THE EARLY PRE-POTTERY NEOLITHIC B IN THE SOUTHERN LEVANT

Contributions from Tell Qarassa North (Sweida, Syria) and Kharaysin (Zarqa, Jordan)

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Abstract. *During the last twenty years, several archaeological sites with occupation levels attributed to the Early Pre-Pottery Neolithic B have been excavated in the southern Levant, filling the previous information gap. Our excavations at Tell Qarassa North (Sweida, Syria) and Kharaysin (Zarqa, Jordan), with EPPNB occupations dated from ca. 8600 to 8200 cal. BC, have contributed to the renewal of our knowledge of the PPNB in the southern area of the Fertile Crescent. This paper presents the main results obtained for both sites regarding architecture, lithic industries, funerary customs and plant and animal exploitation. Both sites show some of the key characteristics of the PPNB period, such as square architecture; bidirectional blade technology and the use of large tanged arrowheads; the transition to plant domestication and, most probably, the beginning of animal herding; complex funerary customs, including the manipulation of human remains; and intensification in human iconography. However, regional peculiarities can be observed in architecture, as houses are grouped together, sharing intermediate walls, while the corners of the buildings are still rounded. These results stress the relevance of the Southern Levantine cultural area in fostering the dynamics leading to the coalescence of the PPNB across the Fertile Crescent.*

Résumé. *Au cours des 20 dernières années, plusieurs sites archéologiques ayant des niveaux d'occupation attribuables au Néolithique Précéramique B Ancien ont été fouillés dans le sud du Levant, comblant le manque d'information antérieur. Les fouilles menées à Tell Qarassa Nord (Souéïda, Syrie) et Kharaysin (Zarqa, Jordanie), avec des occupations du PPNB Ancien datant d'environ 8600 à 8200 av. J.-C., ont contribué à renouveler nos connaissances du PPNB dans la partie méridionale du Croissant Fertile. Cet article présente les principaux résultats obtenus pour les deux sites concernant l'architecture, les industries lithiques, les pratiques funéraires et l'exploitation végétale et animale. Les deux sites montrent certaines des caractéristiques clés de la période PPNB, telles que l'architecture rectangulaire, la technologie laminaire bidirectionnelle et l'utilisation de grandes pointes de flèche, la transition vers la domestication des plantes et, probablement, les débuts de l'élevage, des coutumes funéraires complexes, y compris la manipulation des restes humains et une intensification de l'iconographie humaine. Cependant, des particularités régionales peuvent être observées dans l'architecture, car les maisons sont regroupées et partagent des murs intermédiaires, tandis que les angles des bâtiments sont encore arrondis. Ces résultats soulignent l'apport de l'aire culturelle du Levant Sud dans la dynamique de coalescence du PPNB à l'échelle macro-régionale du Croissant Fertile.*

Keywords. *Early Pre-Pottery Neolithic B, Southern Levant, Tell Qarassa North, Kharaysin, cultural dynamics*
Mots-clés. *Néolithique Précéramique B Ancien, Levant Sud, Tell Qarassa Nord, Kharaysin, dynamiques culturelles*

INTRODUCTION

The Pre-Pottery Neolithic B (PPNB) period was first defined in the 1950s by K. Kenyon based on the excavations at Jericho (Kenyon 1981). She distinguished it from the previous Pre-Pottery Neolithic A phase (PPNA) by such features as rectangular architecture, lime plaster floors, bidirectional blade technology, large arrowheads and the "skull cult". She proposed that this later culture was introduced to the settlement by newcomers. During the 1970s, excavations carried out in the Middle Euphrates by M. van Loon and J. Cauvin at Tell Mureybet (Van Loon 1968; Cauvin 1977; Ibáñez 2008) and by A. M. T. Moore at Abu Hureyra (Moore *et al.* 2000) showed that the PPNA/PPNB sequence was also present in the northern Levant. During the last decades, new excavations in Upper Mesopotamia, the Konya plain, Cappadocia, the Urfa region and the Zagros mountains are showing how the different regions of the Fertile Crescent contributed to the coalescence of the Neolithic (Baird *et al.* 2018; Matthews and Matthews 2020; Özdoğan 2022; Stiner *et al.* 2022). The existence of shared cultural traits across the Levant and beyond during the PPNB has led some scholars to define it as a cultural *"koine*", an interaction sphere (Bar-Yosef and Belfer-Cohen 1989) or an expansive culture (Cauvin 1997). Nevertheless, the regional diversity during this period has also been stressed (Gebel 2004b). This diversity is particularly clear when the regions out of the Levant are considered, so recent synthesis on the origins of the Neolithic in the Near East avoid using the terms PPNA and PPNB (*i.e.* Watkins 2024).

J. Cauvin (1997) interpreted the PPNB as a cultural entity, characterised by the elements identified by K. Kenyon and the domestication of plants and animals. He argued that the PPNB originated in the Middle Euphrates region, at around 8800 cal. BC, evolving *in situ* from the local PPNA variant known as the Mureybetian. Subsequently, the PPNB expanded to the Southern Levant and the Taurus region. The precocity of the PPNB in the Middle Euphrates compared with the south seemed evident at the time of J. Cauvin's writing, since no PPNB sites were dated before 8200 cal. BC in the Southern Levant, *i.e.* at the beginning of the Middle PPNB. This question was also analysed by some scholars working in the Southern Levant. I. Kuijt (2003) pointed out that no clear Early PPNB site was documented in this region, in line with J. Cauvin's assertion that the PPNB came from the North. A. Gopher (1996) tried to argue in favour of the existence of a Southern Early PPNB, primarily based on the occurrence of Helwan points, a potential Early PPNB *fossil directeur*, in several archaeological sites lacking chronological information. Kuijt's position on the absence of an Early PPNB phase in the south and its northern origins was later advocated by P. Edwards and G. Sayej (Edwards and Sayej 2007; Edwards 2016).

Since then, during the last 20 years, several southern sites with levels attributed to the Early PPNB have been excavated, such as Motza (Khalaily *et al.* 2007), Tell Aswad (Stordeur *et al.* 2010, Tell Qarassa North (Ibáñez *et al.* 2010), Ahihud (Caracuta *et al.* 2017), Kfar HaHoresh (Goring-Morris 2005), Kharaysin (Ibáñez *et al.* 2016), Wadi Mushash 163 (Bartl 2018), and Harrat Juhayra 202 (Fujii 2019), amongst others, narrowing the chronological. gap between the origins of the PPNB in the Middle Euphrates and its presence in the Southern Levant. In this paper, we will show the main characteristics of the Early PPNB occupations at two sites in the southern Levant, Tell Qarassa North (Sweida, Syria) and Kharaysin (Zarqa, Jordan; fig. 1), in terms of architecture, bidirectional blade technology, large arrowheads, funerary customs and plant and animal resources. Later, we will discuss how this information fits with other data regarding the origins of the cultural traits that shaped the PPNB culture, *koine* or interaction sphere.

TELL QARASSA NORTH

The Early PPNB occupations at Tell Qarassa North were excavated by a Spanish team (Ibáñez *et al.* 2010) in 2009 and 2010 as part of a French-Syrian archaeological research project centred around the palaeolake of Qarassa (Sweida, Syria). The Qarassa complex comprises a Bronze Age mound (Tell Qarassa South; Braemer *et al.* 2011), an EPPNB, Pottery Neolithic and Chalcolithic mound (Tell Qarassa North; Godon *et al.* 2015; Baldi *et al.* 2019), a Natufian site (Qarassa 3; Ibáñez *et al.* 2013, 2014a; Terradas *et al.* 2013a, 2013b), and some megalithic burials (Steimer-Herbet and Besse 2017). At Tell Qarassa North, the Pre-Pottery Neolithic B levels were excavated in Areas 1 and 2 (Ibáñez *et al.* 2010). The archaeological work had to cease with the outbreak of the Syrian civil war in 2011. Because of this, the archaeological materials of the site could not be studied in detail. We can only show the results of the analysis of the archaeological material that was carried out during the 2009 and 2010 excavation campaigns. Sixteen radiocarbon dates were obtained from different levels and locations. The dates were calibrated by the OxCal program (v. 4.4.4) and the chronological relations between the

Fig. 1 – *Map with the cited sites (map L. Teira).*

stratigraphic levels were statistically modelled using the ChronoModel application (v. 3.2, https://chronomodel.com).

STRATIGRAPHY AND ARCHITECTURE

In Area 1, we excavated a main trench of 79 m² in Squares XYZ-67/68/69and a smaller trench of 12 m² (fig. 2) in Squares UV-67, 6 m to the north. In XYZ, several constructions were documented, dominantly rectilinear though with rounded corners. Space A is a subrectangular structure covered with a compacted earth floor and some stones in the centre of the room indicating the position of a central post. An opening in the eastern wall gives access to Space B, which is delimited by two walls. The posthole and the layer of destruction (Balbo *et al.* 2012) suggest that a roof covered Space A, while Space B, where no destruction level was documented, was an open patio. To the south and southwest of Space A, parts of two other rectangular rooms with rammed earth floors were uncovered, Spaces C and D, which are most probably contemporary with the occupation documented in Space A and B. Four radiocarbon dates for this level (table 1, nos 1–4) yielded a date of *ca.* 8500 to 8300 cal. BC. A 10 × 2 m trench, excavated by the French team in 2008 at the west of the 2009/2010 excavation, in Squares YZ-67/66/65, shows that the rooms with rounded corners continue to the west (figs. 2–3).

Under this occupation level, an older one was documented exclusively within Space A. The walls of the structure corresponding to the later occupation level were not dismantled when this older level was excavated, which left some uncertainty about the shape of the architecture of this earlier phase. A burnt roof (Balbo *et al.* 2012), a central posthole, and another eastern wall, delimiting Spaces A and B were also documented beneath the first phase of occupation. Two radiocarbon dates corresponding to this older phase of occupation (table 1, nos 5–6) dated it to *ca.* 8700 to 8500 cal. BC. Above these two

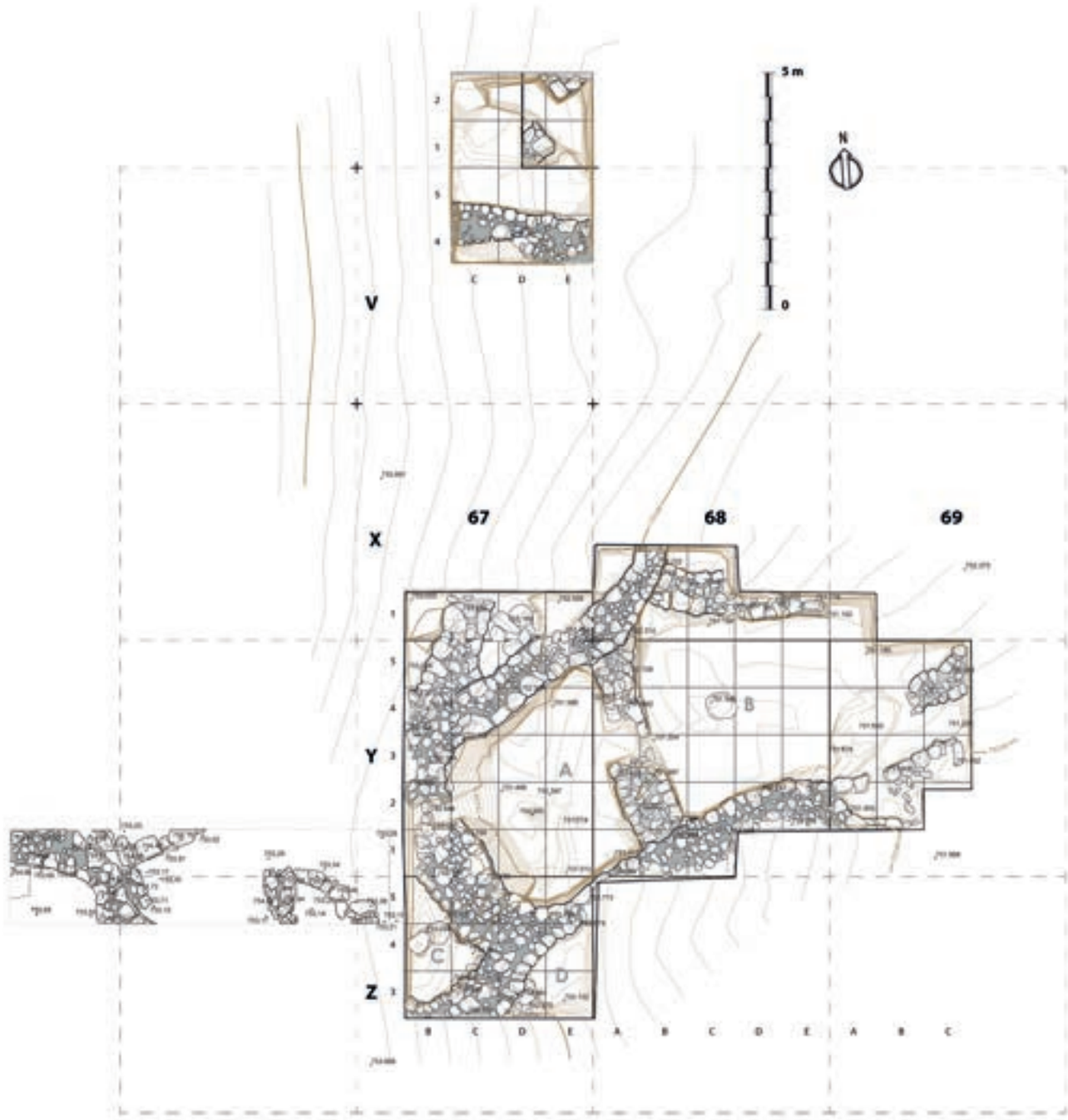


Fig. 2 – *Zone 1 of Tell Qarassa North (CAD L. Teira).*

Fig. 3 – *Zone 2 of Tell Qarassa North (L. Teira).*

levels of architecture, a funerary area was discovered inside the abandoned building with remnants of the earlier phase previously described (Santana *et al.* 2015). One radiocarbon date corresponds to this level (table 1, nº 7), which is dated to *ca.* 8350-8150 cal. BC. In the funerary area, a bone wand depicting two human faces was recovered (Ibáñez *et al.* 2014b). However, the last radiocarbon date from the XYZ area (table 1, nº 8) yielded a chronology of *ca.* 8700-8350 cal. BC, which is not coherent with its position in the upper part of the stratigraphy. This sample was recovered in the upper sedimentary layer affected by modern agricultural activities, suggesting it may have been in a secondary position.

The proximate UV67 trench revealed a similar stratigraphy to XYZ. Here, two levels were documented. The lower one, located in U67, showed the remains of two walls and yielded three radiocarbon dates (table 1, nºs 9–11). Dates nº 9 and 10 indicate an occupation date of *ca.* 8500-8250 cal. BC, while date nº 11 is a little younger. In the upper level, the area was used as a cemetery (Santana *et al.* 2015). It is radiocarbon dated to *ca.* 8250-8000 cal. BC (table 1, nº 12) and it is most probably contemporary to the funerary area in the XYZ upper level.

In 2010, a new excavation unit covering approximately 60 m^2 was opened in Area 2 on the north side of the mound, in Squares JKLMN/41 to 44. Early PPNB (EPPNB) levels were found beneath the Chalcolithic and PN levels (fig. 4; Godon *et al.* 2015; Baldi *et al.* 2019). The upper level consisted of curved stone walls that defined two distinct spaces. The sediment filling the spaces contained a mixture of EPPNB and PN materials, including a few pottery sherds scattered throughout the sequence, up to the earth floor associated with the walls. Some sediment affected by fire, adhered to the walls' base, could be clearly distinguished from the sediment unaffected by fire, where the mixed EPPNB-PN materials were located. Two charcoal samples taken from this burnt sediment provided a chronology of *ca.* 8350-8000 cal. BC (table 1, nºs 13–14). The

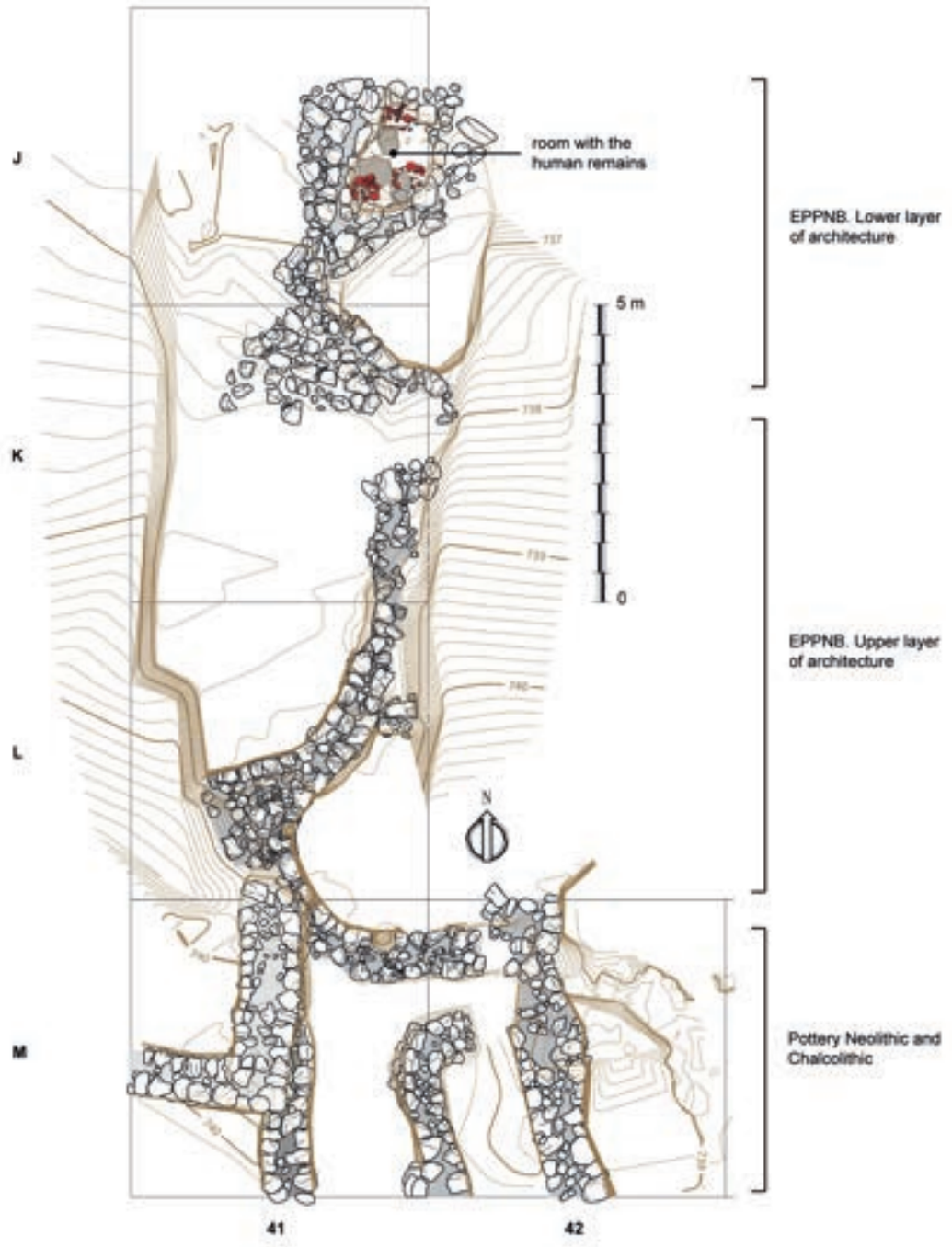


Fig. 4 – *Architecture in Zone 1 of Tell Qarassa North.*

admixture of PPNB and PN materials suggests that the EPPNB structures were later re-occupied by squatters during the PN period, similar to findings at other sites dated to the Final PPNB, PPNC and Early PN, such as Basta (Gebel 2009: 41), Jericho (Kenyon 1981: 92), and Ba'ja (Gebel and Hermansen 2004: 16). On the lower level, two attached rooms were documented, containing exclusively PPNB materials. The southern room shows two straight walls joined in an

Table 1 – *Radiocarbon dates from the Early PPNB levels of Tell Qarassa North (OxCal program v. 4.4.4 Bronk Ramsey 2021; Atmospheric data from Reimer* et al. *2020).*

N	Zone	Square	St. Unit	Interpretation	Reference	Uncal. BP	cal. BC (95.4% of confidence)	Material
1	1	Y67	25	Upper level of architecture	CNA-1353	9255±40	8616-8331	*Triticum boeoticum/monoccocum*
2	1	Y68	52	Upper level of architecture	CNA-1354	9290±50	8700-8334	*Triticum boeoticum/monoccocum*
3	1	Y67	21	Upper level of architecture	Beta-272103	9320 ± 50	8734-8354	Wood charcoal
4	1	Y68	52 C	Upper level of architecture	CNA-1355	9185±40	8542-8293	*T. dicoccoides/dicoccum*
5	1	Y67	57	Lower level of architecture	CNA-1065	9300±45	8702-8347	*Pistacia* sp.
6	1	Y67	57	Lower level of architecture	Beta-290929	9340 ± 50	8750-8432	*Triticum boeoticum/monoccocum*
7	1	Y67	34	Funerary area	Beta-262213	9100 ± 60	8537-8230	*T. dicoccoides/dicoccum*
8	1	Y67	15	Surface; level affected by agricultural activities	Beta-277177	9300 ± 50	8704-8342	*Triticum* sp.
9	1	U67	15	Lower level	Beta–402487	9110 ± 30	8424-8252	Wood charcoal
10	1	U67	14	Lower level	CNA-3129	9192 ±40	8542-8296	Leguminosae seed
11	1	V67	16	Lower level	Beta-262212	8940 ± 50	8270-7956	Wood charcoal
12	1	UV67	4	Upper level	Beta-274098	9030 ± 60	8386-7962	Leguminosae seed
13	2	L41	21	Upper level	CNA-1074	8960 ± 45	8282-7960	Wood charcoal
14	2	L41	14	Upper level	CNA-1059	9110 ± 35	8426-8250	Wood charcoal
15	2	KJ41	27	Lower level	CNA-1058	9145 ± 40	8536-8278	*Pistacia* sp., wood charcoal
16	2	KJ41	27	Lower level	CNA-1060	9010 ± 45	8298-7976	*Pistacia* sp., wood charcoal

orthogonal corner, while the northern room is smaller and oval. The entrance of the oval room was opened north and was sealed with stone boulders. Inside this northern room, a deposit of long bones belonging to one individual and two caches of crania were found lying on the floor (Santana *et al.* 2012). This lower level was dated to *ca.* 8450-8250 cal. BC (table 1, n^{os} 15–16). Whether the two levels are stratigraphically superimposed or correspond to contemporaneous occupations within a terraced village remains uncertain.

PLANT EXPLOITATION

The archaeobotanical assemblage from Tell Qarassa North was retrieved from Area 1, primarily from Squares XYZ 66/67/68, dated to 8600-8200 cal. BC (58 samples). In addition, five samples were studied from UV67, dated to 8500-8000 cal. BC. The assemblage, consisting of 9,439 remains, showed a clear predominance of cereals (*ca.* 56.8%, including chaff), followed by wild and weedy plants (13.3%), other grasses (9%), fruits and nuts (8.6%), and legumes (4.1%; Arranz-Otaegui *et al.* 2016a). Among the cereals, wheat (two-grained einkorn, *Triticum boeoticum/urartu/monococcum*, and emmer, *T. dicoccoides/dicoccum*) was dominant, with barley (*Hordeum spontaneum/vulgare*) also documented in significant numbers. Detailed examination of the cereal chaff indicated that at least 30% of the spikelet forks exhibited the characteristic non-domestic type scar, indicating that by the half of the 9th millennium cal. BC, this domestication trait had developed significantly (Arranz-Otaegui *et al.* 2016b). The exploitation of wild plants seemed to have been common, and included a large number of economically valued wild plant resources, including the seeds, and likely also the leaves and stems, of plants of the Asteraceae, Cyperaceae and Brassicaceae families, as well as the fruits and nuts of some trees like fig (*Ficus carica*), pistachio (*Pistacia terebinthus/atlantica*) and almond (*Amygdalus* sp.; Arranz-Otaegui *et al.* 2016a). Indeed, the multi-proxy reconstruction of the landscape around the site depicted a relatively diverse environment dominated by pistachio-almond woodland steppe and riparian vegetation, with other plant formations, such as Mediterranean evergreen oak and conifer forests growing further away from the site (Arranz-Otaegui 2016; Arranz-Otaegui *et al.* 2017). Towards the end of the occupation, *ca.* 8100 cal. BC, an increase in anthropogenic activities (*e.g.* herding) and changes in climatic conditions (*e.g.* reduced temperature and increased rainfall) are attested, leading to substantial environmental transformations at the dawn of agriculture (Arranz-Otaegui *et al.* 2017).

ANIMAL RESOURCES

The Early PPNB layers at Tell Qarassa North yielded a large faunal assemblage, comprising over 7,000 fragmented bones, with nearly 2,500 identified specimens. These remains, mostly burnt and fragmented, encompass a large diversity of animals, including 11 mammal species and at least eight different bird taxa. The goat (*Capra* format *aegagrus*) is the dominant species across all contexts. Large bovines have a significant contribution to the more recent occupation levels (up to 27% of the identified specimens), whereas the frequencies of gazelles remain stable (*ca*. 25%) throughout the sequence. Additionally, small carnivores such as fox, badger and wild cat, together with various species of birds and reptiles, formed part of the small game spectrum. The array comprises mostly ducks such as mallard (*Anas platyrhynchos*), pintail (*Anas acuta*) and common teal (*Anas crecca*), but also golden eagle (*Aquila chrysaetos*), chukar partridge (*Alectoris chukar*) and great bustard (*Otis tarda*), as well as the spur-thighed tortoise (*Testudo graeca*) among the reptiles. This rich diversity can be explained by the broad use of animal resources, which were potentially attracted by an ancient nearby lake. However, a gradual and significant decrease in small game manifests over time.

Dog stands as the only clearly domestic species that have been identified. The dominance of goat remains at Tell Qarassa North raises the question of the nature of their exploitation. Notably absent were bones of *Ovis* (wild or domestic sheep), except in disturbed upper layers possibly stemming from more recent occupation periods. The rocky landscape surrounding the settlement suggests the likelihood that populations of wild goats found a natural habitat nearby. Analysis of the goat bones indicates that these animals were generally large-sized (similar to *Capra aegagrus*), with a marked sexual dimorphism. Comparative osteometric data of *Capra* from other sites in southwest Asia shows that the Qarassa goats were on average slightly larger than those at Tell Aswad, which decreased in size over the Early to Middle PPNB sequence (Helmer and Gourichon 2008). Distinct allometric differences with goats from Eastern Anatolia (Cafer Höyük, Early and Middle PPNB), where mixed populations of domestic and wild goats have been identified (Helmer 2008), imply that the Qarassa goats could have originated from local wild populations rather than distant ones.

Due to limited data on ancient goat populations and hunting practices during the Epipaleolithic and Early Neolithic periods, determining the domestic or wild status of the goats from Tell Qarassa North remains challenging, requiring further in-depth analysis of the bone remains. However, pollen records from the latest occupations of the settlement (Arranz-Otaegui *et al.* 2017) reveal an increase in anthropozoogenous plant taxa likely linked to grazed pastures and coprophilous fungi indicative of herding activities at that time, coinciding with the emergence of caprine husbandry in some parts of Southwest Asia (Zeder 2011). These findings strongly suggest the exploitation of goats both as domestic herds and as large game in the vicinity of the site, at least during the last Early PPNB occupations.

LITHIC INDUSTRY

The knapped industry was recuperated from Sweida Museum in 2015 and studied in Damascus by Khaled Abdo (table 2, fig. 5). The analysis comprised a total of 5,685 objects.

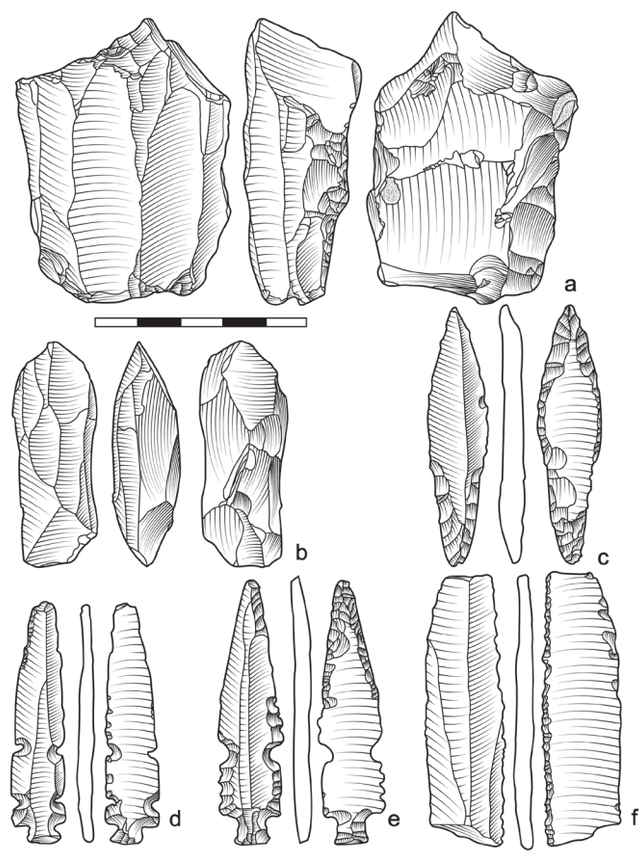


Fig. 5 – *Lithic industry from Tell Qarassa North (CAD K. Abdo). A–B. Bidirectional cores; C. Amuq point; D–E. Helwan/Aswad points; F. Sickle blade.*

Fig. 6 – *Helwan/Aswad arrowheads from Tell Qarassa North (photo L. Teira).*

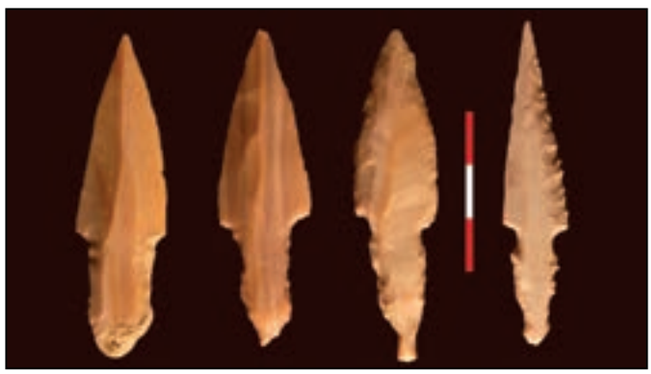


Fig. 7 – *Jericho points from Tell Qarassa North (photo L. Teira).*

Knapped tools are mainly made from flint. Twenty obsidian remains were collected, representing 0.35% of the total knapped objects. Bidirectional blade knapping was the main strategy for producing knapped tools at Tell Qarassa North, though some flake knapping cores are also present. Six of the ten cores documented show bidirectional knapping (two of them are naviform), two are unidirectional and two are amorphous, for flake knapping. Retouched flakes and blades are the most abundant tool category (table 2). They probably correspond to unretouched flakes and blades that were rejuvenated by retouch. Among "formal" tools, glossed blades and projectile points are the most abundant. Our use-wear analysis showed that glossed blades were sickle elements used for harvesting ripe cereal (Ibáñez *et al.* 2021). The distribution of the gloss and the morphology of the side opposite to the glossed one suggest that sickles were made with flint elements inserted in slightly curved shafts, like the sickle found in Nahal Hemar (Bar-Yosef and Alon 1988; Borrell and

Fig. 8 – *Polished axes/adzes from Tell Qarassa North (photo L. Teira).*

Table 2 – *Retouched tools from Zone 1 of Tell Qarassa North.*

	N	%
Projectiles	187	23.4
Sickle blades	146	18.3
Truncation	74	9.3
Burins	63	7.9
Borers/awls/perforators	37	4.6
Notches	30	3.8
Scrapers	16	2.0
Retouched flakes and blade	222	27.8
Denticulates	18	2.3
Lunates	6	0.8
Total	799	100

Molist 2007). Confocal microscopy analysis of the glossed tools revealed that most of them were used for harvesting ripe cereals, with a lesser portion identified as being used for cutting semi-ripe cereals (Ibáñez *et al.* 2021). While domestic cereals are cut in a fully ripe state, the reaping of wild-cultivated cereals is experimentally associated with semi-ripe cutting. Thus, results obtained through the texture analysis of harvesting gloss on sickle blades, indicating ripe and semi-ripe cereal cutting, is coherent with cereal crops transitioning from wild to domestic. Among projectile points, Aswad/Helwan (with tang and pairs of notches; 75%; fig. 6) and Jericho (22%; fig. 7) types are dominant, though a few Byblos

points (3%) have also been documented. Polished axes or adzes are also present in the lithic assemblage (fig. 8). Six lunates were found among the EPPNB tools. This type of tool is anachronistic in this context. It was used during the Natufian period and they were no longer used from the beginning of the PPNA period. They were likely collected from the nearby Natufian site (Ibáñez *et al.* 2013, 2014a; Terradas *et al.* 2013a, 2013b) by the Neolithic inhabitants of Tell Qarassa North.

FUNERARY CUSTOMS

The excavations at Tell Qarassa North uncovered abandoned dwellings containing various types of mortuary deposits, including primary and secondary burials, disturbances of primary burials, and bone retrieval (fig. 9). These deposits encompass both single and collective interments, including adults and non-adults (Santana *et al.* 2015). The grave locations, body positions, removal of human bones, and occurrences of secondary burials corroborate the funerary practices observed in the sparse EPPNB burials previously discovered elsewhere, such as those at Dja'de in the Middle Euphrates and Motza in the Southern Levant (Coqueugniot 2000; Khalaily *et al.* 2007). The archaeological finds at Tell Qarassa North reveal that corpse manipulation occurred at various stages of decomposition, signifying the absence of standardized timing for performing these mortuary acts. For example, the burial BC-5 of Tell Qarassa exhibits a notable hyperflexion of the lower limbs with a partial dislocation of the persistent ankle joint, while other more labile joints, such as the metatarsal-proximal phalanx joints, remained articulated. This is significant because labile connections typically dislocate more quickly than persistent joints. However, environmental conditions, desiccation, and burial practices can result in disarticulation occurring in an atypical sequence (Maureille and Sellier 1996). In this case, a potential explanation is that the individual was interred sometime after death, suggesting a form of delayed burial. This implies that the body was likely curated elsewhere for a period before being buried. In contrast, other instances reveal manipulation occurred while tissues were still partially intact, as evidenced by the cut marks on a clavicle or the disarticulation of a hand (Santana *et al.* 2015). Similar practices are noted in the Early PPNB site of Motza, where the extraction of cervical vertebrae together with the skull in case L5070 suggests the body was semi-decomposed at the time of exhumation (Khalaily *et al.* 2007). The substantial diversity in burial practices at Tell Qarassa North has led us to categorize the upper level of this site as a funerary area, indicative of multi-stage burial practices (Santana *et al.* 2015). This variety in mortuary practices and the timing of their implementation probably results from the absence of highly formalized ceremonies, each being conducted with diverse motivations and perhaps influenced by different cultural or communal perspectives and beliefs.

Fig. 9 – *Primary burial with skull retrieval in Tell Qarassa North (photo J. Santana).*

In Area 2 of Tell Qarassa North, a skull cache was discovered within a singular building; it consisted of 12 crania arranged in circular patterns on the room floor in two groupings. They predominantly belonged to male individuals, except for one child and one preadolescent of unknown sex. In 10 out of the 11 cases, facial skeletons were deliberately mutilated (Santana *et al.* 2012). This behaviour starkly contrasts with other archaeological findings of skull caches, where bones underwent meticulous manipulation, including plastering and decoration.

KHARAYSIN

The site of Kharaysin (Quneya, Zarqa; fig. 1) was discovered in 1984 by J. W. Hanbury-Tenison and colleagues during the Jerash Region Survey (Edwards and Thorpe 1986; Hanbury-Tenison 1989). It was regarded as an extensive PPNB site, covering about 36 ha. A test pit was carried out by J. Fernández-Tresguerres in the north of the site, by the Zarqa-Jerash road, where he found Pottery Neolithic and PPNB occupation levels. However, he did not continue the

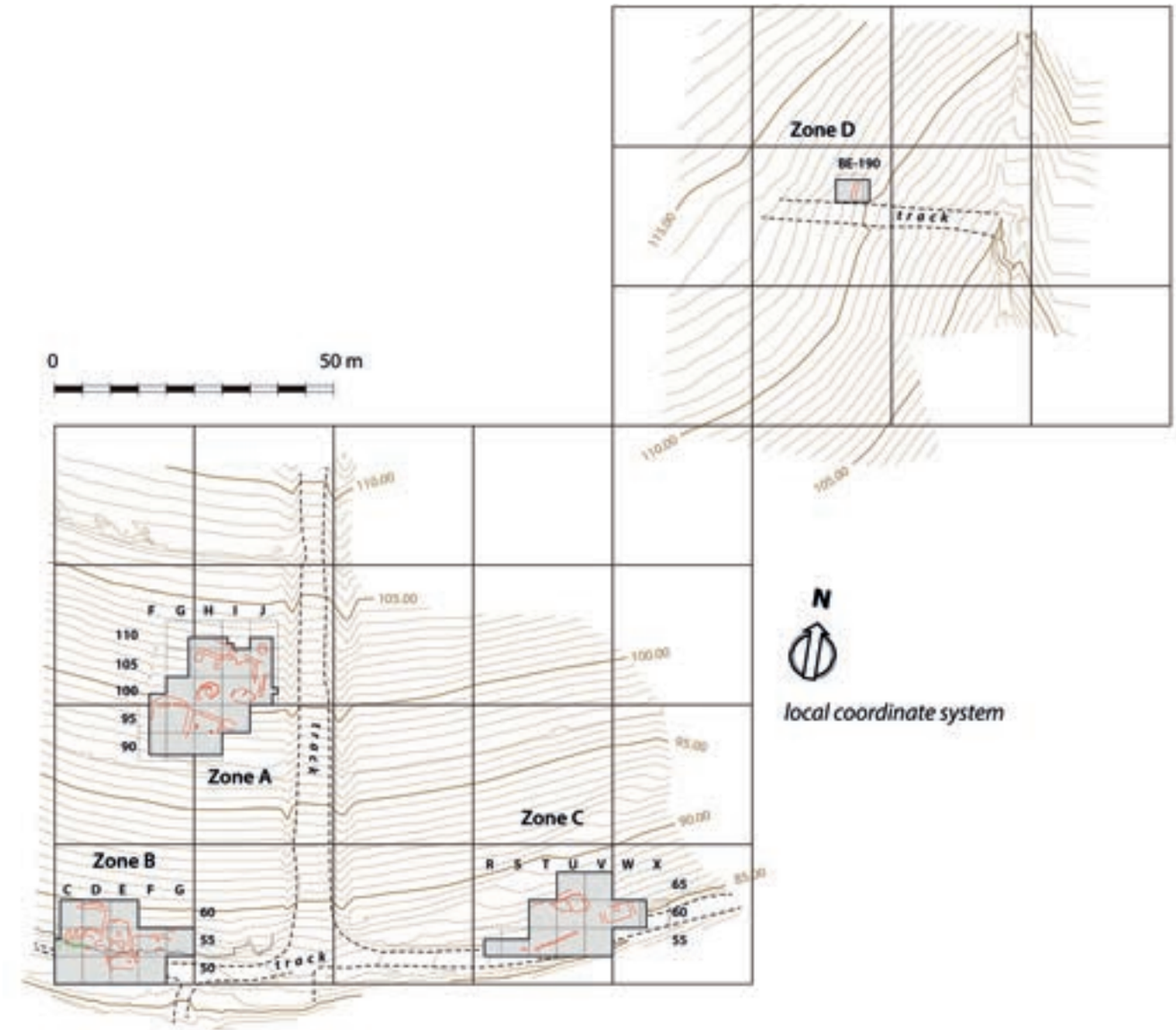


Fig. 10 – *Areas excavated in Kharaysin up to 2022 (CAD L. Teira).*

excavation, as he focused on the study of the nearby Early Bronze Age site of Jebel Mutawwaq (Fernández-Tresguerres 2008a, 2008b). Our excavation was resumed in 2014 (Ibáñez *et al.* 2015c, 2016; Moník *et al.* 2018), with successive seasons from 2015 to 2019 and 2021 to 2023. The area comprising spots where lithic remains are scattered on the surface spans approximately 25 ha. However, the entire surface was not simultaneously occupied during the PPN period (Moník *et al.* 2018). Although the site's boundaries have not been precisely defined, Kharaysin can be considered a mega-site (Rollefson 1992; Gebel 2004a), as Ain Ghazal, Jericho or Abu Hureyra.

Five areas—A, B, C, D and E—have been excavated so far (fig. 10), and five occupation phases have been identified up to 2022. The results of the 2023 excavation, carried out in Area E, are currently being evaluated. The earliest occupation level was found in Areas A and B, dating to the end of the 10th millennium and the beginning of the 9th millennium cal. BC (Late PPNA). The second, corresponding to a PPNA/PPNB transitional level, dates from the first half of the

Table 3 – *Radiocarbon dates from the Early PPNB levels of Kharaysin (OxCal program v. 4.4.4 Bronk Ramsey 2021; Atmospheric data from Reimer* et al. *2020).*

	Square	St. Unit	Interpretation	Reference	uncal. BP	cal. BC (95.4% of confidence)	Material
1	D55	606	St. 21	CNA 4062	9000 ± 47	8296-7966	*Vicia faba*
2	D55	1032	St. 21	CNA 4918	9024 ± 69	8416-7956	*Vicia faba*
3	F55	533	St. 16	CNA 4063	9212 ± 49	8556-8296	*Vicia narbonensis* tp.
4	F55	701	St. 16	CNA 4064	9162 ± 48	8542-8283	*Vicia narbonensis* tp.
5	F55	708	St. 16	CNA 4065	9178 ± 50	8546-8288	*Vicia narbonensis* tp.
6	C55	1029	Sediment under lime plaster floor of St. 21	CNA 4917	9165 ± 70	8559-8259	*Vicia ervilia*
7	C60	911	Wood covering the burial pit in St. 19	Beta-676532	9150 ± 40	8536-8281	*Salix* sp. wood charcoal
8	D60	905	Sediment infilling St. 19	Beta-654187	9080 ± 30	8332-8240	*Lens* sp.
9	E55	2106	Sediment under architectures	CNA-6607	9150 ± 45	8538-8280	*cf. Ficus* sp. Wood charcoal
10	E55	2110	Sediment under architectures	can-6608	9170 ± 40	8538-8290	*Quercus ithaburensis* tp. wood charcoal
11	B55	1117	Sediment under architectures	Beta-689929	9150 ± 30	8527-8286	*Quercus ithaburensis* tp. wood charcoal
12	E50	1018	Sediment under architectures	Beta-695645	9170 ± 30	8536-8291	*Pistacia* sp. wood charcoal
13	C60	846	Wood post of the first phase of construction in the northern wall of St. 19	Beta-695643	9190 ± 30	8538-8298	*Quercus ithaburensis* tp. wood charcoal

9th millennium and was also found in Areas A and B. The third level, described in this paper, dating to the second half of the 9th millennium (Early PPNB), is only present in Area B. The fourth occupation level, dating to the beginning of the 8th millennium (Middle PPNB), is documented in Areas A, B and C. A fifth and most recent occupation level, from the beginning of the 7th millennium (Late PPNB or PPNC) was discovered in Area D (Iriarte *et al.* 2020; Santana *et al.* 2020). Thirteen radiocarbon dates available for the Early PPNB contexts were calibrated by the OxCal program (v. 4.4.4).

STRATIGRAPHY AND ARCHITECTURE

The Early PPNB levels were discovered in Area B and consisted of the remains of six houses — structures 15, 16, 17, 18, 19 and 20 — that are most probably contemporaneous and most of them share middle walls (figs. 11–12). This level of architecture is dated between 8500 and 8200 cal. BC (table 3, nos 3–11, fig. 26). The ensemble was excavated on a slope, with the northern parts sunk into the natural sediment and the entrances located on the southern side (fig. 13). Structure 21 partially cuts St. 19, overlaps with St. 20, and is dated a little later, between 8300 and 8000 cal. BC (table 3 dates no 1–2, fig. 26).

The architecture was partially destroyed by the slope erosion and by a bulldozer to make a track south of the ensemble. Only a small part of St. 15, its NW side, is preserved in G55 (figs. 11–12). We documented the northern part of its eastern wall, oriented north-south, of which only 1 m is left, coinciding with the line between Squares F and G, and a part of the northern wall, which is straight and slightly oblique with respect to its western wall. A lime plaster floor is associated with the walls. One metre to the west of the western wall of St. 15, the eastern wall of St. 16 is observed. This dwelling is located in Square FE-55. It is almost rectangular, as the NW corner forms a 90° angle, whereas the NE corner is curved. The floor is covered with lime plaster. A rounded pit fireplace was located at the centre of the EW axis, close to the area affected by the bulldozer. The N and NE limits of the house are carved into the natural sediment of the slope. The preserved inner area measures around 13.5 m^2. The northern part of the western wall of St. 16 is shared with St. 17 (figs. 12–14), which is entirely preserved. Like the previous house, its northern part is excavated in the natural sediments of the slope; it is nearly square in shape with slightly curved walls and corners. The floor is lime-plastered, except in the northern third of the surface, which has a clay floor. The fireplace is a round pit full of ashes located in the centre of the EW axis and the southern third of the NS axis. The lime-plaster floor is raised around the fireplace, creating a rim. The house's entrance, located in the SE corner, leads to a short corridor flanked by E and W walls. This corridor leads to another space (St. 18), with a lime plaster floor, which was cut

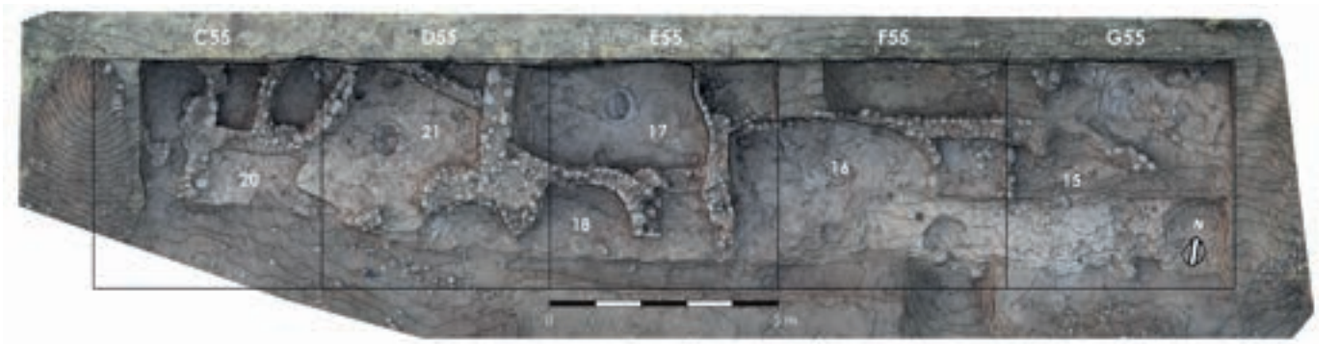


Fig. 11 – *Orthophoto and topography, Area B of Kharaysin in 2017 (photo and CAD L. Teira).*

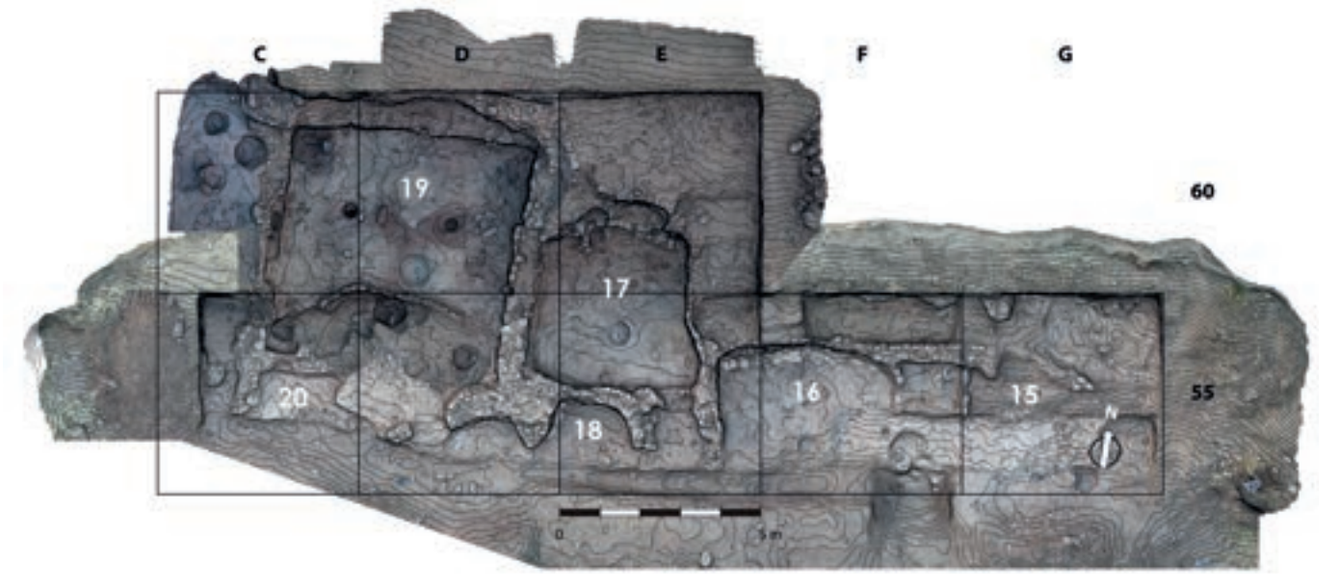


Fig. 12 – *Orthophoto and topography, Area B of Kharaysin in 2019 (photo and CAD L. Teira).*

Fig. 13 – *Area B from the east in 2021 (photo L. Teira).*

through by the bulldozer in the south. Only a small space of this structure, shaped like an apse, is preserved.

Adjacent to St. 17 is St. 19, a square house with rectilinear walls and right angles, whose northern portion is sunk into the slope (figs. 12, 15–16). Two postholes indicate the position of the wooden posts that sustained the roof. The supporting capacity of the walls was reinforced by wooden posts inserted into the wall. The cast negatives of these posts can be observed in the wall plaster, with two in the eastern wall, two in the west and three in the north. The original lime-plastered floor is still preserved in some areas, above a previous solid floor of compacted clay. The central fireplace, slightly displaced to the SE, is a round pit full of ashes. The entrance of the building, located in the western wall, near the SW corner, is a 50 cm-wide

Fig. 14 – *St. 17 in process of excavation, 2017. The southern half of the structure was already excavated. The section of the sediment filling the structure can be observed.*

opening accessed by descending two steps from the exterior. However, unlike the other burnt houses, where the floor was void of items, in this case, several objects were found on the floor, including a millstone near the fireplace and other scattered tools. The rounded pit fireplace, similar to those in the other houses though bigger, and the millstone in primary position suggest that this building was a domestic structure, even though it displays some special characteristics. Several human remains were discovered inside the building. In the NW corner, a square pit about 1 x 1 m in size was excavated into the floor. The pit was covered by a homogeneous layer of charcoal, indicating that it was likely covered by a wooden plank when the house was burnt (fig. 17). Some human remains that were found on the wooden plank showed traces of burning. In contrast, the human remains under the plank did not exhibit any evidence of burning. This burial contains at least five individuals, including both adults and non-adults (fig. 18). Initial deposits were primary burials, later disturbed for bone extraction, particularly skulls. The positioning of certain bones implies decomposition occurred in an unfilled space, indicating that the plank may have served as a cover for the burial, allowing easy access and handling of the remains. Notably, later deposits contained disarticulated remains, possibly linked to alterations of the initial burials. The sequence of funerary practices, *i.e.*, initial placement and subsequent manipulation of remains, suggests that this collective burial was designed to allow a repetitive access over time. Further study of this burial is ongoing and will be the subject of a specific publication. Additionally, other primary and secondary burials were found in pits along the western wall of the building, beneath the floor.

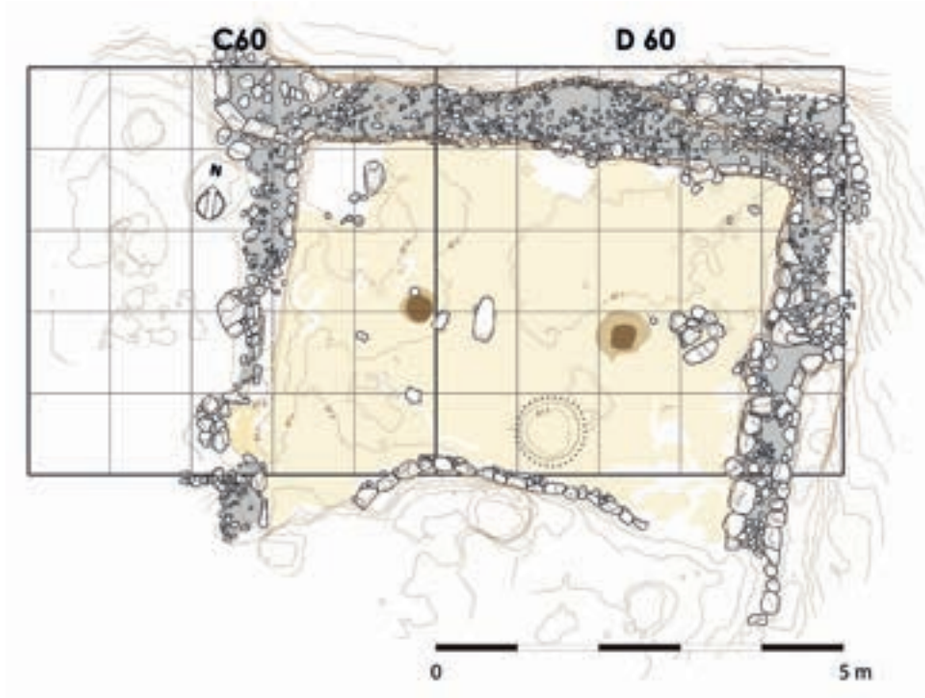


Fig. 15 – *Plan of St. 19 (CAD L. Teira).*

Fig. 16 – *The St. 19 from the south (photo L. Teira).*

Fig. 18 – *Human remains inside the square pit in St. 19 (photo J. Santana).*

Fig. 17 – *Square pit covered by a homogeneous layer of charcoal full of human remains in the St. 19 (photo J. Santana).*

Fig. 19 – *Skull cache consisting of three adult crania embedded in St. 19 (J. Santana).*

A particularly intriguing feature is a skull cache consisting of three adult crania embedded in the plaster of the western wall, complete with facial skeletons and lower parts, such as the occipital bone (fig. 19). Furthermore, a humerus diaphysis was found in a vertical position on the floor, protruding about 20 cm above the surface. Other isolated remains, such as a skullcap, femur, and hip bone, were also discovered on the floor. The presence of sediment between these bones and the floor suggests they may have fallen from a higher location during the building's collapse.

The remains of St. 20 lie to the south of St. 19 (fig. 12). Both houses share a common wall, disrupted by the later house St. 21, cutting through the southern part of St. 19 and overlapping with St. 20 (fig. 11). Regarding St. 20, only around one metre (along the N-S axis) of the northern part is preserved, with the rest of the structure destroyed by the bulldozer. The floor is covered with lime plaster and the corners of the house are slightly rounded. Structure 21, post-dating Sts. 19 and 20, is dated between 8300 and 8000 cal. BC (table 2, n^{os} 1–2). It is polygonal in shape and was built with two levels connected by a single door and one step around 30 cm in height. The lower-level room was almost completely destroyed by the bulldozer. The upper room, the step and the lower space are covered with a continuous lime plaster floor. A round pit fireplace was located in the upper room.

PLANT EXPLOITATION

During fieldwork, archaeobotanical samples were collected from various contexts (pit, hearth, floor) dated from the PPNA to the LPPNB. A total of 171 samples collected between 2016 and 2021 were analysed, exhibiting significant quantitative variability, especially as some remains were hand-picked during fieldwork. In total, 15,088 elements were recovered, corresponding to a minimum number of individuals (MNI) of 8,532. Most of them were preserved by charring, but a few were mineralised. The plant assemblage is dominated by pulses (40.7 to 81.2%), whereas cereals (2.1 to 12.5% including chaff) are minor components. Due to seed fragmentation, many items could not be confidently identified. However, pulses are represented by a wide range of taxa, including lentil (*Lens culinaris*), pea (*Pisum* sp.), chickpea (*Cicer arietinum* type *kabuli*), faba bean (*Vicia faba*), bitter vetch (*Vicia ervilia*), grasspea (*Lathyrus* sp. and *L. sativus*) and Narbon vetch (*Vicia narbonensis*). The EPPNB assemblage is notably dominated by seeds of lentil, Narbon vetch and Viciaceae (*Pisum/Vicia/Lathyrus*). Further studies on potential pulse cultivation will be required. Because cereal remains were particularly damaged by charring, most of the remains could not be identified. Nonetheless, barley (*Hordeum vulgare*) and wheat (*Triticum* sp.)—including a single caryopsis of einkorn (*Triticum boeoticum/monococcum*)—were identified. Except for a few rachises of barley, cereal chaff is largely scarce and does not allow to analyse the domestication process. Despite difficulties in estimating their MNI, fruits are well represented at Kharaysin and dominated by two taxa: fig (*Ficus carica*) and pistachio (*Pistacia* sp.). Additionally, a few grape pips of the wild type (*Vitis vinifera* type *sylvestris*) and unidentified nutshell fragments were encountered. The archaeobotanical assemblage from Kharaysin does not contain many wild/weed taxa, with the highest proportion occurring in the Early PPNB levels (6.9%, n=53), potentially due to hand-picked samples. The wild category is dominated by mallow (*Malva* sp.), wild grasses and legumes (*Astragalus* sp., *Medicago* sp., *M. astroites*, *M. radiata*). In addition, the samples from Kharaysin also contain numerous fragments of amorphous residues (including potential food remains), especially in the EPPNB levels (n=2799).

ANIMAL RESOURCES

The faunal material from Kharaysin predominantly originates from the Middle PPNB layers, which have yielded several thousand bone remains, primarily sourced from building fill. The Early PPNB levels, in contrast, provided only 514 identified animal remains, characterized by a diverse range of taxa. Among these, gazelles and goats dominate (up to 66% together), while the remaining part comprises cattle (*Bos* format *primigenius*), boars, and various small game such as foxes, wild cats, hare, partridges, falcon and other diurnal raptors, as well as spur-thighed tortoise. These trends mirror those observed in the earliest occupations dated to the Late PPNA and PPNA/PPNB transitional period; namely a large diversity despite relatively modest assemblages. However, the most remarkable difference is that goats hold equal importance to gazelles in the Early PPNB levels. In contrast, they are much less frequent than gazelles in the lower levels (under 20%, less than cattle). This increase in goat frequencies becomes more pronounced during the Middle PPNB phase, coinciding with a decline in gazelles and small game. Cattle frequencies, on the other hand, remain relatively stable throughout this sequence. The presence of dogs at the site remains scarce, and definitive direct or indirect evidence is lacking (even through gnawed or partially digested bones).

The preliminary osteometric studies conducted on goat remains revealed distinct phenotypic variations between Northern and Southern Levantine populations, in which the Kharaysin goats align more closely with their southern counterparts, as in the case of Tell Qarassa (see above). Pathological observations on goat remains at Kharaysin provide insights into potential tethering or fettering practices at least during the Middle PPNB period, indicating the captivity or confinement of some goats within the village (on this topic for the Neolithic period in the Near East, see Köhler-Rollefson 1997; Zimmermann *et al.* 2018).

In conjunction with the zooarchaeological studies, our current research applies dental microwear analysis, biomolecular analyses, and sediment micromorphology to understand further phenotypical modifications, dietary changes, and evidence of herd-keeping practices within the settlement. Despite encountering challenges in the biomolecular analyses, ongoing efforts are focused on extracting collagen from better preserved contexts. Preliminary results indicate great variability in goat diets in the Middle PPNB levels (Jiménez-Manchón *et al.* 2023), largely exceeding the mean variation observed in several modern wild or domestic goat populations. This implies the occurrence of different animal groups, possibly from varying distant localities or, most plausibly, with distinct statutes, *i.e.* animals from free-ranging herds and others from human-controlled flocks. Moreover, initial sediment analysis suggests the presence of animal dung in the

Middle PPNB levels, supporting the hypothesis of small-scale herding alongside hunting practices akin to other sites in the region (Gourichon and Horwitz 2021). However, the question remains open for the Early PPNB levels.

In summary, the faunal study at Kharaysin offers valuable insights into the evolutionary dynamics of early Neolithic societies in the Southern Levant, shedding light on animal exploitation, potential husbandry practices, and environmental adaptations. Further multidisciplinary analyses are underway to deepen our understanding of societal developments during this pivotal period, and particularly for the Early PPNB.

THE CHIPPED LITHIC INDUSTRIES

To date, the studied assemblage of chipped stones from secure PPNA and PPNB contexts at Kharaysin amounts to 9,097 flint artefacts and 156 obsidian artefacts. They constitute a relatively small part of the huge number of chipped stone artefacts recovered at the site (especially in flint), which is estimated to come to about 200,000. Of the total studied, 2,704 flint artefacts and 51 obsidian artefacts belong to the Early PPNB occupation exposed in Area B, complementing previous knowledge about both the general aspects of PPNB lithics from Kharaysin (Borrell *et al.* 2019) and some specific

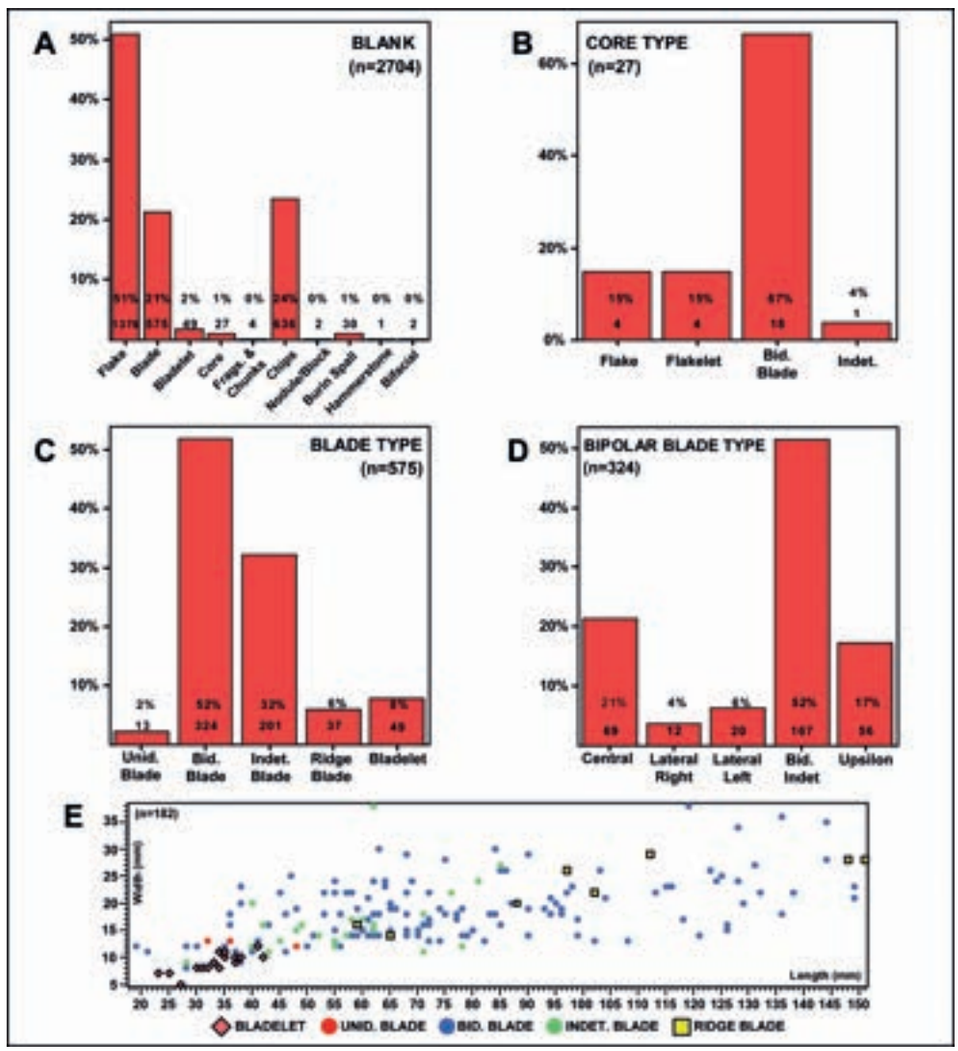


Fig. 20 – *General breakdown of the studied lithic assemblage from Kharaysin (A), core and blade types (B-D), and length and width of the complete blades and bladelets (E).*

PPNB tools (flint figurines and Nahal Hemar knives; Ibáñez *et al.* 2020; Borrell *et al.* 2022).

The majority of the assemblage is made from flint, with obsidian accounting for a very small proportion of it. Most of the Early PPNB flint artefacts were produced from two flint types: a fine-grained purple/violet flint and, secondly, a finer highly lustrous, silky often-banded flint that is quite heterogeneous in colour (mostly pink but also turning to orange, whitish or light brown). This "pink flint" corresponds to the Huweijir-type of Senonian (Campanian) age (*e.g.* Amman Silicified Limestone Formation), found in various locations across Jordan and intensively exploited at 'Ain Ghazal (*e.g.* Rollefson *et al.* 2007).

Chipped stone tool production at Kharaysin during the second half of the ninth millennium was almost exclusively oriented to obtain large bidirectional blades (fig. 20). The analysis of the bidirectional blade cores (n=18) has identified the coexistence of three variants of core configuration and initial block management: with a crested dorsal ridge (naviform; n=1), with a postero-lateral dorsal ridge (n=5) and with the back completely unmodified (n=5; fig. 21). The rest (n=7), given their fragmentary state, remain as indeterminate. The study of the bidirectional cores and blades, which includes a remarkable proportion of upsilon blades (fig. 20D), indicates that the principal scheme for producing bidirectional blades at Kharaysin was the "predetermined-upsilon" variant

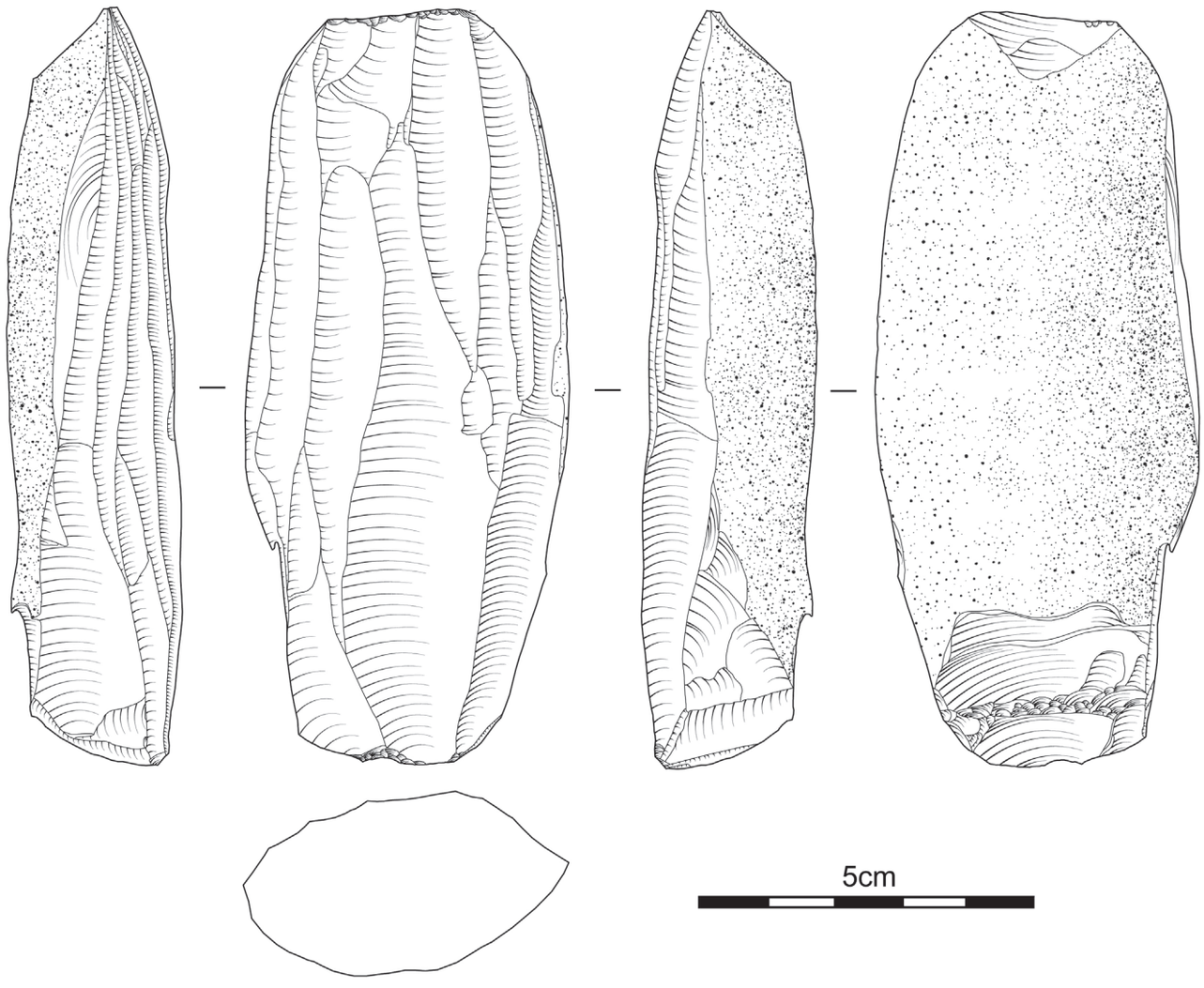


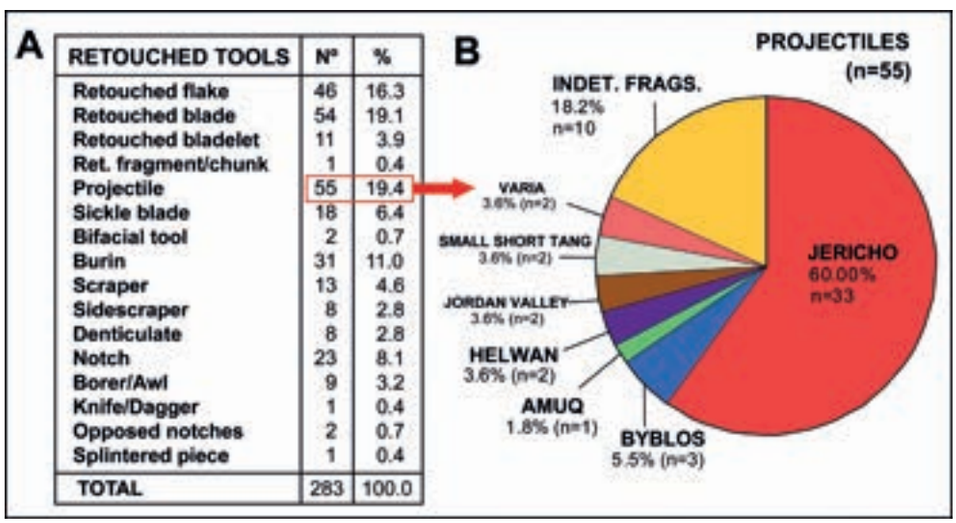
Fig. 21 – *Opposed-platform blade core with fully cortical back from the Early PPNB occupation at Kharaysin (square C55, strata 1029, nº 49957; drawing F. Borrell).*

(Barzilai 2010) or one of the superposed predetermined blade modalities defined by Abbès (2003). The four complete opposed-platform cores recovered indicate that the last central blades detached from them measured between 7.7 and 9.3 cm in length, and the size of the cores when abandoned ranged between 10 and 13 cm in total length. This suggests that the cores were relatively rapidly discarded instead of being intensively exploited and, secondly, that access to the raw materials used was easy. Most of the complete bidirectional blades range between 4.5 and 10.5 cm in length, with the largest blades measuring up to 15 cm, which is also the size of the largest complete initial frontal ridges (fig. 20E). Accordingly, bidirectional cores in their initial stage might have reached up to about 18–20 cm in length. Finally, the presence of cores, core tablets, core trimming elements, initial ridge blades and a range of bidirectional blade types (central, lateral, upsilon) of all sizes, indicates that knapping was carried out at the settlement.

The flint assemblage studied includes up to 283 retouched tools (fig. 22). They amount to 10.5% of the studied flint artefacts. Undiagnostic retouched flakes and blade/lets represent 38.5% of the retouched tool kit. The most common formal tools are projectiles (19.4%), burins (11%) and notches (8.1%). Sickle blades (6.4%), scrapers (4.6%), borers/awls/perforators (3.2%), side scrapers (2.8%) and denticulates (2.8%) appear in limited numbers. Other tools are rarely found, including bifacial tools, double (opposed) notches, a fragment of a bifacially retouched knife/dagger and a splintered piece.

Projectile points are the most common formal tools at Early PPNB Kharaysin, accounting for almost a fifth of the retouched tools (fig. 22). The vast majority of the projectiles correspond to large tanged projectiles, made from large standardized bidirectional blades of fine-grained pink or purple-violet flint. Most of them are of the Jericho type (33 out of 55) and only a few of them are Byblos (n=3), with only one pressure-flaked Amuq point (fig. 22). In addition, a small group of varied projectiles has been recovered, exhibiting notable differences in shape and size but also, in many cases, in the flint types and blade blanks used, compared to the large and standardized tanged points that dominate the studied Early PPNB assemblage. Two correspond to the Helwan type (fig. 23, n^{os} 4–5), in both cases displaying relatively short tangs, one rounded and one flat. Two other projectiles might fit quite well within the definition of PPNA Jordan Valley points given by Nadel *et al.* (1991). These two points were not produced from bidirectional blades and are very small (fig. 23, n^{o} 6). There are also two relatively small-sized projectiles (unfortunately broken, with only the proximal and medial parts preserved) which display very short tangs (one rounded and one flat; fig. 23, n^{o} 7). They have been catalogued as "small, short-tanged" points, displaying features that fall between the Helwan and Jordan Valley point types.

Burins represent the second most common retouched tool type at the site. They were indistinctively made with flakes and blades. Most of them correspond to longitudinal burins (sometimes double or triple) made on truncated blanks (whether blades or flakes; n=19), transversally made burins



RETOUCHED TOOLS	N°	%
Retouched flake	46	16.3
Retouched blade	54	19.1
Retouched bladelet	11	3.9
Ret. fragment/chunk	1	0.4
Projectile	55	19.4
Sickle blade	18	6.4
Bifacial tool	2	0.7
Burin	31	11.0
Scraper	13	4.6
Sidescraper	8	2.8
Denticulate	8	2.8
Notch	23	8.1
Borer/Awl	9	3.2
Knife/Dagger	1	0.4
Opposed notches	2	0.7
Splintered piece	1	0.4
TOTAL	283	100.0

Fig. 22 – *A. The retouched tool kit from Kharaysin; B. Breakdown of the projectile types (F. Borrell).*

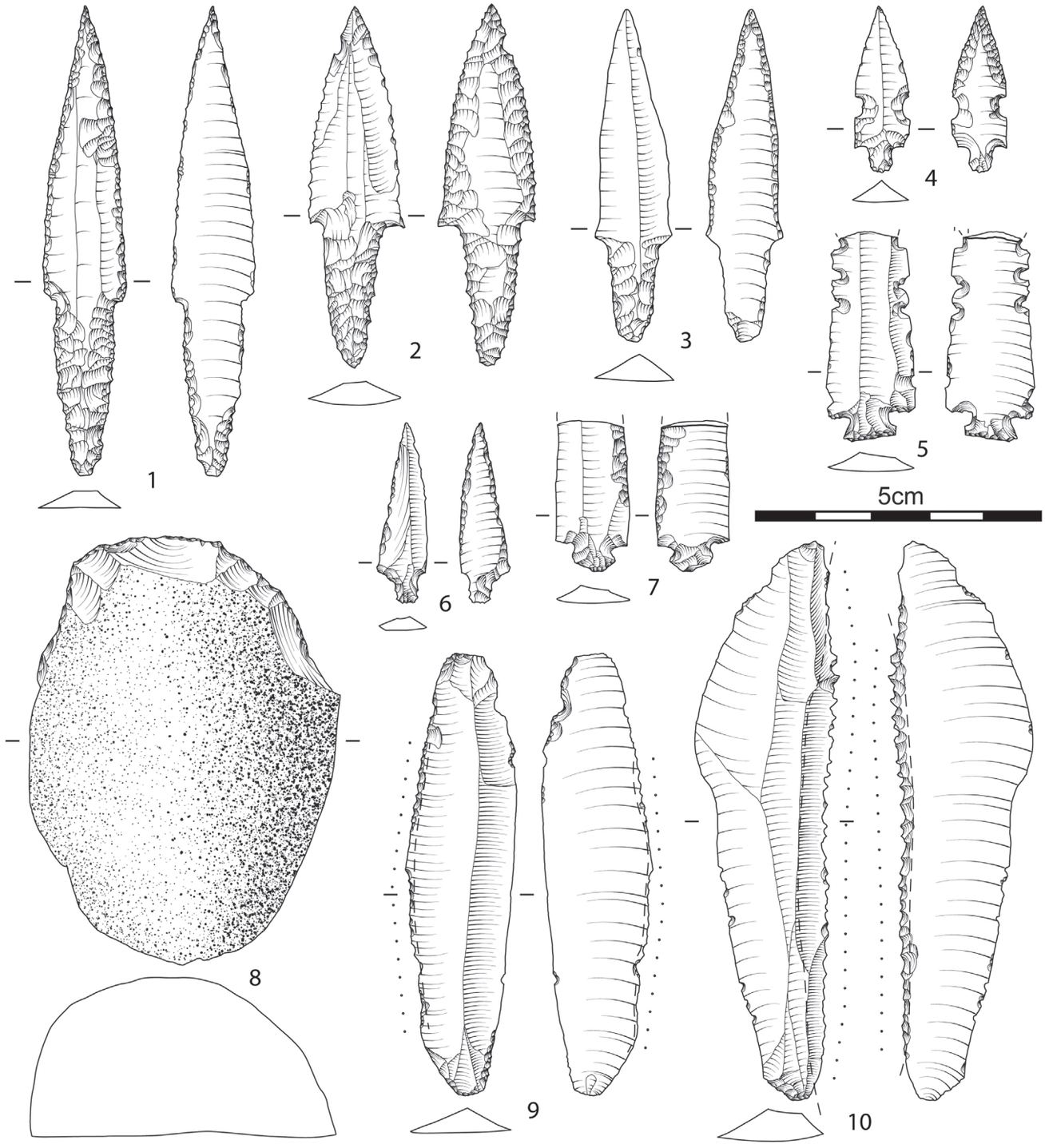


Fig. 23 – *Retouched tools from Early PPNB Kharaysin (drawings F. Borrell, S. Alon).*

(n=9) and, only rarely, dihedral burins (n=1). Notches were also made using both flakes and blades and were almost exclusively shaped with simple direct or semi-abrupt retouch.

Sickle blades (n=18) are relatively common tools at Early PPNB Kharaysin. They were made exclusively from complete large (or large fragments of) bidirectional blades. These primarily consist of central blades but also lateral and, rarely, upsilon blades (fig. 23, nos 9–10). Retouch is usually limited to the active edge of the blade, intentionally producing a slightly serrated edge with simple inverse retouch. In some cases, the active edge is not serrated but displays a non-invasive direct retouch. The active edge was not modified by retouch in only two cases. The non-active edge of the sickles and both ends of the blade remain unmodified, or display only very minor shaping or modification. Gloss usually runs parallel to the active edge of the blade, which can indistinctively be the right or left edge. In addition, sickles displaying gloss on both edges are not rare (5 out of 18). No traces of the adhesive used to fix the sickle elements of the shaft (nor in other tool types such as projectiles) have been observed at Kharaysin, no matter the occupation phase they belong to. The distribution of the gloss indicates that sickle blades were inserted parallel to the shaft, which was likely to have been slightly curved.

Borers were made from both flakes and bidirectional blades. They were roughly made and short-tipped and differ significantly in size and shape. Only one of them displays a relatively elongated tip shaped with both direct and inverse abrupt retouch. Scrapers are generally made from flakes, sometimes using large-sized thick cortical flakes (fig. 23, no 8), though some were made from blades (distal or proximal end scrapers).

Regarding the two bifacial tools recovered, one corresponds to the burnt distal part of an axe, while the second artefact is a complete nicely shaped tranchet axe made with fine-grained lustrous orangish flint (fig. 24).

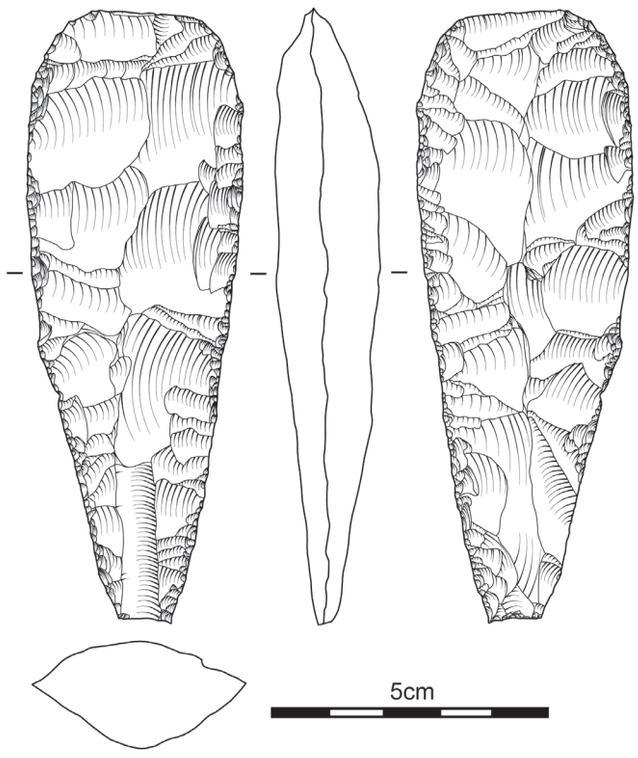


Fig. 24 – *Early PPNB tranchet axe (Square D55, Stratum 1026, no 48074) from Kharaysin (drawings F. Borrell).*

DISCUSSION

New excavations carried out in the Southern Levant during the last decade have filled the knowledge gap regarding the Early PPNB period in this area. This new information strengthens the interpretation of the Neolithic as a multi-regional process, wherein significant cultural changes were taking place simultaneously across the Fertile Crescent (Ibáñez *et al.* 2018). New research challenges are now aimed at elucidating the regional particularities of this process and determining when major cultural innovations (*i.e.* cereal domestication, animal husbandry, square architecture, large arrowheads, etc.) appeared in each region and how cultural interactions between regions took place. The excavations at Tell Qarassa North and Kharaysin offer key insights into the origins of the PPNB in the NE area of the Southern Levant, in the highlands to the east of the Rift Valley. The analysis of the radiocarbon dates of Tell Qarassa North (fig. 25) indicates that the site started to be occupied *ca*. 8600 cal. BC and was abandoned *ca*. 8200 cal. BC or a little later. The Early PPNB period, based on the information from the Middle Euphrates, is dated between 8700 and 8200 cal. BC (Aurenche *et al.* 1981). Thus, the starting date of the Early PPNB in the Southern Levant is very near to the starting date attributed to this period in the North. The radiocarbon dates of the Early PPNB occupations of Kharaysin started a bit later, *ca.* 8500 cal. BC (fig. 26). The occupation of the main area with the contemporary agglomerated buildings seems to have finished quite abruptly *ca*. 8300 cal. BC. Structure 21, superimposed to the main occupation level, was used from 8300 to 8000 cal. BC.

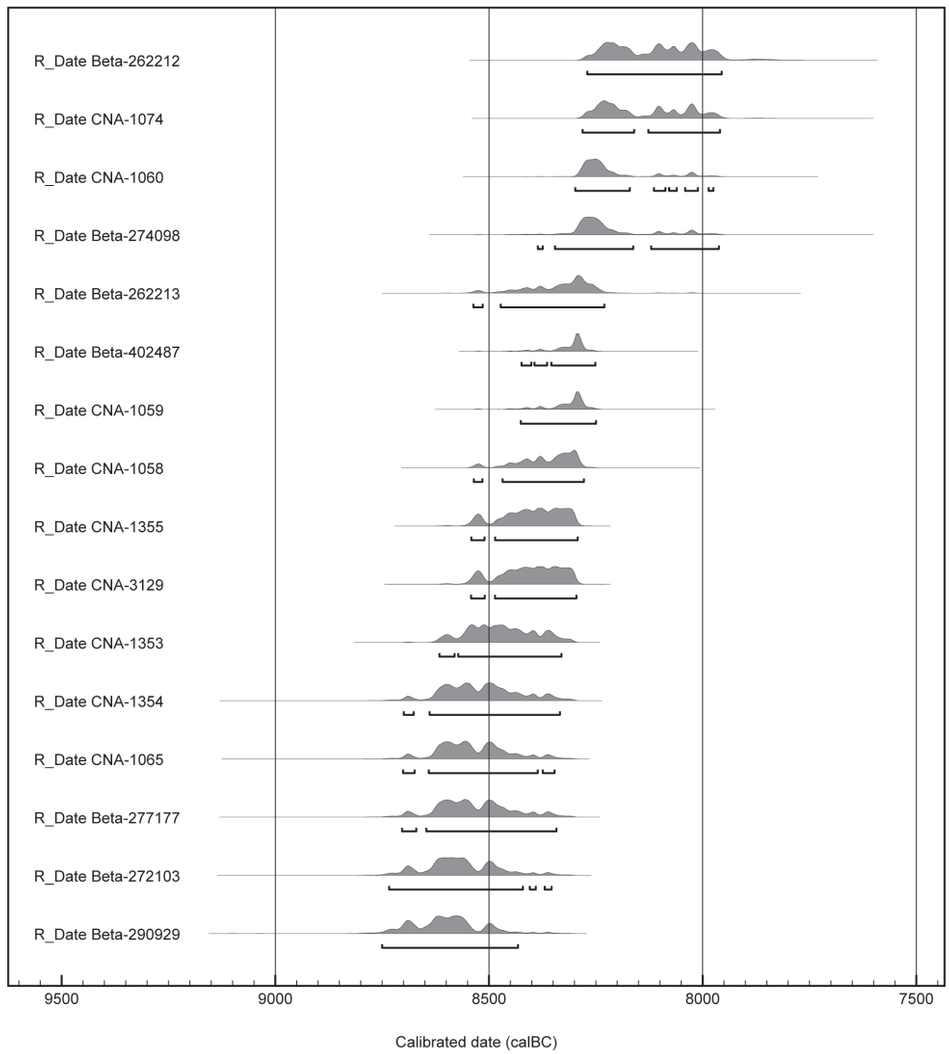


Fig. 25 – *Radiocarbon dates from the Early PPNB levels at Tell Qarassa North (L. Gourichon).*

We have identified rectilinear architecture dating to the EPPNB at both sites. At Tell Qarassa North, architecture in Area 1 consists of square or rectangular buildings with rounded corners. The rooms were covered by a roof supported by a central wood post. The houses are agglomerated, sharing intermediate walls. One particular configuration comprises a square room (Space A) with a roof, associated with an open patio (Space B) delimited by stone walls. One door gives access to the open patio from the roofed room. The presence of the door and the defined boundaries of the patio suggest that the open area belonged to the family unit living in the covered room. This architectural complex is dated to *ca*. 8500 cal. BC. Another architectural level was detected below this one. However, the shape of the building remains uncertain, as the walls from the previous level were not dismantled. Nonetheless, we documented the burnt roof, which was made with several layers of wood branches, reeds and mud, as well as the mud floor of the house and the negative impression of the central posthole. This earlier architecture is dated to *ca*. 8600 cal. BC. Interestingly, the houses and patio of the upper occupation level were reused as a funerary area when the structure was no longer in use, *ca*. 8300/8200 cal. BC. The architectural features in Area 2 are more difficult to understand due to limited excavation. Two curved walls delimit two spaces in the upper level. Although a detailed study of the archaeological material was not possible, most of the lithics were compatible with the PPNB period, while a few pottery sherds were present in the sediment filling the structure up to the floor level. We suppose

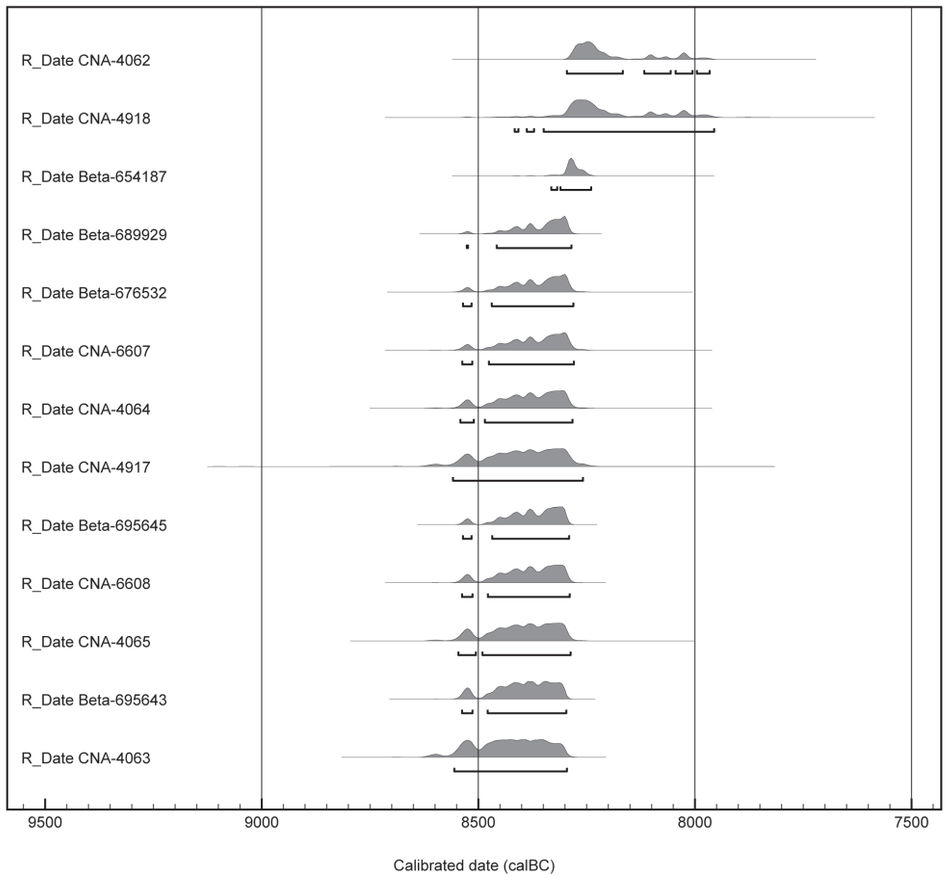


Fig. 26 – *Radiocarbon dates from the Early PPNB levels at Kharaysin (L. Gourichon).*

that the curved architectures were squatted during the Pottery Neolithic, a phenomenon observed at other PPNB sites in the Southern Levant. The reuse of abandoned domestic structures has been discovered in Basta (Gebel 2009: 41), Jericho (Kenyon 1981: 92), and Ba'ja (Gebel and Hermansen 2004: 16), from the Final PPNB to the PPNC and the Early PN. On the lower level, a larger room with two straight walls joined at a right angle was recovered. An attached small oval room with a door sealed with stone boulders contained the caches of human remains.

The architecture at Kharaysin exhibits similar characteristics. We found a cluster of agglomerated houses. Three of them (Sts. 16–17, 20) are square in shape, albeit with slightly curved walls and rounded corners. Another house (St. 19) is larger in size, featuring strictly straight walls and orthogonal corners. Moreover, while no human remains were detected in the other houses, St. 19 yielded a funerary pit and numerous human remains on the floor and inside the wall. This architectural complex, sharing intermediate walls, was partially excavated into the slope, indicating a clear spatial grouping. The larger and more elaborate St. 19 served as a repository for ancestral human bone remains. This organizational pattern, with one dominant house among several others, suggests the existence of a social organization based on communities that comprised several cells living in individual residential units (families?). This larger social unit may have been led by one unit legitimized by their control over ancestral relics. This hypothesis will be developed in forthcoming research.

Square architecture, with rectilinear walls and right angles, is documented at the beginning of the 9th millennium cal. BC, in the late phase of the PPNA, in the Middle Euphrates, such as in Phase III at Tell Mureybet (Stordeur and Ibáñez 2008) and in the upper levels of Jerf el Ahmar (Stordeur 2015). At Tell Qarassa North, square architecture is observed in the mid-ninth millennium and slightly later at Kharaysin. Thus, the rectilinear architecture appears earlier in the North than in the South, so its presence in the South may have been a cultural transfer coming from the North (Edwards 2016). At Jerf

el Ahmar, the gradual and progressive change from rounded to rectilinear architecture along the stratigraphy of the site is well documented by the second half of the 10th millennium cal. BC (Stordeur 2015). Oval architecture is observed at Kharaysin *ca*. 9000 cal. BC. At Tell Qarassa and Kharaysin, the rectangular rooms appear *ca*. 8600/8400 cal. BC as a well-defined cultural achievement. No gradual and progressive transition from oval to rectilinear architecture is documented in Southern Levant in early dates. Thus, as far as we currently know, rectilinear architecture originated in the North and was transmitted to the South during the 9th millennium cal. BC.

Some of the square buildings at Tell Qarassa and Kharaysin show slightly curvilinear walls and rounded corners. Thus, though the square surfaces are clear, the facture still exhibits the "old" style (curved walls and rounded angles). In the later MPPNB levels of Kharaysin buildings are all strictly quadrangular. These characteristics fit well with the idea of a cultural transfer from the north, including a first phase of "imperfect" transmission. However, the discovery of a transitional phase between the PPNA and PPNB at Kharaysin, dated to *ca*. 8800/8700 cal. BC, which is under study, could slightly modify this picture.

The floor of all the EPPNB houses at Kharaysin is covered with a polished lime plaster layer. The use of lime plaster was already evidenced in the Southern Levant during the Epipaleolithic, 18,000 years ago, but, at that time, it was only used as an adhesive for hafting lithic tools (Bar-Yosef and Goring-Morris 1977; Kingery *et al.* 1988: 220). Its first use in architecture is documented at 'Ain Mallaha for covering a bench-like structure (Perrot 19766 Kingery *et al.* 1988: 224) and a round pit at Nahal Ein Gev II (Grosman *et al.* 2020). On the same site, lime plaster covered several burials (Friesem *et al.* 2019). The first use of lime plaster to cover floors is known in some Early PPNB sites, *ca*. 8400 cal. BC, such as Motza near Jerusalem (Khalaily *et al.* 2007), and in Nevali Çori and Çayönü ritual buildings, in SE Anatolia (Hauptman 1997; Özdoğan 1999). Later, the widespread use of quicklime for plastering floors and walls is observed in both the Southern and Northern Levant and in Anatolia from the Middle PPNB, *ca*. 8000 cal. BC and later, at sites like Jericho (Kenyon 1981), Kfar HaHoresh (Goring-Morris and Horovitz 2007), Ain Ghazal (Rollefson 1990), Abu Hureyra (Moore *et al.* 2000), Tell Halula (Molist Montaña 2013) or Aşıklı Höyük (Hauptmann and Yalcin 2000). Possible lime kilns, as evidence of lime-plaster manufacture, were found at some sites, such as the Nesher-Ramla quarry (el-Khirbe; Toffolo *et al.* 2017) or Kfar HaHoresh (Goring-Morris and Horwitz 2007: 904) and 'Ain Ghazal (Rollefson 1990). Thus, the evidence from the EPPNB levels at Kharaysin fits well with other contemporaneous sites in both the Northern and Southern Levant. The lack of lime plaster floors at Tell Qarassa North could be related to the scarcity of local natural lime, as the site is located in the southern fringes of the Leja volcanic region.

The examination of burial practices at Tell Qarassa North and Kharaysin has yielded detailed insights into the variety of mortuary gestures and the intricate meanings embodied within such funerary customs (Santana *et al.* 2012, 2015, 2020; Ibáñez *et al.* 2020). These practices were carried out with a degree of continuity, fuelled by varied motivations such as ancestral veneration, divination, protection, conciliation, consolation, or witchcraft, among others (Kuijt 2008; Santana *et al.* 2015). These findings have facilitated reflections on the regional progression of these customs from the Natufian/PPNA to the MPPNB, and contributed fresh perspectives to the archaeological narrative. The evidence underscores parallels in burial procedures with other Pre-Pottery Neolithic sites in the Southern Levant and additional regions of the Near East. This substantiates the theory that mortuary practices are pivotal indicators for the PPNB *koine* (Goring-Morris and Belfer-Cohen 2014).

The funerary area in an abandoned house at Tell Qarassa North revealed a multi-stage burial practice involving primary and secondary burials and skull caches (Santana *et al.* 2015). The presence of funerary areas within residential zones is evident not only in the Late Natufian at Ain Mallaha in the Southern Levant but also in the PPNA of Körtik Tepe in SE Anatolia (Bocquentin *et al.* 2013; Eldar 2015). Additional evidence from various EPPNB sites in the Southern Levant supports the idea that burials were integrated into the constructed spaces of early Neolithic settlements (Khalaily *et al.* 2007; Santana *et al.* 2015). The increasing relationship between buildings and funerary practices is clearly observed in the burials inside St. 19 at Kharaysin. This example also demonstrates a more direct relationship between the living and the dead, as the burials were made when the house was in use and a wood plank covered the burial pit, suggesting that it could be opened and closed to put human remains into it. This relationship would continue during the MPPNB in the Southern Levant at sites such as Ain Ghazal (Rollefson 2000).

The results from Tell Qarassa North and Kharaysin underscore the significant role of architecture in determining burial locations. At Tell Qarassa North, abandoned buildings were used as funerary areas. In the Early PPNB level at Kharaysin, the human remains were all grouped within a single building,

while the other contemporaneous houses were not used for funerary purposes. The relationship between burials and buildings, and the associated mortuary customs, was dynamic and not uniformly fixed. The nature of the building linked with the deceased played a significant role in shaping this relationship. Interestingly, the specialized use of a building for rituals or gatherings did not always correlate with the presence of burials. For instance, non-domestic structures like those at Nevali Çori (Hauptmann 1997), Beidha (Makarewicz and Finlayson 2018), and 'Ain Ghazal (Rollefson 2000) lacked burials, whereas domestic buildings often contained them. Additionally, certain sites displayed distinct burial zones, as seen at Tell Aswad (Stordeur *et al.* 2006). This variability attests the complexity and diversity of burial practices in the Pre-Pottery Neolithic.

From the mid-9th millennium and during its second half of it, bidirectional blade-knapping was practised at Tell Qarassa North and Kharaysin. It was oriented towards the manufacture of large and standardised bidirectional blades. This production seems to have been massive, not restricted to some households or specialists, and it basically took place at the site and in its immediate surroundings. Accordingly, bidirectional blade technology was already well implanted and developed in the NE region of Southern Levant by ca. 8600 cal. BC. The first evidence of bidirectional technology is documented at Jerf el Ahmar (Stordeur and Abbès 2002 and Tell Mureybet (Abbès 2003) at the beginning of the 9th millennium cal. BC, several centuries before its use in the early occupations at Tell Qarassa North.

Most of the bidirectional blades were used to produce large tanged points of the Jericho type, as well as other tools such as sickle blades, burins, scrapers, borers, etc. At Tell Qarassa North *ca*. 8600/8300 cal. BC, projectile points are mostly of the Helwan/Aswad type, although Jericho varieties are also documented. The analysis of the gloss on sickle blades indicates the harvesting of ripe and semi-ripe cereals (Ibáñez *et al.* 2021), which fits well with the transitional nature of the cereal population, from wild to domestic (Arranz *et al.* 2016a). Obsidian artefacts represent 0.35% of the total of knapped items. The lithic industry at Kharaysin seems to be more evolved, corresponding to its slightly later developmental stage. Helwan points are marginal, compared to the abundant Jericho variety. Analysis of sickle gloss through confocal microscopy and texture analysis indicates that the cereal crops were harvested ripe, suggesting their domestic nature (Ibáñez *et al.* 2021). Obsidian represents, for the advanced phase of the EPPNB studied here, a minor part of the knapped assemblage. Nonetheless, the presence of obsidian indicates connections of both sites with the Northern Levant. The use of pairs of notches (El Khiam points) for hafting projectiles is known from the PPNA in the Southern Levant (Gopher 1994). In the Early PPNB of Tell Qarassa and marginally at Kharaysin, pairs of notches are used in tanged arrowheads (Helwan or Aswad points). The use of pairs of notches in tanged arrowheads was detected at Tell Mureybet from Phase II (Khiamian, PPNA), with the pairs of notches in the proximal zone in the older levels and in the distal zone in the later PPNA ones. At Mureybet, this kind of projectile point is in a minority compared to El Khiam points (truncated base and basal notches) in Phase II, and to the tanged (without notches) arrowheads, which are dominant in Phase III (Cauvin and Abbès 2008). Thus, the use of double notches in tanged arrowheads as a system for hafting appears in the Northern Levant earlier than in the South (Edwards 2016).

In the context of the emergence of animal husbandry, the chronological record exhibits a discernible global gradient from the Northern to the Southern Levant. However, this process is characterized by complexity and variability contingent upon the specific species under examination and likely involved multiple autochthonous events across different areas. In the Fertile Crescent, evidence reveals various phases of human control of some ungulate species, starting with the intensification in manipulation characterized by increased frequency in faunal assemblages, more focused management involving shifts in age and sex profiles, and later changes in shape and size, often resulting in size diminution.

In the Northern Levant, goat and sheep domestication was ongoing during the Early PPNB, primarily through small-scale herding practices (Peters *et al.* 2005). Conversely, both species were herded in the Southern Levant during the Middle PPNB, albeit earlier at Tell Aswad in the Damascene area (Helmer and Gourichon 2008, 2017). Genetic and archaeozoological evidence suggests that local domestication of goats occurred in both the Northern and Southern Levant (Daly *et al.* 2018; Gourichon and Horwitz 2021). Sheep in the Southern Levant likely originated from the North, as also evidenced by their arrival in a domesticated form in Cyprus by the early 8th millennium BC (Vigne 2013). Cattle husbandry appears to have been incipient in the Northern Near East during the Early PPNB period and is obvious in the Southern Levant from the Middle PPNB period onwards (Helmer *et al.* 2005; Helmer and Gourichon 2008; Sapir-Hen *et al.* 2016). Similarly, pigs were domesticated in SE Anatolia during the Early PPNB and in the Southern Levant during the Late PPNB/PPNC (Peters *et al.* 2005; Price and Hongo 2020). The transition from hunting to husbandry was neither rapid nor

uniform across the Levant, highlighting the complexity and variability of early husbandry practices in different geographical areas.

Regarding the archaeobotanical data, despite the relatively short distance between the EPPNB sites of Tell Aswad (Douché and Willcox 2018), Tell Qarassa North (Arranz-Otaegui 2011; Arranz-Otaegui *et al.* 2016a, 2016b), Kharaysin and Ahihud (Caracuta *et al.* 2015), their crop assemblages appear notably distinct. This variation likely reflects differences in the local environmental conditions (soil, temperature, rainfall) and the exploitation of available plant resources and suitable crops near the villages. It is now recognised that cereal domestication was a gradual process that started long before the Neolithic period (Purugganan and Fuller 2011; Fuller *et al.* 2014; Snir *et al.* 2015). Key domestication traits in cereals, such as the presence of significant percentages of non-shattering rachises, are first attested in the archaeological record *ca*. 8500 cal. BC in the Southern Levant, at both the sites of Tell Qarassa North (emmer, einkorn and barley) and Tell Aswad (barley and emmer). In contrast, at contemporary sites in the Northern Levant (*e.g.* Dja'de), SE Anatolia (*e.g.* Cayönü, Gusir Höyük) and the Zagros (*e.g.* Chogha Golan), only wild-type cereal scars have been documented so far (see the recent review of the available data in Arranz-Otaegui and Roe 2023). The exception seems to be Aşıklı Höyük in Cappadocia, which shows increased domestic-type emmer rachises in contexts dated to 8400 cal. BC (Ergun *et al.* 2018). The available data suggests regional disparities in the onset of cereal domestication traits, with the earliest evidence of non-shattering rachises reported so far in the southern-central Levant (Arranz-Otaegui *et al.* 2016b). However, little is known about the domestication process for other plant taxa, which may have started earlier in other regions. For example, at Tell el-Kerkh, the predominance of chickpeas and faba beans was attested around 8600 cal. BC (Tanno and Willcox 2006), and lentils were one of the primary crops at the contemporary site of Dja'de (Douché and Willcox 2018; Pichon *et al.* 2021). A few centuries later (*ca*. 8200 cal. BC), the predominance of lentils, Narbon vetch and faba beans was evidenced at Ahihud (Caracuta *et al.* 2015, 2017). In this sense, the new archaeobotanical data from Kharaysin, though preliminary, highlight the significance of legumes as food sources from the EPPNB onwards, supporting the idea of a multi-regional nature of the process of legume cultivation and domestication.

As we explained in the introduction, at the end of the 1990s and the beginning of the 2000s no Early PPNB site was clearly identified in the Southern Levant. On the contrary, the starting of the PPNB was documented in the Middle Euphrates *ca*. 8700 cal. BC (Cauvin 1997). A gap of 500 years existed between the Early PPNB occupations in the North and the first PPNB (Middle PPNB) levels in the South, dated to *ca*. 8200 cal. BC. This gap was interpreted as resulting from the tardive introduction of the PPNB culture in the South, coming from the North (Cauvin 1997; Kuijt 2003; Edwards and Sayej 2007). Since then, the gap has been shortened thanks to the discovery of some Early PPNB sites in the South, like Motza (Khalaily *et al.* 2007), Tell Aswad (Stordeur *et al.* 2010, Ahihud (Caracuta *et al.* 2017), Kfar HaHoresh (Goring-Morris 2005), or Wadi Mushash 163 (Bartl 2018), and Harrat Juhayra 202 (Fujii 2019). Some of them are extended villages of early farmers dated around 8400/8300 cal. BC, at the end of the Early PPNB, as Tell Aswad, Ahihud or Motza. The Early PPNB levels of Kharaysin would fit in this group. However, the first occupation of Tell Qarassa North, again an extended village of early farmers, is dated sometime earlier, *ca*. 8600/8500 cal. BC. This chronology makes the time distance between the North and the South even shorter, though it is still present (Edwards 2016).

Did the PPNB come from the North? The detailed analysis of the cultural characteristics of Tell Qarassa and Kharaysin in the Early PPNB shows that the cultural shift from PPNA to PPNB was not as simple as a mere acceptance of Northern culture. It is true that rectilinear architecture, bidirectional knapping and notched and tanged arrowheads appeared earlier in the North and could have been transferred to the South (but see below for discussion of new data on lithic industries in the Badia Basin). Nevertheless, one key element attributed to the PPNB culture, the domestication of cereals is attested at Tell Qarassa North and Tell Aswad in the second half of the 9th millennium. At the same time, it is not observed in the Middle Euphrates up to almost one millennium later. The precocity of the North or the South with respect to animal domestication is not so evident. However, data gathered from Tell Aswad and genetic analysis suggest that livestock resulted from a multi-regional process in which the South was also a stakeholder. Another cultural element used to characterize the PPNB, the covering of floors with lime plaster mortar, shows a long chronological itinerary in the South. It was first used for hafting in the Kebarian period (Bar-Yosef and Goring-Morris 1977; Kingery *et al.* 1988: 220), to cover some architectural elements during the Natufian (Perrot 1966 Kingery *et al.* 1988: 224; Grosman *et al.* 2020) and finally, as material to cover dwelling floors *ca*. 8700 cal. BC at Kharaysin (Ibáñez *et al.* 2015c). All this suggests that lime plaster floors were a Southern invention. As we can see, cultural influences go from North to South, but also the other way round. Thus, the

PPNB seems to be more the result of the cultural interaction of the different regions of the Levant (and beyond) than a cultural package originated in one specific region and later spread to other areas (Gebel 2004b; Ibáñez *et al.* 2018; Edwards 2024).

This transfer of cultural innovations from one region to another could have been charged with symbolic meaning. Among the dwellings of Kharaysin, only one of them shows a perfectly square shape, with orthogonal angles and rectilinear walls. As we have seen, St. 19 shows some particular characteristics (bigger size, full of human remains, burnt when abandoned…), indicating that the square morphology was reserved for special buildings. This association is not observed in the Middle Euphrates, such as at Jerf el Ahmar or Mureybet, where rectilinear houses do not show special characteristics. In fact, in the North, symbolic buildings keep the round morphology (Stordeur *et al.* 2000; Stordeur and Ibáñez 2008). Something similar seems to happen in the other direction. Lime plaster floors are used at Kharaysin in normal dwellings. However, in the North (Nevali Çori, Çayönü) symbolic buildings are covered with lime plaster (though not in the Middle Euphrates, where lime plaster floors are not observed before the Middle PPNB). Paraphrasing the title of a recent paper, local mundane becomes foreign extraordinary (Grosman *et al.* 2020).

Some excavations in the Badia region, Southern Jordan, as Wadi Mushash 163 (Bartl 2018) and Harrat Juhayra 202 (Fujii ,2019) indicate that bidirectional knapping was carried out and tanged/notched arrowheads were used in the area *ca.* 8800/8700 cal. BC. This has led to suggest that the Early PPNB started in that area in parallel and in a similar chronology to the Middle Euphrates (Fujii 2024). However, in our opinion, the presence of two elements of the PPNB cultural interaction sphere does not mean that the PPNB as a cultural package was emerging in the Badia Basin. The presence of bidirectional blade technology and tanged/notched arrowheads at an early date in Jordan shows the dynamism and connectivity of the different Neolithic communities living in the Levant (and beyond), which were able to transfer objects, people and ideas in a quick and efficient way. Genetic and isotopic evidence from humans suggests a limited role of human migration during the PPN period, as population structures persisted throughout time, and few non-local individuals are detected in the PPN sites (Lazaridis *et al.* 2016; Santana *et al.* 2021; Wang *et al.* 2023). However, isotopic data indicates that one individual from Tell Qarassa North can be categorized as non-local, likely from the Jordan Rift Valley. Therefore, the migration of mobility of certain individuals must have occurred, facilitating the creation of networks that enabled the exchange of information, goods, and occasionally, genetic material (Santana *et al.* 2021).

In this way, the PPNB can be better understood as a *cultural interaction sphere* rather than a defined culture (Bar-Yosef and Belfer-Cohen 1989). Global cultural elements and regional and sub-regional particularities are mixed, defining a complex scenario (Edwards 2024; Finlayson *et al.* 2024). For example, we have observed that Tell Qarassa North and Kharaysin show some architectural similarities that are not observed in other areas in the second half of the 9th millennium cal. BC. Sub-rectangular dwellings, partially sunken, are attached one to the other, sharing intermediate walls. That means that the general cultural trends (*i.e.* the transition from oval to rectilinear architecture) are interpreted regionally in an idiosyncratic way. In this perspective, we have proposed a complex network model for obsidian trade, in which few distant interactions are combined with more common regional and local exchanges (Ibáñez *et al.* 2015b, 2016). The complex mixture of global and particular features characterizing the transition to the Neolithic in the Near East should be understood in the frame of a network model of cultural change (Ibáñez *et al.* 2018). Different communities were innovating while sharing their novelties with their neighbours and some long-distance partners, which ensured the dynamism and the resilience of the cultural shift. We think that the transition to the PPNB took place throughout the Levant (and beyond) during the first half of the 9th millennium, though at different rhythms in different regions. If we understand the cultural change in this way, there is no need to look for where the PPNB originated as a cultural package, but how it originated and spread as a diffuse cultural interaction sphere. We should understand how Neolithic communities living in distant regions, while keeping their cultural particularities, were moving in the same direction thanks to their commitment to a complex interaction network.

4. CONCLUSIONS

Over the past fifteen years, new excavations have steadily filled the gap in our understanding of the Early PPNB period in the Southern Levant. The excavations conducted at Tell Qarassa North and Kharaysin have provided information about this crucial period in the NE region of the Southern Levant, *i.e.* the Syrian Leja and the Jordan Highlands. The occupations at Tell Qarassa North covered from 8600 to 8100 cal. BC, while the EPPNB occupations at Kharaysin are

dated between 8450 and 8300 cal. BC. Both sites show some of the key characteristics of the PPNB cultures, such as the rectilinear architecture, the use of lime plaster to cover the floor (notably at Kharaysin), the transition to plant domestication and, most probably, the beginning of animal herding. Additionally, bidirectional blade technology and large tanged arrowheads (Borrell *et al.* 2019) are present, alongside complex funerary customs (Santana *et al.* 2015), including the manipulation of human remains, and the intensification in human iconography (Helmer *et al.* 2004; Stordeur 2010; Ibáñez *et al.* 2014b, 2020). However, regional peculiarities can be observed in architecture. At both sites, houses are grouped together, sharing intermediate walls, while the buildings still possess rounded corners. Plant exploitation practices differed between the two sites, with Tell Qarassa emphasizing cereal consumption during the transition to domestication (Arranz-Otaegui *et al.* 2016b), while legumes were dominant at Kharaysin. The environmental study at Tell Qarassa suggested that human occupation in the course of several centuries might have affected the surrounding plant cover (Arranz-Otaegui *et al.* 2017). The presence of a prominent house among the clustered houses at Kharaysin raises the possibility of a social organisation comprising supra-familiar groups, possibly centred on a family unit that held social legitimacy provided by an ancestor cult.

The analysis of the Early PPNB occupations at Tell Qarassa North and Kharaysin gives us information about the origins of the PPNB in the Southern Levant. At the end of the last century and the beginning of the current one, the PPNB was considered as a culture that originated in the Middle Euphrates *ca*. 8700 cal. BC, which spreads as a cultural package to the Southern Levant five centuries later. The discovery of several sites with Early PPNB occupations (Ahihud, Kfar HaHoresh, Tell Aswad) in the South nuanced this interpretation, showing that the PPNB culture was already present in the South *ca*. 8400/8300 cal. BC. The Early PPNB levels of Kharaysin can be attributed to this group of sites. The early occupations of Tell Qarassa North, dated to *ca*. 8600 cal. BC shortened the chronological gap between the Northern and the Southern Levant in the Early PPNB. More importantly, the analysis of both sites in their regional contexts indicates that the PPNB was not a culture coming from the North. In fact, some of the PPNB characteristics (*i.e.* rectilinear architecture) could come from the North, while other important achievements (*i.e.* cereal domestication) would originate earlier in the South. Thus, we think that the PPNB was set up as a global and multi-regional phenomenon during the first half of the 9th millennium cal. BC all along the Levant and beyond. This was possible because cultural innovations were quickly transferred to other regions through a complex network of interactions among Neolithic villages. Thus, the PPNB should be defined as an interaction sphere (Bar-Yosef and Belfer-Cohen, 1989) more than a homogeneous culture. In this way, both the PPNB cultural homogeneity and regional variability can be better explained.

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