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Note on Human Skeletal Remains from the Hellenistic necropolis of Galitta del Capitano (Sarno, Salerno, Italy)

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Abstract. Several human remains, excavated in 1974 from the Hellenistic necropolis of Galitta del Capitano (Sarno, Salerno, Italy), are presented and described. The sample consists of three adults, one juvenile, and one newborn. The high fragmentation of these remains represents an interesting challenge for biological profile reconstruction, which is carried out by selecting different methods that can be applied to the best-preserved bones of each individual. This study aims to determine sex through femoral and clavicular measurements, age based on the auricular surface and long bone fusion patterns, stature using long bones as well as the calcaneus and talus, and body mass through femoral measurements. The results highlight the importance of using replicable methods when analysing fragmented human remains and this research also provides additional information about the Galitta del Capitano necropolis.

Keywords: biological profile, southern Italy, fragmentary bones, osteometric and morphological analysis.

Introduction

The Sarno Valley, in the Salerno province, is a region rich in archaeological discoveries, bearing witness to significant human occupation from the Neolithic to the Middle Ages (Longo, 2010).

Numerous archaeological excavations were carried out in the region in the 1970s, leading to the discovery of around 40 burials in the municipality of Sarno. These burials, dated between the second half of the 4th century and the early decades of the 3rd century BCE, belong to a necropolis known as Galitta del Capitano, sometimes referred to as Garitta del Capitano in earlier

publications (de Spagnolis Conticello, 1994). A funerary monument from the Roman period has also been reported on the site, dating from the 3rd-1st century BCE and the 1st-5th century CE (Russo Ermolli *et al*., 2024).

Today, the necropolis site is well known thanks to the discovery of funerary assemblage, as well as several tuff tombs depicting plants, scenes of daily life, and warfare representations. According to the history of the site and archaeological discoveries, these tombs would probably belong to the Samnite people (Longo, 2010) (Fig. 1).

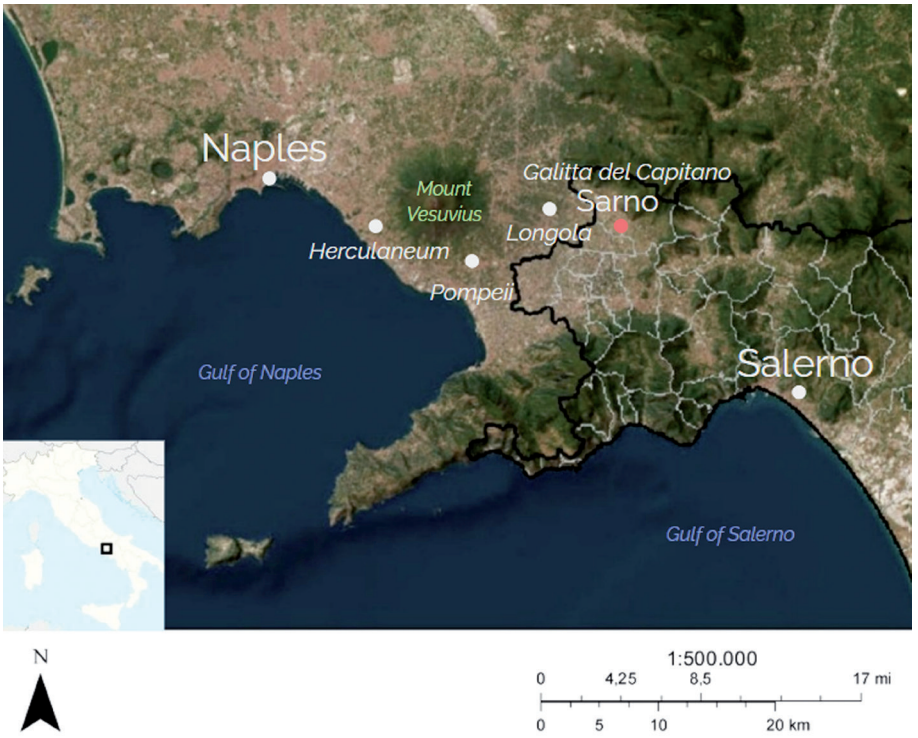

Fig. 1. *Geographical location of the municipality of Sarno and the Galitta del Capitano necropolis.*

Further excavations were conducted in 1974, uncovering several human remains, part of which were subsequently transferred for study at the Laboratories of Anthropology, Department of Biology, at the University of Florence. These remains were stored in the basement of the building and were never studied. Given the limited information available on local populations from this period, this article aims to describe and analyse the skeletal remains from the Galitta del Capitano site.

Material and methods

The human bone remains studied were stored in two wood boxes at room temperature. Each box had several bags containing the bones or bone fragments. Each bag was identified by a registration number consisting of «GC» followed by a unique number (e.g. GC 148), which was also written on the bones and fragments with a black marker (Fig. 2-3). Each wooden box contained several bags, and within each bag, all bones or fragments had the same registration number.

The general state of preservation of the bones was very poor, with deterioration in the form of desiccation cracks and breaks, particularly affecting all the long bones. Pathological alterations were identified macroscopically in one individual and are described in the Results section.

Only the best-preserved, non-pathological bones were used for anthropological analysis (Tab. 1). A first stage of cleaning and restoration of the human remains was carried out to identify the bone remains. Several references were used to compare and identify the human material, including the documented collections of the Laboratories of Anthropology, as well as osteological manuals (Brothwell, 1981; Scheuer and Black, 2004; White and Folkens, 2005).

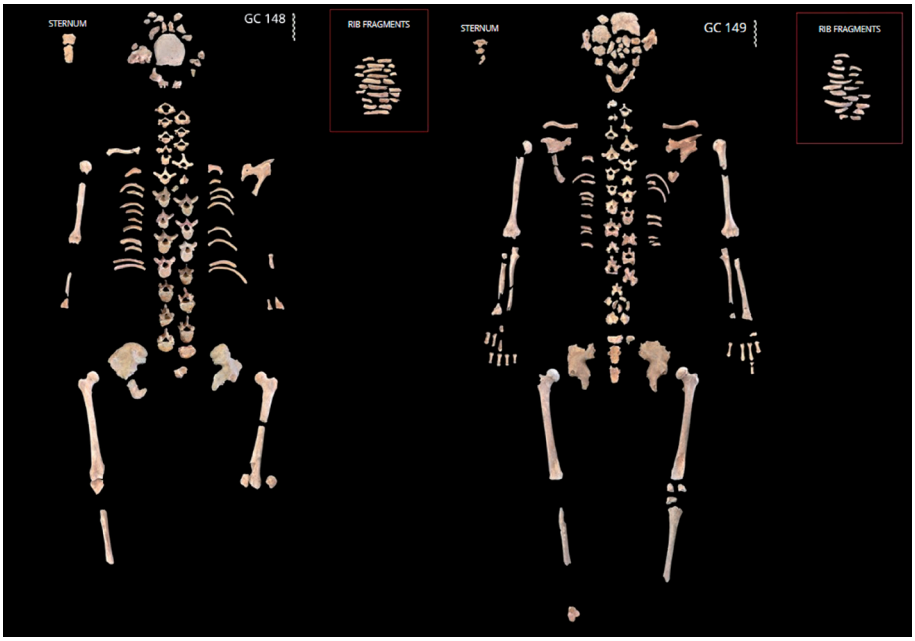

Fig. 2. *Anatomical reconstruction images of individuals GC 148 (adult) and GC 149 (adult). Scale = 10 cm.*

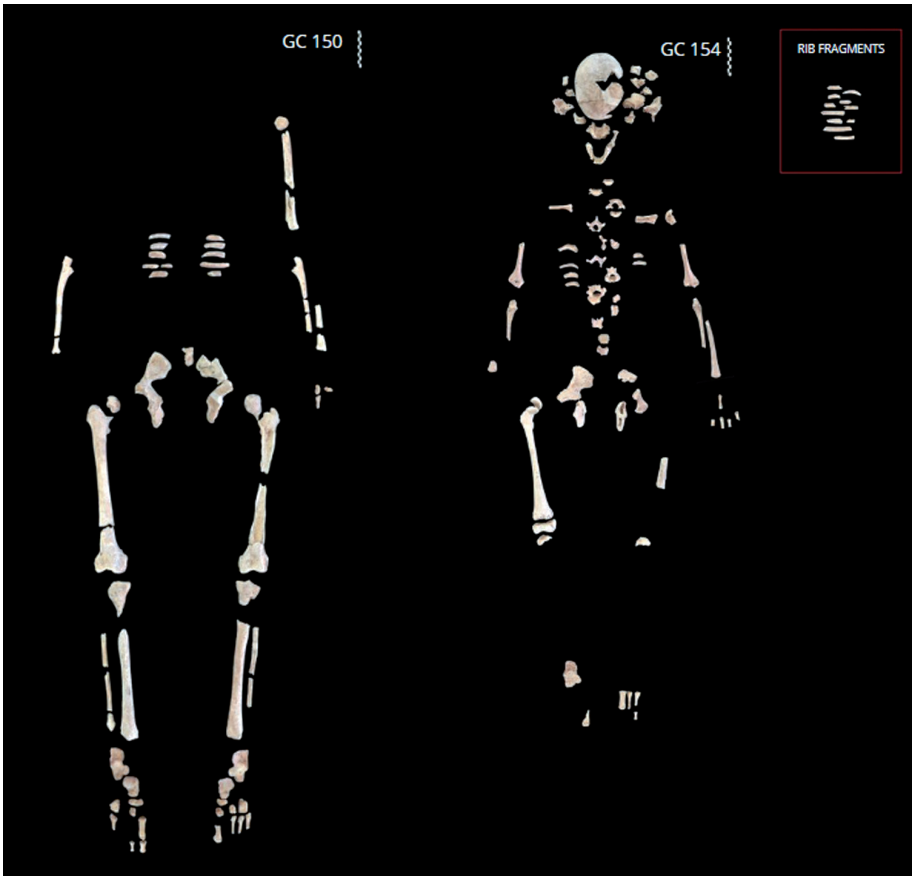

Fig. 3. *Anatomical reconstruction images of individuals GC 150 (adult) and GC 154 (juvenile). Scale = 10 cm.*

INDIVIDUALS	AGE ESTIMATION	BEST PRESERVED BONES USED FOR ANALYSIS
GC 148	Adult	Femurs
GC 149	Adult	Femurs, clavicles, pelvic girdle
GC 150	Adult	Right femur, calcanei, tali
GC 151	Newborn	Humeri
GC 154	Adolescent	Cranial features, teeth, right femur, humeri and pelvic girdle

Tab. 1. *Best preserved bones used for sex determination, age estimation, stature estimation and body mass estimation for each individual.*

To estimate the age at death, the appearance of the acetabulum (Calce, 2012) and the morphology of the auricular surface of the ilium (Lovejoy *et al*., 1985) were used for adult individuals. A method using the appearance and proportions of the humerus (Scheuer *et al*., 1980) was used for newborn individual. For the juvenile individual, the characters used to determine age were tooth eruption (Ubelaker, 1978; AlQahtani *et al*., 2010), the appearance of cranial sutures, the fusion of the proximal and distal parts of the long bones such as the femur and humeri (Flecker, 1932; Hansman, 1962; Bass, 1987), and the fusion of the pelvic girdle (Scheuer and Black, 2004).

The sex of adult individuals has mainly been determined using the methods based on measurements taken on the femur (Seidemann *et al*., 1998; Boonthai *et al*., 2025) and the clavicle (Atterton *et al*., 2016). Due to the high degree of fragmentation of the remains, it was not possible to apply the same approach to all individuals; therefore, different methods were employed depending on the best-preserved and available bones. We decided to use these different methods, originally devised for specific populations, to assess their reliability on our sample. Indeed, Seidemann *et al.* (1998) provide equations based on the femoral neck diameter, which were developed for populations of Caucasian and unknown ancestry; Boonthai *et al.* (2025) propose multiple equations based on different femoral measurements, which have been used for Thai populations; finally, Atterton *et al.* (2016) present equations that use the dimensions of the clavicle, which were originally adapted for medieval British populations. These approaches were also selected for their replicability because (1) they do not require complex equipment, but only basic measuring tools, and (2) the measurements are clearly defined in the publications. The methods were tested beforehand on two Italian identified collections for which the sex and age at death of each individual is known, housed in the Museum of Anthropology, University of Florence. These are the Syracuse collection, from which 19 femurs were analysed, and the Livorno collection, from which 35 femurs were studied (Moggi and Stanyon, 2014). Only the methods or parameters that achieved over 75% accuracy on the Italian identified collections were used for the anthropological analysis of our sample.

Stature was reconstructed for adults using long bones (Olivier *et al*., 1978), femur (Boonthai *et al*., 2025), clavicle (Trangadia and Gupta, 2020), calcaneus and talus (Holland, 1995). Body mass was estimated using the diameter of the femoral head (Ruff *et al*., 2012). The sex, stature, and body mass of juvenile individuals could not be determined due to the advanced degradation of the osteological material.

The minimum number of individuals (MNI) was determined using the principle of frequency, i.e. by counting bones of the same type and laterality.

In order to improve the determination of the MNI, the matching principle was also used, i.e. taking into account the size, shape, health and colour of the fragments in order to verify their correspondence to an individual (Ubelaker, 2001; Parmentier *et al.*, 2011). Based on these criteria, a total of five individuals were identified (GC 148, GC149, GC 150, GC 151 and GC 154).

Results

The calculation of the MNI indicated the presence of three adults (GC 148, GC 149, GC 150), one adolescent (GC 154) and one newborn (GC 151). Specimens GC 148, GC 149 are illustrated in Fig. 2; specimens GC 150 and GC 154 are illustrated in Fig. 3; GC 151 is not illustrated, given the high fragmentation of the remains.

The first adult is identified as a male (GC 148), based on the diameter of the femoral neck, femoral head and the median circumference measured from the right and left femur (Tab. 2). This sex attribution was used in all subsequent analysis (stature and body mass reconstruction). Age estimation based on the morphology of the articular surface of the acetabulum and on dental wear indicates an adult over 40 years of age. Stature reconstruction is approximately 1.63m based on the diameter of the femoral neck and head as well as the medial circumference of the femur (Tab. 5). Body mass turned out to be 58.4kg, using the femoral head diameter.

METHOD	MEASUREMENT	ANCESTRY	RESULTS
Seidemann *et al.*, 1998	Left femoral neck diameter	Unknown	M
Seidemann *et al.*, 1998	Left femoral neck diameter	Caucasian	M
Boonthai *et al.*, 2025	Left midshaft circumference	Northeastern Thai	M
Boonthai *et al.*, 2025	Right femoral head diameter	Northeastern Thai	M

Tab. 2. *Methods, measurements, and results for sex determination of individual GC 148.*

The study revealed the presence of a second individual identified as a male (GC 149), based on the diameter of the femoral neck and head and the median circumference measured from the right and left femur (Tab. 3). For this individual, the length and circumference of the clavicle also showed that the individual appears to be male. This sex attribution was also used in all subsequent analyses (stature and body mass reconstruction). Age estimation, based on the morphology of the acetabular articular surface and dental wear, suggests that this individual was likely over 60 years old. Additionally, individual GC 149 showed signs of severe osteoarthritis on his lumbar vertebrae, identified by the presence of pronounced osteophytes.

These alterations may be related to heavy physical activity and/or advanced age. The estimated stature would be around 1.67 m using the length of the clavicle (Tab. 5) and the estimated body mass would be 62 kg using the diameter of the femoral head.

METHOD	MEASUREMENT	ANCESTRY	RESULTS
Boonthai *et al.*, 2025	Left femur maximum head diameter	Northeastern Thai	M
Boonthai *et al.*, 2025	Left femur midshaft circumference	Northeastern Thai	M
Seidemann *et al.*, 1998	Left femoral neck diameter	Unknown	M
Seidemann *et al.*, 1998	Left femoral neck diameter	Caucasian	M
Boonthai *et al.*, 2025	Right femur maximum head diameter	Northeastern Thai	M
Boonthai *et al.*, 2025	Right femur midshaft circumference	Northeastern Thai	M
Seidemann *et al.*, 1998	Right femoral neck diameter	Unknown	M
Seidemann *et al.*, 1998	Right femoral neck diameter	Caucasian	M
Atterton *et al.*, 2016	Left maximum clavicular length + circumference	British medieval	M
Atterton *et al.*, 2016	Right maximum clavicular length + circumference	British medieval	M

Tab. 3. *Methods, measurements, and results for sex determination of individual GC 149.*

The last adult individual analysed in the study appears to be male (GC 150) based on the distal bicondylar width of the femur (Tab. 4). As the bone remains are highly fragmented, the possibility of determining the sex of the individual is even more limited. However, this sex attribution was also used for the subsequent analysis including stature and body mass reconstruction. Dental wear, marked muscle insertions on the femora and ulnae, and the absence of any recently fused epiphysis suggest that the individual was also over 40 years old. His stature, determined from the length and width of the calcaneus and talus, suggests that the individual would be around 1.72 m tall if it were a male (Tab. 5). Body mass is estimated at around 71.1 kg using the diameter of the femoral head.

METHOD	MEASUREMENT	ANCESTRY	RESULTS
Boonthai *et al.*, 2025	Left femur maximum head diameter	Northeastern Thai	M
Seidemann *et al.*, 1998	Left femoral neck diameter	Unknown	M
Seidemann *et al.*, 1998	Left femoral neck diameter	Caucasian	M

Tab. 4. *Methods, measurements, and results for sex determination of individual GC 150.*

INDIVIDUALS	METHOD	MEASUREMENT USED	RIGHT-SIDE BONE RESULTS (IN CM)	LEFT-SIDE BONE RESULTS (IN CM)	STANDARD ERROR
GC 148	Boonthai *et al.*, 2025	Femur shaft length	161,50	/	5,89
		Femoral head diameter	163,89	/	6,30
		Femoral midshaft circumference	165,94	/	6,15
GC 149	Trangadia and Gupta, 2020	Maximum clavicular length	165,09	168,29	Right: 5,80 Left: 5,79
GC 150	Holland, 1995	Posterior length of the calcaneus	172,82	171,93	5,44
		Maximum length of the talus	172,99	174,45	6,07
		Posterior length of the calcaneus + Maximum length of the talus	172,55	172,51	5,33

Tab. 5. *Summary of the methods, measurements and results (in cm) obtained for stature estimation of GC 148, GC 149 and GC 150.*

Analyses of the adolescent (GC 154) and the neonate (GC 151) are more limited due to the high degree of bone fragmentation; nevertheless, it is possible to estimate the age of these individuals. GC 154 is thought to be between 12 and 14 years old, based on the general state of the teeth, the cranial sutures and the apparent fusion lines. The left third molar is in the early stages of eruption but has no visible roots, the femur has a greater trochanter in formation and the distal and proximal parts are formed but not fused. The distal parts of the humeri are not fully formed and the humeral head is not fused. The three different parts of the pelvic girdle are not yet fused.

Regarding the newborn individual, the length and aspect of the humerus were used. However, two measurements were calculated in this case: a minimum measurement and an estimated measurement following the degradation of the proximal part of the humerus. Based on these measurements, the newborn individual would be at least 36.55 weeks old.

Discussion and Conclusion

The anthropological analysis of the five individuals from Galitta del Capitano provides new information for the excavations carried out in 1974. When the remains were identified and the NMI determined, a fragment originally identified as belonging to individual GC 148 turned out to be the missing part of a fragment from individual GC 150. The other bones did belong to two separate individuals. It's therefore possible that these two individuals were found in close burials, belonging to the same stratigraphic layer, or that individual GC 150 was found above individual GC 148. The poor state of preservation of the material and the lack of documentation do not allow us to

propose any in-depth hypotheses about the relative position of the skeletons in the archaeological site. The different coloration of the bones belonging to the different individuals could also be the sign of distinct burials, but the absence of additional taphonomic elements does not allow us to provide any further information.

Reconstruction of the biological profiles remains limited, but we can put forward some hypotheses as to the identity of the individuals. The adults appear to be two men aged over 40 and one over 60 years. The health status of these adults seems to suggest regular physical activity. The adolescent was aged between 12 and 14 years and the newborn aged over 36.55 weeks, but no further estimation inferences could be made.

From a methodological point of view, it is interesting to note that the methods employed in this article returned results consistent among them and as such they appear to be applicable to a number of different populations; also, they appear quite useful in the analysis of fragmented bone remains.

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