

# 30

## ARKEOMETRİ SONUÇLARI TOPLANTISI



**T.C. KÜLTÜR ve TURİZM BAKANLIĞI**  
**Kültür Varlıkları ve Müzeler Genel Müdürlüğü**



T.C.

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# ARCHAEOMETRICAL RESEARCH AT SAGALASSOS IN 2013

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**Kim EEKELERS**

**Becki SCOTT**

**Patrick DEGRYSE**

**Elena MARINOVA**

**Beatrice De CUPERE**

**Sofie THYS**

**Katrien VAN DE VIJVER**

**Fran STROOBANTS**

**Johan VAN HEESCH**

**Jeroen POBLOME**

**Julian RICHARD**

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## *1. Introduction*

*Marc, WAEKENS*

As a consequence of the fact that pottery sherds could no longer be collected during rural surveys, archaeometrical research in 2013 had to be restricted to material originating from the urban excavations only.

## *2. Geological Fieldwork*

**Kim EEKELERS**

**Becki SCOTT**

**Patrick DEGRYSE**

Between 1990 and 2013, samples of metallurgical waste were collected from several excavation contexts in the city, as well as from different locations

investigated during urban and territorial surveys. These materials are all kept in the depots of the excavation house. The focus of the metallurgical study during the 2013 campaign was to complete a morphological description of this metallurgical waste for a classification into functional categories, and to use a portable XRF (type Bruker Tracer III SD) to analyze these materials *in situ* in order to compare field results with previously obtained laboratory assays. A total of 45 metal slag were analyzed. The aim was to see whether the slag could be qualitatively characterized based on provenance and/or function. Metallurgical waste was classified based on morphological characteristics. Tap slag, recognized by characteristic flow textures, and furnace cooled slag, with a more massive texture, result from the bloomery process. Waste material resulting from smithing activities can be recognized by its distinct (often concave) shape and internal stratification. The pXRF analyses showed two principle groups, a high Ti and Zr group versus a low Ti and Zr group. The high Ti-Zr group also had higher Mn, and all bar one of the samples in this group had high Si. The Ca also split the data into two groups but these were not consistent with the high Ti-Zr group. This clear difference can be explained by the use of different ore sources. When classified based on the find location, the slag with a high Ti-Zr content came from Dereköy, the Ağlasun Valley survey, whereas one sample originated from the 'Eastern Suburbia', formerly known as the 'Potters' Quarter' (Figure: 1). The high Ti-Zr slag probably refers to the use of the Dereköy magnetite placer sands that were used as a raw material for iron production. The low Ti-Zr samples originate from the Sagalassos City Survey and also from the Ağlasun Valley. For this type of slag, the use of the hematite iron ore found north of Sagalassos is more likely. The results were also reviewed in terms of the functional types of slag. This indicated that the majority of the high Ti-Zr group was furnace-cooled slag, with one tap slag and one non-diagnostic slag, and hence the remains of ore smelting. Further analysis will allow proper interpretations concerning the chemical differences related to functionality and origin of the slag in the Sagalassos territory. This study has in the meanwhile shown that pXRF can be successfully used in a field laboratory to analyze differences in metal slag origin and nature.

### 3. *Archaeobotany*

Elana MARINOVA

During the 2013 research season, a total of 48 flotation and 37 wood charcoal samples were studied under a binocular (low magnification microscope). The study aims at reconstructing the ancient subsistence, based on plant food and products. The macrobotanical samples consist in most cases of charred remains of plants that were used on a daily basis for food, fodder, fuel or other domestic or industrial purposes. The most numerous and diverse archaeobotanical finds came from the excavations to the east of the 'Neon Library'. In locus 79 (excavated in 2012) a concentration of barley grains (n=1897) was found, together with numerous weeds but also leafs of fir, pine and few fragments of walnut shell. The sample from locus 127 (excavated in 2012) contained a concentration of lentil seeds (n=452) mixed with remains of fruits - almond, grape, pomegranate, olive and fig. At the Macellum, most of the samples studied this year were rich in plant remains. The richest samples were dated to the Early Byzantine period and show a dominance of cultivated cereals and pulses (mainly barley and lentil), fruits/nuts like grape seeds, walnut shells and plum. Interesting is that, together with the remains of food consumption, also remains of plants which should come from low temperature (domestic) fireplaces were found. Characteristic for the last are numerous remains of conifer twigs/cones and shrubs evidenced by leafs of fir, pine and seeds of the spiny dwarf shrub *Astragalus* (Figure: 2). From Site PQ5, a communal burial in the Eastern Suburbia, wood identified by the iron patina of coffin nails was identified. The wood preserved in the burials was only from coniferous trees (pine or cedar/fir). This is also the most common type of wood found at the site and most probably was the most abundant and easiest accessible wood resource for the ancient inhabitants of Sagalassos. Usually this wood was identified as cf. *Pinus* or cf. *Cedrus/Abies*. To reach a definite identification further analysis with a higher magnification microscope is needed. As a conclusion, the archaeobotanical research from 2013 provided a variety of interesting information on the daily life and economy of the site. The finds from the excavations to the east of the 'Neon Library' are of special interest because of their exceptionally good preservation and the possibility



get information on the agricultural practices of the site through the discovery of barley that had been stored together with weeds that accompany the crop.

#### 4. Zoology

Beatrice DE CUPERE

Sofie THYS

The archaeozoological study focused on the faunal remains that were recovered in the excavation trenches of the Macellum, the 'Imperial Baths' and the site east of the 'Neon Library'. In addition, some material from the 'Eastern Suburbia' (former 'Potters' Quarter'), the 'Urban Mansion' and the Upper Agora was studied. The majority of the finds consists of consumption refuse among which the domestic species preponderate. Some special observations were made for the following assemblages. The excavations at the Macellum yielded also this excavation campaign a large amount of animal remains. Special attention was paid to the material of the dump, dated to the 6<sup>th</sup> century AD, found in Room 15. The faunal material of this locus consisted mainly of the remains of cattle, and to a much lesser extent of pig and sheep/goat. In the case of cattle, all skeletal elements are represented and show many butchery traces. The position and frequency of the butchery traces show that the persons involved with the cattle slaughtering and butchery within this area were professional butchers, perhaps operating in the Macellum proper. A similar butchery dump with cattle remains was found against the outer wall of the 'Imperial Baths'. The skeletal elements are however not all represented in the same quantities here: there are many fragments of mandible, rib and shoulder blades. From the skull only the *maxillae* are preserved and in the case of the *pelvis* only the *acetabula* (Figure: 3). Other skeletal elements of cattle are rare in this dump. This dump also dates to the 6<sup>th</sup> century AD. Another faunal assemblage, found in the northern part of the Frigidarium 1 of the 'Imperial Baths', from the late 5<sup>th</sup> century AD onwards functioning as a space for communal dining, consisted almost exclusively of sheep/goat bones, more specifically the bones of the hind limb. Similar dumps were already found during earlier excavations (2007 and 2008) along parts of the south façade of the 'Imperial Baths'. At least for the first half of the 6<sup>th</sup> century, this dump

can be related with the communal dining hall that, as just mentioned, was installed in Frigidarium 1 during Late Roman times and continued to be used as such until the mid-6<sup>th</sup> century AD only. The assemblage itself is dated to the 6<sup>th</sup>-7<sup>th</sup> century AD. It is known that after the early 7<sup>th</sup> century earthquake made parts of the vault of this huge space collapse, communal dining continued for some time elsewhere in the bathing complex. The faunal remains found at site PQ5 of the 'Eastern Suburbia' consisted of small fragments of sheep, goat and pig. In addition, there was also a variety of bird bones (including chicken, chukar, goose and duck) and fish bones. Egg shells were collected in the residue of the sieved samples. These remains can be considered as the left-overs from meals. The excavations at the complex to the east of the Neon Library yielded faunal assemblages dated to the 1<sup>st</sup> century AD, the date of the thus far earliest occupation of this area, which comprised large horn cores of male goats. Many of these showed saw traces, indicating that the horn of these specimens was collected and subsequently used for the manufacturing of objects.

### *5. Physical Anthropology*

Katrien VAN DE VIJVER

Bioanthropological study focused on detailed analysis of the remains excavated during the 2012 campaign in the Eastern Suburbia's sites PQ 4 and F, besides the remains of one individual excavated in 2013 in site PQ 5, where it was buried next to the church. Detailed study entailed estimation of age and sex, metrical and non-metrical analysis and palaeopathological lesions.

#### Site F

Of the twelve burials excavated in 2012 the oldest burial, an inhumation from the 4<sup>th</sup> to 3<sup>rd</sup> century BC, was analysed further. The remains were badly preserved, but age at death could be estimated between 25 and 35 years and sex was estimated as likely female. Surface wear and fragmentation hindered metric and non-metric analysis and observation of pathological lesions.

#### Site PQ 4

Nineteen burials were excavated, dated between the late 1<sup>st</sup> and 4<sup>th</sup> century

AD. Three were analysed in 2012, a further 13 in 2013. One tomb was found to contain the mixed remains of two individuals, another the remains of an adult female besides perinatal bones, resulting in 15 individuals. Preservation varied from relatively complete individuals with limited wear to badly preserved remains. Age at death estimation resulted in one perinatal individual, three children between 1 and 12 years old, three adolescents between 12 and 20 years old and eight adults of which the oldest was aged over 40 years old. Sex estimation for adults resulted in five female and three male individuals. Maximum estimated stature varied between 154.5 and 157 cm for females and 163.5 cm for one male. Pathological lesions (Figure: 4) were observed in adolescents and adults and related to degenerative joint disease, trauma, metabolic disease, minor skeletal anomalies and possible infection. Dentition showed caries, calculus, oral infection and ante mortem tooth loss.

#### Site PQ 5

One burial was excavated in this area during the 2013 campaign, dated to the first half of the 6th century AD. The individual was relatively complete, although the bone surface showed abrasion. Age at death was estimated over 40 years old and sex as male. Maximum estimated stature was 157 cm. Surface wear hindered pathological study.

#### Conclusion

Despite incomplete preservation and sometimes severe wear, estimation of age and sex, metric and palaeopathological analyses offer interesting data on composition of the population, health status and interpretation of burial customs.

### 6. Coinage studies

Fran STROOBANTS

Johan VAN HEESCH

During the 2013 campaign, a total of 303 coins were identified, of which 180 were found in 2012 and 123 in 2013. The numbers per site are given in Fig. 5.

All of the pieces are bronze coins. 22 of them are provincial coins, of which nine can be dated to Hellenistic/early Imperial times and 13 were minted

during the Roman period. The provincial coins from which the issuing city could be identified, were all minted within the region of Sagalassos (Sagalassos: 10 coins; Attaleia: 1 coin, Perge: 1 coin; Adada: 1 coin; Cremna: 1 coin; Selge: 1 coin). 166 pieces were identified as Roman imperial coins. As is generally the case at Sagalassos, the bulk of the coins date to the late Roman period (4<sup>th</sup>-5<sup>th</sup> century AD), which is represented by 162 pieces. Other imperial coins could be dated to the 1st-3rd century AD (1), 3<sup>rd</sup> century AD (2) and 3th-4th century AD (1). 12 of the coins belong to the Byzantine period, ranging from the reign of Anastasius (491-518 AD) to that of Maurice Tiberius (582-602 AD). The remaining 71 pieces could not be identified, due to bad conservation conditions. Moreover, one striking piece found at the Upper Agora during the 2013 campaign, could be attributed to the Ostrogothic king Baduila and was minted in Ticinum (Figure: 6). The remaining 102 coins could not be identified, due to bad conservation conditions.

The coins identified during the 2013 campaign fit well into the general framework of coin circulation in Sagalassos as established from previous coin finds. Until the second half of the 3rd century AD, mostly civic bronze coins issued in Sagalassos itself and its region were used for daily transactions. The bulk of the coins date to the late Roman period (4<sup>th</sup>-5<sup>th</sup> century AD), however, and consists mainly of small bronze denominations. Finally, the Byzantine coins date from the late 5th century until the beginning of the 7<sup>th</sup> century AD, which corresponds to the late occupation phase of the city.

#### *Acknowledgements*

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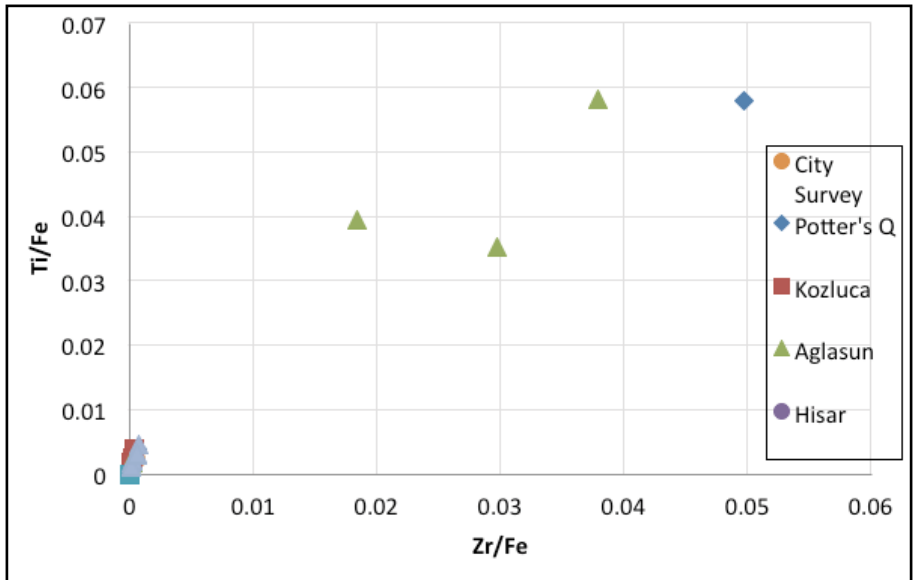


Figure 1: Chemical composition of slag according to origin.

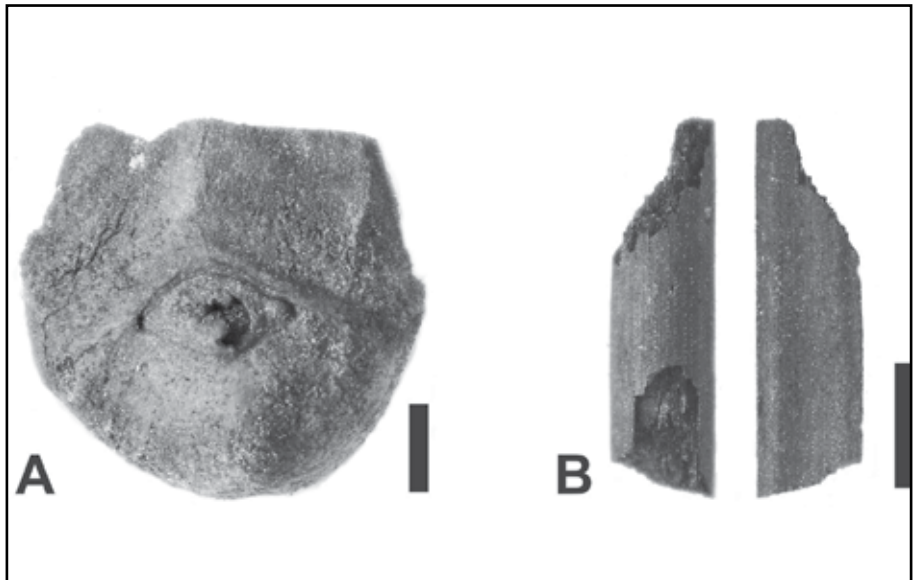


Figure 2: Fragments of pine cone scale (a) and pine needle (b) from the Macellum, locus 40.

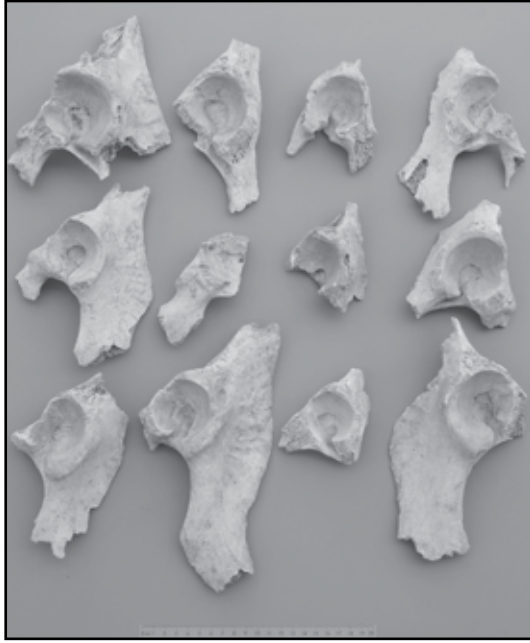


Figure 3: Chopped cattle acetabula from the butchery dump at the 'Imperial Baths'.

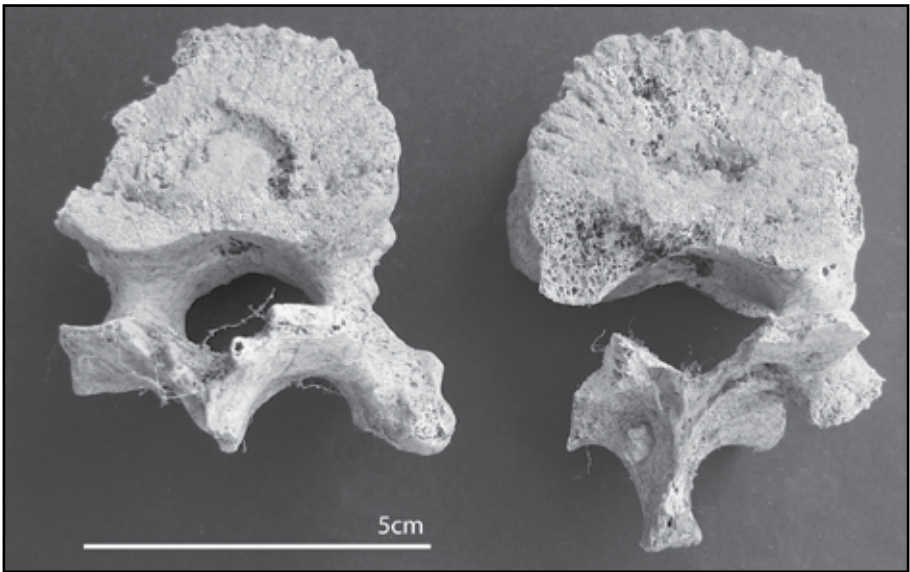


Figure 4: Tomb 19, the 11th and 12th thoracic vertebrae present Schmorl's nodules, intervertebral disc herniations resulting from trauma and stress.

Site	2012	2013
DAI	6	4
LE	52	16
MAC	110	33
PQ1	3	
PQ2	3	26
PQ5		13
RBI	2	5
UA		19
Y	4	7

Figure 5: Coins per site identified during the 2013 campaign.



Figure 6: Coin of the Ostrogothic king Baduila.