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Short fieldwork report

Human remains from Amaziya/Duweimeh, Israel, 2012

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A rock-hewn burial cave, and adjacent 11 large cist graves, were found during salvage excavation in the Israeli northern Negev desert, adjacent to the remains of an early Jewish (Hellenistic–Roman period; 2nd century B.C. – 2nd century C.E.), and late Arab (Ottoman period; 17th–20th century) villages (Varga 2014; **Figure 1**). However, a large number of bracelets and beads, associated with the bones, decisively connect the burials to the Ottoman period Arab village. Probably being established in the 17th century, this village is mentioned in a 19th century document entitled *Duweimeh*. At its peak the site was occupied by a population of about 4000 inhabitants, and was ultimately abandoned in 1948 as a consequence of the Israeli War of Independence (Israel, forthcoming).

Most of the cyst graves were damaged by modern construction activity, and the bones in the cave were scattered, impeding our ability to distinguish between individual skeletons. Nevertheless, the bones were collected and sorted by type on-site, and meaningful anthropological parameters were reconstructed. Selection of the skeletal remains most indicative for the reconstruction of MNI, sex, and age at death, was made to allow for efficient rapid on-site data collection in a very limited time-frame. The methodologies used for the anthropological analysis are described in a previous publication (Nagar 2012). For the estimation of age, these included mainly tooth eruption and attrition stages (Hillson 1986), and length measurements of subadult long bones (Bass 1987: 149, 217). For the estimation of sex, these included mainly measurements of the femoral head (vertical diameter) and the distal humerus (epicondylar width; Bass 1987: 82, 151, 219), and description of skull morphology by means of selected measurements, whenever available (Nagar 2012). Epigenetic traits were also recorded according to a standard list (Nagar 2012), following Hauser and De Stefano (1989). The raw data are detailed in the archival report (Amaziya 6571; Israel Antiquities Authority, in Hebrew), while a summary of the results and preliminary discussion are the aim of the present paper. Most of the bones were reburied on-site after their examination, while well preserved skulls and a small sample of postcranial

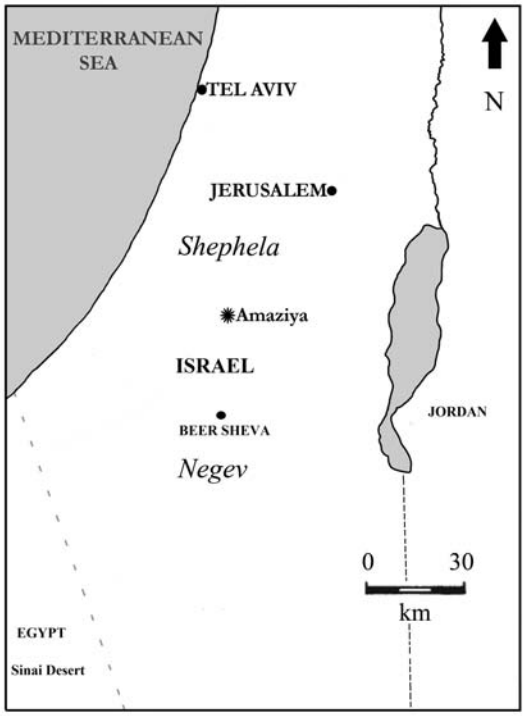

Figure 1. Location of the site.

remains were preserved at the Department of Anatomy and Anthropology, Tel Aviv University for further analysis.

Eleven stone-lined cyst graves covered by flat stone slabs and arranged in a general east-west orientation were found at the site (**Figure 2**). The graves were relatively large (2.1×1.2m on average) and deep (80cm), and used for multiple burials. Three of them (T.3, 5, and 9) were damaged and the bones were not excavated. In the remaining graves, partial anatomical articulation was noticed for skeletal remains found at the bottom, while the upper level bones were scattered. The articulated bones indicated primary burial with the head oriented to the west. In one case where a complete skeleton was unearthed (Tomb 2; **Figure 3**), it was buried on its right side, with the head oriented west, facing south.

The cave was naturally formed, 2.3×3.2m long and 1.2m deep (**Figure 4**). Partially articulated bones of six individuals at the cave's bottom indicate the presence of at least six primary burials, being oriented along an east-west axis, with the head to the west. The remainder of the skeletal remains, including cranial and postcranial bones, were found scattered.

Figure 2. Amaziya: A typical cyst grave.

Figure 3. Articulated skeleton at the bottom of Tomb 2.

Figure 4. Skeletal remains at the bottom of the burial cave.

Skeletal remains from Amaziya represent at least 186 individuals. For the cyst graves, apart from grave T.6, where bones were only partially collected, the MNI varied between 6–32 individuals in a grave, representing infants, children, and adults.

Table 1. Age at death distribution in various locations.

Grave	Age at death (years)									
	<1	1-4	5-9	10-14	15-19	20-29	30-39	40-49	50+	Adults
T1	6	13	4	2	1	2	1		1	2[1]
T2	6	9	3							3
T4	6	15							1	1
T6	2	1								
T7	1	2		1						2[2]
T8	3	3		1		1			1	3[3]
T10	4	6			1	3	1	1		6[4]
T11	1	13	4	3	1	1				3[5]
Cysts (total)	29	62	11	7	3	7	2	1	3	20
Cave	1	2	1	1	6	17	2	7		4

[1] A minimum age of 30, 40 years. [2] A minimum age of 30, 40 years.
[3] A minimum age of 30, 30, 40 years. [4] A minimum age of 15, 20, 20, 30, 30, 30 years.
[5] A minimum age of 20, 40, 40 years.

The sample of sexed adults was relatively small, however, males and females were almost equally represented (12 vs. 11, respectively). In the cave, women slightly outnumbered males (16 vs. 11). The age at death distribution of the dead in each grave and in the burial cave is summarized in **Table 1**.

Discrete (epigenetic) traits being an important morphological characteristic of a population, were recorded from complete and fragmentary bones alike, while bilateral traits were counted as the number of sides, rather than the number of specimens (see Hauser and De Stefano 1989). The results are presented in **Table 2**.

Table 2. Discrete (epigenetic) traits of the Amaziya population.

Trait	Sample size	Trait expression	Frequency
Cranium			
Metopic suture	32	2	6%
Supraorbital foramen	44	8	18%
Accessory infraorbital foramen	24	1	4%
Supratrochlear notch	37	6	16%
Parietal foramen	26	16	62%
Frontotemporal articulation	32	1	3%
Ossicle at lambda	31	1	3%
Inca bone	33	1	3%
Condylar canal	28	15	54%
Foramen of Huschke	47	6	13%
Maxilla and mandible			
Mylohyoid bridge	75	8	11%
Mandibular torus	20	0	0%
Mandible, agenesis of 3rd molar	38	3	8%
Maxilla, agenesis of 3rd molar	7	3	43%
Postcranial elements			
Atlas, posterior bridge	15	3	20%
Atlas, lateral bridge	15	0	0%
Atlas, spina bifida occulta	8	0	0%
Atlas, incomplete transverse foramen	15	0	0%
Axis, incomplete transverse foramen	11	0	0%
Humerus, septal aperture	110	44	40%
Suprascapular foramen	4	1	25%
Tibia, squatting facet	8	6	75%
Sacrum, spina bifida	31	0	0%

Field research also included visual study of the presence of common pathologies such as trauma and periostitis. To avoid statistical bias, data was taken from complete bones only. The results of the palaeopathologies observed from the adult sample are

summarized in **Table 3**. No pathologies were noticed in the much smaller sample of children's long bones (which epiphyses were not fused), which included only 6 bones from each type. The presence of porosity in the orbital roof (*cribra orbitalia*) and in the vault (porotic hyperostosis) in the available skulls was also recorded. *Cribra orbitalia* were observed in 3 out of 50 adult orbits (6%), while no cases of porotic hyperostosis were observed on the adult cranial vaults. However, studying children's orbits, *cribra orbitalia* were noticed in 5 out of 10 cases (50%), and 1 out of 6 vaults manifested porotic hyperostosis as well.

Table 3. Frequency of common pathologies in the long bones (adults only).

Bone	Fractures	Periostitis
Humerus	1/70	0/67
Ulna	0/13	0/13
Radius	2/12	1/12
Femur	0/48	1/48
Tibia	0/10	2/8
Fibula	0/19	0/19
Clavicle	0/12	0/12

The east-west orientation of individuals interred in the graves, with the head to the west facing south, is typical of Muslim populations, suggesting such an attribution for the individuals examined in this study (Gorzalczani 2007). Combining primary burial with later secondary burial in the same grave is also typical of Muslim burials, repeatedly using the same graves (Nagar, forthcoming a, b).

The skeletal sample included infants, children, and adults of a wide age range. Both sexes were represented, while females slightly outnumbered males. Such demographic distribution is characteristic of a civilian cemetery population. However, it is clear that the graves were initially used for only one or two individuals, then at a later date additional bones were deposited above the initial burials. Since another cemetery was used by the nearby village until the early 20th century, it is possible that the skeletal remains deposited after the initial burial(s) found in Amaziya represent the clearance of old burials from the newly-used cemetery region, to make room for new burials. The exhumed bones were secondarily buried in the large cyst graves and cave at the older cemetery, which was the subject of the present excavation discussed here. Such a phenomenon was also observed from the Ottoman period Muslim cemeteries at Jaffa and Jerusalem (Nagar, forthcoming a, b).

While the ages of most skeletons were satisfactorily estimated to a relatively narrow age cohort, combining the number of individuals in an age group from both the cyst tombs and the cave still leaves us with at least 24 individuals of uncertain age. Yet, estimating a minimum age (i.e. 30+, 40+ years) for these individuals was possible,

as can be seen in the footnotes of **Table 1**. This group of adults was distributed in the conclusive table in the relevant cohorts proportionately (Jordana et al. 2010). First, the 40+ individuals were added to the 40–50 and 50+ groups according to their relative size, then the 30+ individuals were added to the 30–40, and the already revised 40–50 and 50+ groups, and so forth in a decreasing order (see also Nagar 2013 for detailed description of this practice). The final data were used to create a mortality graph (**Figure 5**), using the basic life-table methodology (Ubelaker 1974). The shape of the graph is that typical of a regular historic cemetery population. An excess of infants and children, and the fact that the highest age group used was 50+ years only, reduced the life expectancy at birth to a minimum of 17 years, which is probably incorrect. However, these data are consistent with the previously discussed burial practice.

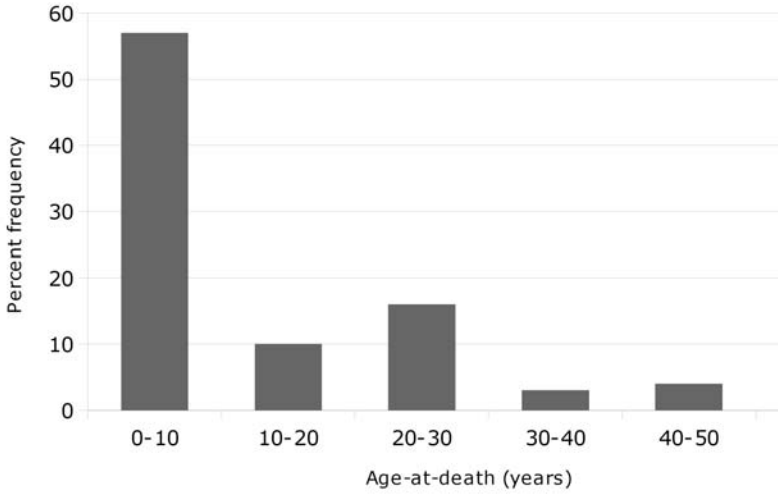

Figure 5. Age at death distribution of the Amaziya skeletal population.

As the more recent cemetery was extensively used in the modern era, older burials from it were relocated to the presently studied cemetery, to allow for re-use of this territory. In this process, it is obvious that skeletal remains from simple pit graves are more prone to be transferred, while the bones of the more distinguished individuals (older adults, most of them males), usually buried in prominent mausolea (traditionally termed 'Sheikh-Tombs'), were left untouched, creating a demographic bias in our sample.

Located at the edge of the Negev desert, the Amaziya skeletal sample represents a sedentary village population, in contrast to the smaller, nomadic Bedouin tribal societies, which abound south of it. The frequencies of epigenetic traits seem to re-

flect this very situation. The data presented in **Table 2** generally correspond to data retrieved from the large Byzantine period settlements in the northern Negev (The 'Negev Towns'; Nagar 1999: 80), which had approximately the same number of inhabitants as did the current village of Duweimeh (Tsafrir 1996). **Table 4** shows a comparison between the data retrieved from Amaziya/Duweimeh, the Byzantine 'Negev Towns', and a reference representing the mean frequencies of Israeli historical populations (frequencies were calculated using the IAA databank), by means of chi-square tests. Only traits of large enough sample size and the necessary minimum frequency were considered, while bilateral traits were counted separately for each side (Hauser and De Stefano 1989). Although no multivariate analysis was yet made, the preliminary results obtained showed no exceptional frequency at Amaziya in each of eight traits which were separately compared (**Table 4**), attesting to the heterogeneity of this population. The only exception is the relatively high frequency of the septal aperture in the humerus. However, since this trait was proven sex-dependant (Mays 2008), appearing more frequently in females, this result goes in accordance with the demographic results, suggesting excess of women in the Amaziya skeletal population. A different situation, in which traits are expressed in different frequencies, was postulated by Kobyliansky et al. (1987) to characterize the traditional nomadic Bedouin groups, usually representing an extended family.

Table 4. Comparison of epigenetic traits by means of χ^2 test.

Trait	Expression / Sample size			χ^2	p-value
	Amaziya	Negev Towns	Reference		
Metopic suture	2/32	5/82	12/205	0.008	0.996
Supraorbital foramen	8/44	42/131	32/125	2.550	0.279
Parietal foramen	16/26	47/61	6/8	0.616	0.735
Condylar canal	15/28	54/92	4/15	2.430	0.297
Foramen of Huschke	6/47	14/130	22/219	0.265	0.876
Atlas, posterior bridge	3/15	9/128	5/49	2.670	0.262
Mylohyoid bridge	8/75	11/125	32/261	0.911	0.634
Mandible, M^3 agenesis	3/38	6/63	66/370	4.031	0.133
Humerus, septal aperture	44/110	28/136	112/476	11.500	0.004

The common pathologies such as fractures and periostitis are expressed in a relatively low frequency in the small available sample. Yet, this also resembles the situation described in the large Byzantine period settlements in the northern Negev, where it was interpreted as reflecting a low frailty of the population (Nagar 1999: 91-97). In the harsh desert conditions, trauma and infectious diseases would lead to death, rather than recovery (Nagar 1999: 100), hence are hard to be observed in the skeletal record, using visual inspection solely.

Skeletal remains from many large Ottoman period cemeteries throughout Israel were found and carefully examined in the last decade. The data recorded in the present study was also incorporated into the relevant databanks, to be used in future studies. Being additive and comparable in nature, it can enrich our understanding of the biological history of the populations in this area in this interesting historical era.

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