[For SUPPLEMENTARY MATERIALS]

Continuity and climate change: the Neolithic coastal settlement of Habonim North, Israel

Roey Nickelsberg1,\*[ORCID 0000-0001-6536-4022], Thomas E. Levy3,4, Ruth Shahack-Gross1,2[ORCID 0000-0001-8085-9381], Anthony Tamberino3,4, Scott McAvoy4,5[ORCID 0000-0001-7810-7025], Gal Bermatov-Paz1, Nimrod Marom1,2[ORCID 0000-0002-1057-154X], Ehud Arkin Shalev1,2[ORCID 0000-0003-1592-3679], Ehud Weiss6[ORCID 0000-0002-9730-4726], Suembikya Frumin6[ORCID 0000-0001-6792-4011] & Assaf Yasur-Landau1,2,4[ORCID 0000-0002-5692-5622]

1 Department of Maritime Civilizations, School of Archaeology and Maritime Cultures, University of Haifa, Israel

2 The Leon Recanati Institute for Maritime Studies, University of Haifa, Israel

3 Department of Anthropology, University of California, San Diego, USA

4 Center for Cyber-Archaeology and Sustainability, Qualcomm Institute, University of California, San Diego, USA

5 Cultural Heritage Engineering Initiative, University of California, San Diego, USA

6 Martin (Szusz) Department of Land of Israel Studies and Archaeology, Archaeobotany Laboratory, Bar-Ilan University, Israel

\*Author for correspondence ✉ rnickelsberg@gmail.com

*Received: 1 March 2022; Revised: 15 March 2023; Accepted: 25 May 2023*

**Ceramic petrography**

The petrographic analysis of 10 samples resulted in the identification of two petrofabric groups, both coastal: one seems to be local and the other from farther south on the coast. The first is characterised by a light brown matrix that includes fine sand-sized quartz grains, fragments of aeolianite rock (*kurkar*) and coralline algae (*Amphiroa* sp.) (Figure S1a & c). This petrofabric is comparable with the coastal groups HQ and K, determined as local coastal production at the Late Pottery Neolithic (LPN) sites of Neve Yam and Tel Hreiz (Ramirez *et al.* 2021a: 118–20; 2021b: 132–33). The second petrofabric group is characterised by a matrix of reddish marl with microfossils. The main inclusion of quartz grains differs from the first group as the grains are larger (medium sand sized; Figure S1b), implying that the quartz did not travel as far as the first group and therefore may have originated in either the southern or central coast of Israel.



*Figure S1.* *Petrographic observations from two different ceramic vessels: a) clay paste includes coastal materials—fine to medium sand-sized grains of quartz as well as fragments of coastal aeolianite (k: kurkar rock)—typical of the Carmel Coast; b) clay paste containing medium-coarse sand-sized grains of quartz, possibly originating in the central or southern Israeli coast; and c) coralline algae (Amphiroa* sp*.) indicating the clay paste was prepared close to the coast.*

**Table S1. Plant remains from Habonim North in comparison with those from the Pre-Pottery Neolithic C (PPNC) site of ‘Atlit-Yam and the LPN site of Naḥal Zehora II.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Period** |  | **PPNC** | **Early PN** | **LPN** |
|  | **Site** |  | **‘Atlit-Yam** | **Habonim** | **Naḥal Zehora II** |
| **Group** | **Plant** | **Plant organ** |  |  |  |
| **Cereals** | *Triticum dicoccum* | fork | 683 | 222 | 11 |
|  |  | grain | 214 | 47 | 6040 |
| **Total cereals** |  |  | **897** | **269** | **6051** |
| **Pulses** | *Lens culinaris* | seed | 25 |  | 61 |
|  | *Lens culinaris?* | seed |  | 1 |  |
| **Total pulses** |  |  | **25** | **1** | **61** |
| **Weeds and wild plants** | *Malva parviflora* | seed | 1 | 2 |  |
|  | *Lolium rigidum* | grain |  | 1 | 14 |
|  | *Lolium temulentum* | grain | 2 | 1 | 2 |
|  | *Scorpiurus* sp*.* | seed |  | 1 |  |
|  | *Phalaris paradoxa* | grain | 9 | 9 |  |
|  | *Chenopodium album* | seed |  | 2 |  |
|  | *Cephalaria Joppensis* | seed |  | 1 |  |
|  | Small legumes | seed |  | 5 |  |
| **Total weeds and wild plants** |  |  | **12** | **22** | **16** |
| **Total** |  |  | **934** | **292** | **6128** |

**Table S2. Radiocarbon results from samples obtained during the excavation and survey.**

**\*Calibration was conducted using BetaCal 3.21 software with calibration curve IntCal13.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Lab Code | Material | 14C Age Years BP | Calibrated Age Years BC\* (1ơ) | Calibrated Age Years BC\* (2ơ) | Locus/Basket | Archaeological Context |
| Beta-568289 | Charred seed | 7090 ± 30 | 6010–5978 (41.5%)  5946–5922 (26.7%) | 6022–5902 (95.4%) | HN-G7/20-L5d-8 | Sq. 2, Area A; 0.1m below surface |
|  |  |  |  |  |  |  |
| Beta-521980 | Wood charcoal | 7160 ± 30 | 6052–6009 (68.2%) | 6070–5990 (95.4%) | NYB18B14-50 | Burnt patch by W002, Area B |
| Beta-568290 | Charred seed | 6450 ± 40 | 5450–5377 (58.3%)  5474–5461 (9.9%) | 5482–5339 (95.4%) | HN-G7/20-L4b-3 | Sq. 1, Area A; within top 30mm of excavation |
|  |  |  |  |  |  |  |

**Table S3. General breakdown of flint assemblage.**

|  |  |  |
| --- | --- | --- |
| **Type** | **N** | **%** |
| Tools | 46 | 24.3% |
| Cores | 35 | 18.5% |
| Blades | 2 | 1.1% |
| Bladelets | 6 | 3.2% |
| Flakes | 65 | 34.4% |
| Primary Elements | 27 | 14.3% |
| Core Trimming Elements | 5 | 2.6% |
| Burin Spall | 1 | 0.5% |
| Varia | 2 | 1.1% |
| **Sub-total** | **189** | **100.0%** |
| Chunks | 40 |  |
| Chips | 615 |  |
| **Total** | **844** |  |

**Table S4. General breakdown of the tool assemblage.**

|  |  |  |
| --- | --- | --- |
| **Type** | **N** | **%** |
| Burins | 8 | 17.4% |
| Backed Piece | 1 | 2.2% |
| Retouched Pieces | 23 | 50.0% |
| Notches and Denticulates | 5 | 10.9% |
| Microliths | 2 | 4.3% |
| Bifacial Tools | 5 | 10.9% |
| Varia | 2 | 4.3% |
| **Total** | **46** | **100.0%** |

**Additional references**

Ramirez, I.O., E. Galili & R. Shahack-Gross. 2021a. Pottery from submerged Neolithic/Early Chalcolithic settlements off the Carmel Coast, Israel: a microarchaeological study of raw material procurement and firing technology. *Journal of the Israel Prehistoric Society* 51: 105–21.

Ramirez, I.O., E. Galili, R. Nickelsberg, P. Waiman-Barak & R. Shahack-Gross. 2021b. Appendix to: pottery from submerged Neolithic/Early Chalcolithic settlements off the Carmel Coast, Israel: a microarchaeological study of raw material procurement and firing technology. *Journal of the Israel Prehistoric Society* 51: 130–35.