very few examples of limestone (15) and quartzite (5). The bulk of this material derives from phase b (58) and from the later refilling layers of the house, phase a (60) while only 15 can be allocated to the earlier phases c-e. The interpretation

of these results has to wait until the study of the whole material is completed, as the earlier layers of the house (phases c-e) yielded much less material than the later phases b and a (cf. fig. 37). Therefore, percentages of types within one phase might help to better understand the meaning of these results. Few of these abrasive stones functioned as other tools, with another use such as hammerstones, polishers or grinding stones as well.

Fig. 38: Pebble 45601Q/e-6 used as polisher (photo: M. Lehmann © SIK).

Polishers were most often made of pebbles and consist of a variety of different materials such as diorite, gneiss, granite, granodiorite, greywacke, quartzite, schist, and tonalite. Occasionally carnelian and agate pebbles were used as well. In general, these stones show polished surface areas, sometimes the entire outer cortex was worked off (fig. 38). Many of these tools also show striation marks in different areas of the surface.

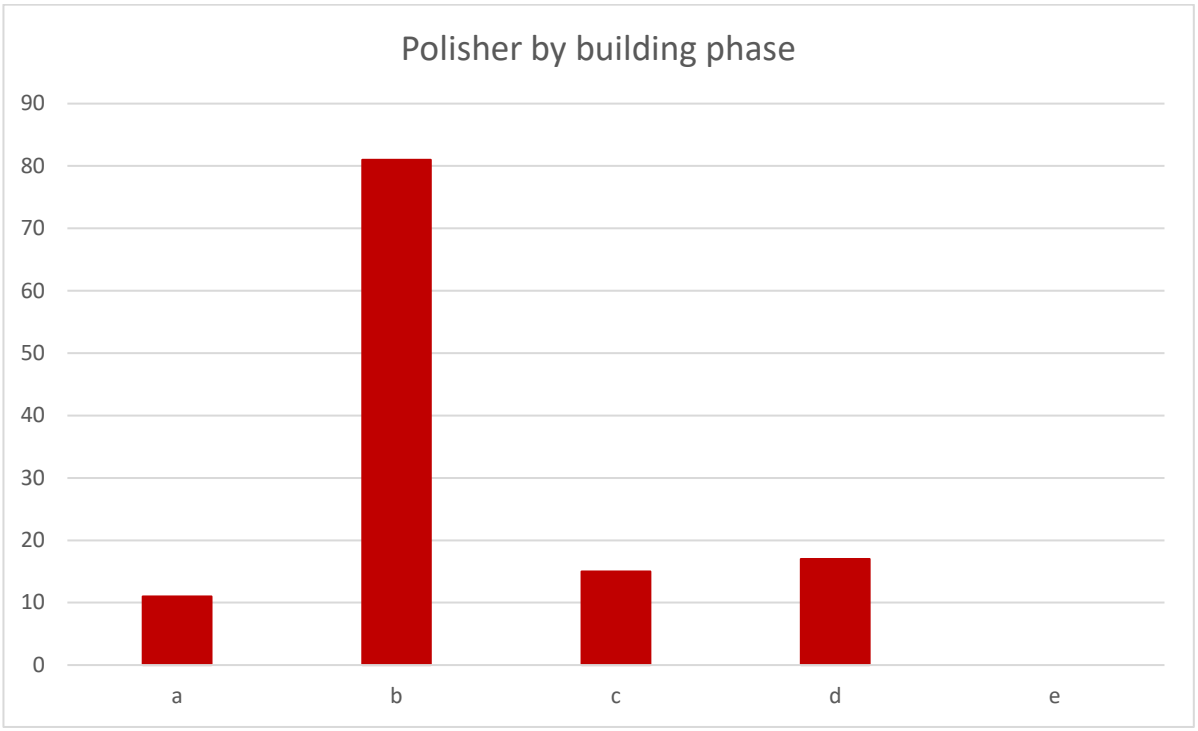

Fig. 39: Polisher by building phase (diagram: M. Lehmann, © SIK).

Additionally, a large amount of these tools was used as combined tools and show percussion marks from use as hammerstones. The distribution of this tool type shows a different pattern compared to the abrasive stones. Polishers are again found most often in phase b (fig. 39).

However, they are a lot less common among the material from the filling of layer a. Polishers are still comparatively common in phases c and d, but none were retrieved from the earliest phase e.

Grinding stones (305), grinding plates (20), and hand mills (40) form one of the largest groups among the stone tools from H55 (fig. 27). So far, 134 of these 365 objects were studied more in detail. The material used for these tools consists mostly of silicified sandstone (248) but other materials such as quartzite, granite, granodiorite, limestone, tonalite, diorite, gneiss, or dolerite were used as well.

Several complete ovoid and flattened grinding stones were found within the house. They were often used as a working surface for other work than grinding, which left percussion marks behind. Several of the grinding stones are covered in red or yellow pigments. The larger amount of this group however, consists of grinding stones broken into fragments, that were then reused further for grinding. In addition, many of them were used for multiple working types with traces from usage as smoothers or hammerstones.

The second largest group among the stone tools from H55 are the hammerstones; 256 of 373 were studied so far. One sub-group of these hammerstones consists of spherical stones that are often used for multiple works and show smoothed areas as well as percussion marks on their surfaces. Oftentimes remains of pigments are still found on the surfaces of these stone tools.

Fig. 40a: Hammerstone 46602P/a-1 (photo: M. Lehmann, © SIK).

Fig. 40b: Remains of yellow fibres (photo: M. Lehmann, © SIK).

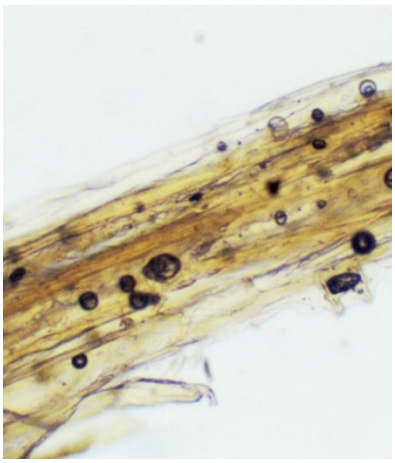

Fig. 40c: Microscope image of the textile fibres (photo: G. Eschenbrenner Diemer, © SIK).

One object, however, hammerstone 46602P/a-1 (fig. 40a), still had remains of yellow fibres on its surface (fig. 40b) in three different areas. The fibres were prepared for microscopic analysis and photographed (fig. 40c) by G. Eschenbach-Diemer and could be identified by P. Ryan as

part of the sedge family *Cyperaceae*, a grass-like plant that grows in wetland and riverine environments. This grass was commonly used in Egypt for the production of mats, baskets, ropes, or sandals. Also, papyrus is part of this sedge family. Other hammerstones consists of more ovoid pebbles and gravel or of fragments of other larger stones that were reused as hammerstones. Quartzite, granite, and granodiorite are among the most frequent materials of this group, reused sandstone is also common. The abundant wooden pegs of different sizes found in room A and C were probably hammered into the ground with some of these tools. The stones might also have been used for refining metal tools (see further down).

Fig. 41a: Red quartzite 44601X/b-26 that was ground down for pigment production (photo: P. Mora Riudavets, © SIK).

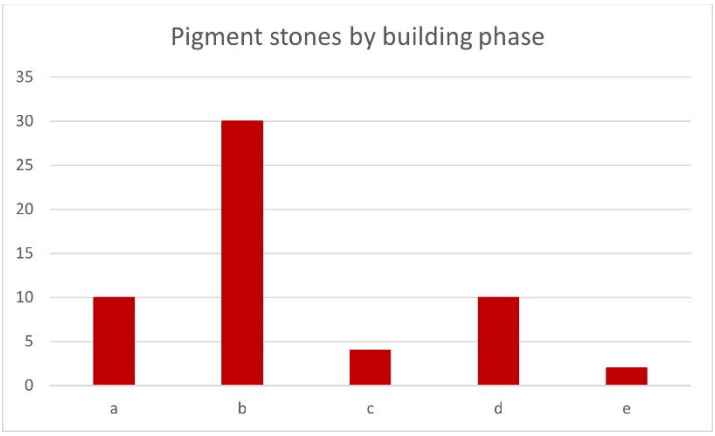

Fig. 41b: Pigment stones by building phase (diagram: M. Lehmann, © SIK).

A lot of stone tools (275 so far identified objects) also show remains of pigments on them, suggesting a usage for cutting or grinding chunks of pigments. Different hues of red are commonly found, and yellow is also relatively common. In addition to these traces of pigments on other stones, 56 pigment stones were identified among the assemblage (fig. 33). They were identified as dark red quartzite by R. Klemm and often show one or more flattened sides from grinding down the stone for pigment production (fig. 41a). The distribution by building phase (fig. 41b) again shows the highest amount for phase b and still quite high amounts for phases a and d. Red quartzite is available locally about one kilometre north of Aswan centre on the east bank. Here the Wadi Abu Aggag is situated[81] and its red coloured stone is already visible on Google Maps (fig. 42a-d). Apart from quartzite, silicified sandstone can also be found here in different shades from pink over dark red to purple and yellow.

Fig. 42a: Map showing the location of Wadi Abu Aggag (google maps).

Fig. 42b: Satellite image of Wadi Abu Aggag (google maps).

Fig. 42c: Photo at the Wadi Abu Aggag (photo: M. Lehmann © SIK).

Fig. 42d: Photo looking down onto the area of the red coloured soil (photo: M. Lehmann © SIK).

Fig. 43: Ceramic palette 45602N/f-1 (photo: M. Lehmann, © SIK).

In addition to the pigments, 26 ceramic vessels or fragments thereof were reused as paint palettes in H55 (fig. 43). They include remains of yellow, blue, black, white, and red colours. Although red pigments dominate by far among the pigment (stones) and as traces on stone tools, for the ceramic palettes, yellow is the far most common found colour (16) followed by Egyptian blue (6). Two palettes contained two different colours showing the vessels were sometimes

used more than once. About half of the material derived from building phase b (12), the rest from phase a (11). Only one object was found in phase d (room B) when paintings inside of the buildings are attested in room D and E in red, yellow, and white. One larger bivalve shell is preserved with red pigments inside, showing that shells were also used as pigment containers occasionally.

Apart from painting walls in the house, pigments could have been used for colouring different objects, such as wooden objects produced in the workshop, although only very few traces remain if at all. Pigments might also have been used to paint other parts of the architecture within the house, such as columns, doors, windows, or lintels. Other objects like pottery[82], faience vessels, papyri, and ostraca, or textiles[83] could have been painted as well within the space. Paint might have also been used to mark objects during different working steps, as is seen in sculpturing or to cut down bone parts during inlay production marked with red lines. Red pigments might also have played a role in domestic ritual life[84].

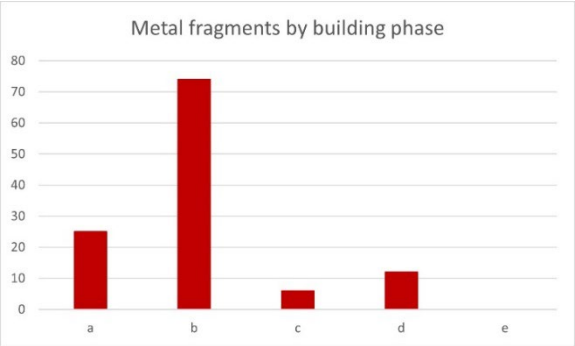

Fig. 44a: Metal fragments by building phase (diagram: M. Lehmann, © SIK).

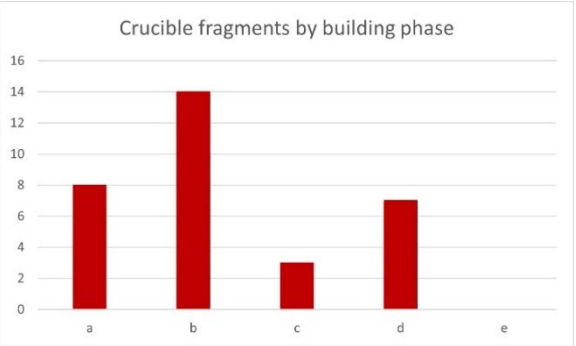

Fig. 44b: Crucible fragments by building phase (diagram: M. Lehmann, © SIK).

Other than the stone tools metal tools, slag and crucible fragments were also documented this season; 100 of 123 metal objects, three slag fragments and 32 fragments of crucibles were studied more in detail. The larger part of the metal remains are unidentified objects, as they only consist of small, corroded fragments. Few complete objects such as arrow heads, fishhooks, needles, and nails are preserved. As seen in fig. 44a the metal fragments were mostly found in building phase b (74). Some derived from the filling of layer a (25) and few were also found in the earlier phases c (6) and d (12).

The distribution of the crucibles (fig. 44b) is almost similar in character to that from the metal, and they derive mostly from building phase b (14) and the later rubble filling layer a (8). Seven remains were found in earlier layers of phase d and three derive from phase c.

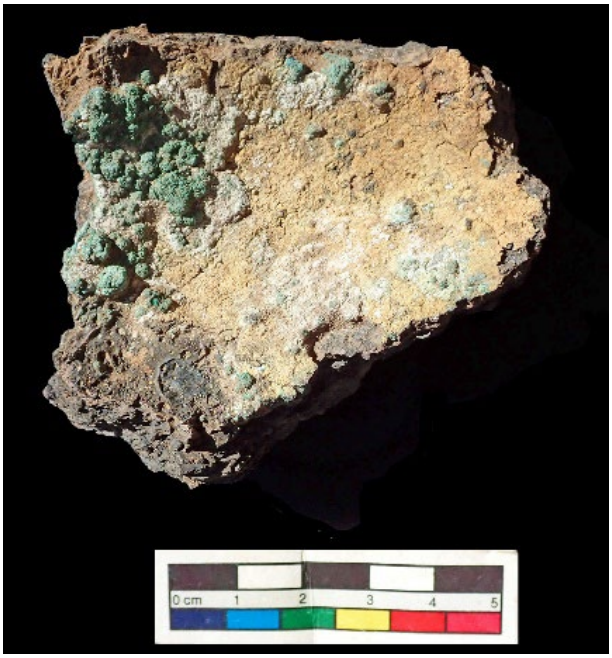

Fig. 45: Crucible fragment 44603E/a-1 (photo: M. Lehmann, © SIK).

The crucibles consist mostly of wall fragments (fig. 45), few diagnostic fragments allow an identification of their shape, such as hemispherical bowls with spouts and slightly flattened bases.

The slag and crucibles found in H55 attest to local production in the workshop, suggesting that metal tools used for wood working were produced and reshaped within the house directly. The larger number of small fireplaces in room C might be related to this activity.

These results are similar to the lithics production (compare report S. Buławka, this season) that also took place in H55. This demonstrates that the workshop was independent – at least to a certain degree - in producing or refining the tools needed for the productions within the workshop. Further studies of this assemblage are needed to complete the documentation of the small finds of H55 to allow an in-depth analysis.

(M. Lehmann)

[1] Fieldwork of the 49th season had to be terminated prematurely in spring 2020 due to the COVID-19 pandemic. In the subsequent season no work could be undertaken on site. Only in autumn 2021 was it again possible to return to Elephantine, the numbering follows the last field season of 2019/20. See also: M. Sählhof et al., *Report from autumn 2019 to spring 2020*, 3: https://www.dainst.org/project/25953: Elephantine – Report on the 49th Season.

[2] On how to approach reconstructions according to international standards see, for example, 'The Venice Charta. International Charter for the Conservation and Restoration of Monuments and Sites (1964)', in ICOMOS Germany (ed.), *International Principles and Guidelines of Conservation*, *MONUMENTA* I, (Munich, 2012), 46-51 and 'Charter of Lausanne. Charter for the Protection and Management of the Archaeological Heritage (1990)', in *MONUMENTA* I, (2012), 122-130.

[3] W. Kaiser, 'Säulenkolonnade und Torbau des Amasis', in Kaiser, *et al., MDAIK* 55 (1999), 105-108. For the base *in situ,* see: Kaiser, *et al., MDAIK* 55 (1999), 107 with fig. 13 (component X) and pl. 22a-22c. For the excavation report, see: C. von Pilgrim, 'Untersuchungen im Vorbereich des späten Satettempels', in Kaiser, *et al., MDAIK* 55 (1999), 94-97.

[4] One of the two components is already mentioned by W. Kaiser 'Die älteren Tempel von Chnum und Satet', in W. Kaiser, *et. al., Stadt und Tempel von Elephantine. 1. Grabungsbericht, MDAIK* 26 (1970), 111. Kaiser, *et al., MDAIK* 55 (1999), 107 with fig 13 (components A and B). Description of component B by F. Junge, *Elephantine* XI*. Funde und Bauteile 1.-7. Kampagne*, *AV* 49 (Mainz, 1987), 67-68.

[5] The components were previously stored in the outdoor lapidaries of the Elephantine Museum, Kaiser, *et al., MDAIK* 55 (1999), 107 with fig 13, components C, F and E.

[6] Inv.-No. JE 41559.

[7] Inscriptions for single components have been previously published by L. Habachi, 'Divinities Adored in the Area of Kalabsha with a Special Reference to the Goddess Miket', *MDAIK* 24 (1969), 168-183 and Junge, *Elephantine* XI, *AV* 49 (Mainz, 1987), 67-68.

[8] The measurements were conducted with the handheld XL3 hybrid analyser with helium flush, Ag-anode, and SDD-detector, a product of analyticon instruments gmbh.

[9] L. N. C. Castro, C. Calza, R. P. Freitas, A. Brancaglion Jr. and R. T. Lopes, 'Analysis of Ancient Egyptian artifacts using X-Ray Fluorescence', *IMEKO International Conference on Metrology for Archaeology and Cultural Heritage, Torino, Italy, October 19–21* (2016), 120.

[10] C. Calza, M. J. Anjos, S. M. F. Mendoça, A. de Souza, A. Brancaglion Jr. and R. T. Lopes, 'X-ray microfluorescence with synchroton radiation applied in the analysis of pigments from ancient Egypt', *Applied Physics* A 90,1 (2008), 76-78.

[11] Castro, *et al.*, *IMEKO* (2016), 121.

[12] Calza, *et al.*, *Applied Physics* A 90,1 (2008), 77.

[13] Castro, *et al.*, *IMEKO* (2016), 120.

[14] R. Klemm and D. Klemm, *Steine und Steinbrüche im Alten Ägypten* (Berlin, 1993), 329.

[15] For a situation report of the United Nations Office for the Coordination of Humanitarian Affairs (OCHA) see: https://reliefweb.int/report/egypt/egypt-aswan-floods-emergency-plan-action-epoa-dref-operation-n-mdreg019.

[16] M. Sählhof, 'Site Management Concept', in: M. Sählhof *et al.*, *Report autumn 2019 to summer 2020*, 9-11: https://www.dainst.org/project/25953: Elephantine – Report on the 49th Season.

[17] See reports listed for download at: https://www.dainst.org/project/4711172.

[18] Dates after E. Hornung, R. Krauss and D. A. Warburton, *Ancient Egyptian Chronology*, *HbOr* 83 (Leiden, Boston 2006), 491-492.

[19] Research questions and overview over methodology in detail see J. Sigl, P. Kopp and D. Fritzsch, 'Stadt und Tempel von Elephantine: methodological approach to the project "Realities of Life" (Lebenswirklichkeiten) and its first application during the 43rd and 44th excavation campaign on Elephantine Island', *MDAIK* 74 (2018), 161–165. See some of the results as an online available lecture in English at: https://www.youtube.com/watch?v=hsw-oVcOmOo.

[20] Currently only present as a desktop database, but to be transferred to a web-version in the upcoming years following the example already published online: https://field.idai.world/project/ayamonte.

[21] This project was possible through the support of the MoTA and the DAI. It was conducted at the laboratory of the IFAO with assistance provided by Nadine Mounir and Anita Quiles. Johanna Sigl, Marie-Kristin Schröder and Leslie A. Warden ensured the material was available and selected the samples.

[22] See C. L. Reedy, *Thin-section petrography of stone and ceramic cultural materials* (London, 2008).

[23] Developed based on the so-called Vienna System, see H.-Å. Nordström and J. Bourriau, 'Fascicle 2. Ceramic technology: clays and fabrics', in: D. Arnold and J. Bourriau (eds.), *An Introduction to Ancient Egyptian Pottery*, *SDAIK* 17 (Mainz, 1993) 147-190.

[24] M.F. Ownby, *Petrographic Analysis of Bread Moulds from Elephantine* (Unpublished petrographic report submitted to Johanna Sigl, 2018).

[25] The full petrographic descriptions are in M.F. Ownby, *Petrographic Analysis of Middle Kingdom Pottery from Elephantine. Part 2.* (Unpublished petrographic report submitted to Johanna Sigl, 2021).

[26] A recent publication has summarized the principal petrographic groups for Egypt, i.e. petrofabrics. See M. F. Ownby and M. Brand, 'Advances in Egyptian ceramic petrography', in: S. Marchand (ed.), *BCE* 29 (Cairo, 2019) 371-390.

[27] M.F. Ownby, 'Ceramic petrography – methods, samples, and results', in: Sählhof, *et al.*, *Report 49th Season* (2020), 23-28: https://www.dainst.org/projekt/-/project-display/25953; M.F. Ownby, *Petrographic Analysis of Middle Kingdom Pottery from Elephantine.* (Unpublished petrographic report submitted to J. Sigl, 2019).

[28] M.F. Ownby, *Petrographic Analysis of Bread Moulds from Elephantine* (Unpublished petrographic report submitted to J. Sigl, 2018).

[29] The marl/calcareous clay fabrics, which includes those of mixed clays (Nile and marl typically), shale clays and others, were discussed in the previous report: M. Sählhof, *et al.*, *Report 49th Season* (2020), 23-28: https://www.dainst.org/projekt/-/project-display/25953; M.F. Ownby, *Petrographic Analysis of Middle Kingdom Pottery from Elephantine.* (Unpublished petrographic report submitted to J. Sigl, 2019). No additional samples were included in the current study.

[30] A. M. de Souza and M. F. Ownby, 'Re-assessing Middle Nubian cultural constructs through ceramic petrography', *AAR* 39, 1 (2022), 35-58.

[31] This room was used as the main hearth of the house during the two best preserved building phases, the mid-13th Dynasty (H169b) and the mid-late 13th Dynasty (H169c): Fig. 21.

[32] This room was separated from Room 9 in the youngest distinguishable building phase of H169, dating to the mid-late 13th Dynasty.

[33] R. Hall, *Egyptian Textiles*, *ShirEgypt* 4 (Aylesbury, 1986), 9.

[34] Examples of dyed linen remain rare in ancient Egypt, due to the nature of the fibre itself, which, unlike wool, is not suitable for fixing colours. For more information, see Hall, *Egyptian Textiles*, 10.

[35] Variations in linen's natural coloration can be explained by its level of maturity at harvesting. See Hall, *Egyptian Textiles*, 9.

[36] For more information on bleached textiles and the process of bleaching in ancient Egypt, see Hall, *Egyptian Textiles*, 10. Further analysis needs to be carried out the textiles from H169 to figure out which bleaching process was used here.

[37] Both samples were kept separately, with the hope that scientific analysis can be carried out in the future to identify the dye and paint that were used here.

[38] For further information regarding spinning and splicing in ancient Egypt, see Hall, *Egyptian Textiles*, 12-13.

[39] Two S-spun yarns, plied in the S direction.

[40] The weaving structure was unidentifiable in twenty-three assemblages due to the poor preservation of the samples. For more information on weaving process and structure, see J. Harris, *5000 Years of Textiles* (London, 2004), 9-24.

[41] The loops are in the weft-direction, and are made by a supplementary weft, inserted and working as a pair with a ground weft.

[42] Reinforced as follows: 4 x 2 warps (2); 2 x 2 warps (2); 2 x 3 warps (1) and 3 x 2 warps (1).

[43] After the warp-ends were grouped and held together with supplementary wefts wrapped around them, they were either left to float (4) or plied (Z2s (1); Z6s (1); Z4S2s (1); S2S8s (1) and S2Z10s (1).

[44] One sample (47501R/a-6) preserved both a starting border and an end-border.

[45] Four assemblages in total: two come from Room 8 (47501L/b-6 and 47501L/e-8) and two from Room 4 (46501F/l-6 and 47501M/n-7). They are of two types: first, four groups of paired s-spun yarns, plied in Z (s2[x4]Z – 47501L/b-6, 47501L/e-8 and 47501M/n-7); second, two ends made of six s-spun yarns plied together in Z, then twisted in S (S2Z6s – 46501F/l-6).

[46] Six assemblages in total: three come from Room 4 (46501F/h-52, 46501F/k-43 and 46501F/c-18), two from Room 8 (47501L/a-6 and 47501L/c-6) and one from Room 5 (46501D/d-8). Four variations in the making process were identified: two s-spun yarns plied in Z (Z2s - 46501F/c-18, 46501L/a-6 and 47501L/c-6); Six s-spun yarns plied in Z (Z6s – 46501F/h-52); two ends made of ten s-spun yarns plied together in S, then twisted in Z (Z2S10s – 46501F/k-43); and four groups of paired s-spun yarns, plied in Z (s2[x4]Z – 46501D/d-8). Knots are simple and the space between each varies from 2cm to 5cm.

[47] Self-bands are paired undyed linen S2s threads, inserted during the weaving process that can either be tone-on-tone decoration (as on 47501M/v-5 (paired warps and wefts on a faced weave) and 47501U/k-6 (paired yarns on a half-basket weave), or weaving/weaver's marks, mostly located close to the borders (as on 45502I/a-6, 46501P/g-6, 47501R/l-7, 47501S/v-6 and 47501Y/e-6 (paired wefts on a faced weave) and 48501F/h-26 (paired wefts on a warp-faced weave).

[48] See for example, needles: 47501S/h-17, 47501K/L-14, 47501H/a-12, 47501H/c-7, 48501D/e-39 and 43501D/c-19 / spindle: 46501D/a-8 / shuttle: 46501K/a-27 / beating sword: 47501R/c-19.

[49] 47501V/w-7 found in Room 8 seems to be the only sample that could be identified as such.

[50] See footnote 44.

[51] See footnote 43.

[52] Three come from Room 4 (46501G/c-6, 46501P/q-6 and 47501M/z-6), one from Room 9 (47501X/a-6) and one from Room 10 (47501C/b-7).

[53] H57 (nine assemblages), H58 (one assemblage), H73 (six assemblages), H166 (eighty-one assemblages), H167 (10 assemblages), H170 (1 assemblage), H174 (three assemblages), H175 (twenty-four assemblages), H182 (two assemblages) and others (eighty-eight assemblages). On the preliminary archaeological assessment of these units see the excavations reports listed for download at: https://www.dainst.org/project/4711172.

[54] Sigl, *et al.*, *MDAIK* 74 (2018), 161-175; J. Sigl and P. Kopp, 'Working from home: Middle Kingdom daily life on Elephantine island, Egypt', in: A.K. Hodgkinson and C. Lelek Tvetmarken (eds.), *Approaches to the analysis of production activity at archaeological sites* (Oxford, 2020), 8-24.

[55] G. R. Gilmore, 'The composition of the Kahun metals', in: A.R. David (ed.), *Science in Egyptology* (Manchester, 1986), 447-462; M. Odler and J. Kmošek, *Invisible Connections: An Archaeometallurgical Analysis of the Bronze Age Metalwork from the Egyptian Museum of the University of Leipzig*, *ArchaeoEg* 31 (Oxford, 2020).

[56] M. Odler and J. Kmošek, 'Copper From Giza: the Latest News', *Aeragram* 20, 2, 2019, 12-17.

[57] V. Kuete, 'Canarium schweinfurthii', in V. Kuete (ed.), *Medicinal Spices and Vegetables from Africa* (Cambridge, 2017), 379-384.

[58] M.A. Murray, 'Fruits, Vegetables and Condiments' in P.T. Nicholson and I. Shaw (eds.), *Ancient Egyptian Materials and Technology* (Cambridge, 2000).

[59] C. von Pilgrim, 'Palast und früheste Kultstätte des Heqaib im Siedlungsbereich südlich des späten Chnumtempels', in Kaiser, *et al.*, *MDAIK* 55 (1999), 85-90.

[60] C. von Pilgrim, 'Archaeological investigations in the centre of the town', in J. Sigl, *et al.*, *Report autumn 2017 to summer 2018*, 16-21. Fig. 15: https://www.dainst.org/project/25953: Elephantine – Report on the 47th Season.

[61] C. von Pilgrim, 'Ein Tempel der Spätzeit zwischen Chnum- und Satettempel (Tempel A)', in Kaiser, *et al.*, *MDAIK* 55 (1999), 145-148.

[62] This sub-project is conducted by B. Bader in close cooperation with her ERC-Project *Beyond Politics: Material Culture in Second Intermediate Period Egypt and Nubia* at the Austrian Academy of Sciences, s. B. Bader, 'Work on the small finds and pottery from excavations at the town wall in Area XXXVI', in Sählhof, *et al.*, *Report 49th Season* (2020), 64-67: https://www.dainst.org/projekt/-/project-display/25953.

[63] S. Buławka, 'The lithic assemblage from House 55. Preliminary results' in Sählhof, *et al.*, *Report 49th Season* (2020), 57-63: https://www.dainst.org/projekt/-/project-display/25953.

[64] C. von Pilgrim, 'Excavation of House 55' in S. Seidlmayer, *et al.*, *Report from autumn 2014 to summer 2015*, 10-12: https://www.dainst.org/project/25953: Elephantine – Report on the 44th Season; C. von Pilgrim, 'Excavation of House 55 (18th Dynasty)' in S. Seidlmayer, *et al., Report from autumn 2015 to summer 2016*, 22-25: https://www.dainst.org/project/25953: Elephantine – Report on the 45th Season; C. von Pilgrim, 'House 55: A

workshop of the late 17th and early 18th Dynasty (Area VIII)', in J. Sigl, *et al., Report autumn 2016 to summer 2017*, 27-35: https://www.dainst.org/project/25953: Elephantine – Report on the 46th Season.

[65] A. Leroi-Gurhan, *Le Geste at la Parole* (Paris, 1964); J. Pélegrin, C. Karlin, P. Bodu, 1988, 'Chaîne opératoire: un outil pour le préhistorien', *Technologie préhistorique, Notes et Mongraphies techniques* 25, 55-62.

[66] M. Brandl, 'Work on the small finds and pottery from the excavations at the town wall in Area BXXXVI. Part E. Chipped stone assemblages' in Sählhof, *et al.*, *Report 49th Season* (2020), 69-72: https://www.dainst.org/projekt/-/project-display/25953; C. Jeuthe and M. Hamdan, 'The cherts of Elephantine Island – an insight into the economic networks', *MDAIK* 74 (2019), 38-54; T. Hikade, *Elephantine XXXV: The Lithic Industries on Elephantine Island during the 3rd Millennium BC*, *AV* 121 (Wiesbaden, 2013).

[67] S. Buławka, 'The lithic assemblage from House 55. Preliminary results' in: Sählhof, *et al.*, *Report 49th Season* (2020), 57-63: https://www.dainst.org/projekt/-/project-display/25953. I would like to thank M. Brandl for the results on the raw material identified last season.

[68] The layout of the rooms in House 55 is presented in: von Pilgrim, in Seidlmayer, *et al., Report 45th Season* (2016), 22-25: https://www.dainst.org/projekt/-/project-display/25953; von Pilgrim, in Sigl *et al., Report 46th Season* (2017), 27-35: https://www.dainst.org/projekt/-/project-display/25953.

[69] B. Bruyère, 'Rapport sur les Fouilles de Deir el Médineh', (1934-1935) *BIFAO* 16 (1939), pl. XLII; A. Spencer, *Excavations at el-Ashmunein III. The Town* (London, 1993), pls. 27, 28, 96; L. Giddy, *Kom Rabi'a: The New Kingdom and Post-New Kingdom Objects* (London, 1999), 226–243, pls. 51–52, 89–90; A. Tillmann, *Neolithikum in der späten Bronzezeit. Steingeräte des 2. Jahrtausend aus Auaris-Piramesse*, FoRa 4 (Hildesheim, 2007), 70-73; S. Buławka, 2017, 'Flint Artefacts from Tell el-Retaba. Polish-Slovak Archaeological Mission, Seasons 2010–2016', *Ä&L* 27, pl. 1.

[70] https://insidewood.lib.ncsu.edu/

[71] C. von Pilgrim, 'Archaeological investigations in the centre of the town', in Sigl, *et al., Report 47th Season* (2018), 18: https://www.dainst.org/projekt/-/project-display/25953.

2017 to summer 2018, 18.

[72] Acacias have recently been reclassified in the genus *Vachellia*.

[73] A. Belov, *Ship 17: A Baris from Thonis-Heracleion*, University School of Archaeology (Oxford, 2018).

[74] The species of *Vachellia nilotica* and *Vachellia raddiana* have been identified anatomically. A. Belov, *Ship 17: A Baris from Thonis-Heracleion*, University School of Archaeology (Oxford, 2018), 29-33.

[75] C. Boreux, *Etudes de nautique égyptienne: l'art de la navigation en Egypte jusqu'à la fin de l'Ancien Empire,* MIFAO 50, (Cairo, 1925), 248.

[76] P. Newberry, *Beni Hasan* (London, 1893), pl. 29.

[77] B. Porten, *The Elephantine papyri in English (*Leiden, New York, Köln, 1996), 115-122 no. B 11.

[78] The bark fragments removed from the lumber are numerous, attesting to the fact that the wood was brought in raw to be prepared in workshop H210.

[79] For further detail see, von Pilgrim, in Sigl, *et al., Report 46th Season* (2017), 27-35: https://www.dainst.org/projekt/-/project-display/25953.

[80] M. Lehmann, 'Angareeb-bed production in modern Nubia: Documenting a dying craft tradition', *Sudan and Nubia* 25 (2022), 21-22.

[81] Mentioned already in S. Seidlmayer, 'Die Felsinschrift des Vorstehers von Unterägypten, Dedusobek in Aswan', in H.-W. Fischer-Elfert and R.B. Parkinson (eds.), *Studies of the Middle Kingdom in Memory of Detlef Franke*, Philippika. Altertumswissenschaftliche Abhandlungen 41 (Wiesbaden, 2013), 206.

[82] J. Budka, 'Weihgefäße und Festkeramik des Neuen Reiches', in G. Dreyer, *et al., Stadt und Tempel von Elephantine 33./34./35. Grabungsbericht*, *MDAIK* 64 (2008), 106-132.

[83] G. Pinch, *Votive Offerings to Hathor* (Oxford, 1993), 102-134.

[84] M. Dalton, *Reconstructing the use and conception of pharaonic domestic space in Nubia: geoarchaeological investigations at Amara West (~1300–1070 BC)* (unpubl. Ph. D. diss, Sidney Sussex College, 2020), 247-272.