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UC Berkeley Archaeobotany Laboratory Report #93: Archaeobotanical Results from water flotation of samples from the Stone Age site of Leira, Aure municipality, Norway by Christine A. Hastorf

Written for: Heidi Mjelva Breivik, Skule O.S. Spjelkavik, and Saeideh Ghafouri, NTNU, Norway as part of the Peder Sather Grant.
Analyzed by: Christine A. Hastorf, University of California, Berkeley
Date: 1 November 2026

In 2020 Dr. Heidi Mjelva Breivik contacted Christine Hastorf to initiate a joint project of a Mesolithic excavation on a Norwegian island to be supported by the Peder Sather grant, that provides research funds for scholars working together from both Norwegian Universities and UC Berkeley. On the second submission the funds were granted for a small excavation, along with a range of artifactual analyses. All analyses were to be completed in Norway except the macrobotanical analysis to be completed by Christine Hastorf in the McCown Archaeobotany Laboratory at UC Berkeley. This is that report on the eleven flotation samples collected, floated and sent to Hastorf in the summer of 2026.

The site of Leira is located on Tustna a small island west of Trondheim. It is located on former beach ridge first identified in 1990. Over time the site would have been above sea level at three occasions during the Mesolithic: 9100 (Early Mesolithic), 7800 (Middle Mesolithic) and 6000 uncal Tustna is also situated at the meeting point of two fjords, *Arasvikfjord/Vinjefjord* and *Halsafjord*. The *Arasvikfjord* would have provided easy and sheltered access to the East. Although the coastline is exposed the Leira site lies nestled in between two low-lying ENE/WSW-oriented rocky ridges, protecting the site from the prevailing westerly winds. Inshore skerries and small islands would also have protected the waters outside the site, making landing by boat easier. (Breivik et al 2026). This site is one of many (50) stone age settlement traces registered on the island.

This recent excavation at Leira was important due to its Middle Mesolithic cultural deposit having been sealed beneath a Tapes transgression layer protecting the deposits. The excavation of the Leira site in 2025 brought together several complementary research initiatives. The Sather funded excavation focused on multi-proxy analyses of the sediments, artifacts and ecofacts. While sediment, pollen, stable isotopes, and ancient DNA analyses were added to the traditional artifact analyses, this Norwegian team also added systematic macrobotanical sediment collections, which this report presents the results from. The project and its goals and results are found in the Breivik et al 2026 report.

The goal of this archaeobotanical analysis is to address part of the overarching questions proposed in this project, including if it is possible to detect plant material, what taxa are still present and if it is possible to indicate which times of the year the site was visited from the plant material. Another question was if macrobotanical remains did survive in this very moist freeze-thaw coastal situation.

In the two excavation units the absolute dates tell us that the excavations span the shift from the Middle to Late Mesolithic, with the earlier dates at the bottom of the units. The bottom of unit 1034 is 6641-6497 BCE, and the top of that unit is 6476-6407 BCE, suggesting a one-hundred-year use of the sector, averaging the median dates becomes roughly 6441-6570 BCE. The dating for the region is in table 1.

Table 1. Norwegian Stone Age date phases (Breivik et al 2026).

Period	Chronozones	Timespan
Early Stone Age		(9500 – 4000 BC)
	Early Mesolithic (EM)	*(9500 – 8000 BC)*
	Middle Mesolithic (MM)	*(8000 – 6500 BC)*
	Late Mesolithic (LM)	*(6500 – 4000 BC)*

The Archaeobotanical Sediment Collection by the Norwegian team:

Processing and subsampling of bucket bulk samples:
A total of 16 buckets of sediments were collected from the excavation units, comprising 5 from Trench 1, and 11 from Trench 2 (6 from quadrant A, and 5 from quadrant B). The five buckets from Trench 1 and the 6 buckets from Trench 2, quadrant A were processed by water flotation. The sediments were not artificially dried prior to water flotation but were instead left to air-dry on trays until fully dry. As flotation and the subsequent sorting of the bulk samples were time-consuming processes, the later samples had a considerably lower moisture content than the earlier ones, as reflected in their decreased volume.

Before processing, five subsamples of approximately one tablespoon each were taken from every bucket. These were intended for isotope analyses and as reserve material for potential additional analyses, such as pollen and sedaDNA.

Following subsampling, the bulk samples were water floated to recover macrofossils and sieved for artifacts. This was carried out in a 3-step process completed by the Norwegian team:

Step 1: Recovery of the light fraction through four-liter flotation.

Any large stones were removed from each sediment batch before measuring out a 4 L soil sample for flotation.
These sub-samples were transferred to a suitable bucket. A 2.5 mm sieve was placed above a 0.2 mm sieve, and the bucket was tilted to allow a controlled flow of water through the sieves.
The sub-sample was floated for approximately 2-3 hours, or until the water became relatively clear. The retained material was then spread onto folded aluminum foil trays and left to dry.
These 4 liters sub-samples were completed until each sample was floated.

Step 2: Secondary recovery of the light fraction from the heavy fraction using pour over style

All remaining sediment from the initial flotation of each sample was retained in the bucket and flooded with water, ensuring that the water level remained below the rim. The water was carefully poured through a stack of sieves consisting of a 2.5 mm sieve above a 0.6 mm sieve. Only the water and floating organic material were allowed to pass into the sieves, while the heavier sediment remained in the bucket. This process reduced the amount of gravel and sand requiring subsequent sorting. The procedure was repeated until no floating material appeared on the water surface.

Step 3: Heavy fraction processing and sieving

A 2.5 mm sieve was placed above a 0.6 mm sieve and positioned in a sink. The remaining sediment was scooped from the bucket and placed into the upper sieve. The material was washed thoroughly with water, allowing finer sediment to pass through to the lower sieve. This process resulted in pour over fractions that could be examined separately for archaeological finds and ecofacts. Lithic artefacts were collected and stored in plastic bags labelled with the appropriate context information. Organic remains, including bone fragments and other ecofacts, were left to dry prior to further analysis.

The retrieved macroplant material is from this flotation system of the eleven collected samples. These were sent to University of California Berkeley to be analyzed at the McCown Archaeobotany Laboratory in the Department of Anthropology.

The Macrobotanical Analysis:

Each water processed sample was weighed for shipping. Once arrived in the Berkeley laboratory, a sorting form was produced for these samples. The completed sort forms with the raw tally data for each sample are in appendix 1. Nine of the eleven samples were sorted by Christine Hastorf, two were sorted by Elizabeth Dresser-Kluchman, currently a post-doctoral fellow in the archaeobotany laboratory. Hastorf checked all the samples.

Laboratory methods:

Once in the McCown laboratory, the light fraction sample weights were recorded on the two sorting forms created for each sample, the first recording the overview, and the second, phase 2 form records the specific plant matter present. Each of the eleven light fraction sample forms were filled out with all the provenience information. The light fraction samples (hereafter simply referred to as the "samples") were sub-divided for analysis with the use of nested brass geological screens into four particle sizes: >2mm, 1-2 mm, 0.5-1 mm, and <0.5 mm (pan). This partitioning of the samples to be studied under the microscope allowed for faster sorting, as the human eye works more effectively when items are all roughly the same size. Each of these sub-samples were placed on a sorting tray and systematically studied under a Wild M38 low power boom-mounted stereo microscope with a dual fiber optic illumination and a 5-40 power range. We analyze the specimen trays beginning with the largest matrix to the smallest from each sample in turn. Any archaeobotanical material is removed from each of these fractions, counted, weighed and separated into different containers for future analysis, should the archaeologists wish more work on the specimens.

Only charred botanical remains were considered to be archaeological, and these carbonized materials were removed and classified as wood, parenchymatous tissue fragments, bark, seeds, or other. Wood fragments and parenchymatous fragments smaller than 2.0 mm at largest dimension were not counted as these fragments of materials smaller than these sizes are virtually impossible to identify even by specialists. Non-archaeological or botanical materials such as fungus galls, snails, bone, modern macrobotanical materials, other non-botanical charred materials, and other miscellaneous materials were not removed. The larger seashell fragments were removed assuming the archaeologists will want to study these. All materials were recorded

as present or absent in each fraction size on the sorting form. Recorded as well were comments regarding the condition and contents of the sample as a whole. The main materials we identified are wood and parenchymatous fragments, with some bark, and several potential very small seeds in the less than .5 mm size, fungi, and seashells. Two additional seed fragments could be Poaceae and two Asteraceae, both common wild, robust plants throughout the world. Both specimen groups are in poor preservation and therefore are only given a possible designation.

Once removed from the matrix the identified specimens were counted, weighed, and recorded on the sorting form, along with comments specific to the plant category. Each class of carbonized materials was then placed in a gelcap or crystal box with a label with the class, size, and provenience. The combined containers were placed in the bag with the original sorted matrix to be returned to Norway. Some of flotation samples were so large and dirty that only a portion of the sample was analyzed. This is noted on the sorting forms, which allows for the adjustment to the original volume when completing statistical analysis. The unsorted and sorted portions were clearly labeled should the archaeological project wish to study the unsorted portion in the future.

The data from the flotation, sorting, and recording forms were transferred to an excel file spreadsheet, for ease of analysis and visual presentation. These samples were extremely dirty, that is, the samples were mainly filled with sediment and decomposed peat, making for very difficult visualizing and extraction of the charred plant remains. As you can see from Table 2, there were virtually no seeds in any of the samples, with wood then parenchymatous fragments only extracted. Table 2 has the weights and counts of these plant remains, noting that at least we can see different densities across the different excavation units.

Macrobotanical Data Presentation:

These floated samples were not the same volume, but as noted in Table 2, they range from 6.5 to 17 liters., making direct comparisons impossible. These counts and weights therefore must be related to these flotation volumes to standardize them and make them comparable. This was done and presented in Figures 1, 2, and 3. Figure 1 is the wood weight/volume plotted by sample. You can see the range of density of both wood. Figure 2 illustrates the parenchyma fragment weight /volume, illustrating evidence of food deposition across the two trenches, bread, porridge or soup. Figure 3 presents the standardized density of the few seeds, with seed weight/flotation volume across all of the eleven samples.

There are three groups of flotation samples from these two excavation units/trenches/ditches. These sectors of the excavation do have different densities of charred material, with wood being the dominant specimen type. Sector 1030 from trench 1 has two samples; the west sample has denser wood than the east sample taken. The 1034 sequence also from trench 1 provided three samples that were collected in a vertical sequence from bottom to top. There we see no trend in wood density in that sequence whereas the parenchyma density increased through time, and surprisingly there were no seeds found within those samples. The third group of samples is from Trench 2 that provided a group of buckets 1-6 with bucket 1 from the top of the trench and bucket 6 the final collection bucket from the bottom of the unit. The figures display no change

Table 2. The Leira macrobotanical counts and weights from the eleven bucket samples that were floated. Twigs were separated out here to see if there was a pattern. They were combined with the wood in the figures. B means bucket, * cf Poaceae, ** cf Asteraceae.

Sample #	Ditch #	Section	volume	Layer	Wt. of sample	>2 wood	>2 wood	>2 parench.	> 2 parench.	>2 twigs	>2 twigs	>1 ukn seeds	>1 ukn seeds	>1 twigs	>1 twigs	.>.5 ukn seeds	> .5 unk seeds	<.5 ukn seeds	<.5 ukn seeds
			L.			weight	count	weight	count	weight	count	weight	count	weight	count	weight	count	weight	count
1	1	1030 W	17		711	6.666	801	0.086	23										
2	1	1030 E	13.5		196.3	0.5668	106	0.0765	16										
5	1	1034	15.4	top	663.2	30.96	3052	0.3678	48										
4	1	1034	13.25	mid	412	14.136	1604	0.4504	68										
3	1	1034	14.15	bot	277.6	22.1	2140	0.705	80										
6	2	1 QA	10	B 1	468.5	0.5734	117	0.1451	22										
7	2	1 QA	12.8	B 2	304.2	0.6633	59	0.0328	2	0.0742	8	0.0047	4	0.1422	94				
8	2	1 QA	10.4	B 3	227.3	0.1375	12	0	0										
9	2	1 QA	11.7	B 4	195	0.0084	3	0.0024	1									0.0002	4
10	2	1 QA	12	B5	189	0	0	0										.0001	2*
11	2	1 QA	6.5	B 6	70.9	0.0022	1									0.0001	2**		

in the wood density in the sequence but there is a decrease in parenchyma by the third bucket with nothing found below that level. Surprisingly, these trench 2 samples are the only ones that have seeds in them. These sparse results suggest that different activities were being deposited in the two trenches, with more food remains in trench two and more fuel in trench 1.

There is enough wood from the samples from trench 1 that could be identified should the archaeologists want taxa identification. We do know from the productive pollen analysis at this site that provenience 1034 has regular pine (*Pinus sp.*), alder (*Alnus sp.*), hazel (*Corylus sp.*) and birch (*Betula sp.*)., all appropriate taxa for the region. Some wood analysis to identify if there is pine or not would be useful, especially due to the pollen's show of pine. Previous excavations at the site did support pine's presence in the wood remains. While there are perhaps fragments of some seeds in the very small subsamples, I do not feel confident in their identification, due to their poor condition.

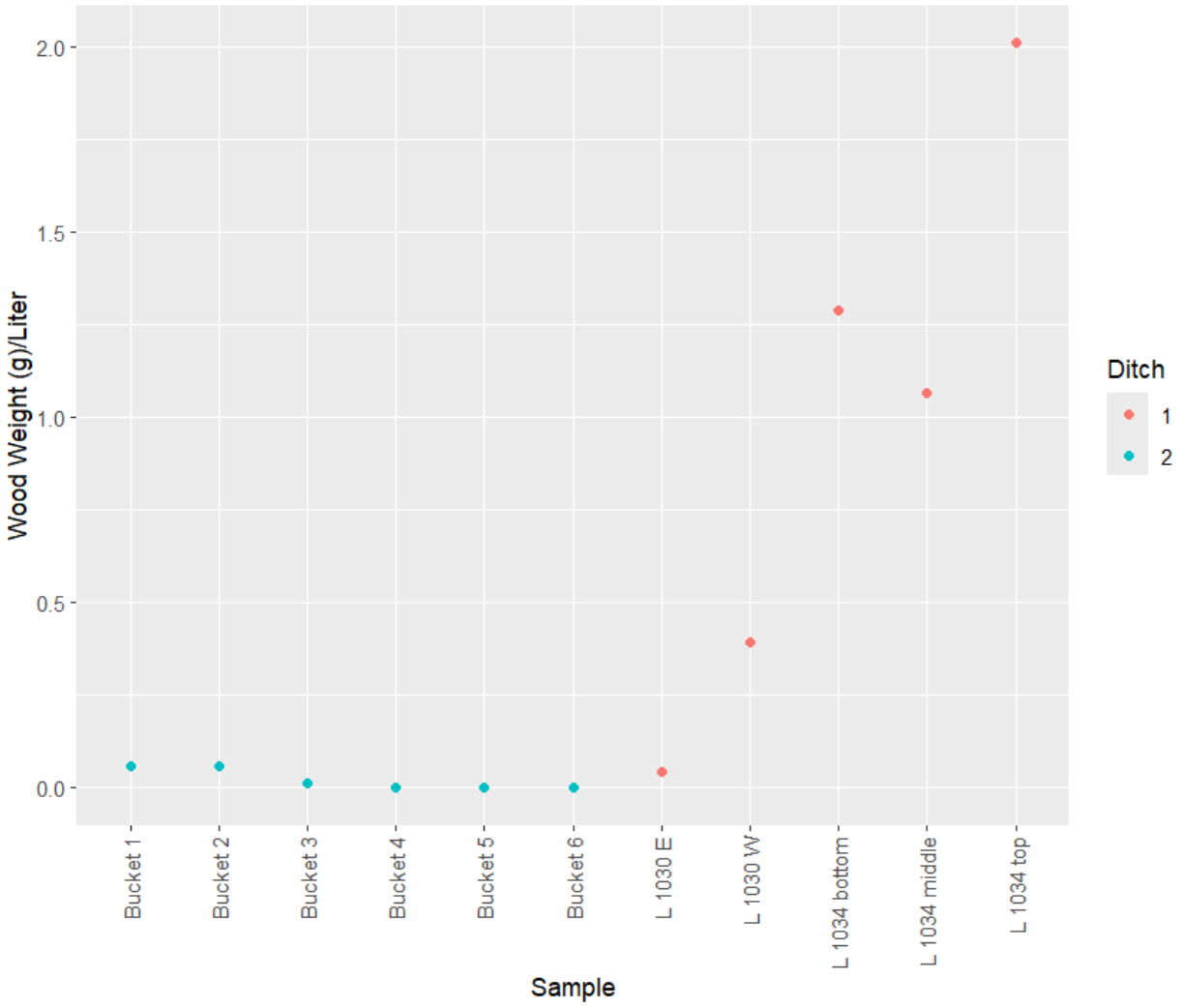


Figure 1. Standardized density of wood by provenience. Ditch/Trench 1 is much more involved in burning/hearths.

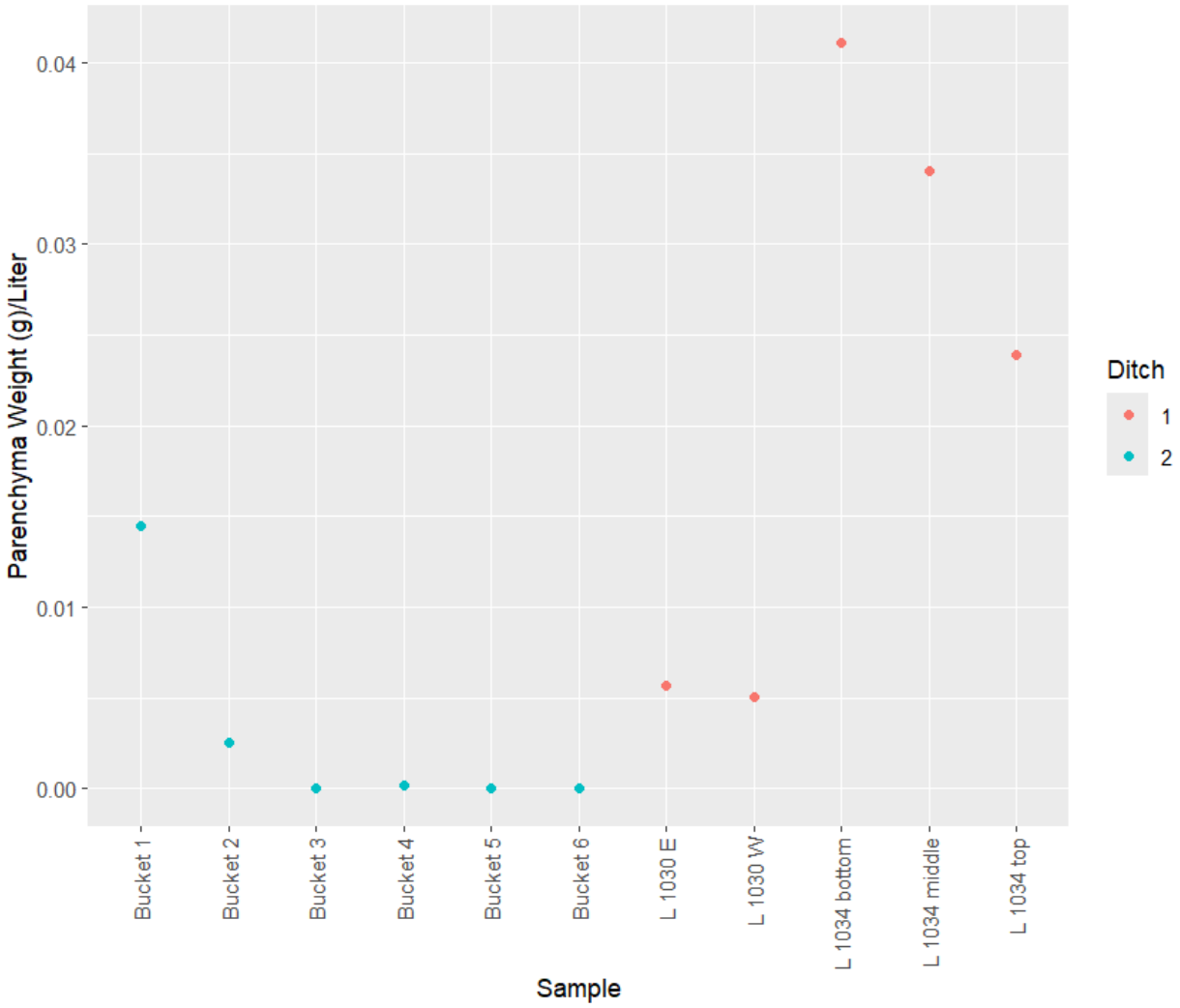


Figure 2. Standardized density of parenchyma fragments by provenience. Ditch/Trench 1 is much more involved in burning/hearths.

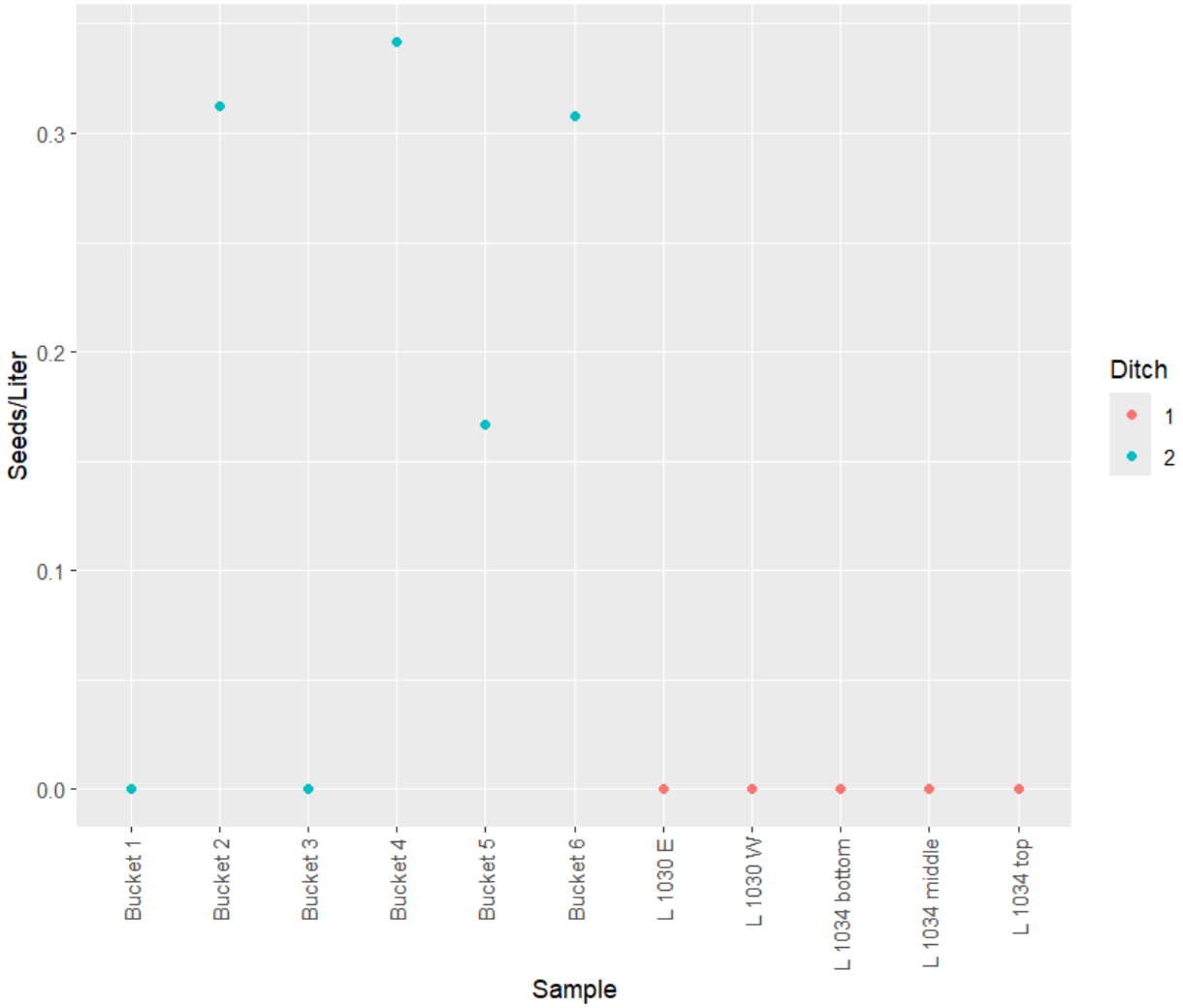


Figure 3. Standardized density of seeds by provenience. Ditch/Trench 2 has more seeds than trench 1, where no seeds were encountered in the flotation samples.

Due to the style of the pour over flotation and processing with drying then wetting of the samples, we probably lost some of the seeds between excavation and arriving in the laboratory, in addition to the very peaty light fractions that were analyzed. Overall, this analysis can mainly speak to the different deposition histories of the two trenches, one with more wood and parenchyma and the other with some small seeds

Reference

Heidi Mjelva Breivik, Skule O.S. Spjelkavik , Saeideh Ghafouri, 2026, Research excavation at the Stone Age site of Leira, Aure municipality, NTNU Vitenskapsmuseet arkeologisk rapport 2026:x.

Leira, Aure 2025 Archaeological Project: Archaeobotanical Flot Sheet (Ph 1)			Sample #	1
Sorter Name and Date	C. Hastoy	Oct 13, 2026	Ditch	1
Fraction Type	(Light)	~~Bulk~~ Scatter Pick	Layer	1030W
Sample Volume (L)	Sample Weight (G) 711.08		Prov	
Items Pulled and Date	only 72 wood & parenchyma. Pulled as anything smaller is unidentifiable		Prov	
			Investigator	HMB
				18.12.25

Presence/Absence	
Wood	✓✓
Parenchyma	✓
Seeds	∅
Bone	
Shell	✓
Dung	
sting seeds	

Preservation Characteristics						
Condition	1	2	3	4	5	
Quality	1	2	3	4		
Fragmentation	1	2	3			
Firing conditions	1	2	3	4	5	6

Draw shells seen in sample:

Observations of Sample

a great deal of Wood
some shell
poor fragments & parenchyma.
overall The wood and ~~parenchyma~~ are not badly distorted
There is not one complete archaeobotani

24
12
141
162
268
203
800

Sample Locations	
Whole LF Location of Sample	
Whole HF Location of Sample	
Whole SB Location of Sample	

Liera, Aure 2025 Archaeological Project: Archaeobotanical Flot Sheet (Ph 2)				Sample #	1
Sorter Name and Date	C. Hastorf	ID Date	Oct 13, 2025 – Oct 16 2025	Ditch	1
Cultural Context Code				Layer	1030W
action Type	Light Flot.	Bulk	Scatter	Prov	
Items Pulled	Spot checked ✓	Entered into Database		Prov	
				Invest	Itm B 18.12, 7

Total Weight: 711.0g

Material:

	>2mm		>1mm		>0.5mm		<0.5mm/ Pan		Total	
	100% S.	Blown Y/N	25% S.	Blown Y/N	75 % S.	Blown Y/N	0 % S.	Blown Y/N	% S.	Blown Y/N
	Wt.	Count	Wt.	Count	Wt.	Count	Wt.	Count	Wt.	Count
Wood	6.6666	801								
Parenchyma (lump)	.086	23								
Dung										
Poaceae										
Shell	.0557	14								
Unidentifiable seed fragment										
UNKN										

Leira, Aure 2025 Archaeological Project: Archaeobotanical Flot Sheet (Ph 1)					
Sorter Name and Date	C. Hastorf	6 Oct 2026		Sample #	2
Fraction Type	Light		Bulk Scatter Pick	Ditch	1
Sample Volume (L)	Sample Weight (G)	196.3		Layer	
Items Pulled and Date				Prov	1030 E
				Prov	
				Investigator	HMB
				HMB	18,12,2

Presence/Absence	
Wood	✓
Parenchyma	✓
Seeds	
Bone	
Shell - Sea	✓
Dung	
sting seeds	

Preservation Characteristics						
Condition	1	2	3	4	5	
Quality	1	2	3	4		
Fragmentation	1	2	3			
Firing conditions	1	2	3	4	5	6

pectin like

Draw shells seen in sample:

Observations of Sample

scant density Throughout -
more parenchyma and in very poor shape
some wood, but also poor quality
no seeds, fungi common >5mm.
fragments

Sample Locations	
Whole LF Location of Sample	
Whole HF Location of Sample	
Whole SB Location of Sample	

Liera, Aure 2025 Archaeological Project: Archaeobotanical Flot Sheet (Ph 2)				Sample #	2
Sorter Name and Date	C. Hastorf	ID Date	6OCT2026	Ditch	1
Cultural Context Code				Layer	
action Type	Light Flot.	Bulk Scatter		Prov	1030 2
Items Pulled	Spot checked ✓	Entered into Database		Prov	
				Invest	HmB 18.12.

Total Weight: 196.3	>2mm	Wt.	>1mm	Wt.	>0.5mm	Wt.	<0.5mm/ Pan	Wt.	Total	
Material:	100% S.	Blown Y/N	100% S.	Blown Y/N	50% S.	Blown Y/N	0 % S.	Blown Y/N	% S.	Blown Y/
	Wt.	Count	Wt.	Count	Wt.	Count	Wt.	Count	Wt.	Count
Wood	.5668	106								
Parenchyma (lump)	.0765	16	.0199	9						
Dung										
Poaceae										
Sea shell	.0156	4								
Unidentifiable seed fragment										
UNKN										

Parched
Photographed
in database

Leira, Aure 2025 Archaeological Project: Archaeobotanical Flot Sheet (Ph 1)			
Sorter Name and Date	C Hawksley	Sept 29, 2026	
Fraction Type	(Light)	(Bulk) Scatter Pick	
Sample Volume (L)	Sample Weight (G) 277.6		
Items Pulled and Date	Date 6641 – 6497 BCE. pot rim use 200yrs		

Sample #	3
Ditch	1
Layer	1034 Bottom
Prov	
Prov	
Investigator	SB/H
	15.01.26
	bag 1 of 2

Presence/Absence	
Wood	✓
Parenchyma	✓
Seeds	ϕ
Bone	
Shell	✓
Dung	
sting seeds	

Preservation Characteristics						
Condition	1	2	3	4	5	
Quality	1	2	3	4		
Fragmentation	1	2	3			
Firing conditions	1	2	3	4	5	6

Draw shells seen in sample:

Observations of Sample

pulled 1 fragment of mineral - golden stone
dense with very fragmentary wood.
Due due the size of sample a 7o of the
first half of sample.
The second half was not investigated

Sample Locations	
Whole LF Location of Sample	
Whole HF Location of Sample	
Whole SB Location of Sample	

Liera, Aure 2025 Archaeological Project: Archaeobotanical Flot Sheet (Ph 2)				Sample #	3
Sorter Name and Date	C Hastorf	ID Date	7Oct 2026	Ditch	1
Cultural Context Code	— Bag 102 —			Layer	1034 Bottom
Fraction Type	Light Flot.	Bulk	Scatter	Prov	
Items Pulled	Spot checked ✓	Entered into Database		Prov	SSH
Bag 102				Invest	15.01.26

Total Weight: 277.6

Material:	>2mm	Wt.	>1mm	Wt.	>0.5mm	Wt.	<0.5mm/ Pan	Wt.	Total	
	50 % S.	Blown Y/N	25 % S.	Blown Y/N	6.25 S.	Blown Y/N	0 % S.	Blown Y/N	% S.	Blown Y/
	Wt.	Count	Wt.	Count	Wt.	Count	Wt.	Count	Wt.	Count
Wood	11.110	1070								
Parenchyma (lump)	.3526	340	.0425	52		too small				
Dung	—									
Poaceae										
Seashell frags	.1361	13								
fungi							.0001	3		

pulled more out for work to use for dating

counted 1/10 wood = 107 x 10 = 1070 total

Unidentifiable seed fragment										
UNKN										

10 = 1,106

Leira, Aure 2025 Archaeological Project: Archaeobotanical Flot Sheet (Ph 1)						Sample #	4
Sorter Name and Date	C. Hastorf		25 Sept 2026			Ditch	1
Fraction Type	(Light)		(Bulk)	Scatter	Pick	Layer	1034 M1
Sample Volume (L)		Sample Weight (G)	412.9g			Prov	
Items Pulled and Date						Prov	
						Investigator	HMB 4.2.

Presence/Absence	
Wood	✓
Parenchyma	✓
Seeds	~~✓~~
Bone	
Shell	✓
Dung	
esting seeds	

Preservation Characteristics						
Condition	1	2	3	4	5	
Quality	1	2	3	4		
Fragmentation	1	2	3			
Firing conditions	1	2	3	4	5	6

Draw shells seen in sample:

Observations of Sample

lots of wood
rare parenchyma
little bit of burnt seashell

mple Locations	
Whole LF Location of Sample	
Whole HF Location of Sample	
Whole SB Location of Sample	

Liera, Aure 2025 Archaeological Project: Archaeobotanical Flot Sheet (Ph 2)				Sample #	4
Sorter Name and Date	Chesterf 25Sept	ID Date	25Sept2026	Ditch	1
Cultural Context Code	26			Layer	1034 MID
Fraction Type	Light Flot.	Bulk	Scatter	Prov	
Items Pulled	Spot checked ✓	Entered into Database		Prov	
				Invest	HMB 4.2.26

Total Weight: 4128	>2mm	Wt.	>1mm	Wt.	>0.5mm	Wt.	<0.5mm/ Pan	Wt.	Total	
Material:	50 % S.	Blown Y/N	75 % S.	Blown Y/N	12.5 % S.	Blown Y/N	0 % S.	Blown Y/N	% S.	Blown Y/
	Wt.	Count	Wt.	Count	Wt.	Count	Wt.	Count	Wt.	Count
Wood	7.0681	802								
Parenchyma (lump)	.2252	34	.0042	4						
Dung										
Poaceae										
Sea Shell	.7479	55	.0050	1						
fuego			.0001	1						
Unidentifiable seed fragment										
UNKN										

In case wanting to do some

Leira, Aure 2025 Archaeological Project: Archaeobotanical Flot Sheet (Ph 1)				Sample #	5
Sorter Name and Date	C Hastoy-	23 Sept 2025		Ditch	1
Fraction Type	Light	Bulk	Scatter Pick	Layer	1034 WTC
Sample Volume (L) ?	Sample Weight (G)	663.2 gm		Prov	
Items Pulled and Date				Prov	
N B. sample sobig now in 2 bags / Date 6476-6407BCE				Investigator	HB 4.2.2

Presence/Absence	
Wood	✓
Parenchyma	✓
Seeds	
Bone	
Shell	✓
Dung	
fungi	✓
sting seeds	
charcoal frags	

Preservation Characteristics						
Condition	1	2	3	4	5	
Quality	1	2	3	4		
Fragmentation	1	2	3			
Firing conditions	1	2	3	4	5	6

Draw shells seen in sample:

? what are your sediment volumes

Observations of Sample In 2 bags

lots of large wood specimens >2mm can be ID'd

huge, dense sample,

sample datable

rare but existence parenchyma.

Sample Locations	
Whole LF Location of Sample	
Whole HF Location of Sample	
Whole SB Location of Sample	

Liera, Aure 2025 Archaeological Project: Archaeobotanical Flot Sheet (Ph 2)				Sample #	5
Sorter Name and Date	C Hastorf 23Sept	ID Date	2026	Ditch	1
Cultural Context Code				Layer	1034 WT
action Type	Light Flot.	Bulk Scatter		Prov	
Items Pulled	Spot checked ✓	Entered into Database		Prov	
				Invest	HB 4.2.26

Total Weight: 616 / Material: 910 / 1526	>2mm	Wt.	>1mm	Wt.	>0.5mm	Wt.	<0.5mm/ Pan	Wt.	Total	
	50% S.	Blown Y/N	25 % S.	Blown Y/N	12.5 S.	Blown Y/N	0 % S.	Blown Y/N	% S.	Blown Y
	Wt.	Count	Wt.	Count	Wt.	Count	Wt.	Count	Wt.	Count
Wood	15.48	1526								
Parenchyma (lump)	.1839	24	.0564	38						
Dung										
Poaceae										
Bark	.0629	15	.0414	21						
Sea Shell	.0575	7								
2.5 fungi					.0055	26				
ceramic frogs?		2								
Unidentifiable seed fragment										
UNKN										

for dating

Leira, Aure 2025 Archaeological Project: Archaeobotanical Flot Sheet (Ph 1)		Sample #	6
Sorter Name and Date	EB Dresser-Kluchman, September 30 2026	Ditch	2
Fraction Type	Light Bulk Scatter Pick	Layer	1
Sample Volume (L)	Sample Weight (G) 468.5g	Prov	QA
Items Pulled and Date		Prov	A
		Investigator	HMB 4.2.2
		Bucket	

Presence/Absence	
Wood	P
Parenchyma	P
Seeds	
Bone	
Shell	
Dung	
leaf attachment/ plant part	
Bark	P
sting seeds	

Preservation Characteristics						
Condition	1	2	3	4	5	
Quality	1	2	3	4		
Fragmentation	1	2	3			
Firing conditions	1	2	3	4	5	6

Draw shells seen in sample:

Observations of Sample

- wood, especially small twigs, present in all size fractions
- small fungal spore balls (●) present in >.5, pan
- >2, >1 size fractions sorted in entirety, >.5mm 25% sorted, pan quickly scanned (nothing), not sorted
- wood pulled >2 mm
- bug body parts (~10) throughout sample

Sample Locations	
Whole LF Location of Sample	
Whole HF Location of Sample	
Whole SB Location of Sample	

Liera, Aure 2025 Archaeological Project: Archaeobotanical Flot Sheet (Ph 2)				Sample #	6
Sorter Name and Date	EB Duesser-Kluchman	ID Date	September 30, 2026	Ditch	2
Cultural Context Code				Layer	1
action Type	Light Flot	Bulk Scatter		Prov	9b
Items Pulled	Spot checked ✓	Entered into Database		Prov	A
				Invest	HMB 4.2.26

Total Weight:	>2mm	Wt.	>1mm	Wt.	>0.5mm	Wt.	<0.5mm/ Pan	Wt.	Total	
Material:	100% S.	Blown Y/N	100% S.	Blown Y/N	25% S.	Blown Y/N	0 % S.	Blown Y/N	% S.	Blown Y/
	Wt.	Count	Wt.	Count	Wt.	Count	Wt.	Count	Wt.	Count
Wood	0.5734	117								
Parenchyma (lump)	0.1451	22								
Dung										
Poaceae										
leaf attachment	0.0072	1								
Bark										
Unidentifiable seed fragment										
UNKN										

Leira, Aure 2025 Archaeological Project: Archaeobotanical Flot Sheet (Ph 1)			
Sorter Name and Date	CA Hartley 19/Sept/2026	Sample #	7
Fraction Type	Light Bulk Scatter Pick	Ditch	2
Sample Volume (L) ?	Sample Weight (G) 304.2gms	Layer	1
Items Pulled and Date		Prov	QA
		Prov	Bucket 2
		Investigator	SgH 6/3/26

Presence/Absence	
Wood	✓
Parenchyma	✓
Seeds	
Bone	✓
Shell	✓
Dung	
sting seeds	

Preservation Characteristics						
Condition	1	2	3	4	5	
Quality	1	2	3	4		
Fragmentation	1	2	3			
Firing conditions	1	2	3	4	5	6

well burned not oxidized, not reduced.

Draw shells seen in sample:

Observations of Sample

twigs throughout sample
seashell fragments
more wood than the other samples throughout whole sample
burnt bone
stopped sorting pan as there is nothing that we can pull from it, - as of Sept 29 2026 - 16 samples 6 - 1

Sample Locations	
Whole LF Location of Sample	
Whole HF Location of Sample	
Whole SB Location of Sample	

Liera, Aure 2025 Archaeological Project: Archaeobotanical Flot Sheet (Ph 2)				Sample #	7
Sorter Name and Date	CAttaway 19/9/26	ID Date		Ditch	3
Cultural Context Code				Layer	1
Fraction Type	Light Flot.	Bulk	Scatter	Prov	QA
Items Pulled	Spot checked ✓	Entered into Database		Prov	Bucket 2
				Invest	SqH 6/3/26

Total Weight: 304.2g Material:	>2mm	Wt.	>1mm	Wt.	>0.5mm	Wt.	<0.5mm/ Pan	Wt.	Total	
	100% S.	Blown Y/N	100% S.	Blown Y/N	25% S.	Blown Y/N	0 % S.	Blown Y/N	% S.	Blown Y/
	Wt.	Count	Wt.	Count	Wt.	Count	Wt.	Count	Wt.	Count
Wood	.6633	59	.2776	254						
Parenchyma (lump)	.0328	2	.0035	3	.0004	3	—	fordating		
Dung										
Poaceae										
seeds			.0047	4 ✓	(some fragmented)					
twigs	.0742	8	.1422	94 ✓						
bark	.0081	2								
seashell frags					.0014	6				
bone (burnt)			.0174	18						
fungi			.0052	8	.0017	14				
Unidentifiable seed fragment				4						
UNKN										

Leira, Aure 2025 Archaeological Project: Archaeobotanical Flot Sheet (Ph 1)			
Sorter Name and Date	EB Dresser-Kluchman ; Sept. 18, 2026	Sample #	8
Fraction Type	(Light) Bulk Scatter Pick	Ditch	2
Sample Volume (L)	Sample Weight (G) 227.3 g	Layer	1
Items Pulled and Date		Prov	Q A
		Prov	Bucket 3
		Investigator	S. Gh.
			06.03.2

Presence/Absence	
Wood	P
Parenchyma	P
Seeds	P(?)
Bone	
Shell	
Dung	
esting seeds	

Preservation Characteristics						
Condition	1	2	3	4	5	
Quality	1	2	3	4		
Fragmentation	1	2	3			
Firing conditions	1	2	3	4	5	6

Draw shells seen in sample:

Observations of Sample

- small wood fragments present throughout all size fractions, many are small twigs; wood collected only >2 mm
- dirt / clay on most objects / throughout sample
- fungal balls in >1mm fraction (n=3)

* pan sub-sampled to 1/8 th

Sample Locations	
Whole LF Location of Sample	
Whole HF Location of Sample	
Whole SB Location of Sample	

Liera, Aure 2025 Archaeological Project: Archaeobotanical Flot Sheet (Ph 2)				Sample #	8
Sorter Name and Date	EB Duesser-Kluchman	ID Date	Sept. 18, 2026	Ditch	2
Cultural Context Code				Layer	1
action Type	Light Flot / ~~Spot checked~~ ✓	Bulk / Scatter		Prov	QA
Items Pulled		Entered into Database		Prov	Bucket 3
				Invest	S. Gh 6.03.26

Total Weight:	>2mm	Wt.	>1mm	Wt.	>0.5mm	Wt.	<0.5mm/ Pan	Wt.	Total	
Material:	100 % S.	Blown Y/N	100 % S.	Blown Y/N	100 % S.	Blown Y/N	100 % S.	Blown Y/N	12.5% S.	Blown Y/N
	Wt.	Count	Wt.	Count	Wt.	Count	Wt.	Count	Wt.	Count
Wood	0.1375	12								
Parenchyma (lump)			0.0062	7						
Dung										
Poaceae										
Cerealia type, charred				1	0.0011		2	0.0003		
Cerealia type, blown										
Unidentifiable seed fragment										
UNKN										

Leira, Aure 2025 Archaeological Project: Archaeobotanical Flot Sheet (Ph 1)					Sample #	9
Sorter Name and Date	C. Hastorf	15Sept 2026			Ditch	2
Fraction Type	Light		Bulk	Scatter Pick	Layer	1
Sample Volume (L)	Sample Weight (G)	195gms			Prov	Q A
Items Pulled and Date					Prov	Bucket 4
					Investigator	6.03.21

Presence/Absence	
Wood	✓
Parenchyma	✓
Seeds	?
Bone	
Shell	
Dung	
sting seeds	

Preservation Characteristics						
Condition	1	2	3	4	5	
Quality	1	2	3	4		
Fragmentation	1	2	3			
Firing conditions	1	2	3	4	5	6

Draw shells seen in sample:

Observations of Sample

87.5% pan not sorted - olive to the very dirty samples

Very dirty sample only wood and parenchyma - potential

Sample Locations	
Whole LF Location of Sample	
Whole HF Location of Sample	
Whole SB Location of Sample	

Liera, Aure 2025 Archaeological Project: Archaeobotanical Flot Sheet (Ph 2)				Sample #	9
Sorter Name and Date	C Hastorf	ID Date	15 Sept 26	Ditch	2
Cultural Context Code				Layer	1
Fraction Type	Light Flot.	Bulk Scatter		Prov	Q A
Items Pulled	Spot checked ✓	Entered into Database		Prov	Bucket 4
				Invest	Sq 6.03.3

Total Weight: 195gms	>2mm	Wt.	>1mm	Wt.	>0.5mm	Wt.	<0.5mm/ Pan	Wt. Pan	Total	
Material:	100 % S.	Blown Y/N	100 % S.	Blown Y/N	100% S.	Blown Y/N	12.5% S.	Blown Y/N	% S.	Blown Y/
	Wt.	Count	Wt.	Count	Wt.	Count	Wt.	Count	Wt.	Count
Wood	.0084	3	.0318	30						
Parenchyma (lump)										
Dung						+ fordates				
Poaceae										
1 parenchymas	.0024	1	.0023	3	.0001	3				
fungus					.0001	2	.0013	20		
unknown seed							.0002	4		
Unidentifiable seed fragment										
UNKN										

Leira, Aure 2025 Archaeological Project: Archaeobotanical Flot Sheet (Ph 1)									
Sorter Name and Date	C Hastorf 14Sept-26								
Fraction Type	Light	Bulk	Scatter	Pick					
Sample Volume (L)	Sample Weight (G) 198.6								
Items Pulled and Date									

Sample #	10
Ditch	2
Layer	1
Prov	QA
Prov	Bucket 5
Investigator	SgH
	13.03.26

Presence/Absence	
Wood	✓
Parenchyma	
Seeds	✓?
Bone	
Shell	
Dung	
esting seeds	

Preservation Characteristics						
Condition	1	2	3	4	5	
Quality	1	2	3	4		
Fragmentation	1	2	3			
Firing conditions	1	2	3	4	5	6

Draw shells seen in sample:

ϕ

Observations of Sample

small pieces of wood, fungi pulled
few small grass stalks
2 grass seeds
Very silty/dirty
no charred plants
no plant remains
Root filled -

Sample Locations	
Whole LF Location of Sample	
Whole HF Location of Sample	
Whole SB Location of Sample	

Liera, Aure 2025 Archaeological Project: Archaeobotanical Flot Sheet (Ph 2)				Sample #	10
Sorter Name and Date	C Hastorf	ID Date	14 Sept 26	Ditch	2
Cultural Context Code				Layer	1
Fraction Type	Light Flot. ✓	Bulk Scatter		Prov	QA
Items Pulled	Spot checked ✓	Entered into Database		Prov	Bucket 5
				Invest	SSH 13.3.26

Total Weight: 198	>2mm	Wt.	>1mm	Wt.	>0.5mm	Wt.	<0.5mm/ Pan	Wt.	Total	
Material:	100% S.	Blown Y/N	100% S.	Blown Y/N	100% S.	Blown Y/N	25 % S.	Blown Y/N	% S.	Blown Y/
	Wt.	Count	Wt.	Count	Wt.	Count	Wt.	Count	Wt.	Count
Wood		ϕ	.0033	3						
Parenchyma (lump)										
Dung										
Poaceae										
round "fungi"					.0007	6	.0033	38		
Poaceae cf.							.0001	2	✓	
Unidentifiable seed fragment										
UNKN										
stone/scoria?		5								

Leira, Aure 2025 Archaeological Project: Archaeobotanical Flot Sheet (Ph 1)			
Sorter Name and Date	CA Hastorf	14 Sept, 2026	
Fraction Type	(Light)	(Bulk) Scatter Pick	
Sample Volume (L)	Sample Weight (G)	70.98	
Items Pulled and Date			

Sample #	11
Ditch	2
Layer	1
Prov	Bucket 6
Prov	
Investigator	HB 18/3/2

Presence/Absence	
Wood	✓
Parenchyma	
Seeds	✓?
Bone	
Shell	
Dung	
esting seeds	ϕ

Preservation Characteristics						
Condition	1	2	3	4	5	
Quality	1	2	3	4		
Fragmentation	1	2	3			
Firing conditions	1	2	3	4	5	6

Draw shells seen in sample:

ϕ

Observations of Sample

Very likely these are not seeds - in bad condition
Very dirty sample, filled with silt
Very root filled
fungi pulled - no plant remains

Sample Locations	
Whole LF Location of Sample	
Whole HF Location of Sample	
Whole SB Location of Sample	

Liera, Aure 2025 Archaeological Project: Archaeobotanical Flot Sheet (Ph 2)			Sample #	11
Sorter Name and Date	C A Hastorf	ID Date 14/Sept2026	Ditch	2
Cultural Context Code			Layer	1
raction Type	Light Flot.	Bulk Scatter	Prov	bucket 6
Items Pulled	Spot checked ✓	Entered into Database	Prov	11
			Invest	HB 18/3/26

Total Weight:	>2mm	Wt.	>1mm	Wt.	>0.5mm	Wt.	<0.5mm/ Pan	Wt.	Total	
Material:	100% S.	Blown Y/N	100% S.	Blown Y/N	100% S.	Blown Y/N	50 % S.	Blown Y/N	% S.	Blown Y/
	Wt.	Count	Wt.	Count	Wt.	Count	Wt.	Count	Wt.	Count
Wood	.0022	1	.0179	17	not pulled					
Parenchyma (lump)										
Dung										
Poaceae										
Round cellular item					.0015	10				
probably not botanical - fungi										
Asteraceae cf.							.0001	2		
Unidentifiable seed fragment										
UNKN										