

Cultural hybridity in central and southern Jordan at the end of the Pre-Pottery Neolithic A

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Abstract. Our understanding of the transition from the PPNA to PPNB in central and southern Jordan has undergone significant changes in recent decades. Initially, it appeared that the PPNB arrived in the region fully formed during the Middle PPNB, expressed at sites such as Beidha. Yet, it retained features like circular architecture associated with the PPNA, and thus presumed to indicate a time lag in its arrival from the north, where such structures had largely disappeared by the Middle PPNB. Fieldwork has uncovered a rich PPNA record in Jordan, but a marked cultural gulf between the PPNA and PPNB remains visible, for example visible in the contrast between *pisé* semi-subterranean PPNA architecture and the aboveground stone PPNB buildings, and in the appearance of naviform technology in PPNB chipped stone repertoires. Ongoing research has narrowed this gap, documenting a shift from semi-subterranean *pisé* constructions to circular free-standing stone structures during the Late PPNA, as well as the cessation of el-Khiam point manufacture and the emergence of an opposed platform blade technology that appears to echo parallel EPPNB developments in chipped stone technology. There is no chronological gap between the Late PPNA and the Middle PPNB, and it appears that this central and southern Jordanian Late PPNA is an indigenous trajectory that developed into a local Middle PPNB while simultaneously adopting further external influences such as true naviform technology. However, recent work on the western edges of the *badia* has identified a fully developed Early PPNB roughly contemporaneous with Late PPNA settlements in the adjacent wadi systems to the west. Out of sync with local developments, this Early PPNB presence suggests the arrival of a distinct group in the western *badia* who maintained their identity, adding to the mix of local, already highly diverse early Neolithic communities of central and southern Jordan. Interactions between these populations continued and through a process of cultural hybridisation formed the characteristic Middle and Late PPNB of the area.

Keywords: Pre-Pottery Neolithic, Jordan, el-Khiam point, cultural hybridisation

Résumé. Notre compréhension de la transition entre le PPNA et le PPNB dans le centre et le sud de la Jordanie a significativement évolué au cours des dernières décennies. Initialement, le PPNB était perçu comme complètement développé lors de son arrivée dans la région au cours du PPNB moyen, ce dont témoigneraient des sites comme Beidha. Ce PPNB ayant cependant conservé des caractéristiques associées au PPNA (architecture circulaire par ex.), il a été supposé qu'il s'agissait d'un décalage chronologique dans son arrivée depuis le nord où de telles structures avaient largement disparu au PPNB moyen. Les fouilles ont permis de souligner l'importance du PPNA en Jordanie, pour autant une rupture culturelle marquée entre le PPNA et le PPNB restait visible comme dans le contraste entre l'architecture semi-souterraine en pisé du PPNA et les bâtiments en pierre du PPNB, ainsi que dans l'apparition du débitage naviforme dans les répertoires lithiques du PPNB. Les recherches actuelles ont permis d'atténuer cette rupture en documentant le passage des constructions semi-souterraines en pisé aux structures circulaires en pierre, isolées les unes des autres, au PPNA récent, ainsi que l'arrêt de la production de pointes d'el-Khiam et, finalement, l'émergence du débitage laminaire à plates-formes opposées qui semble faire écho aux développements parallèles de l'industrie lithique au cours du PPNB ancien. Par ailleurs, il n'y a pas d'écart chronologique entre le PPNA tardif et le PPNB moyen, et il semble que ce PPNA récent de Jordanie centrale et méridionale suive un développement local au cours du PPNB moyen, tout

en adoptant des influences externes telles que le débitage naviforme. Cependant, des travaux récents menés sur les bords occidentaux de la *badia* ont permis d'identifier un PPNB ancien développé, approximativement contemporain des installations du PPNA récent situées immédiatement à l'ouest, dans un système d'oueds. En décalage avec les développements locaux, la présence du PPNB ancien suggère l'arrivée d'un groupe distinct ayant conservé son identité dans la *badia* occidentale, ajoutant encore au mélange des premières communautés néolithiques locales, déjà très diversifiées, du centre et du sud de la Jordanie. Les interactions entre ces populations se sont poursuivies et, par le biais d'un processus d'hybridation culturelle, ont formé le PPNB moyen et récent caractéristique de la région.

Mots-clés: Néolithique pré-céramique, Jordanie, pointe d'el-Khiam, hybridation culturelle

1. Introduction

The early Neolithic of the Levant has been divided into two main cultural phases since Kenyon's work at Jericho, the Pre-Pottery Neolithic A (PPNA) and the Pre-Pottery Neolithic B (PPNB) (Kenyon 1957). The PPNB was subsequently divided into three chronologically distinct phases, an Early, Middle and Late (Bar-Yosef 1991). Further fieldwork led to the clear identification of a transitional Early PPNB phase between the PPNA to PPNB in the northern Levant.

This Early PPNB, regarded as a key developmental stage between the PPNA and PPNB, was long thought to be either completely absent in the southern Levant or of uncertain attribution, as at Jilat 7 in Jordan (Garrard and Byrd 1992; Kuijt 2003; Edwards et al. 2004). This had a significant impact on how we understood the PPNA-PPNB transition, with Kuijt questioning its place in any "culture-historical framework" (Kuijt 2003: 18) and Gopher arguing for a cultural sequence that ran a few hundred years later in the South than the North (Gopher 1994). The recognition of a clear Early PPNB phase at the site of Motza, near Jerusalem (Khalaily et al. 2007) changed this situation and made the previously somewhat controversial chronological assignation of other southern Levantine sites as EPPNB more acceptable. Meanwhile, the identification of a distinctive Late PPNA in the rift margins of central and southern Jordan suggested that the continuing absence of identified Early PPNB sites in this part of the southern Levant might be the result of a different local historical trajectory rather than a cultural stagnation (e.g., Edwards et al. 2001; Finlayson et al. 2014; Smith et al. 2016; Finlayson and Makarewicz 2017a).

However, the role played by the Late PPNA in transitioning from PPNA to Middle PPNB remained open to debate, with Edwards arguing that the Late PPNA ended at 8600 cal. BC, approximately the same date as the Early PPNB first appeared at Motza, based on dates from Late PPNA Zahrat adh-Dhra' 2 in the Jordan Valley. Edwards proposed that the Early PPNB arrived late in the southern Levant, and subsequently rapidly replaced the Late PPNA (Edwards 2016). This accords with recent dates for the EPPNB at Kharaysin on the Zarqa River and the general pattern of dates for Early PPNB material west of the Jordan (Borrell et al. 2019). In contrast, dating for the Late PPNA phase at WF16, southern Jordan, provided a range of 8800-8250 cal. BC (Wicks et al. 2016; Smith et al. 2019), suggesting greater longevity for this period and that it continued in parallel with Early PPNB material cultural traits present elsewhere in the southern Levant (fig 1).



Fig. 1 – Map of key Late PPNA, Early PPNB, and Middle PPNB sites discussed in the text.

Further evidence indicating Late PPNA and Early PPNB communities were contemporaneous with each other comes from radiometric determinations from Harrat Juhayra 202 and Museemite 163, located in the western margins of the Jordanian *badia*, each yielding Early PPNB lithic material, showing a very Early PPNB presence at 8900 or 8800 cal. BC (Fujii et al. 2019; Rokitta-Krumnow 2019), contemporary with the occupation of Zahrat adh-Dhra' 2. In combination, the chronological evidence from the rift and *badia* margins shows that the Late PPNA and Early PPNB have a similar start date, and that the Late PPNA continues until the Middle PPNB, possibly even overlapping with it (table 1). For example, new and revised dating evidence from Shkarat Msaied and Beidha demonstrate that the distinctive southern Jordanian Middle PPNB, notable for its circular architecture, commenced at around 8300 cal. BC (Kinzel 2013; Finlayson et al. 2014; Finlayson and Makarewicz 2018; table 1). The Jordanian northern highlands, as seen at Kharaysin, has a different, perhaps more clearly successional trajectory from the Early PPNB that results in a more classic Middle PPNB characterised by rectilinear architecture, similar to that of the 'Ain Ghazal Middle PPNB. However, there is no Early PPNB at 'Ain Ghazal, and the earliest dates there could suggest a chronological overlap with the Early PPNB at Kharaysin (Jacobsson 2019). Meanwhile, our admittedly limited Early PPNB dataset from central and southern Jordan is currently all dated to the early part of the 9th millennium, chronologically this might even hint that the Early PPNB occupation here is relatively short-lived and does not continue to the Middle PPNB. Elements of continuity in material culture, especially the naviform flint technology, however, suggest this is unlikely and is more likely a factor of limited chronological evidence. The complexity of this emerging picture requires a re-evaluation of the processes of cultural change in central and southern Jordan and of its relationship to the northern Levant.

Table 1 – Selected PPNA-MPPNB dates.

	Uncalibrated determination	Lab code	Cal. BC (95% probability)	Material	Assigned period	Reference
Zahrat adh-Dhra' 2	9635 ± 59	Wk-9633	9240–8823	Charcoal	Late PPNA	Edwards et al. 2004 (noted that some material is from branches and twigs of <i>pistacia</i> sp.)
	9552 ± 59	Wk-9445	9182–8747	Charcoal		
	9603 ± 59	Wk-9447	9221–8801	Charcoal		
	9623 ± 91	Wk-9568	9256–8765	Charcoal		
	9323 ± 59	Wk-9444	8746–8349	Charcoal		
	9528 ± 61	Wk-9570	9158–8657	Charcoal		
	9490 ± 50	OZE-605	9125–8638	Charcoal		
	9440 ± 50	OZE-606	9114–8572	Charcoal		
	9470 ± 50	OZE-607	9121–8625	Charcoal		
WF16 T3	9870 ± 40	Beta-192529	9312–9212	Charcoal	Late PPNA	Wicks et al. 2016
	9140 ± 40	Beta-209010	8536–8276	Charcoal		
	9950 ± 40	Beta-192531	9663–9296	Tamarix		
	9180 ± 50	Beta-135110	8547–8288	Charcoal		
WF16 O91	9650 ± 50	Beta-290709	9260–8490	<i>Chenopodiaceae</i> , juvenile	Late PPNA	
Hurrat Juhayra	9440 ± 40	Unknown	9109–8617	Unknown	Early PPNB	Fujii et al. 2019
	9520 ± 40	Unknown	9126–8658	Unknown		
	9530 ± 40	Unknown	9134–8736	Unknown		
	9500 ± 40	Unknown	9122–8641	Unknown		
Mushash 163	9450 ± 50	Unknown	9118–8566	Unknown	Early PPNB	Rokitta-Krumnow 2019
	9480 ± 50	Unknown	9121–8627	Unknown		
	9320 ± 50	Unknown	8734–8354	Unknown		
	9390 ± 50	Unknown	8801–8547	Unknown		
Motza EPPNB	8965 ± 45	RTT 4577	8281–7970	Charcoal	Early PPNB	Khalaily et al. 2007
	8995 ± 35	RTT 4753	8290–7991	Human bone		
	8890 ± 45	RTT 4579	8240–7842	Charcoal		
	9085 ± 30	RTT 4865	8320 -8247	Charcoal		
	9100 ± 30	RTT 4751	8418 -8251	Bone		
	9130 ± 30	RTT 4749	8438 -8278	Bone		
	9150 ± 35	RTT 4866	8459–8284	Charcoal		

	9200 ± 40	RTT 4867	8543–8300	Charcoal		
	9210 ± 25	RTT 4752	8538–8314	Bone		
	9310 ± 30	RTT 4750	8638–8465	Bone		
	9050 ± 80	TO 11711	8527–7968	Charcoal		
	9170 ± 80	TO 11712	8602–8257	Charcoal		
	9870 ± 90	TO 11710	9756–9180	Charcoal		
Jilat 7	8390 ± 80	OxA-2413	7586–7192	Charcoal		Garrard et al. 1994
	8520 ± 110	OxA-527	7937–7311	Charcoal		
	8810 ± 110	OxA-526	8226 -7611	Charcoal		
Beidha	8546 ± 100	P-1379	7937 -7351	Nut	Middle PPNB	Finlayson and Makarewicz 2018
	8640 ± 50	GrN-5063	7784–7578	Nut		
	8646 ± 69	AA-14109	7938–7551	Amino acid from ovi-caprid femur		
	8640 ± 160	K-1083	8234–7371	Charcoal		
	8760 ± 50	Poz 67013	8166–7606	Oak		
	8720 ± 150	K-1412	8233–7545	Charcoal		
	8770 ± 50	Poz 67011	8170–7609	<i>Pistacia</i> sp		
	8720 ± 50	Poz 67010	8170–7609	Oak		
	8715 ± 100	P-1378	8201–7582	Charcoal		
	8710 ± 130	K-1082	8216–7570	Nut		
	8770 ± 150	K-1411	8252–7581	Oak		
	8850 ± 150	K-1410	8286–7599	<i>Juniperus</i> sp		
	8830 ± 70	AA-13036	8229–7686	Nut		
	8810 ± 50	GrN-5136	8206–7722	Charcoal		
	8860 ± 50	Poz 67014	8224–7795	Oak		
	8940 ± 160	K-1086	8463–7604	Oak		
	9128 ± 103	P 1380	8633–7992	Charcoal		
Shkarat Msaied	8880 ± 80	Aar 9335	8253–7751	<i>Ephedra foemina</i>		Kinzell 2013
	8885 ± 70	Aar 9337	8250–7761	Juniper		
	8977 ± 60	Wk 15159	8291–7964	Charcoal		
	9144 ± 55	Wk 15160	8540–8270	Charcoal		
	9590 ± 90	Aar 9336	9249–8739	Juniper		
el-Hemmeh	9450 ± 60	OS 48491	9120 -8570		Late PPNA	

The presence of two apparently distinct, but contemporaneous, material culture traditions in different parts of central and southern Jordan between 8900 and 8200 cal. BC, an indigenous Late PPNA and a presumably incoming Early PPNB, now seems uncontroversial with the two traditions ultimately merging into a distinctly local expression of the Middle PPNB in the South. Within the current recognition of regional diversity across the wider Southwest Asian Neolithic, this adds a new dimension of complexity to the broader picture. So far, discussions of these different traditions have all been based on an assumption that the expression of the Early PPNB in the southern Levant represents incoming people and, by implication, that the southern Late PPNA represents indigenous people, without much critical assessment of the relationship between flint technologies and cultural groups. This assumption is underscored by numerous models that variously described the arrival of a fully developed Early PPNB (Fujii et al. 2019), Helwan point as time-transgressive and thus not reliable chronological markers (Edwards 2016), the potential role of émigré cultures at Motza (Edwards et al. 2004), and the mechanisms for the arrival of PPN material culture in Arabia (Crassard et al. 2013). How indigenous and exogenous groups interacted with each other and, in particular, how this interaction led to local developments within the Neolithic, provides an additional window into the dynamic processes of change that characterise this period. The normal Neolithic sequential progression of PPNA, followed by Early PPNB, then by a Middle PPNB, clearly does not work, even with a North-South delay in the sequence as proposed by Gopher (Gopher 1994: 255, fig. 8.3); these Neolithic traditions are not chronologically discrete, but represent different, and temporally overlapping traditions. What these traditions represent, of course, also requires careful consideration. Previous work has demonstrated the diverse expressions of the PPNA in this region (Finlayson and Makarewicz 2017a) and we are wary of an overly simplistic assumption that chipped stone tools represent ethnic groups. Given the highly heterogeneous PPNA background, we believe it is important to consider whether the various traditions present in central and southern Jordan—the Late PPNA, Early PPNB, and Middle PPNB—are really homogeneous, and to examine how the different traditions may have interacted.

2. The material culture entities of the early Neolithic of central and southern Jordan

2.1. The Late PPNA

The Late PPNA has been identified and described at three sites, Zahrat adh Dhra' 2, WF16, and el-Hemmeh, all in Jordan. Zahrat adh Dhra' 2 represents a short-lived habitation site near the Dead Sea, occupied after the PPNA site of Dhra' was abandoned (Edwards and Higham 2001). WF16 lies at the junction of Wadis Ghuwayr and Dana and was occupied through the entire PPNA (Mithen et al. 2019). el-Hemmeh, located high in the Wadi el-Hasa, is a Late PPNA site with a later Late PPNB occupation phase (Makarewicz et al. 2006; Makarewicz and Rose 2011). Although Zahrat adh Dhra' 2 was abandoned earlier than el-Hemmeh and WF16, much of the Late PPNA of southern Jordan appears to correspond to the same period as the Early PPNB (8900-8300 cal. BC) elsewhere. Importantly, this means not only that the Late PPNA was contemporaneous with the Early PPNB and was not culturally isolated from wider Neolithic developments, but also that it continued until the emergence of regionally distinctive Middle PPNB sites in both the south and north of Jordan.

Late PPNA chipped stone assemblages are characterised by a near absence of points, all of which, including the el-Khiam points that are diagnostic of the PPNA, disappear from the tool inventory. The only exceptions are a few atypical Jordan Valley points at Zahrat adh Dhra' 2 and a few equally atypical Salibiya points from el-Hemmeh. There are also changes in core reduction technology, with increased attention on blade production, increased use of opposed platform cores, and concern for core maintenance, alongside a growing preference for high quality flint (Smith et al. 2016, 2019). WF16 so far provides the best sequence through the entire PPNA in southern Jordan, being the only Late PPNA site also represented by an Early PPNA occupation. Preliminary analysis of the WF16 material shows continuous evolution of chipped stone technology and typology through the PPNA with the gradual *in situ* development of the Late PPNA chipped stone industry. Although the chipped stone has been separated into distinct phases (A, B and C, with C the clearest exemplar of the Late PPNA) for analytical purposes, it appears clear that these are on a continuum, especially in terms of the shift in raw material and increased focus on blade production. The final assemblage at WF16 shares many similarities with both the Late PPNA material from el-Hemmeh (Smith et al. 2016) and, to a lesser degree, that from Zahrat adh Dhra' 2 (Sayej 2004).

In all these LPPNA assemblages, projectile points are rare (1.1% of the retouched tools at el-Hemmeh, 0.7% at Zahrat adh Dhra' 2, and entirely absent from assemblage C at WF16). Notably, where points are present, they take atypical forms; classic el-Khiam points on bladelets are absent from all three assemblages. Indeed, the majority (8/11) of points at el-Hemmeh take the form of small distal portions of bladelets that are only modified through retouch at the base (Smith et al. 2016). In terms of technology, both the assemblage from el-Hemmeh and assemblage C at WF16 include components made on fine-grained raw materials that are targeted for careful production of bladelets from well-prepared and maintained cores. At WF16, the increased use of fine-grained materials and core preparation/maintenance, together with an increase in evidence for opposed platform blade/let production, stand in contrast to earlier assemblage. However, these Late PPNA assemblages are far from homogeneous. For example, burins are rare at Zahrat adh Dhra' 2 (0.8%) but are defining features of the Late PPNA at both el-Hemmeh (13.2%) and WF16 Assemblage C (8.76%). Similarly, whereas bitruncations are an integral part of the Zahrat adh Dhra' 2 and el-Hemmeh assemblages (3.7% and 2.2% of retouched tools, respectively), they are entirely absent from Assemblage C at WF16 despite having been plentiful (2.13%) in earlier phases at the site (Smith et al. 2019). Overall, the emerging picture suggests that whilst all three Late PPNA assemblages share some features (most notably the lack of el-Khiam points manufactured on bladelets) considerable technological and typological variability exists during this period in the rift margins of Southern Jordan.

The Late PPNA is also characterised at all three sites by a shift in architecture, away from semi-subterranean elliptical structures to free-standing circular buildings, coupled with increased use of stone over mud as the main construction material. At both Late PPNA WF16 and Zahrat adh Dhra' 2, there is no evidence for the specialized architecture characteristic of the Early PPNA, although at each site there appears to have been one larger, possibly communal building. The much greater diversity of architecture at el-Hemmeh, including one structure with a dense array of mortuary installations, shows greater continuity with the preceding PPNA (Makarewicz and Rose 2011).

Overall, the Late PPNA represents a distinctive regional phase of the PPNA that fills the period between Early PPNA and Middle PPNB and provides evidence of local paths of change (Finlayson et al. 2011a, 2011b; Finlayson and Makarewicz 2017a). This is also reflected in the subsistence strategies pursued at different settlements. For example, goats, likely ibex, were intensively hunted at WF16 (trench 3; Carruthers and Dennis 1997), while at el-Hemmeh a diverse variety of ungulate species, small mammals, and birds were targeted including gazelle, goats, aurochs, foxes, hare, chukar and raptors (Makarewicz, unpublished data). The very small faunal assemblage from Zahrat adh Dhra' 2 indicates a variety of taxa were exploited (Edwards et al. 2004).

2.2. The Early PPNB

The Early PPNB is best known from a range of sites in the northern Levant, where it was defined primarily on techno-typological analyses of chipped stone assemblages. Here, there is an evolution from a final PPNA industry, identified through detailed analyses of core reduction technologies, that was focused on the removal of predetermined blades from opposed platform cores. This final PPNA is transitional between the PPNA and Early PPNB (Stordeur and Abbès 2002; Abbès 2008). This gradual local transition appeared in stark contrast to the end of the PPNA in the southern Levant where the Early PPNB was originally thought to be completely absent. In this context, the end of the PPNA in the south was understood to be marked by a rather rapid and abrupt transition from largely unidirectional and *ad hoc* PPNA core reduction techniques to the bidirectional naviform core-based Middle PPNB industries. When the Early PPNB was finally securely confirmed in the southern Levant at Motza, it was understood as arriving both late and fully formed (Khalaily et al. 2007). This simply pushed the abrupt replacement of PPNA by the PPNB back in time and had relatively little interpretative impact on assumptions that the development of the PPNB in the southern Levant was driven by northern Levantine developments, quite possibly even the movement of people. It did, however, make the previously somewhat controversial chronological assignation of other southern Levantine sites as Early PPNB more acceptable (in Jordan, Jilat 7; Garrard and Byrd 1992).

Since the discovery of Motza, other Early PPNB sites have been identified in Jordan. At the site of Harrat Juhayra 202, dated to 8900-8600 cal. BC (Fujii et al. 2019), the chipped stone technology

is based on a single platform pyramidal and opposed platform tabular blade/bladelet cores, but also includes naviform cores. 70% of the tools are small projectile points, dominated by Helwan points (52%), with el-Khiam points (including double notched forms seen by Gopher as transitional between el-Khiam and Helwan [Gopher 1994]) the second most common type. Both these point types are made on unidirectional and bidirectional blanks. There are also small tanged-points, which may herald later MPPNB developments. In contrast to the naviform cores and Helwan points, the presence of tranchet axes suggests continuity or rapid appropriation from a southern Levantine PPNA tradition (a possibility supported by a typical PPNA groundstone assemblage geared more towards pounding than grinding). The excavated structures at Harrat Juhayra 202 include a stone-built circular building, windbreak, and a rock-cut cistern, the former typical of the use of stone in both Late PPNA and Early PPNB, the cistern being entirely novel. A single rejuvenation of the floor in the building and the homogeneous character of artefactual material throughout all the excavated layers suggests occupation of the site was short-lived. Harrat Juhayra 202 appears to be entirely Early PPNB in character throughout its occupation. The predominance of projectile points suggests the site may have been predominantly a hunting base, but there also is evidence for woodworking and plant cultivation (Fujii et al. 2019).

Mushash 163, also dated to 8900-8600 cal. BC, has been identified and described as a PPNA to EPPNB transitional site (Tvetmarken and Bartl 2015). There is evidence here of a local developmental sequence, rather than the transfer of a fully formed Early PPNB (Rokitta-Krumnow 2019). At Mushash 163, bidirectional technology is present from the earliest layers, including naviform cores in the lowest excavated layers dated to ca. 8900 cal. BC, but increasing in frequency over time. Point types at Mushash remain dominated by el-Khiam points throughout its occupation, although Helwan points appear in the upper layers (Rokitta-Krumnow 2019). Double-notched el-Khiam points are again present. Interestingly, the el-Khiam points at Mushash 163 are all made on unidirectional blanks, perhaps suggesting that el-Khiam point manufacture here is firmly based in earlier PPNA technologies, unlike the Helwan points which are made on large bidirectional blades. Therefore, it seems clear that material culture change here stems from local or internal developmental paths with the appearance and increase in frequency of Early PPNB traits over time representing an external influence or appropriation. In contrast to Harrat Juhayra 202, at Mushash 163, the groundstone assemblage contains grinding tools. At least two architectural phases are present and the architecture of Mushash is formed of semi-subterranean structures, where the excavated pits are lined with upright stone slabs supporting additional stone courses.

The radiocarbon dates from Harrat Juhayra 202 and Mushash 163 suggest these sites were occupied early in the Early PPNB, contemporaneous with the Late PPNA phase in the rift margins of central and southern Jordan (Fujii et al. 2019; Rokitta-Krumnow 2019). The Early dates of these Early PPNB sites make it clear they are not a late arrival of exogenous Early PPNB that immediately preceded a local transition to the Middle PPNB, as hypothesised by Edwards (2016) for Zahrat adh Dhra' 2 and Motza. However, despite their near-identical dates and an overlap of EPPNB traits, especially Helwan points and naviform cores, the two sites show considerable differences from each other, indicating yet more local variation. For example, Mushash 163 has a clear technological developmental sequence, while Harrat Juhayra 202 appears Early PPNB from its inception, although the presence of tranchet axes suggests some local influence. Architecturally, the sites also differ one from the other with Mushash having relatively shallow semi-subterranean structures with a PPNA character, while Harrat Juhayra is characterised by free-standing circular stone architecture, more like the indigenous Late PPNA. Rokitta-Krumnow notes that the differences between Harrat Juhayra 202 and Mushash 163 do not point to a simple Early PPNB immigration and raises doubts regarding a unidirectional diffusion. In sum, this Early PPNB presence does not appear to represent a short-lived transitional phase, or the eventual arrival of the Early PPNB from the northern Levant as part of an externally generated PPNA-PPNB transition.

The apparent sharp demarcation between the Late PPNA and the Early PPNB, suggested by the highly visible and potentially emblematic Helwan point and its underpinning bidirectional naviform core technology, may be overstated by our focus on this limited typological selection—especially when the range of diversity in lithic technology, groundstone tools, and architecture present within both the Late PPNA and Early PPNB are accounted for. Fujii has suggested that one of the

problems in identifying Early PPNB sites in Jordan is that they are not homogeneous and often lack definition. However, his proposal that the Early PPNB should be restricted to assemblages dominated by Helwan points would exclude Mushash (Fujii et al. 2019). If the groundstone assemblages at the two sites were prioritised however, their cultural designation might be reversed. While this opposition between chipped and ground stone toolkits reaffirms the problems of Early PPNB heterogeneity, focusing on the Helwan point to define the Early PPNB has further ramifications. Edwards argues that Helwan points disappeared in the northern Levant at the end of the PPNA, and are a transgressive feature, appearing later in time towards the South (Edwards et al. 2004). More recent radiocarbon dates, especially those from Harrat Juhayra 202, show that this is not the case for their appearance (Fujii et al. 2019), although Helwan points do continue in use in the South after ceasing to be made in the North and they may simply not be a very precise chronological marker.

In the North, at Tell 'Abr 3, the PPNA ends ca. 9050 cal. BC, when it is followed by a transitional PPNA-Early PPNB phase (Yartah 2013). The two early southern sites place Early PPNB material back to 8900 cal. BC, chronologically a better match with what is happening in the North, and before geographically in between sites, such as el-Kherkh, seem to develop an Early PPNB phase (Tsuneki et al. 2006). Both new Jordanian sites suggest that the Early PPNB appears early in Jordan, at a similar time to when it appears in the middle Euphrates region. While Mushash 163 shows a process of local change and development, with an Early PPNB character developing out of its initial PPNA occupation, the limited dates available so far suggest that this happens in parallel to the appearance of a more complete EPPNB at Harrat Juhayra 202.

How did the Early PPNB arrive in Jordan, and how did it get there so early? Fujii proposes an eastern migration route for the movement of Early PPNB people southwards, both to account for the presence of sites there and the rapid appearance of the Early PPNB. This might be explained by the movement of people down the arid margins of the region in order to bypass or leapfrog around existing settled PPNA landscapes to the west and filling an empty landscape facet. In this way, these Early PPNB sites may have occupied a geographical niche largely underutilised or unexplored during the PPNA, moving Neolithic occupation further into the arid margins of Jordan, an impression perhaps supported by the innovative cistern at Harrat Juhayra 202 (Finlayson and Flohr 2023). This may also explain the dominance of points at Harrat Juhayra 202 and its potential role as a hunting site. If this were the case, then it is possible that the Early PPNB represents the adoption of technologies that allowed the installation of (semi-sedentary) hunting base camps in areas that had previously been inaccessible.

If sites like Harrat Juhayra 202 represent hunting stations, then Jebel Queisa may be another Early PPNB example from even further south in Jordan (Henry 1995). Jebel Queisa is a small site with only 20 tools. This tool assemblage is dominated by retouched pieces and points, including three Helwan points and a Hagdud truncation and the site was interpreted by Henry as an early Neolithic hunting station. Technologically, the assemblage is focused on the production of blades from opposed platform 'wedge-shaped' cores (the published images and descriptions suggest these may be a form of naviform core). This evidence might indicate a functional role for the Early PPNB as representing specialist arid land hunting camps, a hunting facet of pre-Middle PPNB occupation, where the difference between Late PPNA and Early PPNB was purely functional, not cultural. However, the Late PPNA does not lack evidence for hunting, or even projectile points. For example, several of the truncated 'Salibiya' points from el-Hemmeh include examples with impact fractures indicating use as projectile armatures.

Rokitta-Krumnow (2019) also notes the role of the eastern Jordanian desert in this Early PPNB expansion. While it is tempting to interpret this in terms of movement into a new environmental niche, this is likely an oversimplification. Both Jilat 7 and Mushash 163 are in locations where there was likely a seasonal abundance of run-off water. PPNA occupation at Shubayqa illustrates that PPNA people were both present in this landscape and exploiting its seasonal abundance (Richter et al. 2016). Despite limited direct palaeoenvironmental evidence, Jordanian topography suggests that while rainfall may have been greater than today in the west and north during the early Holocene, the distribution of rainfall is unlikely to have extended much further east and west than today (Jones et al. 2019, 2022). In this context, only Mushash is located sufficiently north and west that it may have received more direct rainfall from the Mediterranean system during this period.

The presence of PPNA Harrat Juhayra 205, close to Early PPNB Harrat Juhayra 202 actually shows this *badia* margin was not a brand-new niche occupied during the Early PPNB. Furthermore, the presence of a cistern and basalt groundstone tools at Harrat Juhayra 202 supports an interpretation that this was not a simple hunting camp, and that exploitation of this marginal zone was being enhanced.

The fact that EPPNB technological features evolve over time at Mushash 163 implies that there must be an alternative, or at least additional, explanation to the rapid arrival of incomers from the North. Even at Harrat Juhayra 202, the presence of tranchet axes suggests at least some continuing local influences and interaction. We have, in line with general usage, described sites with proper naviform technology and Helwan points as Early PPNB, and sites with simple bidirectional cores and a decline in el-Khiam points as Late PPNA. The prioritisation of chipped stone technology in distinguishing between Early PPNB and Late PPNA is not arbitrary as it reflects a considerable shift in knapping practices and skills. While bidirectional cores adopted within Late PPNA practices may superficially emulate naviform technology, naviform technology itself is sophisticated, less amenable to copying, and would require considerably greater effort or social contact to learn. The Helwan points associated with Early PPNB occupation in the *badia* are generally made on naviform products and are a part of the same specific technology that probably developed in the middle Euphrates region at transitional PPNA/Early PPNB sites such as Jerf el-Ahmar (Stordeur and Abbès 2002). However, there is no single material culture package present at either the Early PPNB sites with early dates or the Late PPNA sites. Helwan points may appear early, late, or not at all, core technology varies, and groundstone toolkits seem to vary fairly independently of the chipped stone. The specific technologies present on an individual site—from Late PPNA WF16 at one end to Early PPNB Harrat Juhayra 202 at the other suggests a complex web of different degrees of interaction between communities over time.

Further south, Jebel Qattar 101 (Crassard et al. 2013) in northern Arabia has both el-Khiam and Helwan points (amongst other tool forms, as it is an open-air palimpsest site with multiple periods represented), suggesting possible PPNA and Early PPNB occupations, or just the latter. At first glance, this might support the notion of further expansion of Early PPNB hunters southwards. However, the *chaîne opératoire* of the points is different from that seen at other Early PPNB assemblages, with no evidence for bidirectional core reduction of tool blanks. This suggests a transfer of style and the emulation of emblematic tool forms, rather than a movement of knappers and their way of making things (Crassard et al. 2013). Jebel Qattar 101 is located far from the Jordanian sites (fig. 1), but the material suggests yet another, albeit different, level of interaction between groups similar to the cultural hybridisation that we have described in Jordan.

In northern Jordan and also west of the Jordan River, the Early PPNB appears to have emerged slightly later, around 8500 cal. BC. At Kharaysin it appears to arrive complete with distinctive sub-square architecture (Borrell et al. 2019), while at Motza there is evidence for PPNA continuity—similar to that seen before at Mushash 163 with the manufacture of el-Khiam points, some with double notches, and a scarcity of naviform material except in one cache and in some formal tool types (Khalaily et al. 2007). While at Kharaysin this might indicate the arrival of new migrants from the North, at Motza the material could indicate the movement of an already formed hybrid PPNA/Early PPNB from the Jordanian highlands.

2.3. The Middle PPNB

In order to understand the roles played by Late PPNA and Early PPNB in the transition to the MPPNB, we have to consider the Middle PPNB as expressed within southern Jordan. To date, the Middle PPNB is only sparsely represented in the area, principally by the sites of Beidha and Shkarat Msaied, although there is a Middle PPNB presence in the Jafr, and the site of Ghwayr 1 has yielded radiocarbon determinations consistent with Middle PPNB dates. The southern Middle PPNB as expressed at Beidha and Shkarat Msaied is distinctive from that found in the north Jordanian highlands at sites like 'Ain Ghazal and Kharaysin, most notably in the continued use of circular architecture in its earliest phases.

The Neolithic occupation at both sites commences around 8300 cal. BC, perhaps even earlier (table 1) and is characterised as Middle PPNB. These dates may seem early in light of the standard chronology for the southern Levant, which has the MPPNB commencing around 8100 cal. BC

(Barzilai 2010) but are similar to the earliest extent of calibrated dates from 'Ain Ghazal in northern Jordan (from a posthole in the basal clay at the site, so not well situated in the site stratigraphy and statistically marginal; Rollefson 1998; Jacobsson 2019). In general terms, both Beidha Phase A and Shkarat Msaied have architectural features that appear to evolve from local Late PPNA building practices. These include the use of circular architectural forms, featuring massive stone walls with slots inset on their interior faces that held wooden posts, presumably for roof supports. While the buildings are semi-subterranean, they are largely free-standing judging by their entrances and steps that are not deeply inset into the ground. The ring of posts serving as roof supports are reminiscent of structural features at Early PPNA Dhra', combined with the free-standing stone building techniques developed in the Late PPNA, and the massive wall of object 100 at WF16. The roof collapse found at Shkarat Msaied is almost identical to that found at object 45 in WF16 (Kinzel et al. 2011), while the mortuary structure at el-Hemmeh also has parallels with Shkarat Msaied. There are internal features, such as mud-plaster moulded hearts, that are also evident in the Late PPNA. There are parallels to the communal buildings of the middle Euphrates PPNA-PPNB transitional site of Jerf el-Ahmar in the middle Euphrates (Roux et al. 2000), and it may be that there are echoes of that northern building tradition in southern Jordan, but differences too, not least that this style of building is restricted to communal buildings in the North, where it is also found far more deeply inset into the ground, with much less massive mud-brick, rather than stone, walls.

As in the Late PPNA, there is little evidence for architectural specialisation in the Middle PPNB, although in common with Zahrat adh Dhra' 2 and WF16 Phase 3, there are distinctly larger buildings present that may serve communal functions, continuing PPNA traditions (Makarewicz and Finlayson 2018). Strikingly, at Beidha, the Phase A communal building is for the most part built using the same construction techniques as all the other buildings constructed during that phase. This contrasts with distinctive construction styles employed for communal buildings in the PPNA in southern Jordan, a pattern also seen for sites supporting a PPNA transition to the Early PPNB on the Euphrates (Makarewicz and Finlayson 2018). Shkarat Msaied also has evidence for an upper floor in one circular building, prefiguring the two-storey rectangular architecture that subsequently develops at Beidha, where occupation continues for longer. At Beidha, there is a dynamic sequence of architectural developments, especially in the shift to rectilinear architectural forms that, on the basis of chipped stone and radiocarbon evidence, occurs entirely within the Middle PPNB (Purschwitz 2017). At Ghwair 1, there appear to be different traditions present, with a sub-circular agglutinative architecture, perhaps more reminiscent of Nahal Issaron, followed by a rectilinear, two storeys, 'big-house' architecture, which falls more closely within the southern Jordanian Late PPNB traditions (Gebel et al. 2006; Simmons and Najjar 2006).

The chipped stone assemblages of both Shkarat Msaied and Beidha consist of typical Middle PPNB opposed platform and naviform technology, producing long, regular blades (Barzilai 2010). The general trend to opposed platform cores is foreshadowed by both Late PPNA and Early PPNB technologies, although the naviform technology comes from the Early PPNB tradition. Notably, Beidha has both el-Khiam and Helwan points present (Mortensen 1970). Before the Early PPNB was identified in Jordan, this seemed a strangely 'backward step' after points had largely disappeared in the Late PPNA, but their simultaneous presence can now be interpreted as something inherited through Early PPNB knapping traditions present in the southern Levant.

3. Cultural Hybridity

Edwards' suggestion that incoming Early PPNB people may have behaved as an émigré culture (Edwards 2016) accepts the basic premise that two cultures are interacting—the endogenous PPNA, and potentially exogenous Early PPNB groups who bring with them novel traits that will go on to become standard in the Middle PPNB. However, one of the constant characteristics of early Neolithic Jordan in the Neolithic is the diversity among all sites, regardless of their assignment to cultural phase (Finlayson and Makarewicz 2020). The émigré paradigm assumes the arrival of an immigrant population within a larger indigenous population—conceivably applicable to the context being discussed by Edwards at Motza, but less likely at Harrat Juyhara 202, where only a single small PPNA encampment (Harrat Juyhara 205) is present to represent an earlier population. We suggest that a different paradigm may be more appropriate in this context, one that neither relies

on a simple developmental path, nor that accepts that the classic phase categories represent a straightforward picture of two cultural entities or ethnic groups.

If we accept that there are multiple points of origin for development in the Neolithic and an interplay of ideas and innovation readily visible in material culture, it may be appropriate to move away from the idea of successional cultural development and consider the ideas of cultural hybridity that have been developed in postcolonial studies. These have been developed precisely to escape from a culturally hegemonic world to recognise the importance of local diversity within globalising forces (Frello 2012). Hybridity has been used to counter taken-for-granted essentialist ideas of culture in postcolonial theory (Frello 2012), which seems like an appropriate approach to escape from simplistic approaches to PPNA and Early PPNB cultures.

Although cultural hybridity has been deployed to study contexts with unequal relationships, such as diversity within the Roman Empire and relationships between imperial powers and non-state actors (Gardner 2013), in its original application hybridisation was intended to escape such subaltern colonial relationships and look at the mutual impacts involved in relationships, or at the very least the subversion of the powerful (Silliman 2015). Unbalanced relationships have been part of traditional reconstructions of Neolithic expansion, as the koine grew with settlement spreading from the middle Euphrates (Cauvin 2000). While such linear processes are not so clear-cut in a decentered Neolithic (Ibañez et al. 2018), we have not really replaced how we understand the operation of such decentred influences. Our recognition of diversity within the globalising forces of the Neolithic koine suggests that hybridisation might provide a constructive approach to considering how different communities interacted and blended in the Neolithic where connectivity need not be geographically limited (with long distances being traversed, for example, by social 'short cuts' in obsidian exchange [Ibañez et al. 2016]). Cultural hybridity also provides an antidote to ideas of linear development, where farming lies above hunting and gathering, and the debate occurs in terms of thresholds successfully crossed (see critique in Zeder 2011).

Hybridisation in Frello's sense requires a shift in the way we think of our categories, which cease to be bounded archetypes, with transition only occurring at the boundaries. They are reformed and re-expressed within an ongoing process of hybridisation. Naviform flint knapping technology is adopted from external influences starting from its development in the middle Euphrates area, introduced at Harrat Juhayra and later at Kharaysin, gradually adopted at Mushash (with a similar adoption later at Motza), and emulated within a local and developing tradition of bidirectional flint knapping. The apparently anachronistic re-emergence of the el-Khiam point at Beidha is not because people suddenly remembered how to make them, but rather because they had continued to be made within an Early PPNB knapping tradition throughout the transition from the PPNA. Similarly, new caprine species are adopted during the Middle PPNB, but at Beidha within a long-standing local PPNA tradition of wild caprine herd management (Finlayson and Makarewicz 2020). The circular architecture of the earliest Middle PPNB in southern Jordan is not an anachronistic expression arising from the slow movement of ideas south from the north, but something locally specific that has evolved within a process of hybridisation and keeps on evolving.

Hybridity provides alternatives to acculturation or assimilation, concepts of colonizer and colonized, by allowing for cultural creativity and agency, and emphasizing the heterogeneity that is visible in the early Neolithic. Every site in our transitional period appears different—it is not a matter of delayed take up of changes between north and south as illustrated by Gopher (Gopher 1994: 255, fig. 8.3)—nor of identifying what are Late PPNA and what are Early PPNB traits: these are mixed and matched fluidly. The Helwan point is neither a cultural marker, nor time transgressive. Rather than identifying a 'fully fledged' Early PPNB as an archetypal pure form of culture, and no longer seeking boundaries between cultures, hybridity allows for considerably more fluidity and ambiguity; surely important aspects of a multi-centric, or uncentred Neolithic world. Hybridity is not a means to describe stable outcomes, end points, or the production of 'mixed' societies, but to understand relationships and transformations of different cultural groups. These are not simply about adaption and adoption, but how introductions are assimilated and absorbed and act to change societies—or not. There may be attempts to assert identity, reinforced by feelings of loss of identity where a distinctive item such as the Helwan point might be stressed in such a context as an expression of a more self-conscious self-identity, or could be recreated in emulation using a different technology. But these would exist in a process of hybridization, emphasising transformation, change and

creativity, rather than moments of transition to a mythical end point (Silliman 2015). The hybrids that are constantly being recreated exist in the spaces between our categorisations, which seems a useful space to locate our diverse Late PPNA and Early PPNB communities. As such, we disagree with Edwards' call for new taxonomic labels (e.g. southern EPPNB; Edwards 2004: 54) on the basis that émigré cultures represent new 'reconstituted' cultures. The hybridity emerging is neither static nor consistent—new labels would simply proliferate without number, or at least to a number very similar to the number of individual sites. There is no 'western *badia* Early PPNB' nor a single static southern Late PPNA, rather a dynamic flux. The labels, neither functioning as cultural-historical markers, nor sharply defined, only really work as a fuzzy shorthand. The southern Middle PPNB appears to flow out of this flux, but never stops moving—with current interpretations of Beidha suggesting that the entire architectural development sequence from circular to rectilinear occurs within the Middle PPNB as defined by its chipped stone (Purschwitz 2017).

4. Conclusion

We recognise that while multiple pathways through the Neolithic are widely acknowledged, in most cases they are still understood in terms of local homogeneity forming a mosaic within a more heterogeneous region. Despite widespread agreement regarding a regionally diverse Southwest Asian Neolithic that includes multiple points of innovation (e.g., Rollefson and Gebel 2004; Ibañez et al. 2018), our terminology still reflects simple linear narratives that identify origin points and subsequent region dispersal of ideas and innovations. The commonly used terminology of PPNA, EPPNB, MPPNB, and so on, implies a sequence of cultural steps, and even within the multi-regional mosaic of the aceramic Neolithic of Southwest Asia there is a residual acceptance that everyone has to go through all the stages – even if some people are quicker than others. The idea that the aceramic Neolithic has some basic cohesion before considerably greater diversity develops in the late Neolithic remains strong, even though early Neolithic diversity has always been acknowledged and reflected by the use of the term koine to describe this world. Within the early Neolithic, community identities would likely have been constructed at different scales represented by individual settlements, provinces and regions, cross-cutting and overlapping with one another (Finlayson and Makarewicz 2017b, 2020). In this paper we have briefly summarised the evidence for local continuity, regional contact, interaction and diversity in central and southern Jordan between the PPNA and PPNB, and argue against stable, bounded, homogeneous types of early Neolithic.

We have previously also argued that the main cultural break within southern Jordan, in terms of settlement distribution, architectural form, and technology, might have been between the Middle PPNB and the Late PPNB around 7200 cal. BC (Finlayson and Makarewicz 2017a). However, given that the entire architectural development sequence at Beidha, from circular to pier houses, may occur within the Middle PPNB, that suggestion may no longer be valid. Equally, Edwards' recent proposal regarding the late arrival of Early PPNB facilitating a transition to the Middle PPNB, has already been disproven by new excavations and dates. These suggest the early arrival of people with developed Early PPNB flint technology, presumably from northern Syria, who rapidly began to borrow some local traits while their own technology was adopted, adapted and emulated to varying degrees by local populations. The mixture of southern and northern practices and techniques is highly diverse from site to site and within individual site sequences. However, the problem lies not so much in new data. Rather, it becomes clear that our assignation of categorical labels may be the problem. This has relevance for how we understand the complex development of the Neolithic, which does not consist of a sequence of homogeneous cultural entities, but is a process of hybridization, with innovations emerging throughout Southwest Asia and being picked up, adapted, adopted, or rejected. Hybridity is relevant for understanding a Neolithic world, countering essentialist ideas that reduce the PPNB world to a single Neolithic package with a common developmental sequence.

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