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Theorising the biographies of wetland settlement utilizing insights from micromorphological analysis.

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In recent years much consideration has been given to the ‘social biography of settlements’ – the social factors influencing the foundation, development, and abandonment of settlements and individual buildings therein (e.g. Brück 1999; Gerritsen 1999; 2003; Herbich & Dietler 2007). In a recent paper focussing on the lake-dwelling villages of the northern Circum-Alpine region, the lead author proposed a theoretical biography for these settlements during the Late Bronze Age (Jennings 2012) (Figure 1), but the model could be expanded to include the whole lake-dwelling tradition in the region (c. 4300 – 800 BC). Lake settlements in this region have excellent organic preservation levels, and dendrochronological research frequently allows the identification of individual building phases, for both communal features (e.g. perimeter palisades at Wasserburg-Buchau (Lake Feder, Germany (Billamboz 2009)) and individual buildings (e.g. at Greifensee-Böschen (Lake Greifen, Switzerland (Eberschweiler et al. 2007) and numerous sites around Lake Feder (see Bleicher 2009)). Despite this excellent preservation of specific artefacts (e.g. a neolithic door from Zurich-Opéra (see Bleicher et al. 2011)), relatively few indications of building superstructures are recovered, even though foundation piles and elements are very well represented. Furthermore, erosion events have significantly impacted upon many of the archaeological layers, removing evidence for the final occupation of some settlements (Figure 2), particularly those of the Late Bronze Age (e.g. Zurich-Alpenquai (Wiemann et al. 2012), which can be observed through micromorphological analysis.

Micromorphology applications in lake-settlement studies

Archaeological Soil Micromorphology has been applied by the Institute of Prehistory and Archaeological Science at the University of Basel to the study of lake-settlements for more than 10 years, and has provided significant insights into many lake-settlements of the northern Circum-Alpine region (e.g. Arbon-Bleiche 3, Lake Constance, Switzerland (Ismail-Meyer & Rentzel 2004)). The creation of thin-sections from sediment profiles permits a microscopic examination of features relevant to the formation of the soil deposits in archaeological contexts. These features provide direct indications for both natural and anthropogenic site formation processes (Figure 3), and may provide useful evidence in the consideration of what may be considered as ‘*in situ*’ (cf. Bleicher, this volume.).

One of the most recognisable features in micromorphological samples from lake-settlements is lake-marl, indicating the covering water with higher or lower levels of energy ((Schurrenberger et al. 2003)). Where these layers of lake-marl are interspersed with organic rich cultural layers, lake-transgression and submersion of the settlement can be identified. However, these layers do not typically indicate whether or not the settlement was occupied at the time of transgression, and therefore whether the flooding directly impacted upon the inhabitants. While evidence of inundation is interesting for lake-dwelling research as a whole, on its own it provides little significance for the consideration of settlement biographies. Combining the micromorphological evidence with dendrochronological evidence from these sites provides more information, and can demonstrate a repeated sequence of occupation and inundation. For example, at the site Zug-Riedmatt (Lake Zug, Switzerland) four separate occupation phases are interspersed with three low-energy inundations, during a period of c.100 to 160 years (Gross et al. 2013). Although the duration of each individual occupation or flooding phase is unclear, and it is not evident if the inundation caused the abandonment of the entire site, the inhabitants of this area were clearly unwilling to abandon the area and relocate further away from the lake-shore where inundation would not be a problem.

Lake marl layers can also provide indications of erosion processes in the settlement, resulting in a mixture of anthropogenic deposits within the marl matrix (e.g. Zurich-Opéra, Lake Zurich, Switzerland ((Wiemann In Preparation))). This is of significance as it may demonstrate that anthropogenic layers relating to the final stages of occupation are disturbed, and potentially entirely lost. Furthermore, the position of features and objects in such layers can not necessarily be considered as being 'in situ' (cf. Bleicher, this volume).

Considering the anthropogenic, occupation, layers, charcoal remains are frequently encountered in many settlements, and have occasionally been interpreted as the 'catastrophic' destruction of structures and settlements in fire events (e.g. Greifensee-Boschen (Eberschweiler et al. 2007) and Ürschhausen-Horn (Lake Nussbaum, Switzerland (Gollnisch-Moos 1999)). Not all charcoal remains will be representative of such destructive fires, but will mostly be the remains of hearths, either 'in situ' or re-distributed through by anthropogenic (e.g. dumping, cleaning hearths) or natural (e.g. water or wind dispersion) processes.

Through the identification of sublayers and horizons with the anthropogenic 'settlement' layer, micromorphology can provide even more evidence of anthropogenic practices. Indications of trampling can be seen through the compaction of layers, and may represent living floors, working or construction surfaces, and routes or paths within settlements ((Rentzel & Narten 2000)). The analysis of sediment deposits from within the floorplan of buildings may also provide indications of the changing use practices over time. The best example of such is Arbon-Bleiche 3, where analysis showed that a single structure was used as a house or dwelling over three phases separated by a fire event between the second and third occupation, before being converted into an animal pen (Ismail-Meyer & Rentzel 2004, Fig. 38)(Figure 3). Such successful results from the analysis of intra-structure deposits are rare, because the main indications of structures are the foundation levels, and it is unfortunate that no micromorphological analysis has been constructed at Ürschhausen-Horn, where buildings floors have been preserved in the archaeological record.

Combining micromorphology and the biography of settlements

Combining the insights provided by micromorphological analysis with the biography of lake-settlements proposed previously by Jennings (2012) may provide a material evidence in support of the theoretical model (Figure 2). The most relevant information may relate to the use life and abandonment of settlements/structures, as the specific reasons influencing social choices to settle in certain areas will not be recorded in the micromorphological record. This does not mean that micromorphological research, in combination with dendrochronology, can not tell us anything at all about other stages of the social biography of settlements, but these aspects require a greater reliance upon theoretical application rather than material evidence.

Site selection and occupation

The factors influencing the decision to found a settlement in a specific location are not represented in the archaeological record, but a combination of environmental and social factors should be envisaged. On the environmental side these may have included the local topography, resource (e.g. timber, land) availability, and suitable ground conditions for construction. Social factors may have been influenced by cultural memory, with landscape features indicating a suitable location, and previous signs of occupation, e.g. burial evidence of former settlement piles visible in the lake, showing that settlement should occur in an area. Whatever the reasons for choosing a location, the evidence from Zug-Riedmat illustrates that once a site had been chosen, communities were unwilling to relocate, even if their settlement was inundated on multiple occasions over a short period of time. The foundation of a settlement created a place value in the landscape, which socially exceeded the potential difficulties caused by fluctuating lake-water levels (cf. Chapman 2000, 183-90; Bowser 2004).

Use life of structures

Micromorphological analysis of structure floors, the surface beneath a pile dwelling if elevated above ground, is relatively rare in lake-settlements from the northern Alpine region. One exception is Structure 1 at Arbon-Bleiche 3, showing indications of domestic occupation being replaced by a functional use for an animal pen (Ismail-Meyer & Rentzel 2004; Leuzinger 2000). It is well recorded in ethnographic literature that buildings have a finite life span, and their use for varying purposes can reflect both the size and social status of a household (e.g. Kopytoff 1986, 67). It is unclear if we can see such a practice at Arbon-Bleiche, but it is possible. If it is accepted that the principles of a '*Hausplatz*' (cf. Ebersbach 2013) governed the rights of individuals/households to use specific places in a settlement, then it would follow that occupants/owners of Structure 1 were still resident in the village somewhere when the building was converted into use as an animal stall. This may represent the abandonment of one structure in favour of a new one because it was too old and needed significant repair, the death of one household and the deliberate un-occupation (for dwelling

purposes) of the area as a way of remembering while forgetting (Jones 2007, 39-41) or the merging of two households and subsequent redundancy of one dwelling.

Abandonment of Structures

One of the areas where micromorphology could offer significant insights to the cultural biography of lake-settlements is in the abandonment of structures and settlements. As mentioned above, the recognition of alternating sequential deposits of anthropogenic origin and natural lake marl may indicate the inundation of a settlement (e.g. Zug-Riedmatt). However, without accurate dating evidence, for example by dendrochronology, it is difficult to establish how long an inundation may have lasted, or to suggest if there was an interval between occupation and flooding.

Relatively few micromorphology studies have been conducted on the floor layers of structures, partly because these features rarely survive intact in the archaeological record. Unfortunately no micromorphological studies are published from the site Ürschhausen-Horn (Gollnisch-Moos 1999; Nagy 1999), where floor structures were recorded. Archaeological evidence at this site indicates that ceramics, both intact and broken, were placed around the exterior of some buildings (Gollnisch-Moos 1999, pages; Nagy 1999), while relatively little material culture has been recovered from the interior of the buildings (Figure 5). This may be taken as an indication of the deliberate and planned abandonment of the building for specific reasons. Ethnographic studies in south America (e.g. Deal 1985; Hayden & Cannon 1983) indicate that the placement of broken or discarded material along the exterior perimeter of structures occurs during daily practices, but is left behind when buildings are abandoned, while the relocation of households and removal of objects from the interior of structures, with placement of specific votive offerings can occur when family members died within buildings. A small collection of glass and jet beads from within one of the buildings at Ürschhausen-Horn could represent such an offering, but it is difficult to suggest the influences for abandonment of the building.

Many of the buildings at Ürschhausen-Horn were apparently destroyed in fire events (Gollnisch-Moos 1999), which, given the apparent intentional clearing of the structures, could represent the deliberate destruction of buildings following abandonment. The application of micromorphology to the internal floor structures may provide indications of intentional practices prior to abandonment, such as the cleaning of floor surfaces (cf. Milek 2012), or, if thin laminations are observed in the stratigraphy, other events that may have occurred between abandonment and burning. However, it must be remembered that micromorphology provides a slice through the stratigraphy in a specific location; just as site wide sampling is required to observe the spatial extent of larger events, multiple samples from within structures are required to identify such building wide features as opposed to localised deposits. The problem of identifying what is 'in-situ' also becomes significant when considering samples from within the interior of buildings; materials on the floor may have come from the walls or the roof, and such sources may significantly influence the potential interpretation of thin laminations of deposits (cf. Bleicher, this volume; (Flamman 2004))

Future prospects for cultural biographies of lake-settlements

The founding, use and decline, and layout of settlements are governed by social structures (e.g. Herbich & Dietler 2007), and settlements should be considered a significant part of a community/culture's material culture repertoire. Yet, the social structures governing settlement choice are not preserved in the archaeological record, and one discipline alone cannot provide enough evidence to address the entire social biography of a settlement. The lake-settlements of the northern Circum-Alpine region are blessed with excellent organic preservation, and accurate dendrochronological dating permits a greater possibility to understand the construction sequence of these settlements. Micromorphology can provide infilling data by identifying specific biographical events in the history of settlements, for example inundations or floodings. The few micromorphological analyses that have been conducted within the interior of structures, for example at Arbon-Bleiche 3, provide the potential to examine the occupation biography of individual buildings. It is the role of archaeology and ethnography to identify possible influences for the structuring of settlements, incorporating, for example, natural and human environment and landscape features, to turn the occupation biography (settlement history) into a cultural biography.

From an explicitly micromorphological perspective, future research should attempt to incorporate more samples from within the interior of specific buildings, in addition to site wide sampling. Such practices will help to identify events and practices in the occupation of single buildings, for which suitable precedents can be sought in the ethnographic or experimental archaeological record (e.g. Leuzinger 2004).

Figures:

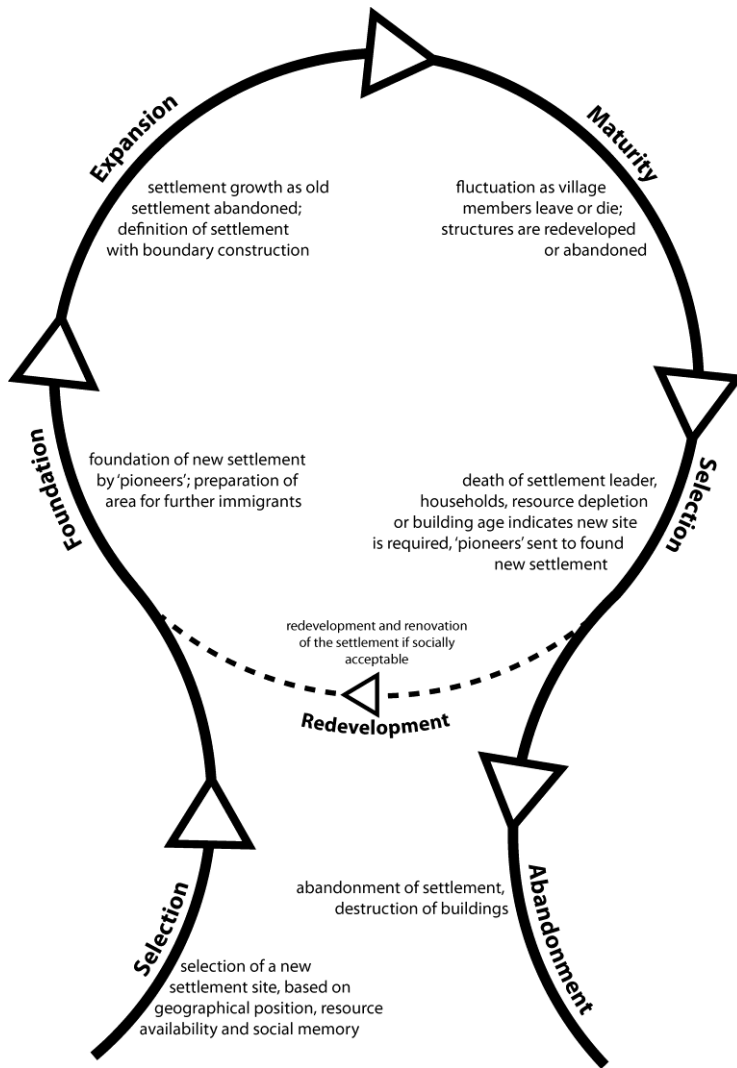


Figure 1: Hypothetical biography of lake-dwellings in the northern Circum-Alpine region (after Jennings, 2013: Fig. 6).

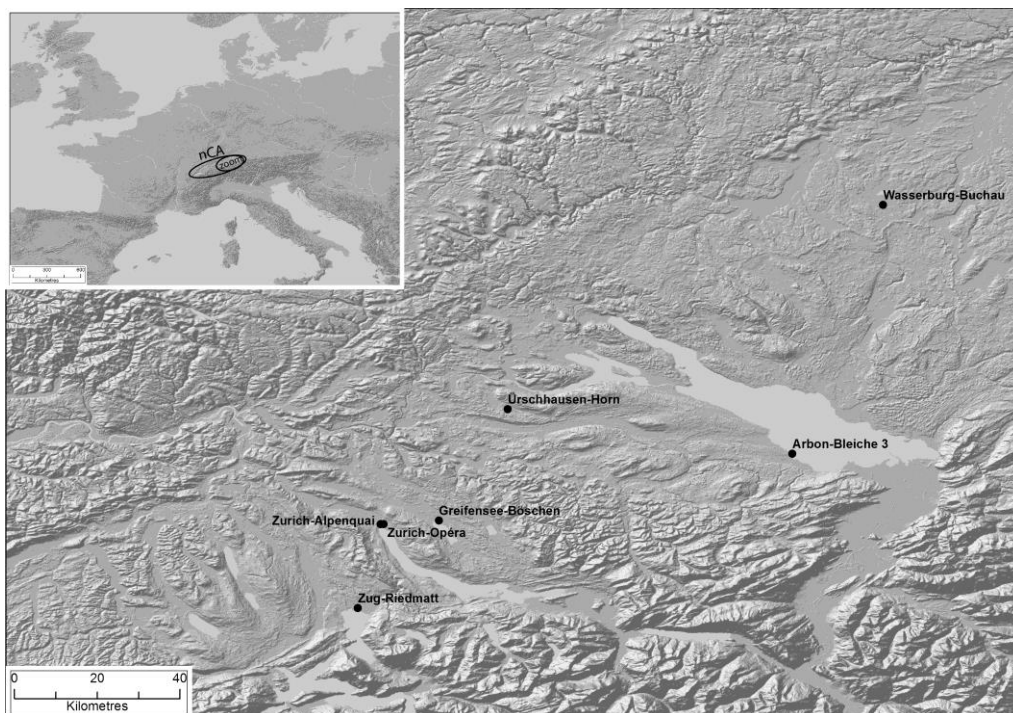


Figure 2: Sites mentioned in the text, and definition of the northern Circum-Alpine region (nCA).



Figure 3: Succession of two Horgen cultural layers at Zurich-Opéra with interjacent lake marl layer representing a period of higher lake level and therefore the abandonment of the older settlement. The overall height of the visible profile is 0.8 m.



Figure 4: Schematic illustration of the development of Structure 1 at Arbon-Bleiche 3. After first construction of the building it was partially destroyed in a fire. Following repair the building was again used as a dwelling, before being abandoned and the area used as an animal pen. (Data from Ismail-Meyer 2004 and Leuzinger 2000).



Figure 5: Ceramics at the LBA settlement were found positioned around the outside of some structures (left; northwest corner of House 5). The study of vessels showed that a

great many vessels were positioned around, for example, House 5 (right; reconstruction illustration House 5 looking towards the northwest). Figures courtesy of, and reproduced with permission from the Amt für Archäologie Thurgau, www.archaeologie.tg.ch.

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