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THE FORMATION OF EARLY NEOLITHIC COMMUNITIES IN THE CENTRAL ZAGROS: AN 11,500 YEAR-OLD COMMUNAL STRUCTURE AT ASIAB

Summary. *Communal buildings have been reported from a number of early Neolithic sites from the Levant and Anatolia, but none were known from the central Zagros. Here we report on the recent excavations at Asiab, Kermanshah province, Iran, and argue that the principal feature found during Robert Braidwood's excavation at the site in 1960 should be interpreted as an example of a communal building. We discuss the results of the previous and recent excavations, highlight the key features of this building, and the implications for our understanding of the early Neolithic in the 'eastern wing' of the Fertile Crescent.*

INTRODUCTION

Structures interpreted as communal or special buildings have been excavated at a number of tenth to ninth millennia BCE settlements in south-west Asia. Although this general term refers to a range of building types they are often considered special either because their architecture differs from other buildings at the same site or because they are associated with unusual deposits, graves or installations with artistic and symbolic content. While the tower and walls of PPNA Jericho (Kenyon 1959; Kenyon and Holland 1981) and the large communal building O75 at Wadi Faynan 16 (Finlayson *et al*. 2011; Mithen *et al*. 2011) represent the earliest known communal building projects in the southern Levant, circular subterranean buildings are attested from a number of late PPNA sites in the Upper Euphrates, such as Jerf el-Ahmar (Stordeur 2000; Stordeur *et al*. 2000), Mureybet (Cauvin 1977) and Abr' 3 (Yartah 2004; 2005). Large communal buildings are also known from several aceramic Neolithic sites in Anatolia, including Nevalı Çori (Hauptmann 1988), Çayönü (Braidwood *et al*. 1981; Schirmer 1990) and of course Göbekli Tepe (Schmidt 2000; 2010; 2012). In the Taurus-Zagros arc and Upper Mesopotamia buildings at Hallan Çemi (Rosenberg 1994; Rosenberg *et al*. 1995; Rosenberg and Redding 2000), Qermez Dere (Watkins 1990) and Nemrik 9 (Kozłowski and Kempisty 1990) have also sometimes been referred to as special buildings. Despite architectural differences in these communal building projects, many

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archaeologists are in agreement that these structures were a key feature of tenth to ninth millennia BCE societies in south-west Asia, which were in the process of developing novel food procurement practices, namely plant cultivation and the management of animals (Watkins 1990; Goring-Morris and Belfer-Cohen 2003; Watkins 2004b; Goring-Morris and Belfer-Cohen 2008). Not only did the construction of these buildings require a communal effort, they also provided loci for social engagements of larger groups of people, regardless of whether their ultimate purpose was as a space for meetings, ceremonies, ritual activities, storage, food preparation, living spaces or a combination of these (Watkins 2004b; Kornienko 2009; Banning 2011; Finlayson *et al*. 2011; Mithen *et al*. 2011; McBride 2015). Some scholars have seen the emergence of these buildings as an expression of ideological changes that underlay the switch from a hunter-gatherer to a farmer mindset or worldview (Watkins 2004a; 2004b; 2005). One of the most prominent, but also most critiqued, interpretations of these buildings is that they reflect the emergence of distinct ritualistic, quasi-religious practices in societies that were in transition from hunting and gathering to agriculture (Cauvin 2000; 2002; Verhoeven 2002; Zeder 2011; Wengrow 2011; and papers in Hodder 2018). The beginning of the Neolithic in south-west Asia saw the agglomeration of larger social groups in particular locales in the landscape, resulting in an archaeological signature of larger and denser sites. It has been argued that such agglomerations required social groups to develop new means of social interaction to resolve conflicts, manage common resources and make communal decisions (Watkins 2005; 2008). This new scale of interaction would have required spaces in which these engagements could be performed and enacted. Thus, many communal buildings may have been manifestations of stages through which emergent forms of social interaction were channelled and focused. Banning (2011) has however urged caution with the interpretation of buildings as ritual spaces in the past, since the mundane and ritual sphere cannot be straightforwardly separated in many non-western societies. He suggested, for example, that even though some buildings were elaborated by distinct features and artworks that this does not necessarily imply that they were ritual or religious buildings.

Although recent research has begun to highlight the eastern Fertile Crescent, and in particular the central Zagros region, as an area in which important changes in human-plant and human-animal relationships can be observed in the early Holocene (Zeder 1999; Zeder and Hesse 2000; Matthews *et al*. 2010; Darabi *et al*. 2013; Riehl *et al*. 2013; Darabi 2015; Weide *et al*. 2018), how this region fits into broader regional patterns in the Neolithization process is still debated. This is partially due to the different pace and intensity of research in this region compared to others. Although goat management occurred in the ninth millennium in the high central Zagros, the onset of plant cultivation appears to have followed a different pathway than elsewhere (Arranz-Otaegui *et al*. 2016; Weide *et al*. 2018). Little is still known concerning the social structure of societies during the tenth–eighth millennia BCE in the central Zagros, and how it relates to the economic changes inherent in the adoption of plant cultivation and animal management (Darabi 2016). Genomic data (Broushaki *et al*. 2016; Lazaridis *et al*. 2016) and lithic evidence (Kozlowski 1994; 1999; Nishiaki and Darabi 2018) suggest that there was little interaction between transitional or early Neolithic groups in the eastern wing of the Fertile Crescent and those in the Levant. These data suggest that on some levels populations had little contact with each other, yet new ways of interacting between humans, plants and animals, as well as other ideas and forms of knowledge, did travel across the region.

Here we report evidence for a likely communal building at the mid-tenth millennium BCE site of Tapeh Asiab, located near Kermanshah in the central Zagros. It is the first instance of an early Neolithic communal building reported from this region. We first summarize the work previously undertaken at the site by Bruce Howe as part of Braidwood's expedition to the Iranian Zagros, before describing the results of our more recent work at the site. We then discuss the interpretation of the structure at the site as a communal building and its implications for our understanding of early Neolithic societies in the central Zagros.

TAPEH ASIAB: PREVIOUS WORK

Asiab is situated at *c*.1300 m above sea level on the east side of the Qara Su river atop a 5 m-high Pleistocene river terrace, about 0.5 km south of the village of Bijaneh and around 0.7 km distant from the modern outskirts of Kermanshah (Figs. 1 and 2). The later Neolithic settlement of Sarab is located *c*.1.5 km to the north. Asiab was first identified and then excavated during the 1959–1960 field season of the Braidwood expedition to Iranian Kurdistan. The two-week long excavation was carried out in early 1960 and was directed by Bruce Howe under Braidwood's overall supervision (Braidwood 1960; 1961; Braidwood *et al*. 1961; Howe 1983). Only brief summaries of the excavations were published (Howe 1983, 115–17), and only a few photographs from those excavations are available. While no plan of the excavation areas or trenches was published, Howe wrote that the site extended over ~20000 m^2, of which 130 m^2 were exposed in a series of smaller and larger trenches (Fig. 3). The two main areas measured 6 x 8 m and 4 x 10 m, but only the first was excavated to virgin soil. Howe reported the depth of deposits over virgin soil to be between 2.5–3 m and described these as a 'chaotic jumble' of worked flint and other stone, animal bones, ash, freshwater clam shells and burnt rock. Howe mentions only one distinct change in colour (from grey to tan-grey lower down) through the entire sequence. At the base of the 6 x 8 m area, one quarter of a circular feature dug into the virgin soil and measuring 8–10 m in diameter was

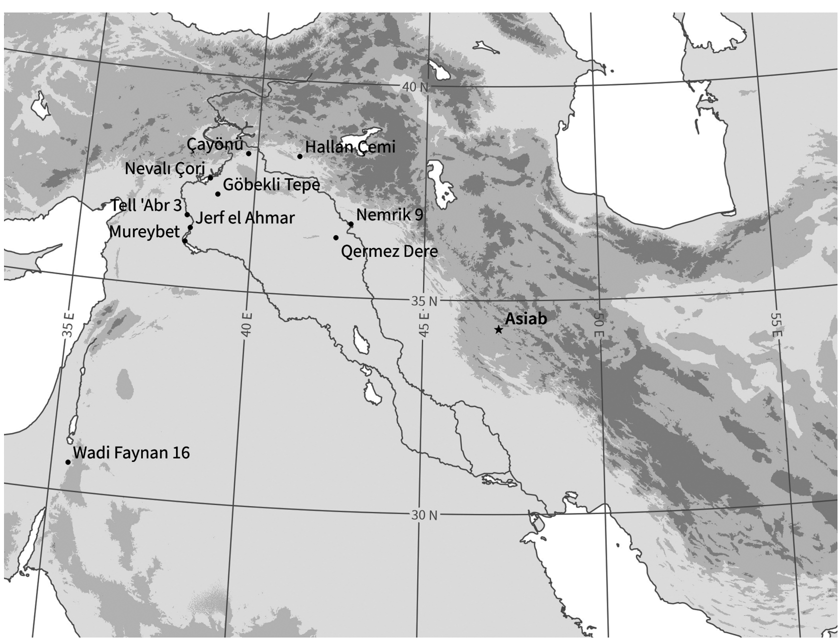

FIGURE 1
The location of Asiab in relation to other early Neolithic sites mentioned in the text.

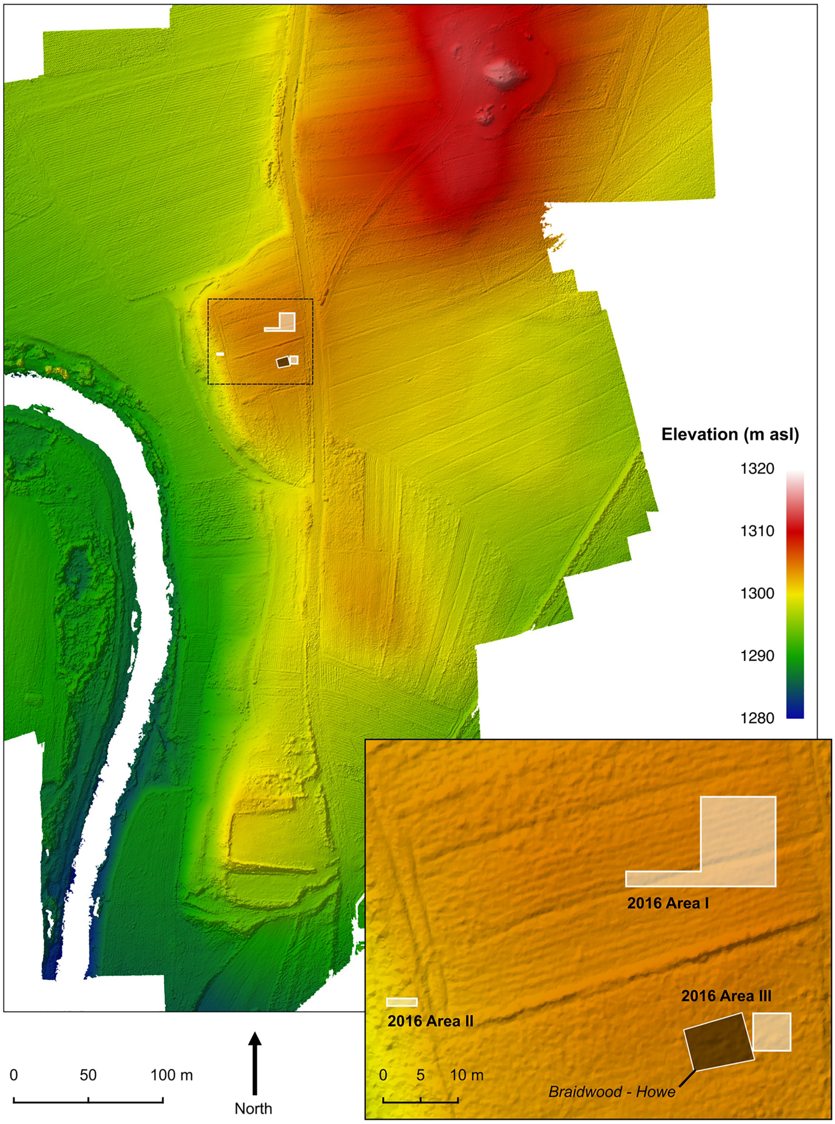

FIGURE 2
Digital Elevation Model of the Asiab terrace showing the location of the excavation areas.

exposed (Fig. 4). In the interior of this feature numerous pits, large numbers of bird bones and two human burials were found, one in a flexed, the other in an extended position. Howe described his finding as 'the vestige of a large shallow-basined oval excavation into virgin soil that suggested a refuse pit or possibly man-made semi-subterranean structure' (Howe 1983, 115). The presence of Bronze Age pottery down to nearly virgin soil suggested considerable disturbance of the upper deposits either by human activity or bioturbation.

FIGURE 3
Overview of the Howe-Braidwood excavation at Asiab in 1960, looking east across the site (courtesy of Frank Hole).

FIGURE 4
View of the main Howe-Braidwood excavation area, showing the outlines of a circular feature dug into virgin soil (courtesy of Frank Hole).

Although Asiab was one of the first early Neolithic site identified in the central Zagros very little is known about the site's stratigraphy, material culture, fauna or botanical remains, because no final, comprehensive report was ever published. However, a number of studies were carried out using the collections from the 1960 excavation (e.g. Bökönyi 1976; 1977; Hildebrand 1996; Zeder and Hesse 2000; Zeder 2001). Inferences about the nature of the occupation (short-term versus long-term), and in particular the function of the circular feature (refuse pit versus building), the date of the occupation, and the nature of the site's economy – both with respect to animals and plants – are largely based on partial, incomplete reports and data of uncertain provenience and quality. Flotation for botanical remains was not carried out during the original excavations, as the technique was not yet routinely used at the time. The radiocarbon dates from Asiab range from 11,300–10,700 to 8700–8400 cal. BCE, with notable differences between the dates obtained by Howe and the more recent dates by Zeder and Hesse (Howe 1983; Zeder and Hesse 2000, see below). In 2016, Asiab was revisited as part of the *Tracking Cultural and Environmental Change* project[1] in an attempt to clarify some of these questions through a detailed reinvestigation of the site.

THE 2016 EXCAVATION AT ASIAB

The primary goal of the excavation was to re-locate the main Howe-Braidwood excavation area. Since no plan of the 1960 excavation has ever been published we had to rely on the few existing site photographs to estimate the original location of the excavation area. An initial walkover survey of the Asiab terrace revealed a surface scatter of worked flint, which further guided the placement of the excavation areas. Following the removal of a considerable amount of topsoil in two search areas we located the Howe-Braidwood excavation in the northern part of Area III (Fig. 2). In order to also target *in situ* Neolithic deposits and obtain samples of material culture and biological remains, we opened a new 5 x 5 m area next to the old Howe-Braidwood excavation (Figs. 5 and 6).

Our excavation of the backfill in the Howe-Braidwood area provided us with a number of insights into the original excavation strategy. Howe and Braidwood appear to have first excavated a series of sondages across the site. These can be seen running in an east-west alignment across the terrace (Fig. 3). Two 2 x 1 m large sondages were found in the north-west and south-west corner of the main excavation area (Fig. 6). The north-western sondage truncated Neolithic deposits at its western edge, while the south-western sondage missed them by a few centimetres. Howe probably decided to extend the main excavation area outward from the north-western sondage, eventually linking it with the south-western sondage. Screening of the backfill from the old excavation area produced a significant amount of unstratified material culture, suggesting that comprehensive sieving was not practiced during the excavation in 1960. After the complete removal of the backfill from the old excavation area the outline of the 'shallow-basined oval feature' was revealed. In the interior of this feature we found the remnants of a number of post- and stake-holes, pits and animal burrows. Except for one pit in the north-east corner of the trench (see below), the entire area had been excavated down to natural in 1960. During the removal of the topsoil in Area III, two disturbed Chalcolithic burials were found. Given the presence of Chalcolithic burials in the area, it is possible that the two burials Howe reported from the interior of the Neolithic structure he excavated are intrusive and not related to the Neolithic occupation. Since we lack documentation of these two burials their chronological placement can not be resolved at present.

The sections at the edge of the Howe-Braidwood excavation provided an overview of the site's stratigraphic sequence (Fig. 7). The sections confirm Howe's observation of two main layers changing from grey at the top to tan-coloured at the bottom (Howe 1983, 115). However, the

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[1] The *Tracking Cultural and Environmental Change: the Late Epipalaeolithic and Early Neolithic in the Seimarreh Valley, central Zagros* is a joint Iranian-Danish research initiative funded by the C.L. Davids Foundation to investigate the transition from the Late Epipalaeolithic to the early Neolithic in the central high Zagros.

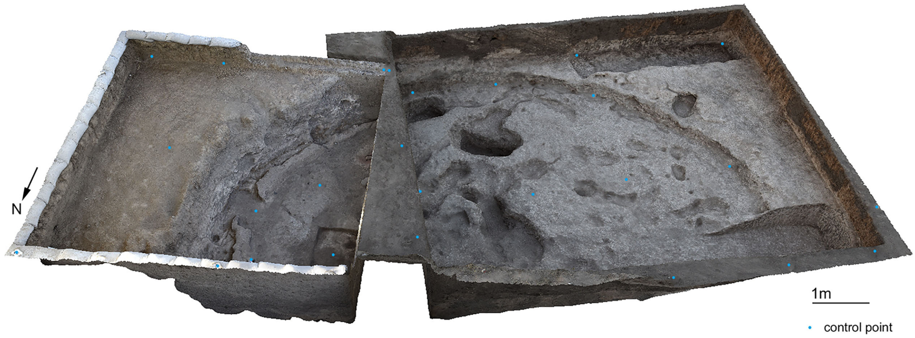

FIGURE 5
Photogrammetric 3D model of the re-excavated Howe-Braidwood area and the adjacent new excavation area dug in 2016. [Colour figure can be viewed at wileyonlinelibrary.com]

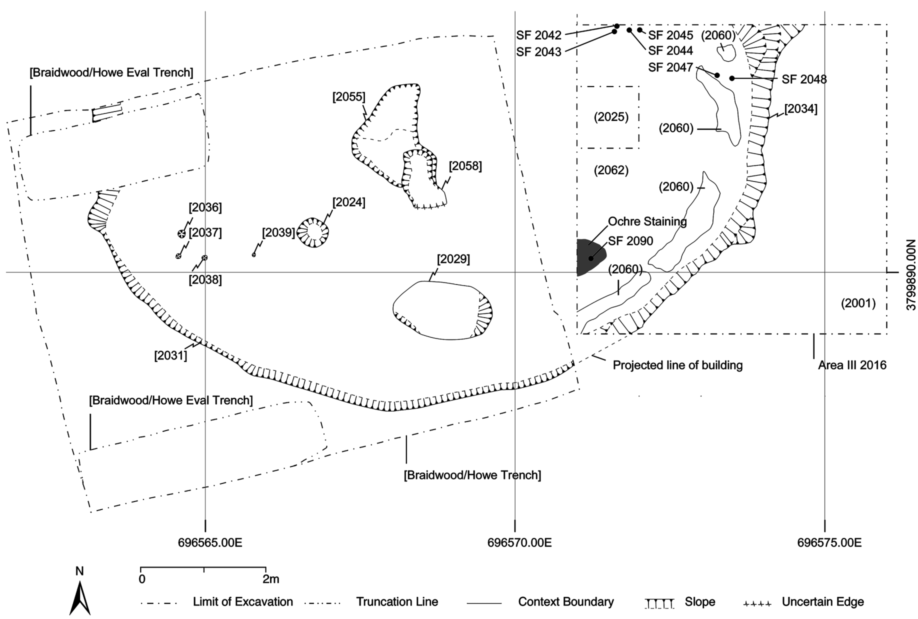

FIGURE 6
Plan of the Howe-Braidwood and the 2016 excavation area. Context [2055] is the pit containing the cache of boar skulls and mandibles. SF 2090 is the wild goat horn core shown in Figure 8.

sections also revealed a number of v-shaped shafts that cut through the archaeological sequence from top to bottom. These shafts lead into some of the animal tunnels found at the base of the excavation area, suggesting that they are collapsed animal burrows. Thus, much of the stratigraphic sequence at Asiab is heavily bioturbated. Between the animal burrows pockets of Neolithic sediments remain *in situ*. These are midden deposits rich in animal bones and knapped chert that filled the circular feature. We can now show that this circular feature was indeed the construction cut excavated for a Neolithic building: in addition to several post- and stake-holes inside the structure, two clear floor layers are visible in the northern and eastern section (see insert Fig. 7).

FIGURE 7
Southern section of the Howe-Braidwood excavation showing the V-shaped animal burrows. Left insert shows the detail of the two floors in the section. Right insert is a flatbed scan of thin section slide Asiab-2016-2,101, showing the lower compact clay-rich floor(s) and a possible foundation deposit underlying it, an overlying dark-coloured, organic- and microartefact-rich deposit, and the covering fill deposits. [Colour figure can be viewed at wileyonlinelibrary.com]

Neither the post and stake-holes nor the floors were reported by Howe, which is puzzling, and suggests that they may have been missed during excavation.

The re-excavation of Howe's trench thus allowed us to document and sample the microstratigraphy of the features not recorded or described in detail during their initial excavation. During work in Area III, eight micromorphology samples were collected from the north (Samples 2122, 2123, 2124, 2148 and 2149) and east (Samples 2101, 2102, 2103) sections in areas undisturbed by animal burrows. These sediment blocks were processed at Applied Petrographics, Inc. in the USA and the resultant slides analysed at the Geoarchaeology and Southwest Asia Prehistory Laboratory at the University of California, Berkeley. Full analysis is currently underway and preliminary results are presented here. The samples from both sections show a similar sequence of events related to the construction, use and abandonment of the large 'shallow-basined oval feature' noted above and discussed at length below, as well as subsequent post-depositional disturbance related to bioturbation. Diagenesis of the deposits from chemical or other physical alterations is minimal. Thus, those areas that escaped burrowing show microstratigraphy that appears to be largely intact and *in situ*.

Of the two sections, the east section exhibits more continuously preserved segments of the Neolithic feature and its contents (Fig. 7), with a complicated series of micro-strata documenting the building and use of the floor, and its associated deposits, clearly visible in the section. Here, micromorphological samples were taken a) at the base of the section from the preserved cut (Context 2031) and floor (Context 2042) of the structure, and an overlying organic-rich layer (Sample 2,101), b) immediately above and in the middle of the intact Neolithic deposits capturing some of this dark, organic-rich layer and the fill above (Context 2041) (Context 2102), and c) above (b) in the fill within the structure (Context 2041) (Sample 2103). While all of the slides from the samples contain charcoal fragments (1–15%), chipped stone microflakes (1–5%) and bone fragments (burnt and unburnt 1–10%), these materials are absent from the floor and more plentiful, but highly fragmented, in the overlying organic-rich layer of Sample 2101. The fill above contains larger

(1–10 mm) fragments of these materials. This is consistent with the faunal and floral evidence below suggesting that this layer is part of the post-occupation fill. The floor itself is readily identifiable in the lower portion of Sample 2101 as a highly compact, reddish-orange clay with microlaminations running parallel to the ground surface and large planar voids at right angles to each other giving it is blocky structure. It is approximately 2 cm thick, has discrete upper and lower boundaries, with clear but thin layers of buff-coloured, dark brown, and red sediments below it that may represent the cut and foundation deposits for the floor itself. The layered appearance of the floor context also suggests its maintenance through re-surfacing; however, further analysis is necessary to explore how many times this may have occurred. Overlying the floor is the dark brown, organic-rich layer with highly fragmented charcoal, bone fragments (1–4 mm) and small pieces of disintegrated floor clay (1–2 mm). The spongy appearance of this ~2.5–3 cm-thick layer, with vugh and vesicle voids and pellicular excrement infillings, suggests some degree of bioturbation by microfauna. This layer likely represents the debris accumulated on the floor surface prior to disuse or resurfacing. Above this layer is a thin lens of (carbonate-rich) clay aggregates (~2–5 mm) reminiscent of the floor deposit below that might indicate an attempt to resurface the structure with another, overlying clay floor. However, it is highly fragmented and discontinuous.

In the north section, samples were collected from two locations within the preserved Neolithic deposits. Three samples (2122, 2123, 2124) were staggered from the base to mid-section to cover an extensive fill deposit (2043; similar to 2041) overlying a pit cut and fill (2055) and the cut of the structure (2031). These layers are not as easily identifiable in this sequence of slides, which consist mainly of 2043, a light-brown, clay-rich sediment with mottled areas higher in charcoal and fragmented burnt bone and other organic matter (especially in 2122 and 2123). The lowermost slide contains large (3–10 mm) clay aggregates that represent the remains of the clay floor. Two samples (2148 and 2149) were collected further to the east in another small pocket of preserved fill and floor deposits (2043, 2044 and 2031). A very dense clay-rich layer in 2148 represents the floor deposit here; its lower portion consists of highly fragmented clay aggregates while the upper portion exhibits higher densities of charcoal, soil aggregates and bone fragments.

One feature apparently unnoticed and left unexcavated by Howe was an oval, *c*.1 m long, shallow pit situated in the approximate centre of the building. The feature was difficult to distinguish from the surrounding sediment, because it was sealed using re-deposited natural. This suggests that the pit was left open only briefly and filled in with the excavated spoil soon afterwards. The pit contained a cache of 19 boar (*Sus scrofa*) crania and mandibles, tightly packed on top of and next to each other and neatly arranged in an east-west direction. The mandibles were placed to one side and the crania to the other (Fig. 7; Bangsgaard *et al*. 2019). The skull of a brown bear (*Ursus arctos*) had been placed centrally underneath the boar remains in the pit. This tightly packed deposit of neatly aligned wild boar and brown bear remains was interpreted as a placed deposit, the details of which were published elsewhere (Bangsgaard *et al*. 2019). Similar placed deposits are known from other early Neolithic sites, including a pit containing the remains of 15 wild goat skulls and many birds of prey from Zawi Chemi Shanidar, and a pit with more than 100 vulture wings from Shanidar B1 (Solecki 1977; Solecki and McGovern 1980).

Removal of the topsoil in the new 5 x 5 m area adjacent to the Howe-Braidwood excavation revealed the continuation of the circular construction cut of the building. In the new area, it was possible to see that this feature was actually cut into the sub-soil immediately beneath the plough zone/topsoil horizon. By contrast, in the Howe-Braidwood area the circular cut was only extant to a height of ~0.3 m. This suggests that most of the upper part of the circular feature was truncated during the 1960 excavation. The upper part of the midden deposit filling the feature in the new area was very disturbed by animal burrows. Only further down towards the floor layers could *in situ* deposits clearly be distinguished from those disturbed by animal burrows. Careful excavation was necessary to separate the *in situ* from the disturbed sediments.

The construction cut for the circular feature that was exposed in the new excavation area was dug into the natural clay of the terrace, and has a sharp break of slope at the top and at the bottom with near-vertical sides. The cut is approximately 1.2 m deep. A low pisé feature preserved to a height of *c*.0.2 m was built at the base of the cut, following its circular shape. It is unclear whether this was originally a wall of which only the base is preserved or a bench running along the outer base of the structure. The earliest floor surface lipped up to this pisé feature. The floor consists of two thin whitish-grey, possibly lime, wash layers interspersed with a make-up layer of friable dark greyish-brown clay. A cache of red deer (*Cervus elaphus*) antlers and wild sheep (*Ovis orientalis*) horn cores were incorporated into the bottom of the pisé feature. The pisé feature is not currently extant in the Howe-Braidwood area and it is unclear whether it was originally there and removed during the 1960 excavation. In the south-west corner of the new excavation area the floor had a shallow depression in it. This depression was painted with red pigment and a complete horn core from a wild goat (*Capra aegagrus*) was placed into the depression (see Fig. 8). Additional horn cores from wild sheep (*Ovis orientalis*) and wild goat (*Capra aegagrus*), as well as more red deer antlers, were found on the second floor. Installations and caches of horn cores are a common occurrence at aceramic Neolithic sites in the Zagros and adjacent areas. At Ganj Dareh a cache of two wild sheep skulls were found in Level D (Smith 1983). Four large wild goat skulls and one sheep were found in Building 2 at Sheikh-e Abad, dated to the mid eighth millennium BCE (Matthews *et al*. 2013a, 44–6).

Re-excavation of the Howe-Braidwood area and excavation in the new area produced a number of finds ranging from knapped chert, animal bones and botanical remains, to beads and clay objects. The chipped stone assemblage consists of more than 6000 pieces, including over 1000 retouched pieces, but relatively few cores (Fig. 8). All the raw material is local chert/flint. The reduction sequence was geared towards bladelet removals: single platform bladelet cores and bladelets were common, although flakes also occurred in appreciable numbers. The retouched

FIGURE 8
Wild goat horn core placed in a depression in the floor of the structure, painted with red pigment. [Colour figure can be viewed at wileyonlinelibrary.com]

artefacts comprise many backed and retouched bladelets, but no geometric microliths or points. A small number of blades with 'sickle sheen' were found, but are overall quite rare. Techno-typologically, the Asiab assemblage can be grouped under the 'Pre-M'lefatian industry', a transitional lithic tradition that links preceding Zarzian to the succeeding early M'lefatian tradition (Nishiaki and Darabi 2018). A small number of ground stone tools, including two quern fragments and a grooved stone, were recovered. Other finds include a small number of stone beads, as well as two clay tokens, one clay figurine fragment, and four pieces of worked bone. The botanical assemblage comprises thousands of seeds, fruit and nuts, wood charcoal, parenchymatic tissue, animal faeces and possible remains of prepared plant-foods. However, a relatively large percentage of the remains seems to be intrusive, as indicated by their uncharred state (e.g. *Galium, Heliotropium*, etc.). In terms of charred remains, there is prevalence of small-seeded grasses, along with other taxa such as feathergrass and medusahead. Cereals are present, with barley most abundant, but they are overall very rare, and their status as wild, wild cultivated, or domesticated cannot yet be established. Wild plants identified so far include edible species that grow in riverine areas or close to water resources, including club-rush and fig, as well as those that inhabit steppes and grasslands such as various chenopods, mallow, and poppy. Legumes are not well represented in the assemblage. The faunal assemblage from the in-situ midden deposits consist mainly of larger wild mammalian species, such as wild goat and sheep, wild boar, red deer and aurochs. But the heavy residue does clearly testify to a more diverse subsistence strategy based on hunting smaller game species such as cape hare, red fox and tortoise, as well as fishing in the local river.

The previously available radiocarbon dates for Asiab have long been a source of some confusion. Four dates were obtained from the 1960 excavation (GrN-6413, UCAL-1714F, UCLA-1714B and UCLA-1714C), which placed the occupation between ~9300–7500 cal BCE (IntCal 13 1 σ; see Table 1, Fig. 9). Zeder and Hesse (2000) obtained three further dates from animal bone collagen from the Asiab collection stored at the Smithsonian Institute. While two of these dates (B-159554 and B-159555) placed the occupation between ~9100–8600 cal BCE (IntCal 13 1 σ; see Table 1; Fig. 9), one sample (B-159552) produced a date of 6684–6529 cal BCE (IntCal 13 1 σ). Being considerably later this date is clearly an outlier. The samples dated by Howe were all analysed before the deployment of Accelerator Mass Spectrometry (AMS) dating; the sample material has only been described broadly as charcoal, but not identified to genus level. The dates obtained by Zeder and Hesse (2000) were taken from animal collagen prior to the advent of ultra-filtration techniques. Pre-ultra-filtration dates have been shown to produce dates that are too young (Higham *et al.* 2006). In addition, the exact provenance of all previously dated samples within the stratigraphic sequence at Asiab is unclear. With evidence for extensive animal burrowing at Asiab, the movement of charcoal and bone by bioturbation cast further doubt on the integrity of sampling locations.

Eight new samples of charred plant remains recovered during the 2016 excavation were processed at the Aarhus University Accelerator Mass Spectrometry Centre (Bangsgaard *et al.* 2019). The position of each sample was recorded with high precision using a total station. All the plant materials were identified to genus/family level. We used the phase function in OxCal 4.3.2 to model the dates and all were calibrated using INTCal 13 (Reimer *et al.* 2013). Since AAR-26657 and AAR-26656 were from the boar pit, which represents a single, brief event, we combined these dates in the model. Cumulatively, the modelled dates suggest that Asiab was occupied between ~9640–9310 cal BCE (1 σ; see Table 1 and Fig. 9). Two of these dates (AAR-26659 and AAR-26657) have produced questionable agreement values, suggesting that they may be outliers. However, the differences here are not significant and may simply be due to ambiguities in the stratigraphic resolution that may have to be addressed. We have, for example, assumed in this instance that the

TABLE 1
List of previously and newly obtained radiocarbon dates from Asiab

Sample lab code	Sample ID	Context	Material dated	Uncali. date	pMC	δ^{13}C (CF-CN)	Carbon fraction (TCD)	Nitrogen fraction (TCD)	Years cl BC 1σ	Years cal BC 2σ	Modelled dates years cal BC 1σ	Modelled dates years cal BC 2 σ
Bruce Howe dates												
GrN-6413	n/a	–	Charcoal (unspecified)	9755±85	n/a	n/a	n/a	n/a	9307-8945	9393-8835	9310-8944	9392-8833
UCLA-1714F	n/a	–	Bone collagen	9050±300	n/a	n/a	n/a	n/a	8616-7791	9142-7576	8618-7760	9137-7576
UCLA-1714B	n/a	–	Bone collagen	8900±100	n/a	n/a	n/a	n/a	8247-7939	8287-7732	8247-7878	8287-7732
UCLA-1714C	n/a	–	Bone collagen	8700±100	n/a	n/a	n/a	n/a	7937-7595	8198-7574	7937-7595	8198-7574
Zeder and Hesse dates												
B-159552	n/a	–	Bone collagen	7790±60	n/a	n/a	n/a	n/a	6684-6529	6798-6471	6685-6528	6799-6471
B-159554	n/a	–	Bone collagen	9370±60	n/a	n/a	n/a	n/a	8723-8568	8795-8469	8722-8567	8796-8471
B-159555	n/a	–	Bone collagen	9480±80	n/a	n/a	n/a	n/a	9117-8639	9152-8576	9118-8639	9152-8579
New TCEC dates												
AAR-26654	2085	2041	Wood charcoal: Salicaceae	9940±37	29.01±0.14	–26.42±0.11	50.85±0.01	1.05±0.01	9443-9316	9652-9293	9357-9310	9389-9294
AAR-26653	2154	2035	Wood charcoal: Amygdalus	9980±39	28.87±0.14	–24.69±0.11	59.82±0.01	1.38±0.01	9651-9360	9670-9316	9365-9317	9397-9301
AAR-26652	2220	2035	Wood charcoal: Amygdalus	9959±30	28.94±0.11	–26.08±0.1	64.13±0.007	n/a	9448-9328	9653-9309	9363-9318	9395-9302
AAR-26657	2217	2054	Wood charcoal: indt. twig	9900±56	29.16±0.2	–11.37±0.11	58.13±0.01	1.13±0.01	9439-9286	9653–9257	9648-9363	9660-9343
AAR-26656	2224	2054	Wood charcoal: Amygdalus	10024±50	28.71±0.18	–25.34±0.1	60.985±0.007	1.045±0.007	9745-9416	9808-9344	9648-9363	9660-9343
Combine Boar Pit									9644-9325	9658-9316	9648-9363	9660-9343
AAR-26655	2166	2044	Wood charcoal: Amygdalus	9917±27	29.09±27	–26.18±0.11	61.97±0.01	n/a	9373-9304	9442-9295	9440-9352	9451-9330
AAR-26658	2262	2062	Wood charcoal: Salicaceae	9901±41	29.16±0.15	–25.01±0.11	56.02±0.01	1.13±0.01	9379-9291	9641-9265	9442-9352	9651-9327
AAR-26659	2243	2061	Wood charcoal: Pistacia	9912±26	29.12±0.1	–23.79±0.11	61.49±0.01	n/a	9368-9303	9441-9292	9438-9352	9446-9335

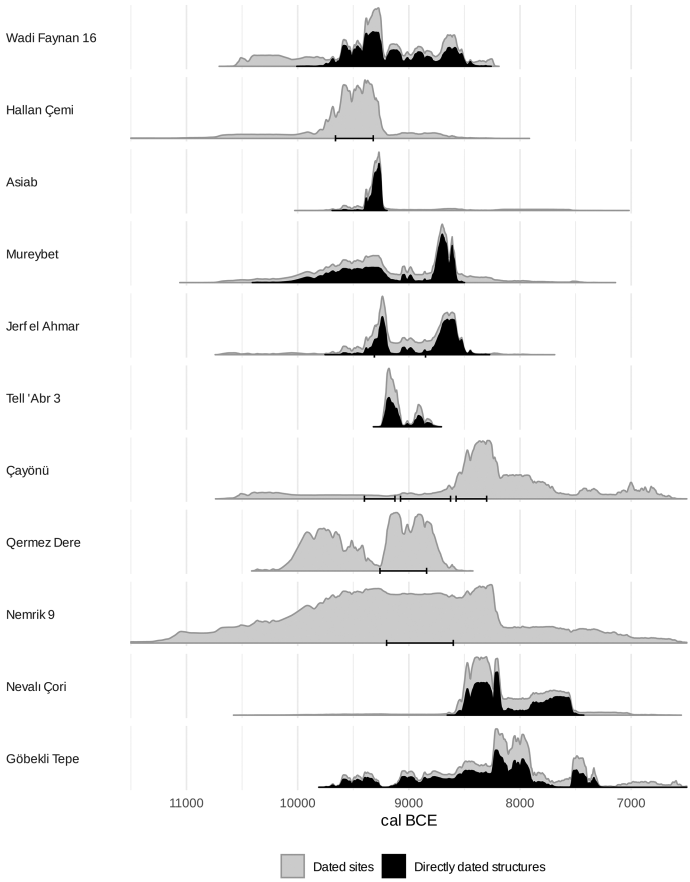

FIGURE 9
Calibrated radiocarbon dates from Asiab and other sites with communal buildings. Grey area indicates range of general dates from the sites, while black area indicates directly dated buildings.

boar pit deposit post-dates the construction of the two floor layers in the building, which are represented by AAR-26659, AAR-26658 and AAR-26655, but this cannot be strictly demonstrated because the area had already been excavated down to sterile deposits by Howe. Nevertheless, even when we look at the unmodelled range of dates the occupation is bracketed between ~9750–9290 cal BCE (1 σ, INTCal13), which is not significantly different from the modelled range. At their upper age limit the dates suggest that the occupation at Asiab falls into the very earliest phase of the Neolithic in the central Zagros and is coeval with the dates from Trench 1 at Sheikh-e Abad (Matthews *et al*. 2013b, 62) and the early phase of occupation at Chogha Golan (AH IV-I) (Conard *et al*. 2013). Interestingly, the dates also suggest that the time between the construction and use of the building and its infilling by midden deposits appears to have been quite short, since the dates from the stratigraphically lowest phase and the midden deposit infilling the structure are very close.

The new excavations at Asiab have shown that much of the stratigraphic sequence at the site was disturbed by animal burrows and only careful separation of the sediments within and outside of these tunnels ensured that stratigraphically secure archaeological data could be obtained. It is uncertain whether this was also done during the 1960 excavation. Thus, many of the previously retrieved finds are of uncertain provenience since they may very well have come from disturbed parts of the sequence. Certainly, assessment of diachronic change through time within Asiab itself based on this data may thus be considered problematic.

DISCUSSION

Until our new excavations the function of the circular pit at the base of the Howe-Braidwood excavation area was unclear. The presence of two successive floors, several postholes and remnants of a circular pisé wall or bench inside the subterranean, circular feature provide clear evidence that we are dealing with the remains of a building. This building has a diameter of *c.*10 m and an assumed interior space of approximately 78 m^2. The building was dug to a depth of at least 1.6 m, perhaps more, depending on the extent of the horizontal truncation at the site. Several postholes inside the structure suggest that it was probably roofed, but there is no direct evidence for the type of roof these posts may have supported. We can only assume that this was likely to have been made of lighter organic material. Based on the diameter and depth of the structure we estimate that between 180–220 m^3 of soil had to be excavated to create the large pit the building sat in. Given that this comprises compacted sub-soil clay rich sediments, we can estimate that the excavation required the removal of between *c.*360–440 tons of sediment. Although we do not have any evidence for the size and appearance of other structures at Asiab, what we know of the tenth millennium architecture at other sites in neighbouring areas (e.g. Qermez Dere, M'lefaat, Nemrik 9) suggests that the building at Asiab is on average larger than standard Neolithic buildings at these sites. The size of the building, and its corresponding capacity to potentially provide space for a large number of people, points to parallels with communal buildings at other early aceramic Neolithic sites in south-west Asia. Estimating the number of people the building could have accommodated at any one time is a complex issue that depends on a variety of factors, such as whether people are standing, sitting or lying down, how much personal space would have been considered appropriate and how much space would have been taken up by architectural features and installations (McBride 2015). We have not undertaken the kind of contextual analysis that McBride (2015) carried out in her study, but based on the her calculations we can estimate that the building could have possibly accommodated up to 185 individuals in cross-legged sitting position. This number, however, is surely an over-estimate, since it does not take into account space taken up by architectural features and installations. McBride's (2015) contextual model of communal architecture showed that a number slightly above half of the total capacity provides a reasonable estimate. Thus, we cautiously estimate the likely capacity of the Asiab building to have been slightly above 90–100 people. It is also difficult to estimate how many people would have been involved in the construction of the Asiab building, but it would have likely involved a larger group of people working collaboratively to dig out the soil, procure construction materials, erect posts, lay down floors, build pisé walls, and put in place a roof. The implied workload would have required the collaboration of a larger community beyond that of an individual household or even an extended family.

In addition to the communal effort required for construction, a number of features in the interior suggest that the building fulfilled potentially ceremonial or special purposes: the wild boar deposit, the painting of the plaster floor with ochre, and the placement of wild goat and sheep horn cores and red deer antlers. The killing of 19 wild boar and a brown bear would likely have required the cooperation of multiple hunters. Furthermore, the meat resulting from the capture of so many wild boar would have supplied a large amount of food for a considerable number of people (Bangsgaard *et al*. 2019).

The Asiab building thus shares many features with communal or special buildings documented at other tenth and ninth millennia BCE sites in south-west Asia. The overall size, shape and subterranean construction of the building are reminiscent of communal buildings excavated at Jerf el-Ahmar, Mureybet and ‘Abr 3. Bearing in mind differences in some aspects of the construction methods, other similarities are the inclusion of a placed deposit and other evidence for symbolic behaviours, such as the inclusion of antlers, goat and sheep horns, and the possible association with human remains. The placement of sheep and goat horn cores, as well as deer antlers, has been documented at a number of sites in the Zagros (e.g. Ganj Dareh, Sheikh-e Abad), as well as elsewhere, and has often been interpreted as ritual or cultic in nature. It links the practices seen at Asiab into a wider cultural sphere in which animals body parts were used in possible ceremonies, feasts or rituals. A considerable amount of evidence therefore makes it probable that the Asiab structure was not just the result of a communal construction effort, but was used as a space at which significant face-to-face social interactions could take place, perhaps as part of ceremonies, feasts or specific ritual events. These may have served to unite the community at certain points in time.

Our new radiocarbon dates suggest that the building at Asiab may be one of the earliest structures of this kind yet reported from south-west Asia. The radiocarbon dataset from other sites that have communal buildings is sometimes ambiguous. While it is possible to link specific dates with specific buildings at some sites, the relationship between the dated samples and specific buildings or the phases that the buildings belong to is less clear. The building at Asiab could potentially date as early as 9700 cal BCE and shares a significant overlap with the assumed dates of House A at Hallan Çemi. Farther afield, the large communal building O75 at Wadi Faynan 16 dates to the same time range. The earliest incarnation of the Skull Building at Çayönü, building EA47 at Jerf el-Ahmar and at least some of the large enclosures at Göbekli Tepe overlap with the range of the Asiab dates.

Our work also suggests that Howe and Braidwood overestimated the size of the settlement at Asiab. Howe argued that the site measured some 20,000 m^2 in total area. Our own work could only confirm a dense spread of chipped stone and some isolated ground stone artefacts in an area measuring *c*.3800 m^2. The recent excavations have also shown that the subterranean feature was not only a Neolithic building, but also that it appears to be the only Neolithic structure surviving at the site. The rest of the Neolithic settlement appears to have eroded away over the millennia, whereas the subterranean building was dug deep into the virgin sediment of the Asiab terrace and thus survived.

If our interpretation of the Asiab building is correct, the existence of such an early communal structure in the central Zagros suggests that the phenomenon of these communal buildings is more widespread than previously assumed. The results from Wadi Faynan 16 already suggest that early Neolithic communal buildings were not confined to the middle-upper Euphrates, south-east Anatolia or the Upper Tigris. The evidence from Asiab now seems to suggest that these type of buildings have an even wider distribution. Given the early dates from Asiab, it would seem that the point of origin – if there is a single one – for the kind of practices that these buildings were associated with is not necessarily associated with the northern Fertile Crescent. It appears that different communities in various places, at various times, initiated larger construction projects during the earliest stages of the Neolithic. While we cannot answer precisely at this point why this may have happened, there are likely links to changes in food practices, growth of population, environmental change, changes in demography and quite probably the emergence of a different mode of social interaction. Communal buildings appear to have been important features at least at some of these settlements, and clearly fulfilled a key function in maintaining and negotiating intra-communal (and inter-communal?) social relationships. The high central Zagros appears to have been, in this respect, similar to other parts of the Fertile Crescent, where comparable communal building projects were undertaken during the tenth millennium BCE.

Finally, the communal building at Asiab provides further evidence for regional networks of interaction amongst tenth millennium BCE societies. The emergence of communal buildings in various places suggests that there was a degree of shared knowledge, ideas and concerns that found expression in these larger scale construction projects that people began to engage in.

CONCLUSION

Public or communal buildings started to be constructed in south-west Asia during the tenth millennium BCE, as plant cultivation was beginning to be an increasingly important part of mixed subsistence economies. As people began to agglomerate in gradually growing settlements, new forms of social interaction and living together emerged. Communal building projects and the structures resulting from them not only created new kinds of spaces in which people could meet and interact, but they focused people's attention on a common, joint enterprise. The creation of larger, permanent and fixed places inside these settlements, and in the landscape, required communal effort and cooperation and, therefore, united communities through work. The structured process of building these structures, as well as their maintenance and rebuilding, may have been as important as their use. Hodder and Pels (2010) have described the repeated construction of more elaborate and distinct buildings at Çatalhöyük, which they termed 'history houses', in similar terms as the creation of communal, shared histories. While Watkins (2004a; 2004b) has argued that the construction of houses and special purpose buildings during the early Neolithic is representative of a new worldview. Place-making and the creation of shared experiences and memories may, of course, be much older than the Neolithic and appears to have deep roots in the Palaeolithic (Maher 2019; Maher and Conkey 2019). Through coming together in the joint enterprise of communal building projects communities in the tenth millennium BCE were assembling themselves into different social structures. Communal buildings were both the medium and outcome of this process. They brought people together in a common task, created shared memories and social bonds beyond the immediate or extended family group. These experiences were reinforced by the activities that likely took place in many of these buildings, as well as the maintenance and repair of these structures through time. This is not to say that the construction and use of these buildings may not also have been exclusionary at times or that it was not used as a means of coercion or control to some degree. It is always tempting to emphasize communal, shared and social aspect over exclusion or coercion, but the end result would have been more or less the same: the creation of shared memories and experiences and the creation of new personal bonds, but also potentially social divisions. The appearance of these structures during the tenth millennium BCE is an intriguing social phenomenon that suggests a connection between the appearance of new human-plant and human-animal relationships, and changes in the social structure and composition of these gatherer-hunter-cultivator societies.

The evidence from Asiab suggests that communal structures may have been an integral and important element of transitional Neolithic societies in the central Zagros, as they were elsewhere in south-west Asia. Together with the lower levels of Sheikh-e Abad, Asiab is one of the earliest tenth millennium BCE sites in the central high Zagros and it seems significant that this kind of communal building was present right at the start of the Holocene during this early part of the transition from hunting and gathering to agriculture. The construction of the building taken with the evidence for communal hunting and possibly feasting suggest changes in social structures during this time. Our re-assessment of the evidence from Asiab also highlights possible cultural connections or contacts between the central Zagros and communities to the North and West, and that there may have existed some commonalities in the construction and use of such structures. It is curious and significant that buildings sharing a number of common elements (size, subterranean construction, circular plan, etc.) are spread across such a wide region stretching from the Upper Euphrates all the way to the central high Zagros. If we understand the communal building at Asiab as part of a phenomenon that stretched across the Fertile Crescent in the tenth and ninth millennia BCE, it suggests that early Neolithic gatherer-cultivator-hunters were more integrated into an overall cultural sphere than previously supposed.

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