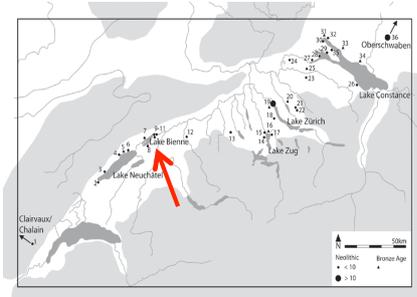


Site monitoring at Lake Lobsigen (Canton of Bern, Switzerland)



Christoph BROMBACHER
Institute for Prehistory and Archaeological Science IPAS, University of Basel, Switzerland



Seedorf Lobsigen at Lake Lobsigen (514 m a.s.l.)



Excavation 2007



Lake Lobsigen

Introduction

Seedorf – Lake Lobsigen, located in the Canton of Bern (Switzerland), represents a late Neolithic settlement on a small lake in the pre-Alpine region.

Since 2011 it belongs to a selection of 111 archaeological pile-dwelling sites covered by UNESCO World Heritage status.

The site comprises several Neolithic layers from the Cortaillod culture (4000 - 3600 BC).

Site monitoring

Following the artificial lowering of the lake level in 1945 and during the 1970s/1980s, large parts of the actual settlement are now situated above the water table. This has led to a progressive destruction of organic material.

A rescue excavation in 2007 (30 m²) produced a large number of soil samples and profiles.

The archaeobotanical analysis from the previously waterlogged layers focused on the identification of uncarbonised macro remains and the assessment of their level of degradation. Each plant subfossil has different resistance to weathering and degradation, which leads to varying levels of conservation and selective preservation.

Twenty samples (which correspond to 30.5 liters of soil) were analysed. In these samples only 4470 plant macro remains were found, of which only 38% were in a waterlogged state of preservation, 62% are charred. The density of non-carbonised seeds/fruits is very low, with only 56 items per liter, as opposed to the typical values of 2000 - 10 000/liter.

This is a primary indication for the significant and extensive degradation of organic matter.

Level/class	Description	Preservation quality
A	Concentration often > 5000 items/liter; many fragile remains like e.g. barley chaff or leaf fragments. Species richness often > 100.	Very good preservation
B	Concentration mostly > 1000 items/liter; fragile remains are rare. Species richness mostly > 50.	Good preservation
C	Concentration between 50-500 items/liter; fragile remains are absent. Species richness mostly < 20.	Moderate preservation
D	Concentration low (<10 items/liter); only lignified objects such as elderberry, blackberry, hazelnut. Often strong fragmentation of remains. Number of taxa often < 5.	Bad preservation
E	Concentration very low (< 1 items/liter); usually only remains of elderberry.	Very bad preservation

Species richness classes (preservation level)

Field ID	Phase	Micromorphologie	Phase	Macroremains
46	Cultural layer	Slightly weathered	N (4000-3850)	C
60	Cultural layer	Relatively well preserved, partly loamy	N (4000-3850)	C
59	Bank layer	Slightly weathered	N (4000-3850)	D
50	Bank layer	Weathered, degraded	N (4000-3850)	D
28	Bank layer	Well preserved	N (3850-3750)	C
41	Bank layer with wood	Well preserved	N (4000-3850)	D
39	Bank layer	Partly more weathered	N (4000-3850)	D
43B	Layer with bones	Slightly weathered	N (neol.)	C

Comparison of micromorphological and archaeobotanical conservation criteria of the individual layers

Species	Leaf	pres. level	resistance values (RV) n. Brinkkemper
Viscum album	Leaf	?	12.5
Urtica dioica	Seed/fruit	C	11.1
Nuphar lutea	Seed/fruit	C	20
Schoenoplectus lacustris	Seed/fruit	C	20
Chara spec.	Oospore	C	20
Chara aspera	Oospore	C	20
Ajuga reptans	Seed/fruit	D	47.5
Chenopodium spec.	Seed/fruit	D	35
Chenopodium album	Seed/fruit	D	46.1
Ranunculus repens	Seed/fruit	D	21.1
Polygonum lapathifolium/persicaria	Seed/fruit	D	12.5
Rubus fruticosus	Seed/fruit	D	83.6
Rubus idaeus	Seed/fruit	D	96.1
cf. Clematis vitalba	Seed/fruit	D	11.1
Corylus avellana	Seed/fruit	D	36.1
Physalis alkekengi	Seed/fruit	D	71.1
Eupatorium cannabinum	Seed/fruit	D	20
Solanum spec.	Seed/fruit	D	35
Sambucus ebulus	Seed/fruit	E	196.1
Sambucus spec.	Seed/fruit	E	162.5

List of taxa (waterlogged remains) grouped by species richness class and resistance values



Corroded seeds of *Papaver somniferum*, *Ranunculus* sp., *Rubus idaeus*

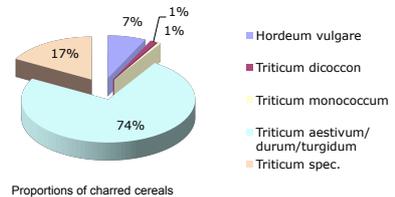
Preservation of waterlogged material

The state of preservation can be judged by several criteria (e.g. amount of organic matter, diversity of plant species and number of seeds, preservation of individual seeds, presence/absence of plant remains susceptible to corrosion).

We used the resistance values (after Brinkkemper 2006) and compared these with our classification (species richness classes) and the amount of organic material in the samples. The most common taxa all belong to the group of hard-shelled corrosion resistant remains, which is manifested in the high values. Fragile remains that belong to the groups A and B are completely missing in the archaeological material. Remarkable is that a high proportion of organic material as well as a relatively good preserved layer from a micromorphological point of view, does not necessarily coincide with a good preservation of the seeds and fruits. Apparently only a moderate degradation of organic matter can already lead to the indeterminacy of many seeds and fruits. After about 50 years of temporary dehydration, a large part of the determinable non-carbonised macro remains have decayed.

Some archaeobotanical results

In the earliest occupation phase (4000 - 3800 BC) the spectrum of charred cultivated plants is dominated by naked wheat and barley. In the more recent phases (around 3600 BC) occasional findings of einkorn are registered in addition to naked wheat. The spectrum of wild plants is poor due to the strong organic degradation. They are mainly composed of hard-shelled seeds of *Sambucus*, *Rubus* and *Physalis* and in smaller numbers *Corylus*, *Galium* and *Chenopodium*. More fragile remains like cereal chaff or flax capsule fragments were not found.



Proportions of charred cereals



Profile (Excavation 2007)



Excavation 2007