ʿAtiqot 95, 2019

Geomorphological Setting and Palaeoenvironment of the Pottery Neolithic Site at Tel Yosef (Tell esh-Sheikh Ḥasan)

Arlene Miller Rosen

Introduction

The Pottery Neolithic (PN) site at Tel Yosef (see Covello-Paran, this volume) is located on the southern fringe of the Ḥarod Valley, c. 25 km south of the modern settlement of Tel Yosef. The site is situated about 0.5 km from an Upper Cenomanian–Turonian limestone and dolomite cliff, on heavy clay vertisol soils, formed in the marshy environment of the valley. Naḥal Ḥarod bisects the valley, and today, runs about 1 km north of the site. Water resources for the prehistoric residents were enhanced by the presence of several springs, situated within easy walking distance from the site (ʿEn Yosef, ʿEn Ayyalot, ʿEn Riḥan; see Covello-Paran, this volume: Fig. 1).

The site was covered by an overburden of c. 2 m of clayey colluvium, which had been removed before the fieldwork began. There are many signs of seasonal inundation at the site, and the wetting/drying regime, which has been active since the site's abandonment, is the primary factor for the poor preservation of charcoal, bone and potsherds. The high soluble silica content in the vertisols is responsible for the formation of a heavy silica patina on the flint artifacts (see Khalaily, this volume).

A deep geological section at the eastern edge of the excavation (Sqs J/8–9; see Covello-Paran, this volume: Plan 1) allows for the reconstruction of aspects of the landscape and environmental history of the site's vicinity. This section was cross-referenced with sections in Sqs D7 and B5 (see Covello-Paran, this volume: Plan 1). Taken together, the sections provide a more complete east–west section and a correlation with the archaeological strata at the site. A description of these sediments is presented in Table 1.

The Geological Setting

Unit III. The lowermost unit exposed in the geological section at Tel Yosef attests to floodplain backswamps and river deposits from a much more vigorous Naḥal Ḥarod than the present one. Unit III alluvial deposits indicate a strong and steady flow of a broad perennial

Table 1. Description of Natural Sediment Units at Tel Yosef

Unit	Thickness (cm)	Color	Texture	Structure	Inclusions	Boundary	Depositional Environment	Stratum (see Covello-Paran, this volume)	Probable Date (BCE)
I	60	Dark yellowish brown (10YR 4/4), moist	Very poorly-sorted silty clay	Massive	Very friable sherds; charcoal flecks; c. 20% 2–10 cm angular limestone and flint gravels and reworked carbonate nodules; a small moderately well-sorted channel deposit between Strata I and II in Sq B5	Abrupt and irregular	Hillslope colluvium, mixed with a small stream channel deposit	I or Post-II	5th millennium
IIa	200 gravel sets, 5–20	Dark yellowish brown (10YR 4/4), moist	Moderately well-sorted pockets of 2 mm and 2 cm pebbles	Slightly imbricated	Sub-rounded to rounded discoidal limestone and flint gravels with Fe and Mn coating; a PN sherd was found in the uppermost gravel lens	Abrupt and slightly wavy	Channel deposit of well-sustained seasonal flows	II	6th millennium (PNA)
IIb	20–45	Very dark, grayish brown (10YR 3/2), moist, with facies of dark brown (7.5YR 4/4)	Clay	Angular blocky soil structure	20% *in situ* calcium carbonate nodules (diam. 1–2 cm); 5% 1–5 cm limestone and flint pebbles; pronounced clay skins on peds	Slightly graded and wavy	Truncated paleosol on floodplain backswamp deposit	III	Early Holocene
III	250	Brown (7.5YR 4/4), moist	Large gravels	Massive	Rounded to sub-rounded discoidal limestone and flint; pockets of fine-grained sediment containing carbonate nodules (diam. 0.5–1.0 cm)	Abrupt and wavy	Channel deposit from stream with strong perennial flow		Late Pleistocene

stream that meandered through the valley. In the period of Unit III, the stream neared its southern edge, where the PN site was later founded. This activity probably occurred in the Late Pleistocene, when such vigorous stream systems are generally known in the region (Rosen 1986).

Unit IIb. In this phase, Naḥal Ḥarod retreated to the north, in the direction of the center of the valley. The sediments near the site are very fine-grained black overbank deposits. They accumulated when floodwaters periodically overflowed the stream banks, and water was trapped behind stream levees, creating seasonal swamps. The thickness of these deposits indicates that this swampy regime lasted for a significantly long period of time (possibly for hundreds of years). The upper portion of the unit is characterized by well-developed *in situ* carbonate nodules, resulting from soil formation on a stable land surface in a moister climatic regime. This indicates that either the overbank flow from Naḥal Ḥarod became less frequent due to reduced flow and fewer flooding events, or that there was a further shift of the stream toward the northern border of the valley.

This unit probably corresponds to the Early Holocene "Neolithic Wet Phase," which, archaeologically, was contemporary with the Pre-Pottery Neolithic B (PPNB; Goldberg and Rosen 1987). The soils of the upper portion of Unit IIb are cut by small channels from a network of small streams that crosscut the marshy landscape of the valley. These deposits are represented by Unit IIa (see below). Until this point in time, there was very little wash from the cliffs just south of the site. The hills were heavily vegetated and the soils were therefore firmly held in place.

Unit IIa. The uppermost channel of Unit IIa contains small rounded gravels and one well-rounded sherd, indicating that this sediment regime was still active at the time of the first PN occupation of the valley; however, it predates the main occupation of the site. The landscape, which greeted the first PN settlers, comprised forested hillsides flanking a well-watered marshland.

Unit I. Shortly following the first PN settlement at Tel Yosef, the environment suffered a major change. This led to the build-up of the Unit I colluvial deposits. These derived from the hill slopes, which had become progressively more sparsely vegetated. This change may have resulted from human deforestation of the slopes, but due to the sparse population at the time, it is more likely that it was due to the climatic shift from the moist PPNB period to a drier phase in the PN (Rosen 2003). The PPNB moist phase probably enjoyed a more even distribution of rainfall throughout the year, including summer rains. The rainfall patterns of the PN were most likely similar to those of the present, with distinct wet and dry seasons. The vegetation, which had previously thrived on summer rains, would have disappeared from the slopes, leading to looser soils more prone to erosion and to the colluvial deposits of Unit I. The marshy conditions persisted at this location, but these marshes were formed by slope runoff and poor drainage, as opposed to the previous regime of floodplains and back swamps.

A similar pattern has been observed at the PN site at Tel Te'o near Qiryat Shemona in the Ḥula Valley. There, the sediments which immediately predate the PN, exhibit true soil development, also reflecting the rainfall and vegetation stability of the PPN. Like Tel Yosef, the PN settlement at Tel Te'o occurs within a colluvial deposit, marking a period of instability, probably reflecting the change to a drier climate (Rosen 2001).

THE PALEOEVIRONMENT OF THE SITE

As the site of Tel Yosef is located within a colluvial deposit, it was unclear if the various cobbled surfaces unearthed (see Covello-Paran, this volume) were a function of cultural (anthropogenic) or natural processes. These surfaces were examined from a geoarchaeological perspective and most were determined to be a result of human activity. The evidence for this includes: (a) the concentration of uniformly-sized gravels (colluvium is typically poorly size-sorted); (b) the orientation of the gravels, with longitudinal axes on a horizontal plane (colluvial deposits are randomly oriented); (c) the almost complete lack of these stone concentrations within the non-site sections of the colluvium; and (d) the occurrence of these surfaces at or near the levels of the bases of walls.

Finally, the scarcity of ceramic, bone and charcoal finds is attributable to the marshy conditions that persisted from the PN to present days. Potsherds found in sections through the colluvium were as soft when wet as the surrounding clayey sediment.

REFERENCES

Covello-Paran K. This volume. The Pottery Neolithic Settlement at Tel Yosef (Tell esh-Sheikh Ḥasan).

Goldberg P. and Rosen A.M. 1987. Early Holocene Paleoenvironments of Israel. In T.E. Levy ed. *Shiqmim* I: *Studies concerning Chalcolithic Societies in the Northern Negev Desert, Israel (1982–1984)* (BAR Int. S. 356). Oxford. Pp. 23–33.

Khalaily H. This volume. The Flint Assemblage of the Pottery Neolithic Site of Tel Yosef (Tell esh-Sheikh Ḥasan).

Rosen A.M. 1986. *Quaternary Alluvial Stratigraphy of the Shephela and Its Paleoclimatic Implications* (Geological Survey of Israel Report, GSI/25/86). Jerusalem.

Rosen A.M. 2001. Environmental Studies. In. E. Eisenberg, A. Gopher and R. Greenberg. *Tel Te'o: A Neolithic, Chalcolithic and Early Bronze Age Site in the Ḥula Valley* (IAA Reports 13). Jerusalem. Pp. 153–156.

Rosen A.M. 2003. Paleoenvironments in the Levant. In S. Richard ed. *Near Eastern Archaeology: A Reader*. Winona Lake. Pp. 10–16.