Stone age bedding by the Sea of Galilee

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Evidence by Nadel et al. (1) in a recent issue of PNAS, of the world’s oldest bedding at the site of Ohalo II on the edge of the Sea of Galilee is an example of the serendipitous nature of archaeological discovery. During the 1980s and 1990s, drought and pumping of water for domestic and agricultural needs resulted in a serious drop of water level. The falling water level exposed 2,000-year-old boats and the archaeological site Ohalo II, dated to 23,000 years ago (Fig. 1). The site is noteworthy for three reasons. First, it has preserved a wide range of plant material and organic traces of huts or shelters in which people lived. Second, the site was occupied toward the end of what must have been one of the most severe climatic episodes in human history. Finally, direct evidence of bedding and, consequently, of the layout of the domestic space was recovered. Before the Neolithic period (after 11,000 years ago), there is little direct evidence of the human use of plant resources and information about adaptations and ways of life depend largely on stone artifacts and faunal remains found in archaeological sites. Nadel et al. (1) mention the rare earlier occurrences of normally perishable material and thereby highlight the extraordinary circumstances of the Ohalo discovery where rapid burial by a layer of sand and water sealed the site from disturbance. The burial must have been essentially instantaneous because wave action, exposure to wind and rain, and so on would have dispersed and degraded the plant material and outlines of the huts. Chance good luck preserved a unique site, raising the question of how many more such sites lie submerged around the lake.

The Sea of Galilee itself was newly formed when Ohalo was settled and probably attracted many bands of hunters and fishers. Throughout the Pleistocene, the Levantine Rift, a structural depression extending from the Red Sea to the mountains of Southern Anatolia, saw essentially continuous human occupation. The central part of this rift is the Dead Sea Valley, in which, during the final glacial period, Lake Lisan stretched from south of the Dead Sea northward to the Sea of Galilee. Tectonic activity at the end of the last glacial period created the Sea of Galilee (2) as well as the deep northern Dead Sea basin and left the two separated by the Jordan River (see figure 5.90 of ref. 3 and figure 15 of ref. 4).

Another remarkable factor is that, according to the radiocarbon dates, the site was occupied during the Last Glacial Maximum (LGM), when climate indicators such as pollen and isotopic composition of speleothems, as well as a greatly lowered permanent snow line, indicate that the Near East was cold and arid (5, 6). Botanists have inferred that many plant species, including trees, were vacant from much of the landscape and were present only in small refugia where water resources and enhanced solar warming due to topography and aspect created favorable conditions. Under these late glacial conditions, human populations and the game on which they subsisted were restricted to the most favorable locales.

Ohalo was in an environment with abundant terrestrial and aquatic resources in a broader landscape that was relatively impoverished. Plant remains indicate spring and fall harvest, and birds, both migratory and local, as well as fish, could be harvested in all seasons. There seems little reason to doubt that year-round use of the site would have been possible (2). Nevertheless, it is hard to reconcile the apparent abundance of food resources with the apparent very short-term occupation of the huts (7).

One of the major questions about the late Pleistocene and early Holocene in the Levant is the climate and the resources that could be used by humans. Ohalo II provides the oldest and best attested evidence for preparing a living surface off the ground itself.

It is unusual to be able to acquire good paleoclimate and environmental information from the specific locale in which archaeological sites occur. Again, Ohalo is an exception. The site has given an excellent picture of the surrounding vegetation, which, as Nadel et al. (1) note, is similar to that of today. What we do not know, however, is whether this was a unique environmental niche or a reflection of a much broader flora. Although the Levant today is a biological hot spot, some botanists maintain that its floral diversity and, especially, the proliferation of annual species are associated with the Mediterranean climate that features strong seasonal contrasts with mild wet winters and hot dry summers (8). Did such conditions exist at the end of the LGM? There is no indication that they did across the region, although relict stands may have persisted in favorable locales. Cores taken from the Sea of Galilee might inform on the local climate from the formation of the basin through the recent period and thereby add valuable evidence to the few cores already known from other lake basins. It should be noted, however, that soil samples from the site did not yield pollen (ref. 9, p. 16).

The article by Nadel et al. (1) focuses on the use of plant material for bedding.

See companion article on page 6821 in issue 17 of volume 101.

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Clearly, this is the oldest and best attested evidence for preparing a living surface off the ground itself. It is not, however, particularly surprising when we consider that all people known today prefer to place even a thin mat between themselves and the ground, and that mammals, birds, and even fish prepare “beds.” The most important thing, then, is not the fact that humans had developed new insights into comfort and the organization of dwelling space but that a previously invisible but suspected part of human adaptation was firmly in place, namely the harvesting of what appears to have been an eclectic assortment of plants.

Studies of use-wear, the analysis of microscopic traces of wear on flint tools, have previously suggested that later Natufian people were harvesting grasses at ground level with flint sickles (10, 11). The presence of *Puccinellia* stems in the bedding that had apparently been cut similarly suggests a much earlier use of this harvesting method when one might have supposed that mere uprooting would have sufficed. Perhaps this is evidence that people preferred clean bedding.

The presence of wild wheat and barley, the latter in considerable abundance, raises the question why it took another 10,000 years for people to develop agriculture. After the LGM, climate ameliorated and vegetation responded. People followed the resources and were soon living in stone-founded communities apparently continuing to harvest and process wild cereals. Abundance of these resources may have inhibited any interest in pursuing deliberate planting until the climatic reversal known as the Younger Dryas, after which cultivation of crops can be detected. Coincident with a greatly improved climate in the early Holocene, there was a rise in CO2 that some botanists think was the fertilizer that stimulated the growth of the economic annuals and provided the solid subsistence base of agriculture (12, 13). However, the early adaptation to plant foods as exemplified at Ohalo that began to establish the social and technological preconditions for the eventual adoption of agriculture. It is interesting that people at Ohalo possessed neither sickles for reap ing grain nor stones to grind or pound it, both seemingly necessary for the efficient harvest and utilization of grain as a staple. However, we must note that one reason the barley was preserved is that it was charred. A modern, traditional practice is to harvest grain before it is fully ripe and to roast it in an open fire. The product, known in the region as frikkeh, can then be pounded to groats. The advantage of this method is that wild grain, which because of its seed dispersal mechanism is hard to harvest when ripe, can be collected, processed, and stored for future use. Moreover, the use of nearly ripe grain provides a highly nutritious source of glucose at the end of a long, lean winter season when fresh plant food would not be available.

Sites like Ohalo remind us of how much we miss in normal sites that have been exposed to the atmosphere and bioturbation. At the same time, they raise new questions and suggest new avenues of exploration.