'Atiqot 94, 2019

The Archaeobotanical Remains from Ḥorbat Nevallaṭ

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Introduction

During the excavation of Areas A and B at Ḥorbat Nevallaṭ, charred pieces of wood and carbonized seeds were collected from layers dating to the Chalcolithic period, and in smaller quantities, from Byzantine contexts (see van den Brink and Lazar, this volume).

The environs of Ḥorbat Nevallaṭ have been under continuous cultivation since ancient times, resulting in the near-denudation of the primary climax arboreal vegetation. The present-day flora is mainly segetal. What survives of arboreal vegetation comprises garigue and batha formations, with few *Ceratonia siliqua* (carob) and *Ziziphus spina christi* (jujube; Christ thorn) trees. Comprehensive dendroarchaeological research in Israel has shown that the primary climax vegetation, which dominated the Mediterranean phytogeographical zone during Nevallaṭ's occupation periods, was a *Quercus calliprinos* (kermes oak)—*Pistacia palaestina* (terebinth) association (Liphschitz and Biger 1990). *Olea europaea* (olive) was also present, and in markedly increasing numbers following human cultivation (Liphschitz et al. 1991).

Material and Methods

The Ḥorbat Nevallaṭ archaeobotanical remains came from Chalcolithic loci in Area A, and from Chalcolithic and Byzantine contexts in Area B. Most of the samples derived from Area A, and in some cases, were obtained by sieving the soil (Table 1).

Wood

For species identification purposes, 0.5–1.0 cu cm samples were taken from each of the charred pieces of wood. The samples were aspirated in absolute ethyl alcohol, dipped in a celloidin-clove oil solution for 24 hours, rinsed in absolute ethyl alcohol, and finally transferred to 50–55°C paraffin for 72 hours. Blocks were made in paraffin, and 12 milimicron-thick sections were cut with a microtome. Cross-sections were prepared, as well as longitudinal, tangential and radial sections. Species identification was based on the three-dimensional structure of the wood, as examined microscopically in these sections. Comparison was made with reference sections from systematically identified living trees and with anatomical atlases.

Table 1. Find Contexts of Wood Remains from Areas A and B

Area	Locus	Basket	Period	Tree species	Remarks
A	148	4220	Chalcolithic	*Olea europaea*	
	149	4245	Chalcolithic	*Olea europaea*	Sieving
	153	4232	Chalcolithic	*Olea europaea*	
	173	4292	Chalcolithic	*Olea europaea*	Sieving
B	320	3041	Chalcolithic	*Olea europaea*	Sieving
	321	3039	Chalcolithic	*Olea europaea*	
	321	3032	Chalcolithic	*Quercus calliprinos*	
	303	4146	Byzantine	*Quercus calliprinos*	From a winepress

Olive Stones

Identification of seeds (olive stones) was carried out morphologically, through comparison with recent specimens. The olive stones from Ḥorbat Nevallaṭ comprise very small carbonized specimens. One concentration came from Area B (L320, B3041); the rest were recovered from Area A, principally from a deep depression and crevices associated with or below the broad room building (Table 2). Altogether 36 specimens were measured, all very similar in size (Table 3). Comparison was made with olive stones found at a Chalcolithic site in Shoham (Liphschitz et al. 1996), as well as others from an Early Chalcolithic site, Naḥal Zehora II (Liphschitz and Bonani 2000). The olive stones from these sites have proven to be a reliable parameter for distinguishing between wild and cultivated varieties. The Nevallaṭ assemblage was also compared with samples from currently cultivated trees in various locations in the Mediterranean hills and mountains of Israel (Table 4).

Table 2. Find Contexts of Chalcolithic-Period Olive Stones

Locus	Basket
Area A	
162	4261
164	4258
167	4279
167	4282
167	4286
167	4303
167	4310
167	4313
172	4289
176	4302
180	4325
180	4335
182	4330
186	4339
Area B	
320	3041

In order to establish the age of the olive stones from Ḥorbat Nevallaṭ, single stones were analyzed through Accelerator Mass Spectrometry (AMS) Carbon-14 dating (Table 5)—a method which requires only several milligrams for measurement—at the Eidgenössische Technische Hochschule laboratory in Zürich.

Table 3. Statistical Data on Dimensions (mm) of Olive Stones (N = 36)

	Width	Length
Mean	4.58	7.84
Variance	0.47	1.77
Standard Deviation	0.69	1.33
Maximum	6.50	1.50
Minimum	3.50	5.50

Table. 4. Comparison Between Chalcolithic Olive-Stone Assemblages from Ḥorbat Nevallaṭ, Shoham and Naḥal Zehora II and Present-Day Cultivated Trees

Location / Factor	Ḥorbat Nevallaṭ	Shoham (Liphschitz et al. 1996)	Naḥal Zehora II (Liphschitz and Bonani 2000)	Modern Cultivated Trees
Size of Sampling	36	23	10	100
Calibrated Age Range (95% confidence limit)	4002–3808 BCE	3824–3646 BCE	4866–4343 BCE	Present-day
Mean length (mm)	7.84	7.50	8.05	13.50
Mean width (mm)	4.58	4.80	5.00	5.40

Table 5. Age of Olive Stones from Ḥorbat Nevallaṭ (by AMS; van den Brink et al. 2001)

Sample No.	AMS ^{14}C Age (BP)	δ13C % Calibrated Age (BCE)	95% Confidence Limit
ETH 20802	5160 ± 55	-25.5 ± 1.1	4048–3893 (66.5%); 3888–3797 (28.3%)
ETH 20803	5145 ± 55	-24.3 ± 1.1	4042–3793 (99.2%)
ETH 20802/3	5150 ± 35	-24.9 ± 1.0	4002–3929 (69.6%); 3875–3808 (27.4%)

RESULTS AND DISCUSSION

The wood remains collected at Ḥorbat Nevallaṭ derive from two tree species: *Olea europaea* and *Quercus calliprinos*. Most of the samples (77%; seven out of nine samples) were *Olea europaea* and only two were *Quercus calliprinos* (Table 1). As stated, the only seeds collected at the site were olive stones (Table 2). All the *Olea europaea* remnants—wood and seeds—originated in Chalcolithic layers. One of the two *Quercus calliprinos* samples was recovered from a Chalcolithic layer; the other came from a Byzantine-period winepress.

The archaeobotanical findings from Ḥorbat Nevallaṭ were compared with remains from a Chalcolithic site at nearby Shoham (Liphschitz 2005). The two assemblages are very similar. Most wood remains identified at Shoham were of *Olea europaea*: 28 of the 30 wood samples from the Chalcolithic horizon in Cave 4, and 8 of the 10 from the coeval layer in Cave 2. Similarly, 12 of the 14 wood samples dating to EB IB (Cave 2) were olive. Altogether, 48 of 54 wood samples from Shoham, i.e., 88.9% of the wood assemblage, were olive. As at Ḥorbat Nevallaṭ, among other wood species identified at Shoham was *Quercus calliprinos* (Liphschitz 2005).

The AMS analysis results indicated that the Ḥorbat Nevallaṭ olive stones date to the Chalcolithic period (Table 5; van den Brink et al. 2001). Furthermore, they are of similar dimensions to those from coeval Shoham and Naḥal Zehora II—further evidence that olive stone size is a valid metric for identification of cultivated trees.

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