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Archaeobotanical investigations at Eneolithic pile-dwelling sites from Ljubljansko barje, Slovenia

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Introduction

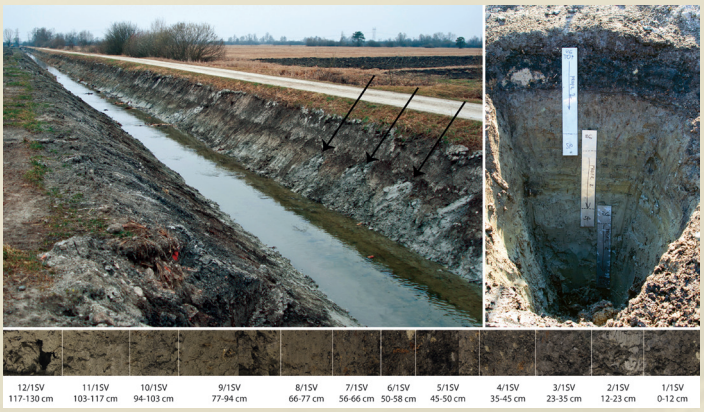
The accuracy of archaeobotanical reconstructions (vegetation history, human impact on the environment, plant economy) depends on the quality of botanical data recovered from the excavations. Both, the preservation as well as research methodology, affect the final results and interpretations.

Stare gmajne site

Preservation by waterlogging (such as at pile-dwelling sites) allows better insight into the diversity of plant macroremains (fruits, seeds, cereal chaff, wood, charcoal etc.), simply because much more remains are preserved. Therefore the influence of the methodology is much bigger.

Material and Methods

An overview of the latest archaeobotanical results from the 4th mill. cal BC Slovenian pile-dwelling sites (i. e. Strojanova voda, Maharski prekop and Stare gmajne) will be presented.



Strojanova voda site

The sites were archaeobotanicaly differently treated, therefore the methodological aspects will also be discussed and compared:

THE SITE	STROJANOVA VODA (dendro end date 3550 cal BC)	MAHARSKI PREKOP (dendro end date 3490 cal BC)	STARE GMAJNE (dendro end date 3330 and 3110 cal BC)
SAMPLING	profile sampling (130 cm)	surface sampling of the cultural layer (35 cm)	surface sampling of the cultural layer (54 cm)
TREATMENT: WET SIEVING	in total 8,3 litres of sediment samples were fine wet sieved with half flotation 0,355 mm: the smallest sieve mesh size	in total cca. 360 litres of sediment samples were rough wet sieved with washing over method 1 mm : the smallest sieve mesh size	in total 8,7 litres of sediment samples were fine wet sieved with half flotation 0,355 mm: the smallest sieve mesh size
TREATMENT: STORING	wet storing, sorting and counting of the botanical macroremains	drying of plant material	wet storing, sorting and counting of the botanical macroremains
RESULTS	results in concentrations per 1 litre of sediment sample	results in absolute numbers while the volumes of sediment samples were not measured	results in concentrations per 1 litre of sediment sample

Results

SITE: STROJANOVA VODA

Crops: 5 - 6 taxa: barley (*Hordeum vulgare*), emmer (*Triticum dicoccum*), einkorn (*Triticum monococcum*), flax (*Linum usitatissimum*), poppy (*Papaver somniferum*), ? turnip (*Brassica rapa*).

Gathered plants: 14 presumably gathered plant taxa were identified, the most abundant were: elder (*Sambucus ebulus*), strawberry (*Fragaria vesca*), blackberry (*Rubus fruticosus* agg.), bladder cherry (*Physalis alkekengi*), apple / pear (Maloideae), cornel / dogwood (*Cornus mas* / *C. sanguinea*), acorn (*Quercus* sp.), hazelnut (*Corylus avellana*) and water chestnut (*Trapa natans*).

SITE: MAHARSKI PREKOP

Crops: 2 - 4 taxa: barley (*Hordeum vulgare*), emmer (*Triticum dicoccum*) / einkorn (*Triticum monococcum*), peas (*Pisum sativum*), ? turnip (*Brassica rapa*).

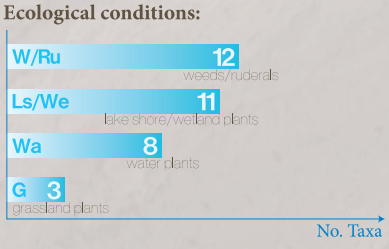
Gathered plants: 17 presumably gathered plant taxa were identified, the most abundant were: blackberry (*Rubus fruticosus* agg.), bladder cherry (*Physalis alkekengi*), vine grape (*Vitis vinifera* ssp. *sylvestris*), black nightshade (*Solanum nigrum*), acorn (*Quercus* sp.), cornel / dogwood (*Cornus mas* / *C. sanguinea*), hazelnut (*Corylus avellana*) and elder (*Sambucus ebulus*).

SITE: STARE GMAJNE

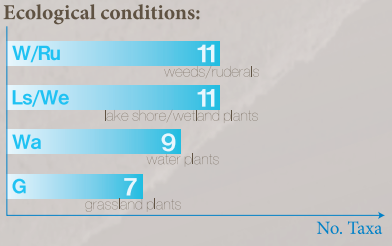
Crops: 6 - 7 taxa: barley (*Hordeum vulgare*), emmer (*Triticum dicoccum*), einkorn (*Triticum monococcum*), flax (*Linum usitatissimum*), poppy (*Papaver somniferum*), peas (*Pisum sativum*), ? turnip (*Brassica rapa*).

Gathered plants: 18 presumably gathered plant taxa were identified, the most abundant were: apple / pear (Maloideae), strawberry (*Fragaria vesca*), blackberry (*Rubus fruticosus* agg.), bladder cherry (*Physalis alkekengi*), cornel (*Cornus mas*), hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), vine grape (*Vitis vinifera*), acorn (*Quercus* sp.), hazelnut (*Corylus avellana*) and water chestnut (*Trapa natans*).

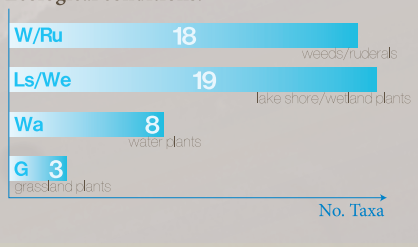
Ecological conditions:



Ecological conditions:



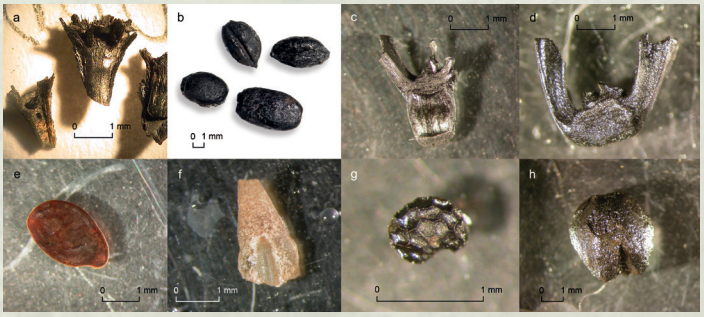
Ecological conditions:



Conclusions

Appropriately made archaeobotanical investigations at waterlogged sites enable reconstruction of nutrition habits and economy of inhabitants as well as environmental conditions on the site before, during and after the settling.

NUTRITION and ECONOMY

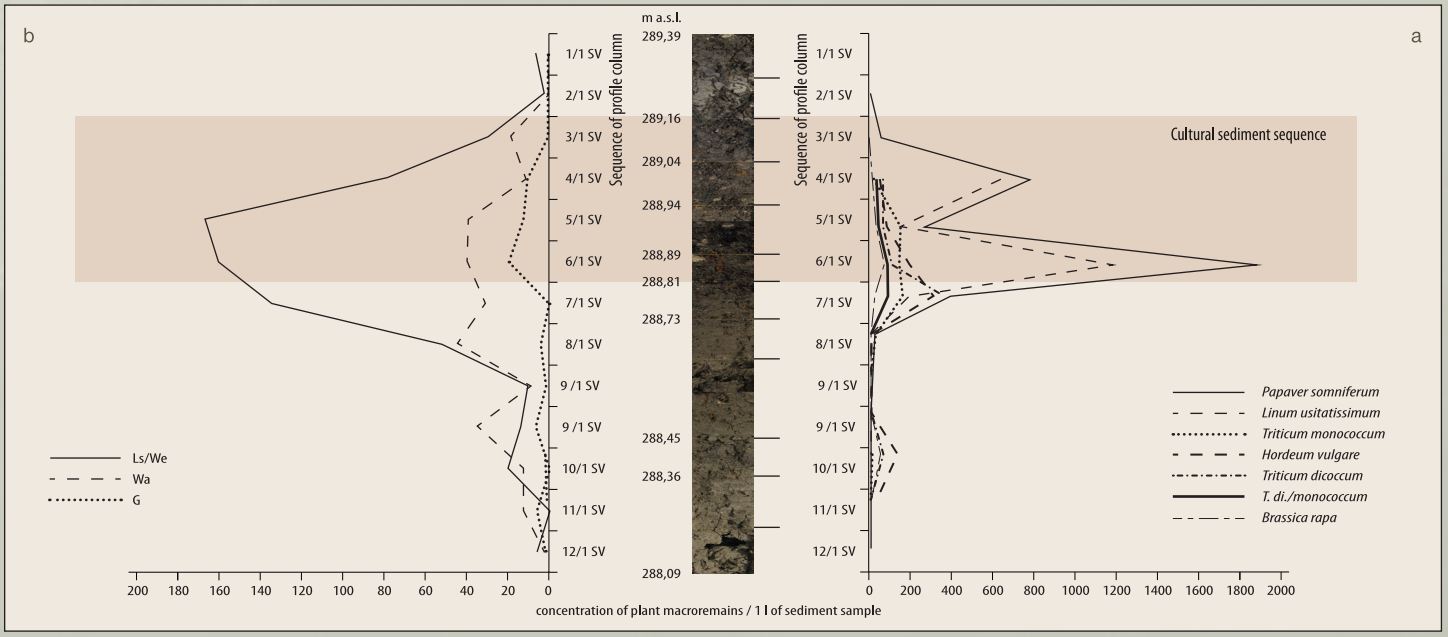


6 cultivated plants were recognized: a, b) barley, c) einkorn, d) emmer, e, f) flax, g) poppy, h) peas. Turnip - not on a figure - could also be cultivated or at least gathered while those oil-rich seeds are regularly found.

Among the gathered plants, the most abundant were: a) strawberry, b) blackberry, c) bladder cherry, d) vine grape, e) apple / pear, f) blackthorn, g) cornel, h) hazelnut, i) acorn and j) water chestnut.

ENVIRONMENTAL CONDITIONS

Botanical macroremains from 3 different sites show very similar ecological conditions at the time of the settling. Prevailing lake shore / wetland to eventually low water plant taxa confirm the assumption that all the three settlements were located on a marshy (lake shore) ground and presumably very close to the lake. A probability of changing ecological conditions (e. g. floods and changes in water levels) can also be evidenced. Low proportions of identified grassland plant taxa show that meadows of great extent, that are common for today Ljubljansko barje area, were not present yet. Forest edges and forest, which were commonly used for gathering, hunting and pasturing, should have therefore been quite close to the pile-dwelling settlements and to the lake.



Vertical distribution of plant macroremains from Strojanova voda site show: a) increased concentrations of cultivated (as well as gathered and ruderal / weed plant taxa, see: Tolar and Andrič in preparation) plant macroremains in the cultural sediment sequence (-s) and also b) increased concentrations of lakeshore / wetland and water plant macroremains in the sediment sequence (-s) that was (were) formed at the time when the researched area was settled (i.e cultural seq.). It seems that the inhabitants prefer lakeshore environment close to the lake (see also: Turk and Velušček 2013). The concentration of grassland plant macroremains, although modest, increases in the time of the settling as well, what is most probably due to pasturing and burning the forest.

More details:

Tolar T., Jacomet S., Velušček A., Čufar K. (2010) Recovery techniques for waterlogged archaeological sediments: a comparison of different treatment methods for samples from Neolithic lake shore settlements. Veget Hist Archaeobot 19: 53–67.

Tolar T., Jacomet S., Velušček A., Čufar K. (2011) Plant economy at a late Neolithic lake dwelling site in Slovenia at the time of the Alpine Iceman. Veget Hist Archaeobot 20: 207–222.

Tolar T., Andrič M (in preparation) Human impact on the environment and plant economy of Neolithic pile dwellers at SE part of Ljubljansko barje, Slovenia.

Turk J., Velušček A. (2013) Multidisciplinary investigations of the pile-dwellings at Lj. barje (Slovenia). Quaternary International 294 : 183-189.