Early evidence (*ca.* 12,000 B.P.) for feasting at a burial cave in Israel

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Feasting is one of humanity's most universal and unique social behaviors. Although evidence for feasting is common in the early agricultural societies of the Neolithic, evidence in pre-Neolithic contexts is more elusive. We found clear evidence for feasting on wild cattle and tortoises at Hilazon Tachtit cave, a Late Epipaleolithic (12,000 calibrated years B.P.) burial site in Israel. This includes unusually high densities of butchered tortoise and wild cattle remains in two structures, the unique location of the feasting activity in a burial cave, and the manufacture of two structures for burial and related feasting activities. The results indicate that community members coalesced at Hilazon to engage in special rituals to commemorate the burial of the dead and that feasts were central elements in these important events. Feasts likely served important roles in the negotiation and solidification of social relationships, the integration of communities, and the mitigation of scalar stress. These and other social changes in the Natufian period mark significant changes in human social complexity that continued into the Neolithic period. Together, social and economic change signal the very beginning of the agricultural transition.

Epipaleolithic | Natufian culture | origins of agriculture | ritual | social complexity

The practice of feasting—the consumption of large communal meals within a socially constructed setting—has attracted widespread attention as a result of its role in affecting social and ideological change (ref. 1 and references therein). In particular, feasts have been shown to play essential roles in the negotiation and solidification of social relationships. Feasts are heavily imbued with meaning and are often associated with ritual behavior and socially important events such as burials (2–4). Despite the interest in these processes, until now, clear evidence for feasting has not been documented before the Neolithic period.

The Levantine archeological record documents substantial changes in the social and economic structure of human groups before, during, and after the transition from incipient cultivation to full-fledged agricultural economies (5–8). Enormous attention has been devoted to explaining why and how the transition to agriculture began with models primarily emphasizing three major themes: population dynamics (e.g., ref. 9), environmental change (e.g., ref. 10), and social factors (e.g., refs. 11, 12). Here, we investigate the role of social factors by providing strong evidence for feasting before the Neolithic period. We discuss the relationship of this discovery to Natufian social complexity and its relevance for understanding the transition to agriculture in the southern Levant.

The Natufian period is situated at the end of the Epipaleolithic sequence in the southern Levant and directly precedes the Neolithic (Fig. 1). The Early Natufian phase is marked by prominent changes in settlement and subsistence, most notably the appearance of sedentary communities and the intensified use of wild plant and animal resources, including labor-intensive grasses and small game (13). Several distinct cultural markers absent in preceding Epipaleolithic contexts provide considerable evidence for accompanying changes signaling increased social complexity in the Natufian period. These include artistic manifestations, ceremonial behavior, differential treatment of the dead, cemeteries and new burial customs. These changes are likely linked to an increasingly sedentary lifestyle beginning in the Early Natufian (5). Because of increased contact between community members, social complexity often emerges as populations begin to settle down and require new methods for social integration (14, 15). The expression of the same cultural markers despite decreased sedentism in the Galilee and coastal regions of the southern Levant attest to the continuation of social complexity into the Late Natufian phase (16).

Hilazon Tachtit is a small burial cave containing the remains of at least 28 individuals in the Lower Galilee region of Israel (17). The cave is located on an escarpment 150 m above the Nahal Hilazon. The only prehistoric deposit inside the cave dates to the Late Natufian phase at the end of the Epipaleolithic period [12,400–12,000 calibrated years B.P. (18)]. The Natufian presence is confined to a small depression (30 m^2) in the center of the cave.

Architectural activities have been observed in the Paleolithic record (19), but do not become commonplace until the Early Natufian period, when construction involved careful planning and high energetic investment. Building activities continued during the Late Natufian (20) although, for the most part, structures were smaller, less standardized, and less meticulously planned and executed. The overall impression is of a more opportunistic approach to architectural planning. At Hilazon, the Natufians modified the cave's surface by excavating the bedrock to create two small subterranean structures (Fig. 2) and three burial pits (18).

Structure A was constructed by removing the bedrock to create an oval-shaped depression. A smaller oval basin was carved into the bedrock at the structure's base. The oval basin was plastered with clay and lined with flat limestone slabs. It was constructed for the burial of a unique elderly woman, most probably a shaman (21). The structure contains 75 cm of deposits, the lower 40 cm of which encapsulate the sealed burial (21) and associated grave inclusions. The fill of the grave and the upper 35 cm of the structure are rich in material remains, particularly flint artifacts and animal bones.

Structure B was hollowed out of the original bedrock surface of the cave. To produce a circular shape, the Natufians rounded the western bedrock wall and filled a 50-cm gap in the bedrock with six courses of undressed limestone blocks (Fig. 2). Unlike structure A, the floor is composed of sediment compressed into the bedrock surface. The eastern bedrock wall slopes inward, thus the area at the structure's base is much smaller than at its top (~0.5 m^2, 80 cm deep; Fig. 2). The structure's dimensions, too small even for one person's needs, suggest that it was not built for domestic activities such as flint knapping or food preparation. Nevertheless, the fill is rich in material remains capped by a human burial. If structure B was intended to serve as a depository, the energy invested into its manufacture suggests that the deposited materials had special significance. In Neolithic contexts, pits were sometimes built spe-

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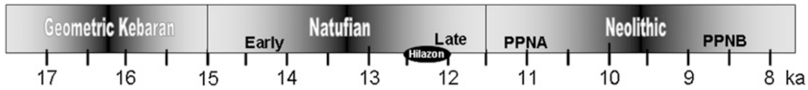

Fig. 1. Timeline of the Epipaleolithic and Pre-Pottery Neolithic periods in the southern Levant, including the relevant archaeological entities.

cifically to deposit the remains of feasting events (ref. 22 and references therein).

Results

The fill of the structures contained large quantities of identifiable animal remains (N = 9,669). Of special interest are the skeletal remains of aurochs (wild cattle; *Bos primigenius*) in structure B (N = 112) and Mediterranean spur-thighed tortoise (*Testudo graeca*) in structure A (N = 5,505; Fig. 2). These taxa are unusual in their unprecedented density and quantity in comparison with other Natufian sites and provide the focus of the remaining discussion.

Eighty-five percent of the aurochs remains from Hilazon Tachtit are located in structure B. The aurochs remains represent at least three individuals—two adults older than 18 mo, indicated by two left fused posterior distal humeri, and at least one juvenile animal younger than 18 mo (Fig. 3), indicated by the presence of 12 unfused and/or porous bones (Fig. 4*D*), including the unfused proximal epiphysis of a first phalanx, which fuses at approximately 18 mo (23).

The aurochs remains represent all anatomical regions of the skeleton [horn, head, neck, axial, upper forelimb, lower forelimb, upper hind limb, lower hind limb, and feet (24); Fig. 3] and thus include both high- and low-utility parts. There is no evidence for selective transport of anatomical units to the cave. The aurochs remains exhibit clear signs of butchery and bone processing. Despite the fact that concretions obscured many bone surfaces, the identification of cut marks on clean patches of four specimens attest to the removal of flesh from both juvenile and adult carcasses (Fig. 4*C*). In addition, the aurochs remains are fragmented. Except for three phalanges, all bones with marrow cavities (n = 39) were accessed by humans. All long bone shaft fragments (n = 31) sustained spiral breaks indicative of fresh breakage and all first phalanges but one (n = 5) were split vertically (Fig. 4*F*). Burning is uncommon—only one phalanx was partially burned, but not all bone surfaces were visible. Together these results indicate that the cattle remains in structure B were fully exploited for both meat and fat before deposition.

Three groups of articulated aurochs bones were recovered from structure B: a right astragalus and calcaneum; a left navicular-cuboid, external and lateral cuneiform and proximal metatarsal; and four lumbar vertebrae. These articulations indicate that the aurochs remains were deposited when fresh. Before they were discarded, the cavities of the calcaneum (Fig. 4*E*) and metatarsal were first accessed for marrow. The rich deposit of aurochs bones from an undisturbed context, the large size of aurochs and their rarity in Natufian sites, the wide array of body parts, the evidence for butchery and thorough bone processing, and the disposal of articulated joints suggest that the aurochs assemblage from structure B represent the remnants of at least one large consumption event.

The tortoise assemblage from structure A consists of 5,505 identified specimens, representing at least 71 individuals. Tortoises are common in Natufian sites (25), but the large size of the assemblage in structure A is emphasized by the small excavation volume (<1 m^3) and substantially lower quantities in structure B [number of identified skeletal parts (NISP), 600; minimum number of individuals (MNI), 13]. No other Natufian site yielded an assemblage of this density (25, 26). Although all tortoise body parts—carapace, plastron, and limb elements—are well represented, they are not equal. The carapace is the most common body part (MNI, 71), followed by the plastron (MNI, 52) and the limb bones (MNI, 42). This pattern differs from the tortoise assemblage in structure B in which the limb bones are better represented (MNI, 13) than the carapace (MNI, 8) and plastron (MNI, 6). Many tortoise carapaces from structure A (MNI, 12) were recovered in complete or partial articulation. Many others became disarticulated during excavation but were difficult to refit because of the vast number of segments in the structure. The large number of carapaces and their completeness undoubtedly reflects a conscious effort to inter complete carapaces in the grave.

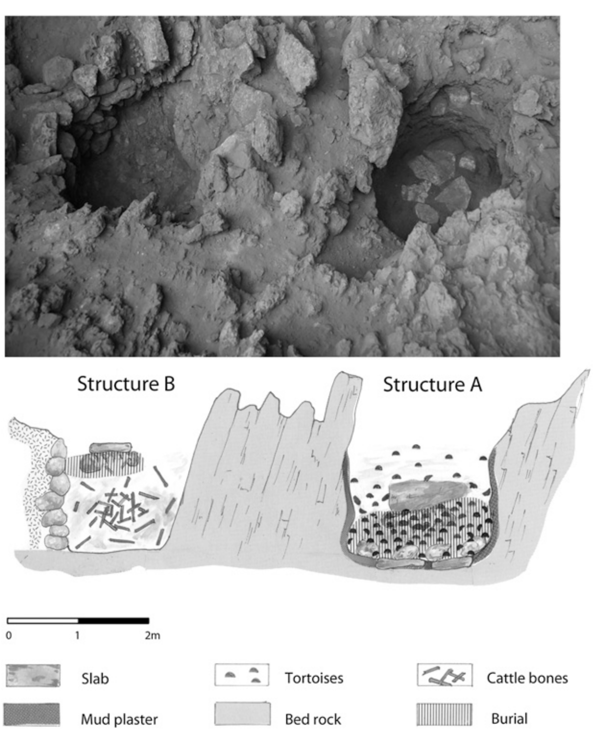

Fig. 2. Overview of structures A and B from Hilazon Tachtit cave and artist's reconstruction of their stratigraphic cross-section (to scale). Illustration by Peter Groszman.

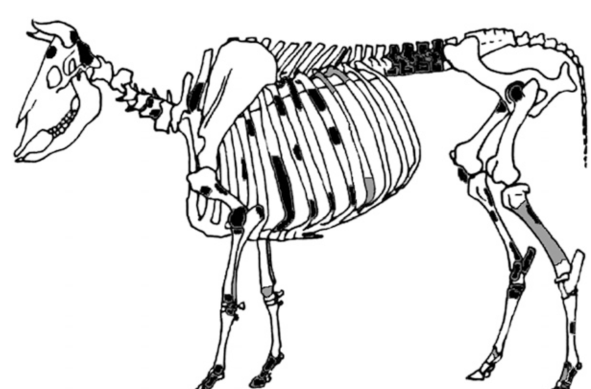

Fig. 3. Skeletal diagram of an aurochs indicating the adult (black) and juvenile (gray) skeletal parts recovered from structure B.

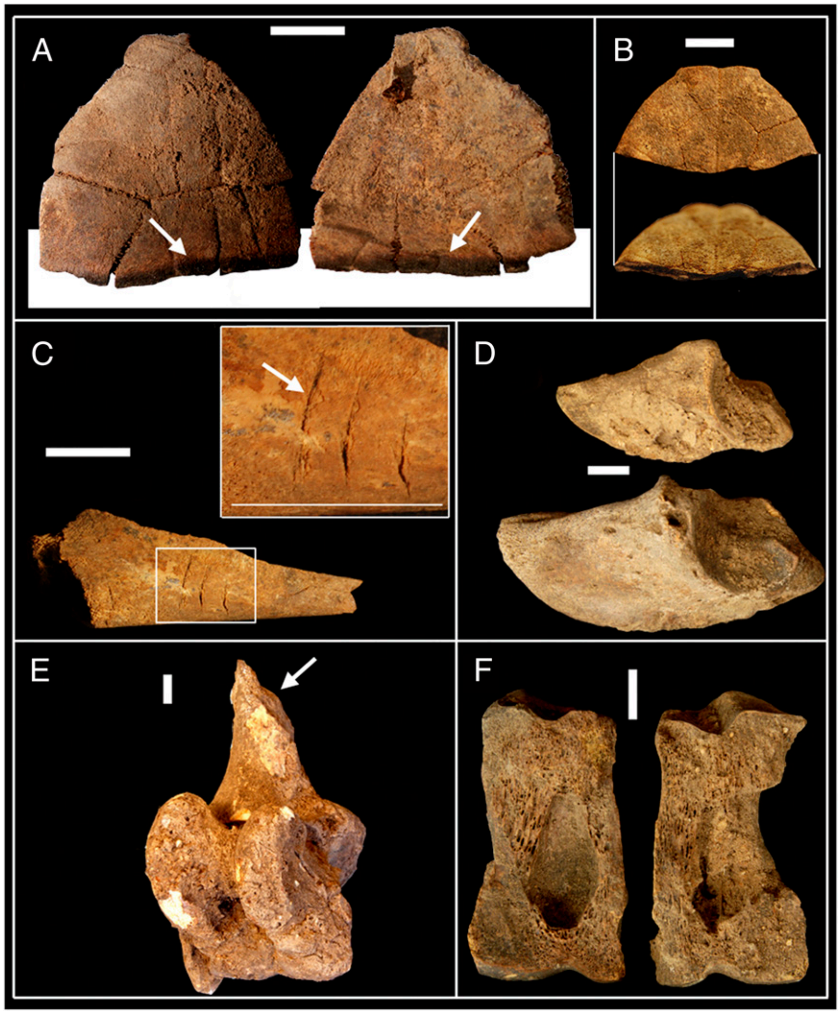

Fig. 4. Anthropogenic damage on aurochs and tortoise remains from Hilazon Tachtit: (*A*) tortoise carapace fragment burned on outer edge, (*B*) two views of a fresh (spiral) break across the anterior end of a tortoise plastron, (*C*) cut marks on a juvenile aurochs ulna (dorsal view), (*D*) third phalanx of juvenile and adult aurochs indicating presence of multiple animals, (*E*) articulated aurochs astragalus and calcaneus (arrow indicates spiral break where calcaneus was opened to extract marrow), and (*F*) two aurochs first phalanges split vertically for marrow removal. Photographs by Gideon Hartman.

Nearly all of the plastrons from structure A (96.2%) exhibit spiral fractures across the five anterior segments (Fig. 4*B*). Repeated breakage of the bridge connecting the plastron and carapace indicates that the plastron was pulled away from the carapace to expose the tortoise flesh inside. These breaks occur just above the natural suture, indicating that shells were broken when covered in keratin. This breakage strategy allowed meat to be removed from the shell while preserving the carapace intact. That both the fractured plastron elements and limb bones were disposed of in the grave indicates that the tortoises were opened at the time of burial. Four percent of carapace and plastron segments are burned (NISP, 5,059), in comparison with only 0.4% of limb bones (NISP, 500; highly significant difference, $\chi^2 = 16.38$; df = 1; $P < 0.001$). Of the burned specimens, 95% are burned only on their exterior surface or, in the case of peripheral segments, on their distal edge [*sensu* ref. 20; Fig. 4*A*]. This pattern establishes that burning resulted from intentional human behavior rather than secondary burning following disposal that should affect all taxa equally (i.e., by succeeding hearths or brush fires). In addition, burning on the exterior of both plastron and carapace segments, but virtually no limb bones, indicates that tortoises were roasted in their shell.

The evidence suggests that the tortoises were killed and processed at the time of the interment of the woman in the grave. First, at least some tortoises were roasted in the shell. Next, the shell was breached through the plastron and the meat was removed. Care was taken not to damage the carapaces that were then placed in the grave. The plastron and limb bones were also deposited in the grave. The low representation of limb bones in comparison with carapaces likely reflects the loss of limb bones during consumption and/or their less careful treatment during transport to the grave after the meal. Several lines of evidence indicate that the tortoise carapaces were intentionally buried in the woman's grave. First, a large triangular slab was placed on top of the grave to seal it and deposits under this slab were not disturbed after burial. Second, a number of tortoise carapaces were found in direct contact with different parts of the human skeleton. Third, the tortoise shells were distributed throughout the grave—both above and below the woman's skeleton. For example, the woman's skull rested directly on a tortoise carapace, while three carapaces were recovered directly above her pelvis and two were found immediately below. The carapaces underneath the pelvis were recovered just a few centimeters above the base of the grave.

Most other material remains retrieved from the site including lithics, seashells, bone tools, ground stone tools, and art objects are concentrated in the structures. The lithic assemblage in the structures (n = 4,154) comprises 64% of the assemblage from the site, although it is concentrated in only 15% of the area (4 m^2 vs. 26 m^2). Interestingly, although the knapping waste, primarily debitage and cores, is equally distributed among the various areas, 80% of the tools are found in the structures (n = 2,169; 52%). This and a high tool-to-debitage ratio suggest that knapping was not the main activity carried out at Hilazon and that tools were preferentially deposited in the structures. Furthermore, tools are not distributed evenly throughout the fill of structure B, but are clustered in discrete concentrations at various depths, potentially representing discrete dumping events.

Discussion

A feast entails the communal consumption of large quantities of food and is best identified in archaeological contexts using a number of independent lines of evidence (see reviews in refs. 1, 4, 27, 28). Common criteria derived from ethnographic contexts to identify feasting in the archaeological record include (*i*) special foods, i.e., unusually large quantities of food remains in discrete contexts, especially of rare, large, or symbolically important animals; (*ii*) energy and time investment, i.e, an unusually high investment in the acquisition, transport, processing, and preparation of food; and (*iii*) special contexts, i.e., the location of the aforementioned in a special setting in association with ritual activities. The data from Hilazon Tachtit meets each of these criteria, as detailed in the following paragraphs.

First, aurochs remains are often found in Natufian assemblages, but always in low frequencies. Yet at Hilazon Tachtit, the remains of at least three aurochs were recovered from structure B alone. In view of their exceptionally large body size, the three animals could have provided considerable quantities of meat [>300 kg (22)]. Excess portions of the aurochs carcasses may have been transported away from the cave by the funeral guests after the event. Although there is no clear evidence that aurochs played a symbolic role in the Natufian, strong indications of their symbolic and ritual importance is common in the Early Neolithic (29, 30). Likewise, the tortoise remains interred in a single depositional context (a grave) within structure A comprise at least 71 individuals consumed in a single event. The yield of meat (at least 17 kg) would have been sufficient to feed at least 35 people.

Second, aurochs were the largest and one of the most dangerous animals available to Natufian hunters. Their decline in anthropogenic assemblages from the Middle Paleolithic to the Epipaleolithic reflects their reduced availability on Levantine landscapes (31). Tortoise populations were also depressed in the Natufian (32), which would have increased search time in comparison with earlier periods. Given these circumstances, the capture of aurochs and/or 71 tortoises for a specific event represents a monumental undertaking. Because tortoises are easily penned and have minimal food requirements, this burden may have been relieved somewhat by collecting them over a period of a few days leading up to the burial event. Finally, substantial time and energy were also invested into the manufacture of the structures.

Third, the remains of the aurochs and tortoises are found in a ritual context within a Natufian burial cave (18). Moreover, many of the tortoises were intentionally placed within the unique grave of a woman interpreted as a shaman (21). The construction of two structures, one intended for a burial and the other potentially for receiving ritual deposits produced by activities associated with burials, also meet the criteria for a special context. Finally, high concentrations of material remains in the structures suggest the intentional burial of caches of artifacts. These may foreshadow the Neolithic custom of caching objects in pits under floors or in special structures (33, 34).

Despite the ubiquity and centrality of feasts in ritual events across the globe today and in history, we still do not know exactly when these distinctly human activities first emerged. Many scholars have argued that feasting goes back to at least to the Upper Paleolithic period and is associated with the emergence of modern human behavior (3, 4), and we agree that this is likely. Nevertheless, although feasting is suggested in some Upper Paleolithic and Epipaleolithic contexts (35–37), the cultural remains from Hilazon Tachtit provide the best clear evidence for feasting in a pre-Neolithic context.

So, if feasting did exist before the Neolithic, why has clear evidence not been found until the Natufian period? First, feasting could be detected at Hilazon Tachtit because of the exceptionally well preserved deposits within the structures. But more importantly, we argue that the identification of feasting in the Natufian record relates to the expansion of public ritual as part of increased social complexity initially triggered by sedentization. These social processes likely increased the public nature and scale of mortuary ritual and associated feasts in the Natufian period, heightening the likelihood of finding feasting residues in the archaeological record. In addition, we argue that changes in disposal practices linked to increasingly public mortuary feasts also increased the chance that the remains of feasts would be recovered by archaeologists. As mortuary rituals became larger in scale, increasingly public and formalized, the material remains including the trash associated with these events ("ceremonial trash," cf. ref. 38) became more precious and worthy of special burial.

Conflict management, competition among individuals, and the need for social mechanisms to smooth over real or perceived emergent social inequalities (8) are expected outcomes of closer daily contact between individuals brought on by increased sedentism. Community integrative mechanisms such as feasting and other forms of public ritual serve to mitigate scalar stress by bringing people together to engage in events based on shared ideologies, thus increasing solidarity (8, 39, 40). Mortuary contexts are natural venues for the expansion of public rituals as community members aggregate to commemorate an individual's life and simultaneously establish community membership (40). Likewise, new ritual behaviors, especially those associated with burial activities (37, 41), would have played an important role in reinforcing shifting ideologies associated with the adoption of new economic strategies focusing on delayed rather than immediate returns.

The identification of feasting at the beginning of the transition to agriculture provides support for social models for agricultural origins (11, 12), as important social processes are undoubtedly already at play. Nevertheless, multiple lines of archaeological evidence from the same period point to declines in human foraging efficiency, resource depression, and intensified plant and animal use as predicted by population models (32, 42). Instead of lending support to one specific model, the Natufian evidence suggests that increased social complexity enabled society to successfully adopt the major subsistence changes that agriculture entailed. Yet for the transformation to occur, unique environmental and demographic circumstances were required (43).

Finally, elements recorded in the feasting event at Hilazon Tachtit are reminiscent of those of great importance in later cultural traditions. The use of wild cattle in feasting and other ritual events is particularly prevalent in the Neolithic period across southwest Asia (4, 22, 30, 44–46). Furthermore, cattle, more than other animals, recur as ritual symbols in early Neolithic contexts across the region (29). Notwithstanding their suitability to feed large groups of people, their prominence at Hilazon Tachtit suggests symbolic and ritual continuity with the succeeding Neolithic cultures. This continuity in tradition emphasizes the importance of local contributions to the agricultural transition.

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