

# Basic methodological research on waterlogged sediments

Bigna L. Steiner, Ferran Antolín, Werner Vach, Stefanie Jacomet

In collaboration with Örne Akeret, Christoph Brombacher, Marlu Kühn, Patricia Vandorpe

## Introduction

Within the framework of the SNF-funded project *Formation and taphonomy of archaeological wetland deposits: two transdisciplinary case studies and their impact on lakeshore archaeology* (project nr. CR3012\_149679), several studies were performed in order to determine how to best treat a waterlogged archaeobotanical sample before and during analysis.

Together with research at the IPAS over the last 20 years, these studies give important methodological implications, which are briefly presented here.

## THE PROJECT

### Sites

Two Neolithic lakeshore settlements from Central Switzerland:  
Zürich-Parkhaus Opéra  
Zug-Riedmatt  
dated to c. 3200-3100 cal BC



### Testing the consistency of wash-over sieving (Steiner *et al.*, 2015)

Inconsistencies of sieving performed by different operators can negatively affect archaeobotanical results (Hosch and Zibulski, 2003).

Here we tested the consistency between four sievers with identical instructions using the wash-over sieving method (Kenward *et al.*, 1980).



## THE TESTS

### Comparison of volume measurement techniques (Antolín *et al.*, 2015)

Systematic comparison of the two commonly used methods of displacement and classical (upper limit of the sediment in water, measured before and after freezing as pre-treatment) volume measurement were done with the samples of ZHOPE (>300). Four operators measured the classical volume.



### Investigation of the subsampling process (Steiner *et al.*, submitted)

Following previous research (Hosch and Jacomet, 2001), the sampling of ZHOPE was based on bulk samples (5-8L) for a representative recovery of large remains. Subsamples (0.3L) were taken to investigate the smaller fraction, thus minimizing the sieving time. Different techniques for carrying out this subsampling were tested.



### Comparison of different sample volumes/fractions (Antolín *et al.*, in preparation)

Results from the 2mm fraction of large-volume samples were compared with the ones from the 2mm fraction and the 0.35mm fractions of small-volume subsamples taken from the same samples. The goal was to see which taxa were found in which fraction and sample type (large or small volume) in order to improve the sampling strategy in future projects.

## GUIDELINES BASED ON METHODOLOGICAL RESULTS

### basic sampling unit

bulk or profile sample, ideally min. 3L (Hosch and Jacomet, 2001)

taking of subsamples for **special examinations**, eg. of pollen, parasites, geochemistry

**volume measurement** using the displacement method (Antolín *et al.*, 2015)

**freezing and slow thawing** of sample as pre-treatment (Vandorpe and Jacomet, 2007)

### wash-over sieving (Hosch and Zibulski, 2003)

clear instructions and feedback for sievers (Steiner *et al.*, 2015)

at best 100% of the sample  
**subsampling after sieving** (Steiner *et al.*, submitted)

### analysis

using detailed counting instructions to avoid counting remains twice in different fractions (Antolín *et al.*, in preparation)

if time-saving strategy needed

random sampling

large subsample

8 + 2 mm

small subsample

(2 +) 0.35 mm

### References

- Antolín F, Steiner BL, Vach W, Jacomet S, 2015. What is a litre of sediment? Testing volume measurement techniques for wet sediment and their implications in archaeobotanical analyses at the Late Neolithic lake-dwelling site of Parkhaus Opéra (Zürich, Switzerland). *J. Archaeol. Sci.* 61, 90-104.
- Antolín F, Steiner BL, Vach W, Jacomet S. The bigger the better? On sample volume and the representativeness of archaeobotanical data in waterlogged deposits, in prep.
- Hosch S, Zibulski P, 2003. The influence of inconsistent wet-sieving procedures on the macroremains concentration in waterlogged sediments. *J. Archaeol. Sci.* 30, 849-857.
- Hosch, S, Jacomet, S, 2001. New aspects of archaeobotanical research in Central European Neolithic lake dwelling sites. *Environ. Archaeol.* 6, 59-71.

- Kenward HK, Hall AR, Jones AKG, 1980. A tested set of techniques for the extraction of plant and animal macrofossils from waterlogged archaeological deposits. *Sci. Archaeol.* 22, 3-15.
- Steiner BL, Antolín F, Jacomet S, 2015. Testing of the consistency of the sieving (wash-over) process of waterlogged sediments by multiple operators. *J. Archaeol. Sci: Reports* 2, 310-320.
- Steiner BL, Antolín F, Vach W, Jacomet S. Systematic subsampling of large-volume bulk samples in waterlogged sediments. A time-saving strategy or a source of error?, submitted to *Veg. Hist. Archaeobot.*
- Vandorpe P, Jacomet S, 2007. Comparing different pre-treatment methods for strongly compacted organic sediments prior to wet-sieving: a case study on Roman waterlogged deposits. *Environ. Archaeol.* 12 (2), 207-214.

➔ online handbook of procedures incl. video with wash-over sieving instructions in preparation