Supplementary Information (S.I.) Text

Unveiling the Culinary Tradition of '*Focaccia*' in Late Neolithic Mesopotamia by way of the Integration of Use-wear, Phytolith & Organic-residue Analyses[1]

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This PDF file includes:

- Archaeological samples
- Experimental trial
- Laboratory analyses, including:
  - Use-wear analysis
  - Phytolith analysis
  - Residue analysis
- References for SI reference citations

Archaeological Samples

Thirteen *husking tray* fragments were analyzed in this study, of which four are from Mezraa Teleilat (MT), two are from Akarçay Tepe (AKA), and seven are from Tell Sabi Abyad (SAB) (Table S1).

Item No.	Level	Period	Context
AKA 16	Und.	Pre-Halaf	Undetermined (Und.).
AKA 17	Und.	Pre-Halaf	Und.
MT 40	IB1c	IIB3- IIB2	Grid: 3-9/f-k
MT 167	IIB2	Und.	Grid: 3-10/f-k
MT 110	IB1a	IIB2	Grid: 1-10/f-k
MT 136	IIA1	I-IIC2	Grid: 1-10/g-k
SAB 88 Q14 50-24	3B	Early Halaf	Operation I: fill of an open area with loamy layers, charred grains and charcoal fragments
SAB 88-549	3-4	Transitional	Operation II: no architecture
SAB Q14 39	3B	Early Halaf	Operation I: open Area (post-use fill of Level 3B)
SAB 88 Q14 34-4	3B	Early Halaf	Operation I: fill of a pit containing grey-brown loam and black ash. Open area with many other fire pits
SAB 88 371	3-4	Transitional	Operation II: no architecture
SAB 88 S12 120-53	7A/B	Pre-Halaf /Transitional	Operation I: ashy fill of a fire pit containing abundant charcoal and pieces of burnt loam. Open area with many fire pits.
SAB 88 P15 35-105	4	Transitional	Operation I: fill of hearth, Locus 14.

Table S1 Contextual data of the analyses of the *husking tray* fragments.

[1] The research developed as part of doctoral research 'The role of the husking trays in the Late-Neolithic communities of the Near East' (1)

Experimental Baking Trial

In general, this experimental activity is based on the experiences already published in 2 and 3.
The doughs baked in the experimental trials were made from:

- Freshly stone-ground, organic *tumminia* wheat flour (a low-gluten wheat),
- Organic pork lard
- Organic extra-virgin olive oil
- Sourdough
- Water.

The *husking tray* replica was made from natural clay, tempered with numerous plant inclusions in keeping with the archaeological data.
The experimental baking trial took place in a specially constructed domed oven similar to those found in Near Eastern Late Neolithic contexts. The fuel on which the firing relied was wood charcoal.
The cooking temperatures were recorded with a pyrometer TE/XF0600F3F, AM&C.
The experiments took place in Sicily in springtime.

Figure S1 Experimental baking of bread seasoned with animal fat: a) ingredients; b, c) baking the dough in the domed oven; d) resulting bread turned upside down to show the marks on the surface of the bread; e) internal surface of the HT after baking; f) the red arrows indicate use-wear developed on the internal surface of the HT replica after the experiment.

Laboratory Analyses

The analyses were performed at:

- LTFAPA Lab. at the Sapienza University of Rome (use-wear)
- The Autonomous University of Barcelona (UAB) (phytolith and organic residues)
- The Prehistory Lab. at the Istanbul University (use-wear)
- The ARHA Lab., Koç University of Istanbul (use-wear and organic residues)
- The Institució Milà i Fontanals (IMF), Spanish National Research Council (IMF-CSIC)(phytoliths).

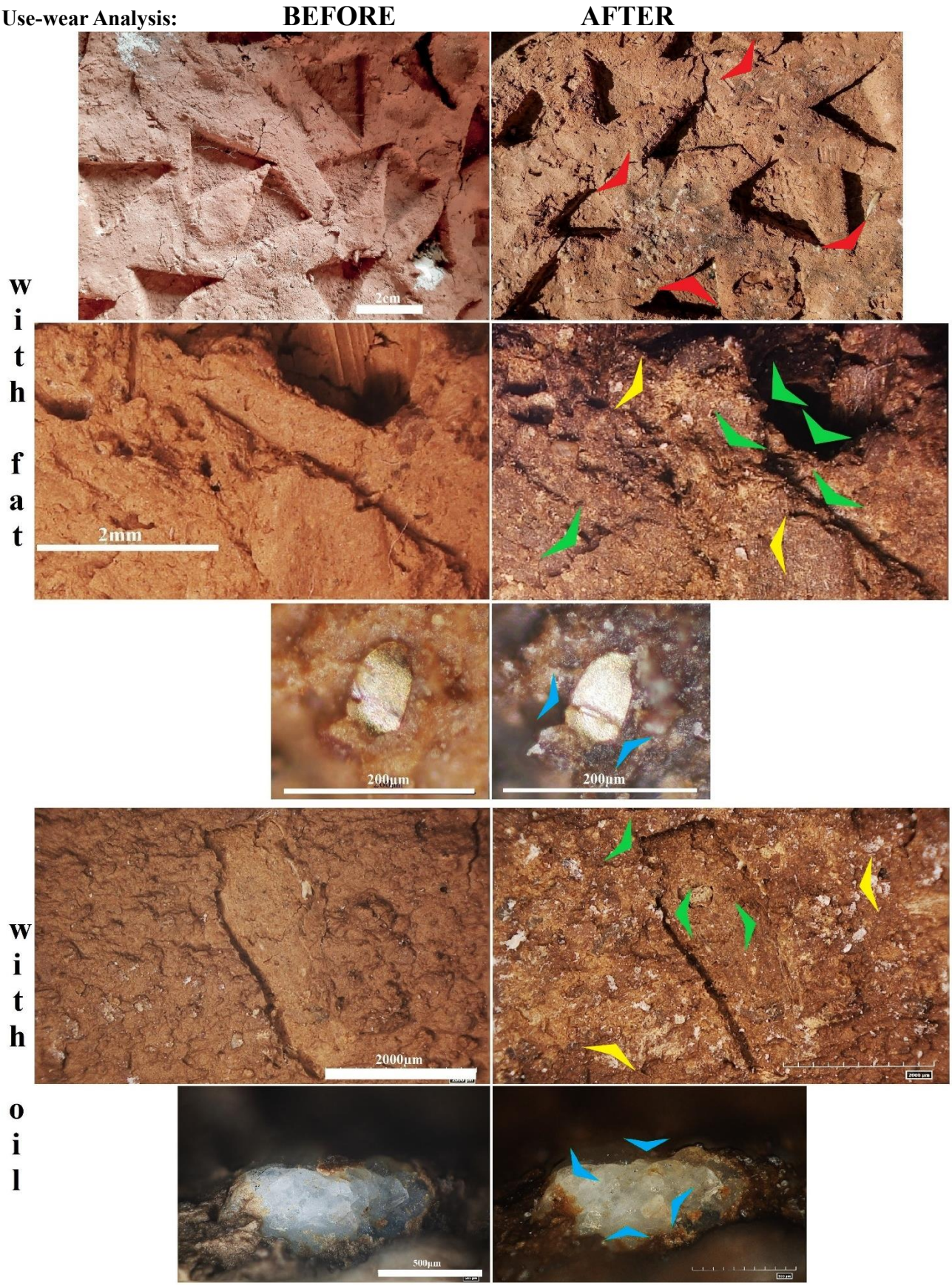

Figure S2 Internal ceramic surfaces of HT replicas before (left) and after (right) being used to bake seasoned doughs. The first three photos from the top show the internal surfaces of vessels used for baking focaccia with animal fat; the last two photos show the internal surfaces of vessels used to bake focaccia with plant oil. The red arrows indicate dark spots; the green ones indicate waved profiles; the yellow ones scattered crumbs; and the blue ones the rounding of mineral inclusions (micro-traces).

Content	Replica	Vessel Section	Surface	Residue	Macro-alterations	Micro-alterations
Plain dough	Life-size	Base	I	Crusts, charred encrustations	Rips	Not analyzed
			E	Soot	Striations, spall detachment, scratches	Not analyzed
		Side	I	Crusts, charred encrustations	Rips	Not analyzed
			E	Soot		Not analyzed
	Small	Base	I	Crusts, charred encrustations	Rips	Depressions
Dough with animal fat	Life-size	Base	I	Crumbs (light spots?)	Rounding, Dark spots, weaved edges	Not analyzed
			E	Soot	Striations, leveling, scratches	Not analyzed
		Side	I	Crumbs (light spots?)	Rounding, dark spots, waved profiles	Not analyzed
			E	Soot		
	Small	Base	I	Crumbs (light spots?)	Rounding, darkening, weaved profiles	Rounding
Dough with plant oil	Small	Base	I	Crumbs (light spots?)	Rounding, darkening, weaved profiles	Rounding

Table S2 Comparative table of surface evidence in relation to the baking of different types of dough in *husking tray* replicas (I = internal surface. E = external surface).

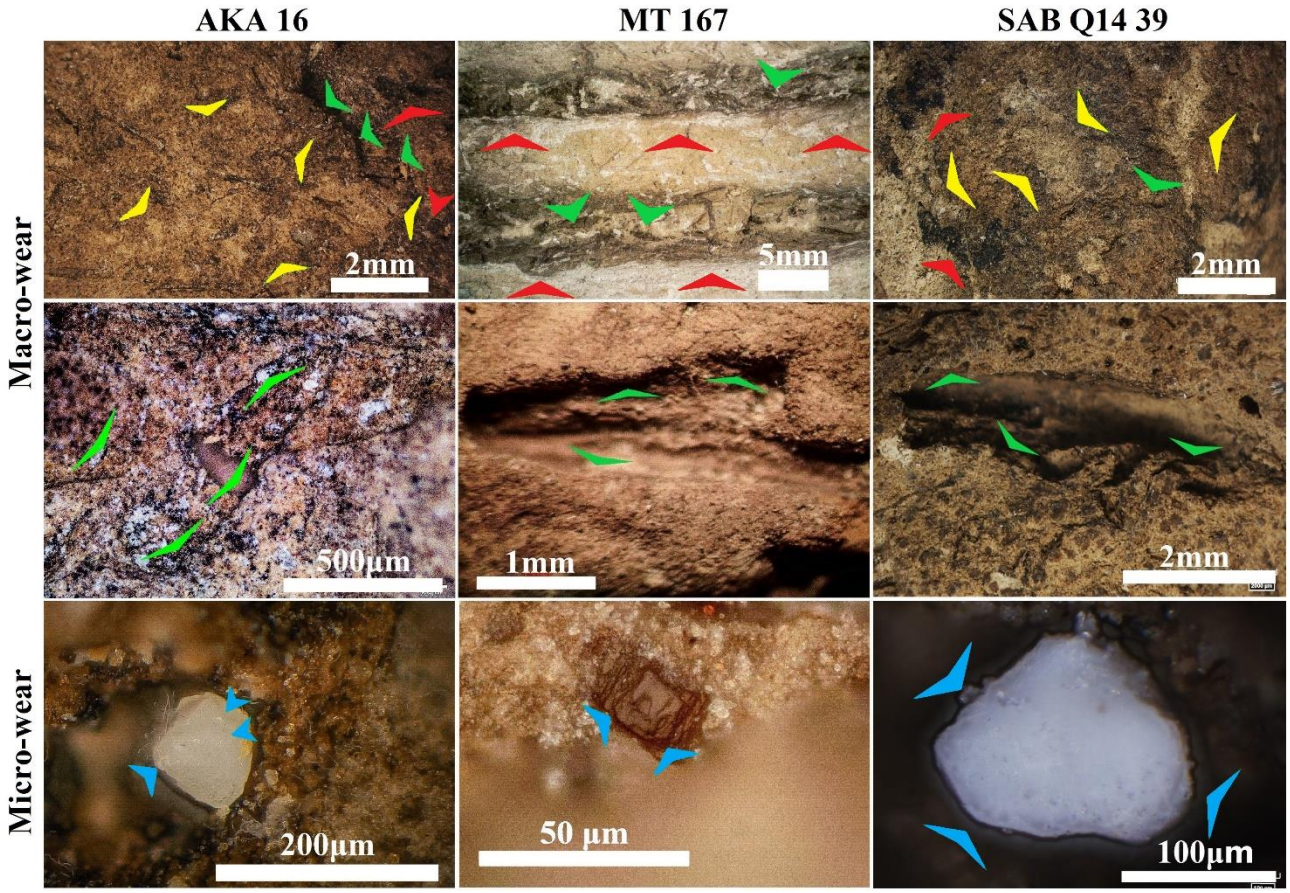

Figure S3 Use-wear detected on the archaeological fragments of *husking trays* AKA 16, MT 167 and SAB Q14 39, identified as belonging to pans used for baking flour dough mixed with lipid-containing ingredients. The red arrows indicate dark spots; the green ones indicate waved profiles; the yellow ones scattered crumbs/light spots; and the blue ones the rounding of mineral inclusions (micro-traces).

Item No.	Vessel Section	Surface	Macro-wear	Micro-wear	Activity
AKA 16	Base	I	Rounding, dark and light spots, waved profiles	Rounding	Lubricant-mediated adhesive activity
		E			
AKA 17	Und.	I	Rounding	Rips, rounding	Adhesive activity?
		E			
MT 40	Base	I	Rounding, dark and light spots	Rounding	Lubricant-mediated adhesive activity
		E	Scratches, striations	Striations	Abrasive activity
MT 167	Base/ Wall	I	Rounding, dark and light spots, waved profiles	Rounding	Lubricant-mediated adhesive activity
		E	Striations, scratches	Striations	Abrasive activity
MT 110	Base	I	Rounding, dark and light spots	Rounding	Lubricant-mediated adhesive activity
		E	Striations, scratches, sooting	Striations, spall detachment	Abrasive activity, Carbonization
MT 136	Wall	I	Rips	Depressions	Adhesive activity
		E	Rounding, leveling, sooting		Abrasive activity, Carbonization
SAB Q14 50-24	Base?	I	-	-	Undetermined
		E	Rounding	Striations, leveling, rounding	Abrasive activity
SAB88 549	Base	I	Rips, rounding, dark and light spots	-	Adhesive and lubricant-mediated adhesive activities
		E	Striations, sooting, scratches, leveling	-	Abrasive activity, Carbonization
SAB Q14 39	Base	I	Rips, dark and light spots, charred encrustations	Rounding, depressions,	Adhesive and lubricant-mediated adhesive activities, Carbonization
		E	Striations, sooting	-	Abrasive activity, Carbonization
SAB Q14 34-4	Base	I	Rips, charred encrustations		Adhesive activity, Carbonization
		E	Striations, sooting, leveling		Abrasive activity, Carbonization
SAB88 371	Und.	I	Rips?, charred encrustations, striations	Rounding	Adhesive and abrasive activities?
		E			
SAB 88 S12 120-5 3	Base	I	Rips	Depressions	Adhesive activity
		E	Striations, scratches		Abrasive activity
SAB 88 P15 35-105	Base	I	Rips	Depressions	Adhesive activity
		E	Striations, leveling		Abrasive activity

Table S3 Results of the microscopic use-wear analysis of the archaeological samples (I = internal surface. E = external surface).

Phytolith Analysis:

Sample ID	Surface	Phytoliths 1 g of sediment (million)	Weathered Phytoliths (%)	Multicelled Phytoliths (%)	Grass Phytoliths (%)	Inflorescence Phytoliths (%)
AKA 16	I	0.64	5.2	22.6	89.2	30
	E	0.65	14.1	5.9	81.9	30.2
AKA 17	I	3.18	5.4	8.3	90.8	40.9
	E	1.76	4.6	10.8	91.4	44.2
MT 40	I	14.8	5.7	2.8	89.4	26.6
	E	3.56	6.5	5.3	89.7	40.3
MT 110	I	2.11	4.2	5.6	92.1	37.1
	E	1.5	2.6	4.3	94.8	26.9
MT 136	I	11.3	8.6	6.7	87.3	27.5
	E	1.84	12.1	11.2	84.8	36
SAB Q14 50-24	I	0.92	3.5	2.7	92.7	29.6
	E	0.32	12.5	3.6	78.9	38.5
SAB88 549	I	2.8	6.2	19.5	89.7	35.6
	E	0.85	10.5	25.9	79.2	22.5
SAB88 Q14 39	I	0.93	5.2	9.3	90.9	36.2
	E	0.71	4.1	7.6	91	44.8
SAB Q14 34-4	I	0.71	8.1	2.7	87.8	30.8
	E	0.23	5.3	0	82.1	32.1
SAB88 371	I	2.05	5.8	29.6	92.5	37.8
	E	0.49	6.8	24	89.3	38.2
SAB88 S12 120-5	I	3.03	10.4	29.8	87.3	31.5
	E	0.51	10.4	23.1	80.1	30.4
SAB126 P15 35-105	I	2.91	6.1	19.1	89.4	51.6
	E	0.92	5	11.9	91.7	57.5

Table S4 Main phytolith results obtained from ceramic trays found in Akarçay Tepe (AKA), Mezraa Teleilat (MT), and Tell Sabi Abyad (SAB), (I = internal surface. E = external surface) (expanded from Table 4 in 3).

Organic Residue Analysis:

Sample ID	Sampled Part	Analysis	Lipid Concentration (µg/g)	Results
AKA16a	Und.	GC-FID, GC-MS	6.2	Degraded Animal Fats
AKA17a	Und.	GC-FID, GC-MS	0.3	No significant lipids preserved
MT 40a	Base	GC-FID	4.9	No significant lipids preserved
MT 167a	Base	GC-FID, GC-MS	7.5	Degraded Animal Fats
MT110a	Base	GC-FID	5.8	No significant lipids preserved
MT136 a,b,c	Rim, Wall, Base	GC-FID, GC-MS	20, 28, 25	Degraded Animal Fats
SAB Q14 50-24a	Und.	GC-FID	3.9	No significant lipids preserved
SAB88-549a	Base	GC-FID	2.5	No significant lipids preserved
SABQ14 34-4a	Base	GC-FID	2.4	No significant lipids preserved
SAB Q14 39a	Base	GC-FID, GC-MS	9	Degraded Animal Fats
SAB88-371a	Und.	GC-FID GC-MS	9.4	Degraded Animal Fats

Table S5: List of samples where organic residue analyses were performed, sampled parts, instruments used and results.

Sample ID	P/S ratio	L/M ratio	VLCFA %	Other compounds	$\delta^{13}C_{16:0}$‰	$\delta^{13}C_{18:0}$‰
AKA16a	1	1.14	2%	31K, 33K, 35K, 12-28 Alcohols Dicarboxylic acids	-29.8	-29.9
MT167	1.5	0.67	1%	N.D	N.A	N.A
MT136a	1.9	0.39	1%	N.D	N.A	N.A
MT136b	1.9	0.44	1%	N.D	N.A	N.A
MT136c	2.5	0.32	1%	N.D	N.A	N.A
SAB Q14 39a	1.1	0.54	2%	Dicarboxylic acids	N.A	N.A
SAB 88-371a	1.2	0.52	3%	31K, 33K, Dicarboxylic acids	N.A	N.A

Table S6: Results of the GC-MS study of positive samples. P/S: almitic (C16:0) to stearic (C18:0) acid ratio. L/M: lauric (C12:0) to myristic (C14:0) acid ratio. VLCFA%: Percentage of very long chained fatty acids (C>20) from the total amount of fatty acids. N.D: Not detected. N.A: Not analyzed. 31K: Hentriacontan-16-one, 33K: Tritracontan-16-one, 35K: Pentatriacontan-18-one.

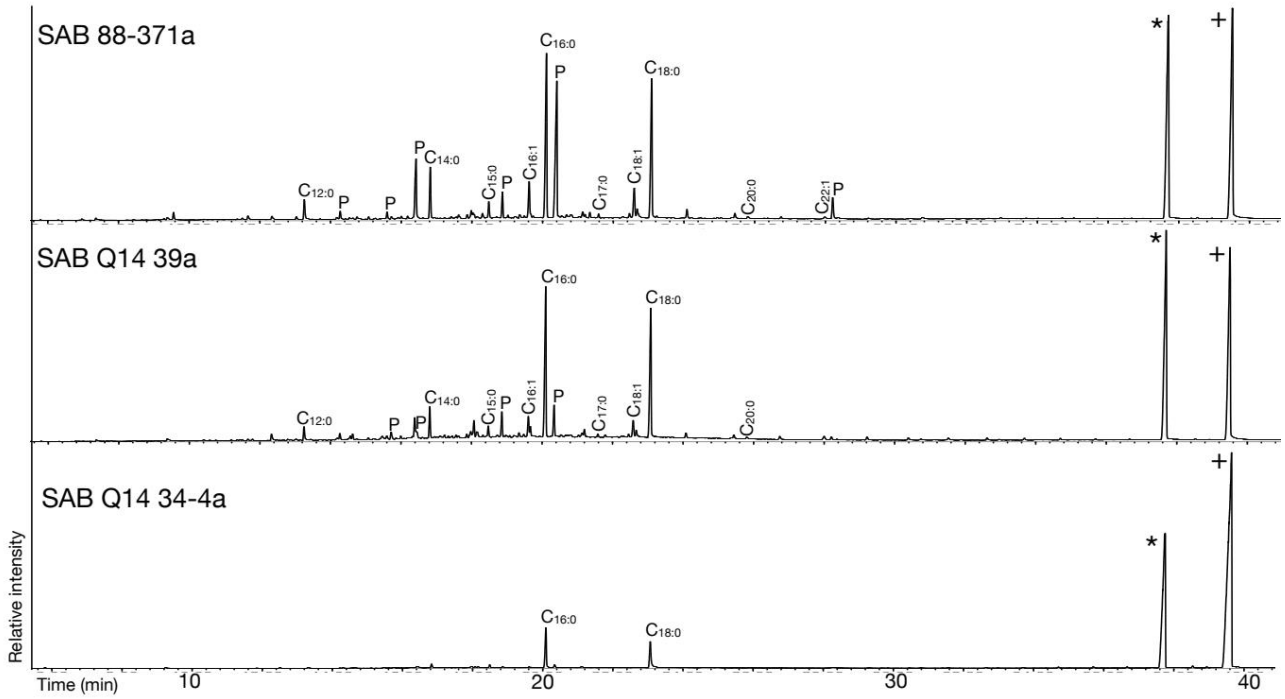

Figure S4: Examples of chromatograms from positive (SAB 88-371a, SAB Q17 39a) and negative (SAB Q14 34-4a) samples in the study. Cn:m, Fatty acids of n carbons long with m unsaturations. P: phthalic acids. *: Internal standard tetratriacontane, +: internal standard hexatriacontane.

References:

1) Taranto, S. (2022). The role of the *husking trays* in the Late Neolithic communities of the Near East. Unpublished PhD Thesis, Autonomous University of Barcelona in joint research with Sapienza University of Rome.
2) Taranto, S. (2020a). The role of the *Husking Trays* in the Late Neolithic communities of the Northern Mesopotamia. In Broadening Horizons 5 (Atti del Congresso; Udine 2017), Trieste, pp. 27-38.
3) Taranto, S., Portillo, M., Gómez Bach, A., Molist Montaña, M., Le Mière, M., & Lemorini, C. (2023). Investigating the function of late-Neolithic *'husking trays'* from Syrian Jazira through integrated use-alteration and phytolith analyses. JASc: Reports, 47. https://doi.org/10.1016/j.jasrep.2022.103694