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ARCHAEOLOGICAL EXPEDITION AT AKSUM (ETHIOPIA) OF THE UNIVERSITÀ DEGLI STUDI DI NAPOLI "L'ORIENTALE" AND ISMEO - 2018 AND 2019 FIELD SEASONS: SEGLAMEN

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Introduction *(L. Sernicola)*

In November/December 2018 and 2019 the Italian Archaeological Expedition of the Università degli Studi di Napoli "L'Orientale" (UNIOR) and the Associazione Internazionale di Studi sul Mediterraneo e l'Oriente (ISMEO), co-directed by Andrea Manzo and Luisa Sernicola, conducted the twenty-fourth and twenty-fifth field seasons of investigations in the region of Aksum (Tigray, northern Ethiopia), the ninth and tenth at the ancient site of Seglamen[1].

The site, located about 15km to the South-West of Aksum along the Aksum-Adet road (Fig. 1), was first recorded and partially excavated in the early 1970s (Bernand *et alii* 1991-2000; Ricci, Fattovich 1987; Schneider 1976), and repeatedly surveyed by members of the UNO expedition and local archaeologists within the framework of the World Bank Ethiopian Cultural Heritage Project (Fattovich, Hagos 2006).

Since 2010, UNIOR conducts systematic researches in the area and its neighbouring regions, in collaboration with the Aksum University (AU) and ISMEO. The project is aimed at investigating a 100sq km transect along the Mai Negus/Haselo river valley, from Addi Hankara to the North of Adet with the territories around the modern villages of Medogwe, Seglamen, Merina and Adet as major areas of investigation.

Main goals of the project are to provide: 1) a reconstruction of the cultural and environmental history of the region to the South-West of Aksum, and 2) a detailed archaeological map of this region for the cultural heritage management of Central Tigray. The area has been selected as the Negus/Haselo river valley represented an important traditional exchange route linking Aksum and the Tigrean highlands to the Tekeze river in the South-West and, through this, to the southern regions of the Ethiopian plateau (Sernicola 2019, 11-38).

Field activities carried out in 2018 and 2019 consisted of archaeological excavations at site SG1, survey, and ethnographic enquiries; the study of human remains from the 2017 excavation in the cemetery has been also continued.

Situated in the modern village of Seglamen at the edge of a cultivated terrace overlooking the river valley, site SG1 is a large pre-Aksumite centre intensively investigated since 2010[2]. The site, extending for about 7ha, includes an ancient settlement, in the area of Amda Tsion, and the associated cemetery, in the area of Mogareb.

Excavations conducted in 2018 and 2019 concentrated in the settlement and in the cemetery respectively[3].

[1] Members of the 2018 expedition were: Luisa Sernicola, research co-director and field director, Diego Capra, archaeologist and lithic analyst, Mattia Morselli, Davide Memola and Domenico Filosa, assistant archaeologists (Università degli Studi di Napoli "L'Orientale", Italy). The expedition benefitted of the contribution and support of Friat Angesom (Aksum University) and Negus Gitaw (Addis Ababa University). Four MA students in archaeology and heritage management from Addis Ababa University and 25 BA students in archaeology and heritage management from Aksum University joined us for two weeks in the field in the framework of the "Italian contribution to the Education Sector Development Programme (ESPD) - Post Graduate Programme (PGP)", and of the affiliation program between Università degli Studi di Napoli "L'Orientale" and Aksum University respectively. The Bureau of Culture and Tourism, Central Zone, Aksum, was represented in the field by Aley Woldeselasie.
Members of the 2019 expedition were: Luisa Sernicola, research co-director and field director; Diego Capra and Francesco Michele Rega, archaeologists and lithic analysts; Mattia Morselli and Domenico Filosa, assistant archaeologists and surface surveyors; Eleonora Minucci, physical anthropologist and surface surveyor; Elisa Scorsini and Sofia Patrevita, undergraduate students in Archaeology at Università degli Studi di Napoli "L'Orientale". Friat Angesom, Welu G/Selasse, and T/Brhan Brhane were the instructors of Aksum University involved in the field as part of the affiliation program between Università degli Studi di Napoli "L'Orientale" and Aksum University. 6 MA students, one collaborator and one professor (Dr Ayele Terekegn) from the Department of Archaeology and Heritage Management of Addis Ababa University joined us for one week in the framework of the "Italian Contribution to the Education Sector Development Program (ESPD) - Post Graduate Program (PGP)".

[2] For a description of the results of each field season see also Fattovich *et alii* 2012, 11-128; Makonnen *et alii* 2013, 343-439; Sernicola 2014, 479-506; Sernicola 2015, 267-279; Sernicola *et alii* 2016, 223-241, 2017, 159-171, Sernicola *et alii* 2018, 353-364.

[3] As in the previous seasons, stratigraphic excavations have been conducted according to the procedures established by Harris (Harris 1979).

EXCAVATIONS AT AMDA TSION *(F. Angesom, D. Memola, L. Sernicola)*

Seven 10×10m excavation units, SEGXV, XIX, XX, XXI, XXII, XXIII, and XXIV have been established where the remains of a monumental building had been already partly exposed in 2014.

The main goals of the excavation were to outline the complete plan and layout of the building, to excavate some of its rooms in addition to Room 1 investigated in 2014, and to better understand its chronology and use through time as a great quantity of black and gray ceramics, allegedly post-Akusmite, had been detected in all the excavated strata mixed to the typical pre-Aksumite ones (Sernicola 2019, 23-25; Sernicola *et alii* 2016, 225-227).

Excavations conducted in 2018 allowed to detect the western, northern and eastern external walls of the building, and to identify two rooms in addition to the five detected in 2014. The disturbed remains of a North-South oriented stone staircase abutting the western wall of the structure have been also exposed; remains of a similar feature were brought to the light along the eastern wall in 2014.

Three rooms of the building have been fully excavated: Room 2, Room 4 and Room 5 (Figs. 2, 3, 4), already identified in 2014.

Room 2 is a rectangular room (ca. 4.75×4.95m) located approximately in the center of the structure, immediately north of Room 1. Traces of a living surface leveled with a thin layer of compact clay soil (SU64) have been detected immediately above the bedrock in the North-eastern corner of the room; radiocarbon date from a sample of charcoal from this context point to 910-808 cal. BC[4]. This was covered by a thick stratum of stones from collapsed walls, mixed to abundant ceramics fragments (SU50). Spots of plaster have been also recorded along the northern wall of the room. No evidence of openings or thresholds have been observed in this room; as Room 1, it was possibly a store-room in the basement of the building, accessed from the top by a wooden ladder.

Room 4 and 5 are two small square rooms with a stone pavement, 1.5×1.5m, located to the North-West of Room 2. A date from a charcoal sample from the lowest stratum of Room 4 points to 805-746 cal. BC. Anyhow, both of them were highly disturbed during post-Aksumite times, between 11th and 12th century AD, as suggested by radiocarbon dating[5].

Pre-Aksumite and post-Aksumite ceramics have been collected in the lower and upper levels of these rooms respectively, as well as micro- and macrolithic tools. Abundant animal bones and ashes were associated to the ceramic fragments recorded in the post-Aksumite strata of both rooms suggesting a possible later use as garbage areas.

In 2019, a test excavation conducted following the western external wall of the building to the South allowed to detect the scanty remains of the South-western corner of the structure and part of its southernmost wall. Unfortunately, this sector of the building is very much disturbed by a modern narrow path between cultivated fields and terracing, it is thence impossible to reconstruct its internal organization. The general extension of the building results to be 17.40×ca. 25m.

Photogrammetry (D. Filosa, M. Morselli)

A topographical mapping of the features exposed during the excavation at Amda Tsion in 2018 was carried out using terrestrial photogrammetry technique, following the Structure From Motion (SfM) process already used in the previous seasons (Fattovich *et alii* 2012, 116-117). The modeling required the use of several photo shots: ca. 200 for small areas (Room 4 and Room 5), and about 500 shots for larger areas (Room 2 and the trench). The photos were taken at eye level with a Fujifilm camera (XA-10, with 16-50 macro lens) with an overlapping of 60-70% (Agisoft 2018); ten marker points and two scale bars allowed a better quality and precision in the creation of the 3D models.

The photos were processed using the software Agisoft Photoscan 2017, and the elaborated models were used as base for drawing the plan of the SUs and of the trenches by using the 3D design and modelling software AutoCad 2017 (Figs. 2, 3, 4).

The use of these procedures demonstrated to be particularly suitable for fieldwork documentation, as it allowed us to create detailed and accurate 3D models aimed at managing archaeological data and at keeping them as much intact as possible, avoiding to disperse any kind of information. This methodology allows to devote more time to the excavation, avoiding to halt too much for realizing drawings (Cocca 2013), but it also raises some problematic issues such as the variation of light during the shootings (40-60 minutes), especially in large areas. Moreover, the processing of the model requires a very long time (6-10 hours) that could be reduced by using a higher performance equipment of cameras and laptops.

[4] Radiocarbon dating have been performed by Beta Analytic Testing Laboratoy, Beta Analytic Inc., Miami, Florida.

[5] Room 4, SU53 1033-1190 cal. AD; Room 5, SU54, 1028-1184 cal. AD; Room 5, SU65, 1016-1154 cal. AD.

EXCAVATIONS AT MOGAREB *(F. Angesom, L. Sernicola)*

In 2019, archaeological excavations concentrated in the area of Mogareb, where the remains of a pre-Aksumite cemetery have been systematically investigated since 2010 (Sernicola 2019, 25-27).

A 10×10m excavation unit, SEGXXV, has been established immediately to the West of SEGXVII-XVIII, excavated in 2017 (Sernicola *et alii* 2018, 354-356).

Excavations at this trench exposed the remains of 4 funerary features which include 4 tombs (Tomb 34, 35, 36, 37) and the remains of a stone platform originally intended to cover all the tombs, made out of medium and small natural stones and small blocks of sandstone and limestone (SU8).

3 tombs have been excavated (Tomb 34, 35, 36), the other (Tomb 37) has been identified and will be investigated during the following season. The excavated tombs consisted of rough circular shafts containing very few, badly preserved bones together with complete and almost complete pots. One of them, Tomb 34, is associated to a sandstone stela (H. 129cm, W. 25cm, Th. 10cm), now laying on top of the shaft (Fig. 5). In this tomb a high quantity of incense-burners has been collected nearby the base of the stela and immediately below it. A good number of incense-burners has been also found within the stone platform covering the tombs.

The tombs were concentrated in the central/western sector of the trench, while the eastern one did not show any evidence of archaeological remains, with the exception of surface scatter of fragmented ceramics. This represents an important element as it suggests that in this cemetery the tombs were grouped into clusters with empty areas in between. Future investigations will contribute to provide a detailed map of the distribution of the clusters of tombs so far investigated and will presumably help to understand their meaning.

Photogrammetry (E. Minucci)

A digital documentation survey of the entire trench SEGXXV, based on the SfM approach, was performed. The aim was to generate a geometrically correct 3D model of the area in order to georeference the new trench and merge it to the general site plan. As we were not equipped with instrumentation for digital georeferencing, several points, clearly identifiable in the images, were indelibly marked in the trench; in the next field season the coordinates of these points will be measured with Total Station and the points will be recognized in the 3D model elaborated in 2019 and presented here. These Ground Control Points (GCPs) will, therefore, be used to roto-translate and georeference the vertices of the trench.

Considering the extension of the trench and the conformation of the different ground levels, characterized by deep funerary pits and by many large outcropping boulders, it was almost impossible to keep the same shooting distance from the objects. Therefore, different techniques were tested and two image datasets were acquired in two working days. The first survey was carried out with a pole, shooting by remote control from North-East to South-West. The swipe of the second one was conducted freehand, from South-East to North-West. A Nikon D90 camera was used for both the acquisitions.

During the data processing, it was decided to elaborate the dataset of images acquired without the use of the pole because of its better overlap and resolution. In order to increase the detail of some elements, 29 of the photos taken with the pole in the first photogrammetric survey have been added to this dataset; these are images related to the details of the rocks with GCPs that will be used for the future georeferencing phase. Therefore, 641 images were processed in a single chunk in the Photoscan Metashape Professional software, package by Agisoft (version 1.5.1). Although the “extra” images were taken on a day with different light and not from the same height, they were correctly aligned and processed with a satisfactory result. The value of the ground resolution was 0.426mm/pixel. The following parameters have been set for the processing: a) Alignment phase, Accuracy = High (original images), Depth Filter = Mild; b) Elaboration of the Dense Cloud, Quality = Medium (67,584,386 points), Depth Filter = Mild; c) Mesh was processed from the point cloud with a Medium Quality (5.501.933 faces).

Once the complete processing of the photogrammetric survey was finished, the software returned the textured 3D model used to extract the orthophoto (Fig. 6) with a resolution of 0.394mm/pixel.

Some holes in the cloud depend on the insufficient overlapping of the images due to the presence of pits and rocks causing difficulty of movement in the trench; the incomplete parts will be filled with detailed photogrammetric surveys carried out in the individual squares of each the trench. In conclusion, the preliminary 3D model and the digital products fit well with the needs of the 2019 field season. In the near future, the quality and the density of the point cloud will be increased in order to better recognize the points that will be used for georeferencing.

SURVEY *(M. Morselli, E. Scorsini)*

During the 2019 archaeological expedition, a survey was conducted along the edges of the natural terrace where site SG1 is located. Starting from the site we went down along the northern slopes of the terrace moving southwards along the Haselo river until we reached a locality called Megaru.

There, 4 rock shelters have been identified. The first one, rock shelter #1, is located in the North-western sector of the modern village of Seglamen, along the eastern edge of the Haselo river (04° 63' 6,37" N - 15° 55' 09, 00" E; elevation 2018 m asl.). It is a rock shelter whose living floor is covered by a thin layer of brown soil and natural stones of medium and big size and measures 1.60m in height, 5.2m in width, and 2m in depth. According to local informants, it is used nowadays as a shelter by farmers during the rainy season.

The second one, rock shelter #2, is located at 04° 63' 8,26" N - 15° 54' 8,31" E, elevation 2024 m asl., is a rock shelter whit a floor of natural rock and is ca. 1.50m high and 7.30m wide, with a maximum depth of 1.80m. The higher its depth, the shorter its height. It presents a tight long shape and is characterised by two recesses in the rock. According to local informants, it is used nowadays by herders during the rainy season; a three-line modern inscription is present. The other two shelters are located on the opposite edge of the tributary of the Haselo river, to the South of Seglamen.

Rock shelter #3 is located at 04°63' 7,87" N-15° 54' 6, 20" E, elevation 2016 m asl. It is a rock-shelter measuring 3×13.40×ca. 2.70m and a floor of natural rock; a rock recess with irregular narrowing can be observed. It appears to be still used by herders during the wet season.

Finally, rock shelter #4 (04° 63' 8,19" N - 15° 54' 5,96" E; elevation 2011 m asl.) is a rock-shelter with the living floor characterised by natural rock covered in some part by a thin layer of brown soil. It presents a rock recess with irregular narrowing and measures between 2 and 3m in height, 19m in width and between 1.70 and 2.30m in depth, and is characterized by a small flow of rainwater running down from the top of the shelter that can be collected. A high quantity of chert pieces was scattered on the entire surface of the cave; a random sampling has been made of these materials to be analysed. The rock cave seems to be still used nowadays by herders.

Although the aim of this survey was to identify traces of ancient human activities along the river valley, no remarkable evidence has been recorded. Even the chert samples from rock shelter #4 do not show any mark of knapping activity.

Anyhow, it would be very difficult to find any archaeological material still in situ due to the orography of the area, that is very steep and subject to flood during the rainy season.

The recorded shelters are situated more or less at the same elevation, 30/40m above the Haselo river bed, where are the farmland and the pastures. So, these caves, as nowadays for the locals, could represent suitable shelters for ancient farmers or herders during the rainy season. Anyhow, they are (and possibly were) used only as very temporary shelters due to their small room capacity and to their proximity to the site.

Further surveys moving southwards along the Haselo river are planned for the next campaigns in order to find evidence of the activity and movements of ancient pastoral groups.

ANTHROPOLOGICAL ANALYSIS *(E. Minucci)*

During the 2019 field season the study of human remains from Tomb 31 excavated in 2017 has been continued; in particular, the bones from the upper (SU39-41) and lower (SU34-40) levels of the central pit[6]. Since several individuals were buried in two chambers re-used multiple times, skeletal remains have been found, in both the rooms, disconnected and heavily mixed-up. Therefore, so far the value of the MNI (Minimum Number of Individuals)[7] has been calculated for the central pit and for the side chamber separately and for adults and subadults independently. The new anthropological analysis has allowed to update the MNI in the central pit of the tomb.

The examination of new skeletal remains from the stratigraphic units 39-41 and 34-40 has increased the MNI of the first room up to 7 adults (+20 years) and 1 subadult (8,5-9,5 years). The number of adult individuals has been updated thanks to 2 left femurs added to those found in 2017.

The first femur presents the epiphysis of the head completely fused but with the union line still visible, which leads to identify the individual as a young adult (around 18-25 years of age). The second femur shows a plaque on the neck, an imprint located on the anterior margin of the neck close to

[6] See Sernicola *et alii* 2018, 354-356 and 357-358 for a description of the tomb and the results of first phase of analysis carried out in 2017.

[7] It refers to the fewest possible number of individuals in the osteological assemblage. When possible, sex diagnosis (Acsádi, Nemeskéri 1970; Buikstra, Ubelaker 1994; Krogman, Iscan 1986; White, Folkens 2005), estimation of the age of death (Al-Qahtani 2010; Brothwell 1981; Lovejoy 1985; Meindl, Lovejoy 1985; Schaefer, Black, Sheuer 2009) and significant paleopathological alterations (Ortner 2003; Ortner, Putschar 1981) were collected.

the head, with the edge of degree 1 (Radi *et alii* 2013) and probably a Poirier's facet. These pathological traits are indicative of repetitive microtrauma caused to the femoral neck by its impingement against the acetabular rim. These could be the cause of many cases of idiopathicosteoarthritis of the hip and may represent skeletal markers of activity in the bioarchaeological record, although the interpretation of these features remains complex.

The MNI in the side chamber is of 1 child and 7 adults equally, including the almost complete skeleton buried last in the uppermost stratigraphic level (Sernicola *et alii* 2018, 354).

The research is still ongoing and only with the complete analysis of all the odonto-skeletal remains of the two rooms the MNI in the tomb can be precisely defined. A large number of infants and children dental elements have been found in both the burial rooms as well. By carefully examining the samples it will be possible to establish the precise number of subadults buried in the tomb.

ETHNOGRAPHY

Macrolithic tools (D. Capra, F.M. Rega)

An ethnographic study has been started by Mr Diego Capra in 2018 as member of the Italian Archaeological Expedition at Aksum. Mr Francesco Michele Rega joined this research project in 2019. The main aim is to investigate traditional uses of stone tools in the region of Aksum including food and medicine processing as well as hide and pottery manufacturing. The information will be useful for a better comprehension stone implements from archaeological contexts, including those from the pre-Aksumite site discovered at Seglamen, some of which have been previously analysed by L. Phillipson (2012; 2013). Furthermore, it would be crucial for recording important local traditions that are disappearing due to the modernisation of the region.

A total of 10 interviews have been performed: 4 in 2018 and 6 in 2019. 9 of them provided information regarding the use and the discharge of grinding stone and other macro-lithic tools, used for cereals, spices and other culinary processing; plants treatment for medical purposes has been investigated too. The other interview concerns hide working destined to the manufacturing of parchments and covers for manuscripts. A part of the interviews was recorded by using a camera (Nikon D3200) and/or a voice recorder, according to the wishes of the people involved and their right of privacy. Nevertheless, the choice of recording was mostly related to the necessity of registering the name of the items involved in the grinding process and the name of the parts of the houses in Tigrinya language. Local interpreters[8] assisted the authors in the realization of the work, by translating questions, answers and spelling and writing local names.

The interviews were performed inside people houses. They were done following a pre-established questionnaire, which was sometimes extended or reduced according to the time granted from the interviewed or the necessity of deepen a specific topic. The questions were elaborated also thanks to the confrontation with L. Nixon-Darcus (Pers. Comm.), who conducted a first ethnographic study in the area of Gulo Makeda, eastern Tigray (2014). Similar studies, regarding the Gamo and Mursi people in southern Ethiopia were respectively made by J. Arthur (2014) and J. Robitaille (2016). The grinding equipment was photographed, measured and described according to the terminology proposed by L. Phillipson (2012) and J.L. Adams (2014). The mobile ones were also weighted.

9 women between 22 and 72 years, and 3 men, between 50 and 80 years, were interviewed. The preliminary data helped to create a first reconstruction of the process of crafting and use of the grinding equipment among modern Seglamen inhabitants.

The most common procurement place, indicated by the interviewers, is Kollo[9]; other locations are Addi Bus, Amda Tsion, and the bed of dried water courses nearby the village. At least in two cases the people interviewed did not know the provenance of the raw materials. Stones are generally chosen according to the colour, associated to specific properties. Slabs are generally extracted with metal hammers and crowbars. Friends and family members are involved in the transportation of the slabs, done by using wooden bars. The crafting of tools is generally made at home: it takes from 4 days to 1 week to create a lower grinding tool and 1 or 2 days for the upper ones. In one case, a general time-span of 2/3 weeks was indicated as necessary to create both parts. Metal hammers and chisels are utilised to shape the lower and upper grindstones.

Regarding their use, the introduction of the electric mills has affected the utilisation of traditional stone grinding implements. However, all the women interviewed still use these tools, generally in the preparation of meals. Different types

[8] The interpreters involved are: Guish Assefa Aregawi (local interpreter for the UNIOR expedition and local guide), Gaim Gebremedihim Meshesha (local interpreter for the UNIOR expedition), Samuel G/Egziabher (ARCCH) and Friat Angesom (Aksum University).

[9] Kollo is a quarry area located at 1 hour walk from the modern village of Seglamen.

of lower grindstones and upper stones are used for this purpose. They are generally made from sandstone and basalt. Commonly, a couple of tools is employed for cereals, one for spices (Figs. 7a, b, c). Teff, sorghum, maize, barley and wheat are the most common grinded cereals. Salt, pepper, berbere, onion, garlic are the most widespread spices. Wooden mortars are used too (Fig. 7d). Once grinding stone tools are no more useful, they are reemployed for other purposes. Broken lower grindstones are reused as smaller lower and upper active tools. Alternatively, they are employed in the masonry. The range of their use goes from sporadically or 3/4 times per month up to 3/5 times a week. Only in one case the answer was every day. Grinding is always avoided during holy days.

Concerning the leather worker, the 39 years old man provided a complete description of the different steps required to create parchment. A possible porous scoria rock is utilised to remove the hair and clean the skin as sand or rock powder get stuck inside the interstices facilitating the abrading activity. A possible pumice rock and another unknown smaller rock are used for correcting mistakes during writing and drawings, or to make punctual adjustments.

Provil-Novo CD2 (Heraeus Kulzer) light, fast set was used for casting the active surface of selected stone tools in order to provide data for future use-wear analysis and start to create a reference collection of use-wear traces.

Goldsmithery (M.S. Patrevita)

In November/December 2019 an ethnographic research on Aksum's traditional handicraft and goldsmithery was started[10]. It was possible to document, with interviews, photos and videos, an artistic heritage in danger of extinction because of the arrival of new technologies and the lack of interest of the younger generations towards these ancient crafts.

In the center of Aksum, near the Stelae Park, there is Casah's workshop. He is an *anteyeqa* and an expert in the creation of bells and hand crosses, made for traditional religious liturgies. The technique used to make these objects is one of the oldest ever attested: the "cire perdue" or lost wax method of casting.

The manufacturing process can be divided into 4 main phases. The first step is to create the wax models of the bell and the cross. The craftsman makes a cone-shaped support with a "special clay" for the bell and the handle of the cross. Impressing an iron or wood mold on a disk of "pure clay", Casah creates the icon (e.g. Saint Mary, Saint George or Jesus) which constitutes the principal decoration of the bell. Then, he draws the shape of the cross on a sheet of wax and carves it with the mekereti (Fig. 8a). Finally, the craftsman makes a rattle and a handle for the bell and cleans the objects. The second phase consists of covering the wax models with the "special clay" leaving a hole on the top to let the wax come out. Then, the artifacts are left in the sun to dry for 2 days. The third stage is the melting of the metal (brass), with the use of forgia. The wax models are put on the fire and slowly the wax comes out. Then, the brass pieces are placed into the forgia, hammered on an "anvil-stone" with an "hammer-stone" and put again on the fire. The small pieces are put into a *kawri*. When the metal is melted (Fig. 8b), the *kawri* is extracted from the forgia. The metal is poured into the molds, which are then put in the water. The molds are broken with a "hammer-stone" and the metal object comes out. Finally, the pieces are finished with the carta vetra and on a large "anvil-trunk" and assembled. For the cross, there is another phase: the *btas*. The cross is batted into *btas* on the fire and acquires a silvery-white color. According to Casah, this practice comes from Sudan.

Behind piaza, there is Aksum's goldsmiths district. Menafh, goldsmith for 15 years, is expert on the traditional feminine ornaments. There are six different types of jewels: earrings (*kutecha*), necklaces and front-ornaments (*nay kesada*), rings (*qeyebet*), single crescent moon-shaped earrings for the top of the ear (*sequre*), and chains (*atar*). The main technique used in this area is the filigree. All types of traditional ornaments have a particular design called chat. Although there are different chat styles, all of them recall the floral pattern, such as the crown of passion flower filaments. There are also other types of traditional jewelry. *Telsum* is a necklace with pendants of different shapes, used for protection from the devil-eye; *goba qube* is a necklace with two shield-shaped pendants and one ring in the center, worn by married women as it symbolizes the marriage union; *ambar* is the general name for bracelet, but the oldest type is a bivalve-bracelet with a pin closure; *telal* is the name for crescent moon-shaped earrings with granulated decoration; *zebto* is the traditional wedding silver ring with engraved design.

Medhanye is a young goldsmith, expert in traditional filigree jewelry. When I visited him, he was creating the chain for a front-ornament in gold, using one of the basic goldsmith's technique: the welding. A piece of gold is filed with mebred to

[10] The work and help of two interpreters were fundamental: Samuel G/Egziabher (ARCCH) and Gaim Gebremedihim Meshesha (local interpreter for the UNIOR expedition).

obtain dust of gold. This dust is mixed with shinkar. With a disc cutter, the goldsmith cuts a small disc from a gold plate. Then, the discs are modeled on a dapping block with a hammer. To produce the wire, Medhanye works a piece of gold with two important tools: first, he uses the machine and then the *meshabi*. From the wire, he cuts pieces 1cm long, rounding the ends like a hook. The goldsmith makes up the chain: on a refractory stone he places the wires and the discs on it. With a feather-brush, he puts water and the mix of gold dust and shinkar in the points to be welded. Blowing slightly into the *menafia*, Medhanye directs the fire from the torch to the points to be welded (Fig. 9a). When the chain is ready, he repeatedly immerses it in nitric acid on the fire (Fig. 9b).

Despite artisans and goldsmiths are discriminated and called *buda*, their art is still one of the most fascinating. The combination of archeology, goldsmithery and ethnography allows to deepen the study of this ancient art beyond the Ethiopian borders. Through the comparison of the diverse manufacturing techniques, tools and symbols associated with the use of certain artifacts, it is possible to broaden the research to the other cultures of the Horn of Africa and the Nile Valley.

Further interviews together with inspections at the quarry sites are planned during the next field seasons to deepen our knowledge and establish experimental protocols.

CONCLUSIONS *(L. Sernicola)*

Archaeological investigations conducted in 2018 and 2019 at Seglamen and in the area of Aksum increased our understanding of pre-Aksumite funerary practices at Seglamen and of the spatial organization of the cemetery, and allowed to define the general extension and layout of a large pre-Aksumite building partially reused and disturbed during post-Aksumite times, and to start the systematic survey of the Haselo river valley in search of possible evidence of ancient human movements and activities along it. Ethnographic enquiries opened up stimulating lines of research on the production and use of macrolithic tools and traditional ornaments that will help document a long-established but unfortunately disappearing heritage, and help the interpretation of specimens from archaeological contexts.

Finally, part of the 2019 field season has been devoted at organizing an exhibition at the Archaeological Museum of Aksum aimed at presenting to the local community and to the visitors the results of 10 years of investigations at the pre-Aksumite site of Seglamen by the Università degli Studi di Napoli “L’Orientale” and ISMEO. The exhibition, which consists of 3 showcases with objects from funerary and domestic contexts of site SG1, posters and detailed captions in English and Amharic, tell to the audience about the economy, the social organization, the daily life and the funerary rituals of the ancient people living at the site. On this occasion, 3D models of some of the exhibited objects have been made using the SfM approach. The objects were complete medium-size bowls and bottles from funerary contexts. These required about 150 photos each with an overlapping of 70-80% to ensure a more detailed and refined model. The objects were photographed outdoor using two cameras (Fujifilm XA-10, with 16-50 macro lens; Canon G9X Powershot), four square marker points and two scale bars. In this way, we obtained quite detailed 3D models of each pot that can be used for archaeological study and for dissemination.

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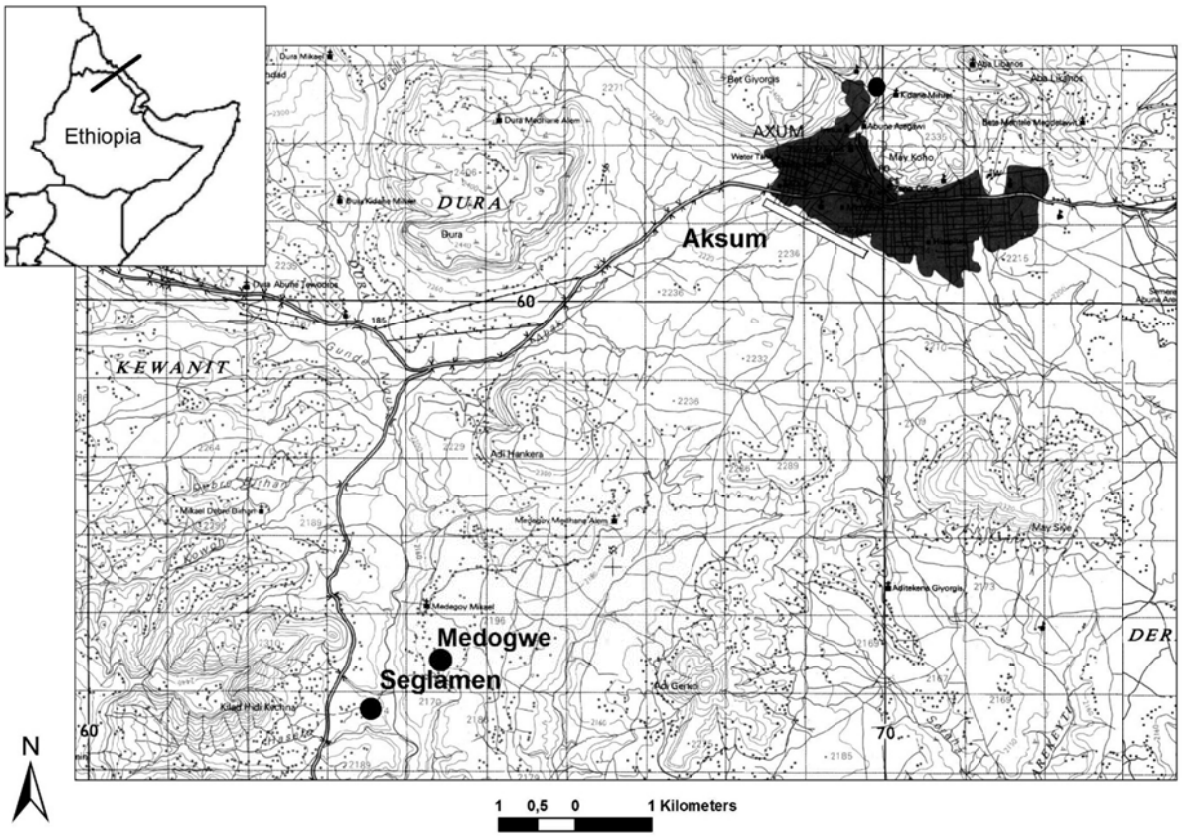

Fig. 1 - Map showing the location of site SG1 at Seglamen

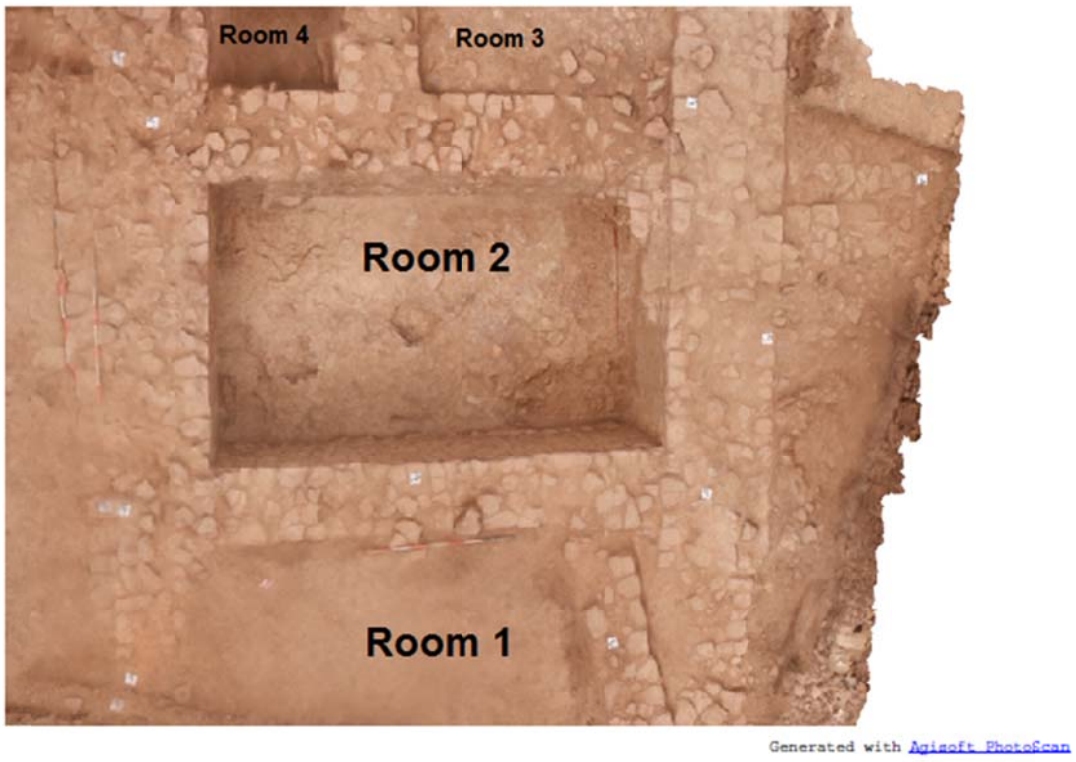

Fig. 2 - 3D Model showing Room 2

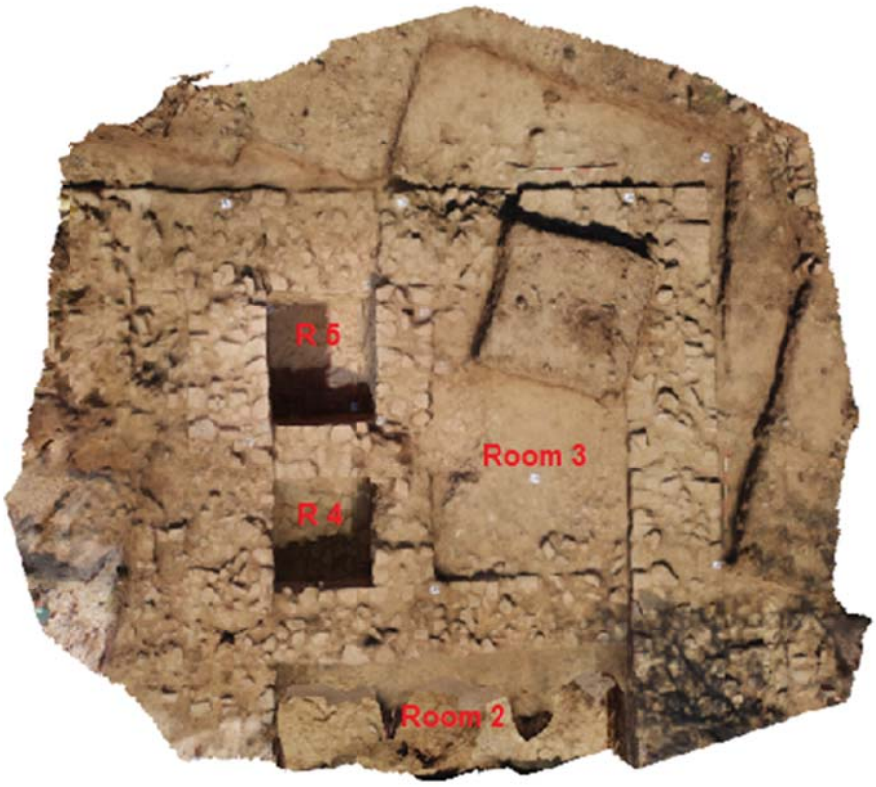

Fig. 3 - 3D Model showing Room 3, 4 and 5

Fig. 4 - 3D Model of Room 4

Fig. 5 - Upper part of the shaft of Tomb 34 and the associated stela

Fig. 6 - 3D Model of trench SEGXXV after the completion of excavations

Fig. 7 - a) Grindstone (*maṭhan*) and topstone (*madit*) used for cereals, located inside the house; b) Grindstone (*maṭhan*) and topstone (*madqos*) used for spices, located in the garden; c) Example of big topstone (*madit*) used for cereals; d) A wooden mortar and its pestle

Fig. 8 - a) The craftsman draws the shape of the cross on a sheet of wax with the *mekereti*; b) The melting with the use of *kawri* and *forgia*

Fig. 9 - a) The goldsmith welds with *menafia* and torch; b) Gold chain and pendants with the traditional decoration called *chat*