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Short Fieldwork Reports

Tell Umm el-Marra (Syria), seasons 2000–2006

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Located between the modern city of Aleppo and the Euphrates River (**Figure 1**), Tell Umm el-Marra (36°8'2.86"N, 37°41'35.12"E) is the largest Bronze Age site (approximately 25 hectares) in the Jabbul plain and may be the site of ancient Tuba (Curvers et al. 1997; Schwartz et al. 2000; Schwartz 2007). The Umm el-Marra expedition began in 1994 under the co-direction of Drs. Hans Curvers of the University of Amsterdam and Glenn Schwartz of the Johns Hopkins University. Conceived as a long-term research project, the expedition has a primary goal of exploring the development of complex societies in western Syria during the Bronze Age (ca. 3000–1200 BC).

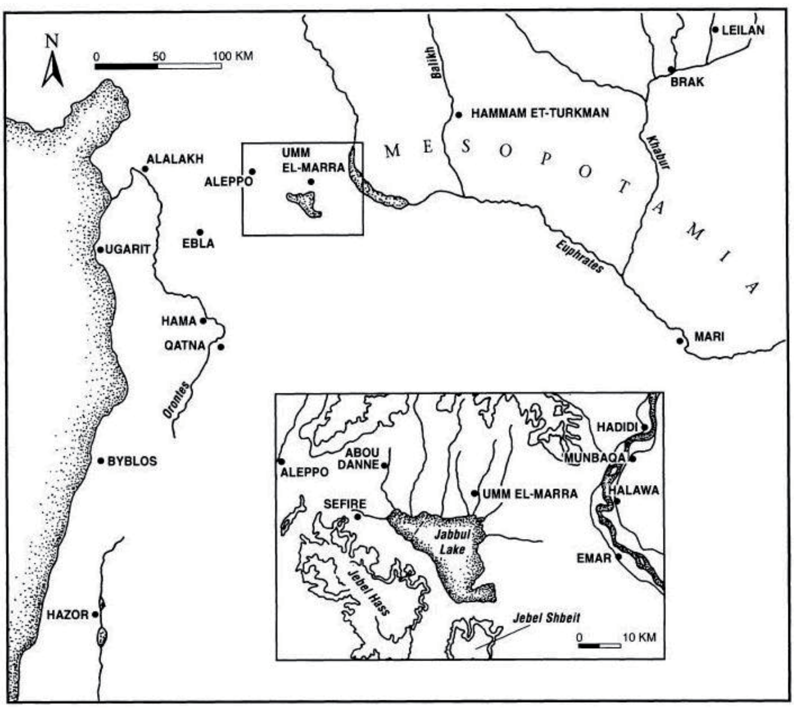

Figure 1. Jabbul plain region in northwest Syria (after Schwartz 2000:420, Fig. 1, permission from author).

Broad horizontal excavations during the early phases of the project in 1994 and 1995 yielded evidence of use during the Bronze Age (EB IVA–LB), as well as Hellenistic and Roman periods. The second phase of the project in 1996 and 1997 provided more evidence of Early Bronze occupation and the EB–MB transition, including a focus on the archaeobotanical and faunal data (Schwartz et al. 2000). In 2000, excavations uncovered a high-status tomb (Tomb 1) in the site's Acropolis Center, and subsequent work in 2002 and 2004 showed that this feature was part of a larger tomb complex with associated installations (**Figure 2**). Installation B, originally designated Tomb 2, was later found not to have been used primarily for human burial. A jar containing infant skeletal remains was discovered outside of Tomb 1 and is now considered to be part of Installation C. The tombs and installations appear to have been built successively over at least three centuries, from ca. 2500–2200 BC (Schwartz et al. 2003, 2006). In 2006, excavations uncovered a new tomb (Tomb 8) tentatively dated to ca. 2500 BC (Schwartz, personal communication). All skeletal remains are curated on site, except skeletal and dental samples with the author at the University of Arkansas.

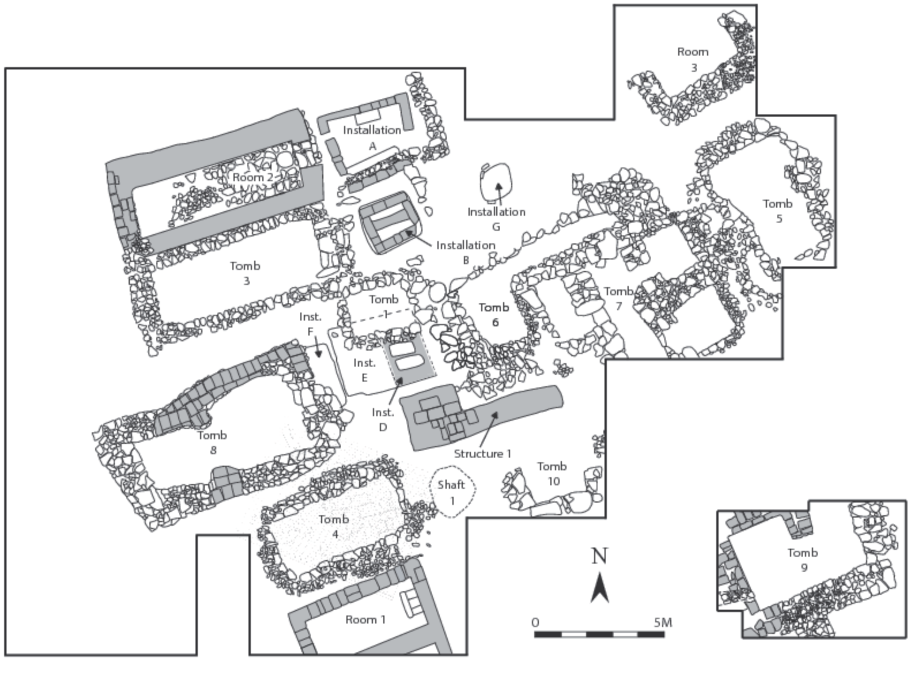

Figure 2. Acropolis Center excavations as of 2011, Umm el-Marra (image courtesy of G. Schwartz).

Barbara Stuart provided initial field descriptions of the human remains, and other preliminary assessments were made by Bruno Frohlich and Judith Littleton of the Smithsonian Institution (Schwartz 2007). The author joined the Umm el-Marra project as bioarchaeologist for the 2006 field season. The goal was to re-analyze all human remains recovered from the tomb complex in order to investigate a number of topics, including demography, diet, health and paleopathology, possible familial relationships, and lifestyle reconstruction. All data were collected by the author according to protocols outlined in *Standards for Data Collection from*

Human Skeletal Remains (Buikstra & Ubelaker 1994). The following report includes a summary of those observations and some results of recent analyses of the data.

Preservation and demography. Generally, preservation of the sample is fair, although there is differential preservation between and within tombs. Remains from Tombs 1 and 4 exhibit the best overall preservation. Individuals with poor preservation were generally incomplete, highly fragmentary, or the bones had undergone significant taphonomic degradation. For each tomb, the minimum number of individuals (MNI) was determined by considering repeated skeletal elements and matching commingled remains based upon diagnostic indicators for age and sex, as well as general appearance. In some instances, especially if the remains were highly fragmentary, a large portion of the remains could not be assigned to any particular individual (e.g., Tombs 3 and 7). So far, the human remains recovered from the tomb complex represent an MNI of 35 individuals (see **Table 1**). Several individuals recovered in 2006 are not part of the EB tomb complex nor reported here. These include two individuals uncovered while excavating the Northwest Gate area, as well as a few individuals and bone fragments found in some of the Acropolis Center's upper levels (see Schwartz et al. in press).

The demographic profile of the sample resembles those reported for many other archaeological series—young and middle-aged adults make up the largest proportion of the adult sample, and old adults are represented less frequently. Adults (over 20 years-old) and juveniles (under 20 years-old) represent 54.3% (19/35) and 45.7% (16/35), respectively. Young adults (20-35 years) and middle adults (35-50 years) are equally represented, each comprising 20.0% of the total sample. Only one individual is aged over 50 years. Four individuals are assigned to the adult age group with no further specification due to poor preservation. Young children (0-5 years) represent 31.4% of the sample. Of this group, 10/11 are infants between 0 and 1 year-old. This is expected, considering the typical human pattern of mortality in which the risk of death is highest during the first year of life (Wood et al. 2002). The unusually high proportion of infants may result from their frequent recovery from ceramic vessels located in the installations. These installations, which also contained skeletal remains of animals, especially equids, were an important component of the mortuary program at Umm el-Marra.

Generally, sex assessment was reserved for individuals over 18 years of age. However, sex was estimated for two juveniles (Individuals 1.5 and 3.4) included in these results. With probable males and probable females included, the sex ratio is 1:1. Due to poor preservation in Tomb 7, the three adult individuals there are undetermined for sex.

Paleopathology, stress, and trauma. Due to differential preservation, paleopathological data are not reported for nearly one-third of the sample. Also, because of time constraints, paleopathology was not recorded for the individuals from Tomb 8. Of those observed, 13/21 individuals exhibit some type of pathological lesion.

The most common pathology is periostitis, which is commonly found in archaeological cemetery samples (Ortner 2003). Periostitis occurs in 6/21 of the observable sample and more frequently on the lower limbs, although the upper limbs are also affected. Both active and healed lesions were observed. Porotic hyperostosis, another lesion commonly reported in archaeological skeletal samples, is uncommon in the Umm el-Marra sample. Porotic hyperostosis is often considered a result of anemia, although its etiology is likely more complicated (Walker et al. 2009). No cases of porotic hyperostosis on the cranial vault occur; however, cribra orbitalia—porosities on the orbital roof—occur in 2/21 individuals (a young adult and juvenile, see **Figure 3**).

Table 1. Summary of the Umm el-Marra skeletal sample.[a,b]

Tomb (Date)	Individual	Preserv.	Age	Sex
5 (ca. 2600–2500 BC)	5.1	Poor	middle adult	M
	5.2	Poor	infant (1-2 months)	?
6 (ca. 2600–2500 BC)	6.1	Fair	middle adult	M
8 (ca. 2500 BC)	8.1	Fair	middle adult	M
	8.2	Fair	young adult	M
	8.3	Poor	infant (0-1 month)	?
3 (ca. 2450 BC)	3.1	Poor	young adult	M?
	3.2	Poor	middle adult	F?
	3.3	Poor	middle adult	F
	3.4	Poor	adolescent	F?
4 (ca. 2350)[c]	4.1 (A)	Good	infant (2-3 years)	?
	4.2 (B)	Fair	old adult	F
	4.3 (C)	Good	young adult	M
	4.4 (D)	Excellent	young adult	M
	4.5 (E)	Fair	young adult	F?
	4.6 (F)	Good	middle adult	F
1 (ca. 2300 BC)[c]	1.1 (A)	Poor	young adult	F
	1.2 (infant with A)	Good	infant (1-2 months)	?
	1.3 (B)	Fair	young adult	M
	1.4 (C)	Good	young adult	M
	1.5 (D)	Poor	adolescent	F
	1.6 (infant with D)	Good	infant (1-3 months)	?
	1.7 (E)	Poor	middle adult	F?
	1.8 (NE corner infant)	Good	infant (3-5 months)	?
7 (ca. 2200 BC)	7.1	Poor	adolescent	?
	7.2	Poor	adult	?
	7.3	Poor	adult	?
	7.4	Poor	adult	?
Installation A	A.1	Poor	infant (1-2 months)	?
Installation B[d]	B.1	Good	foetus/infant	?
	B.2	Poor	infant (0-1 month)	?
	B.3	Poor	infant (1-2 months)	?
Installation C	C.1	Poor	infant	?
	C.2	Poor	infant	?
	C.3	Poor	infant	?

[a] Sex codes: M = male, F = female, M? = probable male, F? = probable female, ? = undetermined.

[b] Tombs listed chronologically; installations likely date to the EB IVA period.

[c] Individuals from Tombs 1 and 4 have been previously designated with letters (see Schwartz et al. 2003; Schwartz et al. 2006).

[d] Individual B.2 may more likely represent two separate individuals, as some of its skeletal elements were recovered from just outside of the installation, as was Individual B.3 (pers. communication with G. Schwartz).

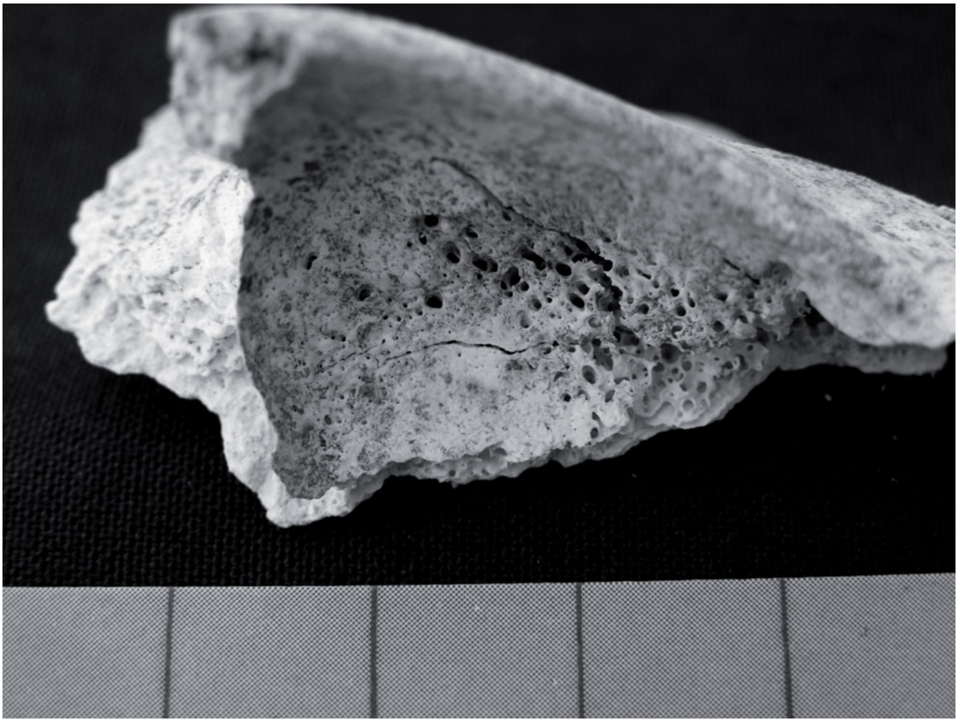

Figure 3. Cribra orbitalia (Individual 1.3).

Generally, individuals at Umm el-Marra exhibit good dental health with low-to-moderate attrition and few carious lesions (3/16 individuals). Although observed, alveolar abscesses and antemortem tooth loss are rare. The level of dental attrition is similar to that associated with a mixed-subsistence economy (pastoralism and agriculture) in Bronze Age skeletal series from the Arabian Gulf (Littleton & Frohlich 1993). Individual 1.7 exhibits excessively high attrition; although a middle-adult, the observed attrition seems inconsistent with overall pattern from the sample. Individual 1.7 has a pathological condition that may be responsible for compromising the quality of the dental enamel. Individual 4.2, an old adult, exhibits extremely high attrition on the right teeth, possibly the result of preferential use of the right side due to poor dental health on the left side, as evidenced by antemortem tooth loss and large calculus deposits.

Enamel hypoplasias were only recorded for individuals with available permanent teeth; thus, observations were limited to less than half (n=16) of the sample. Considering all teeth, 12/16 individuals exhibit at least one hypoplasia; 8/16 individuals have two or more. Based upon dental hypoplasia location (Goodman & Rose 1990), it seems the highest proportion of growth disruptions occur between about 3 and 4 years of age.

Skeletal fractures are uncommon in this sample. Only two individuals exhibit evidence of traumatic injury. Individual 1.5 exhibits a mandibular fracture that was most likely a secondary consequence of some other, primary pathological condition that resulted in severe osteoporosis. Individual 4.4 exhibits a healed fracture on a metacarpal, and healed fractures on a number of ribs (**Figure 4**). There is evidence that one of the individuals from Tomb 8 has a depression fracture on the cranial vault, but time constraints did not allow for further analysis.

Figure 4. Healed fracture on rib (Individual 4.4).

Two individuals, 1.5 and 1.7 (skeleton D and skeleton E, respectively, in previous publications), exhibit a similar pathological symptom: severe osteoporosis throughout the skeleton. Individual 1.5, an adolescent female, was recovered from the uppermost layer of the tomb. Individual 1.7, a middle-adult probable female, was recovered in the lowest layer of Tomb 1. A specific diagnosis may not be possible for either of these cases, but osteoporosis (especially for an adolescent) may be associated with Cushing's syndrome or type 1 osteogenesis imperfecta. If preserved, ancient DNA may shed light on possible relatedness of these individuals, which would support the hypothesis that these two individuals shared same genetic disorder.

Dietary reconstruction. In order to investigate diet, carbon and nitrogen stable isotope ratios were analyzed. Samples of bone and teeth from 14 individuals were retained for the analysis of stable isotopes. $\delta^{13}C$ values are available from bone apatite and bone and dental collagen. $\delta^{15}N$ values are available from bone and dental collagen. Bone samples were taken from the femoral midshaft, and permanent second premolars or molars with intact crowns were selected. The results below represent isotopic ratios from collagen.

Except for three outliers, carbon and nitrogen values obtained from collagen cluster together (**Figure 5**). One of the outliers, Individual 1.1, exhibits a $\delta^{13}C$ value of -21.1‰. Bone collagen samples from Individuals 4.3 and 4.6 have very low $\delta^{15}N$ values (-1.1‰ and -2.6‰, respectively). These negative values drastically affect the mean and standard deviation for nitrogen values, particularly those from bone samples. It is interesting to note that these two individuals also happen to be secondary burials within Tomb 4, although the significance of this association is difficult to determine at this point. Generally, though, individual and mean isotope values are similar to those reported for apatite (Al-Shorman 2004) and collagen (King 2001) for Bronze Age, Iron Age, and Byzantine sites in northern Jordan.

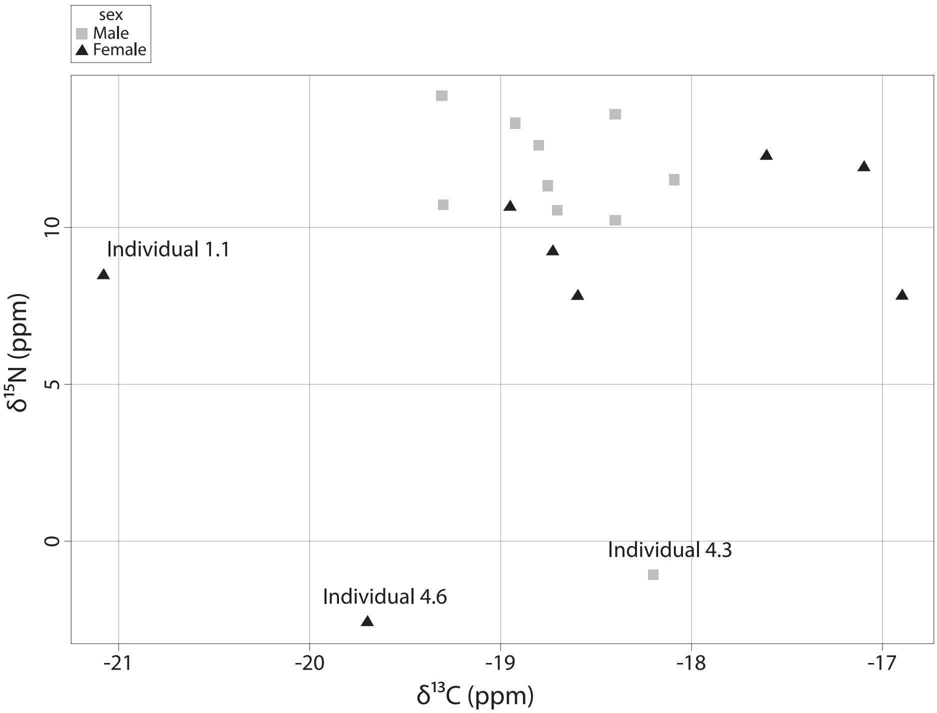

Figure 5. δ^{13}C and δ^{15}N values for bone and dental collagen samples.

The δ^{13}C values from human bone collagen are relatively consistent, ranging from -12.9‰ to -21.1‰ (mean = -17.0‰). The mean δ^{15}N value for the sample (excluding the outliers) is 11.1‰. No significant differences exist between groups, although the difference in the mean δ^{15}N value between males and females approaches significance ($p<0.07$). Based on the carbon and nitrogen ratios of plants and animals likely used for subsistence in the ancient Near East (King 2001) and the enrichment factors of carbon and nitrogen (DeNiro 1985), it seems likely that the diet of these individuals consisted largely of cereal grains and ovicaprids. These results support archaeo-botanical and faunal data, which suggests that subsistence at Umm el-Marra was largely based consumption of two-row barley/bread wheat and goats/sheep (Schwartz et al. 2000).

Activity patterns. Together with osteoarthritis (OA), anthropologists have used musculoskeletal stress markers (MSMs) as indicators of activity patterns and skeletal responses to the mechanical environment, although the utility of MSMs for interpreting activity patterns continues to be debated (Weiss 2007). According to previously published methods (Hawkey

& Merbs 1995), MSMs were scored on 10 individuals. Only observations from nine of these individuals are reported here (Individual 1.5 is a juvenile that exhibits skeletal pathology and is not included in the analysis below). MSMs were scored at different sites on the clavicle, humerus, radius, and ulna. The associated muscles control shoulder and arm movements that are thought to affect gross morphology at these locations on the bone (Zabecki 2009). Overall, MSM scores for the Umm el-Marra sample are low, with scores of 0 and 1 as the most common. The only enthesopathy score occurred at the right costoclavicular ligament of Individual 1.3. As expected, males exhibit higher mean scores than females. There were no significant differences between the Tombs 1 and 4, which had the most observable individuals. If related to repeated activity, the locations of the higher mean MSM scores would be consistent with consistent forward and backward rotation of the scapula, or shoulder, generally.

Similar to MSMs, OA has been used to investigate activity patterns in past populations, though this must be done with caution (Bridges 1992). Of the observed adults, 4/13 individuals exhibit osteoarthritis of the thoracic and lumbar vertebrae. Also, Schmorl's nodes—erosion of one or more foci on the articular surface of the vertebral body—occur in 6/13 individuals. The development of Schmorl's nodes may have resulted from increased strain on the spine. Other bones exhibiting OA include carpals, phalanges, patellae, and ribs. Individual 6.1 exhibits eburnation on several joint surfaces.

Familial relationships. Schwartz (2007) has suggested that given the chronology, small number, and demography of the individuals interred, a reasonable hypothesis is that the tombs contained members of a series of important families or dynasties. In order to investigate biological relatedness within and between tombs, data were collected on dental and skeletal non-metric traits, particularly since most lines of evidence suggest that the development of non-metric traits, especially those of dentition, is strongly controlled by genetics (Scott & Turner 1997:162).

Generally, the observed sample exhibits a high degree of homogeneity in the dichotomous expression of dental non-metric traits, although reducing ranked traits into "present vs. absent" masks some of the variation in degree of expression. There is some variation in trait presence among tombs. For example, the only occurrence of shoveling occurs on Individual 1.4. Also in Tomb 1, 3/4 individuals (1.1, 1.3, and 1.5) exhibit the Carabelli's trait. No other individuals in the sample exhibit this trait. This may suggest some degree of genetic relatedness among these individuals. Similar results have been reported at Bab edh-Dhra (Bentley 1991) and Jerablus Tahtani (Parras 2004). Future analyses will use an individual-count approach and explore variation in expression, as well as more-detailed comparisons with other archaeological populations.

Conclusion. The human skeletal remains so far recovered from the elite tomb complex at Umm el-Marra are a significant resource and have the potential to make important contributions to the bioarchaeological literature for the Near East. Dental microwear data, which can help answer questions of diet, have been collected and analyzed on a sample of 14 individuals. Further, bone samples are available for the analysis of ancient DNA, which can possibly confirm or refute the hypothesis of familial relationships within and between tombs, although preservation issues continue to be a problem in Near Eastern skeletal samples (Baca & Molak 2008). Several, more-detailed presentations of the observations and results reported here are currently in preparation for submission to this and other journals.

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Bakr Āwa (Iraq), seasons 2010–2011

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The site of Bakr Āwa (35°13'14"N, 45°56'26"E), in the Sulaymaniyah Province of Northern Iraq, was first described by James Felix Jones in 1844. Regular excavations at the site were undertaken in 1960-1961 by the Iraqi General Directory of Antiquity and then resumed in 2010 by the German-Kurdish archaeological team directed by Professor Piotr Miglus from the Institute of Pra- and Protohistory, University of Heidelberg. A preliminary report in the 2010 excavations together with a historical introduction has been already published (Miglus et al. 2011).