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Micromorphology applied to lakeside settlement at Marin/Les Piécettes (Neuchâtel, Switzerland): analysis of clay accumulations

Michel Guélat & Matthieu Honegger

Abstract: Six clay accumulations found in a lakeside settlement were analysed by micromorphology. The goal of this geoarchaeological study was to identify the human activities responsible for the formation of these features. Our results suggest that they were mainly the product of domestic activities such as food waste dumps or dismantled hearths. The analysis of the successive deposits in each accumulation also allowed for the reconstruction of the sequence of main events affecting the site.

Keywords: clay accumulations, hearth, micromorphology, domestic waste

1. Archaeological context of the site

The lakeside settlement of Marin/Les Piécettes is located on the northern shore of Lake Neuchatel (Switzerland), less than 500 m from the famous La Tène site (fig. 1). The remains are situated at an altitude of 430 m, about 1 m above the current level of the lake. Salvage excavations were undertaken at the site between 1998 and 2002. An area of almost 3000 m² was investigated in the centre of the village, as well as at its northern margin. Occupation of the site occurred during the Neolithic period, dated to 3500–3400 cal. BC.

The village plan shows that most buildings were rebuilt many times and the site was inhabited for several decades. The distribution of posts and postholes gives an idea of the architectural organisation (Honegger & Michel 2002, 36). An access road passes through a row of fences and ends at a large mound, on which a central building was erected. Habitation areas on both sides of this mound are characterised by the presence of regularly laid out houses with apparently raised floors. Features and domestic refuse cover the ground in these areas; the majority of these features consist of sandy clay layers accretion, often more than 2 m in diameter (fig. 1). These accumulations form a complex succession of alternating deposits of clay layers and organic levels, both of anthropogenic origin. In many cases they contain burnt clay nodules.

2. Purpose of the analysis

Micromorphological study consists in an examination under microscope of loose sediments impregnated with epoxy resin. A series of twenty-two covered thin sections was prepared from six of the clay accumulations which were sampled in order to obtain data for the eastern (L1, L2 L3) and the western (L20, L22, L24) sectors of the site, on either side of the mound. Thin sections were described according to Bullock et al. (1985) and Courty et al. (1989). The goal of this analysis was to answer questions that arose from archaeological hypotheses:

- What are the origin and the formation processes of the layers, notably those that incorporate burnt clay nodules? Did the latter correspond to hearth remains and, if so, are these hearths in primary or secondary position?

- Are the identified layers within these accumulations similar from one dwelling to the next, or are these the sedimentary records of local events linked to single dwellings? In other words, is the formation of these features the result of phenomena that affected the entire village or is it the reflection of the history of each individual dwelling?

3. Results

The microscopic analysis of the sediments reveals deposit characteristics similar to those of a lake-margin marsh. A detrital input and the reworking of anthropogenic deposits during several transgressive episodes show the lake's influence. Soil formation processes were active and the sediments were exposed at the surface to aerobic conditions: organic matter is not well preserved, often showing advanced decomposition. The sequences studied all rest on lake marls predating the establishment of the Neolithic village. Carbonate-rich facies do not appear in the uppermost part of the deposits, though a transgressive layer, composed of detrital mineral grains, has been identified in most sequences. The analysis of six features revealed recurrent sedimentary facies that are found in all sequences,

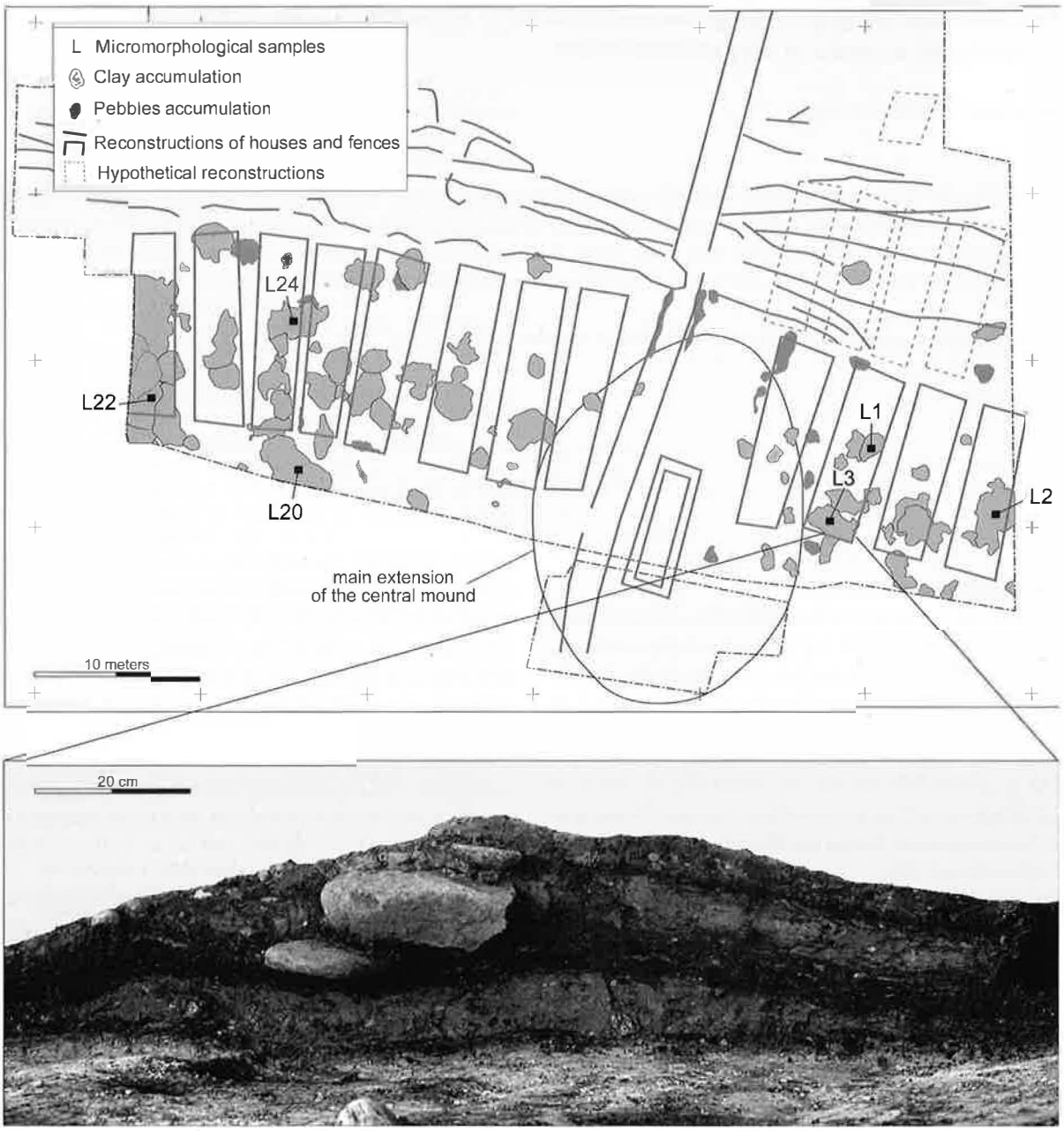

Fig. 1 Schematic plan of the centre of the village with the position of clay accumulations. These features are composed of many layers of sandy clay separated by organic deposits. In this example, the three clay layers contain burnt nodules that suggest a link with hearths. Height of the section: 35cm.

although each has its own peculiarities. The anthropogenic factor is preponderant in the creation of these deposits. Three following main groups were identified:

Accumulations of occupational remains: It is a rather porous formation with a complex microstructure composed of more or less charred organic material, associated with washed sand and minute bone fragments, as well as sandy clay nodules. The silty matrix is primarily composed of a fine organic or charred fraction. Macroremains are present although generally badly preserved. There are two principal types of this facies. Interpreted as an accumulation of occupational refuse reworked by the lake, the first facies shows medium porosity, microlaminated elements, graded microbedding and rounded sandy clay aggregates. The second type has high porosity and highly bioturbated organic groundmass. In this case, the occupational refuse has accumulated in situ, which suggests emersion (regression of the lake). Although the occupation of the settlement continues, this type of level shows a significant slow-down in sedimentation, even a hiatus.

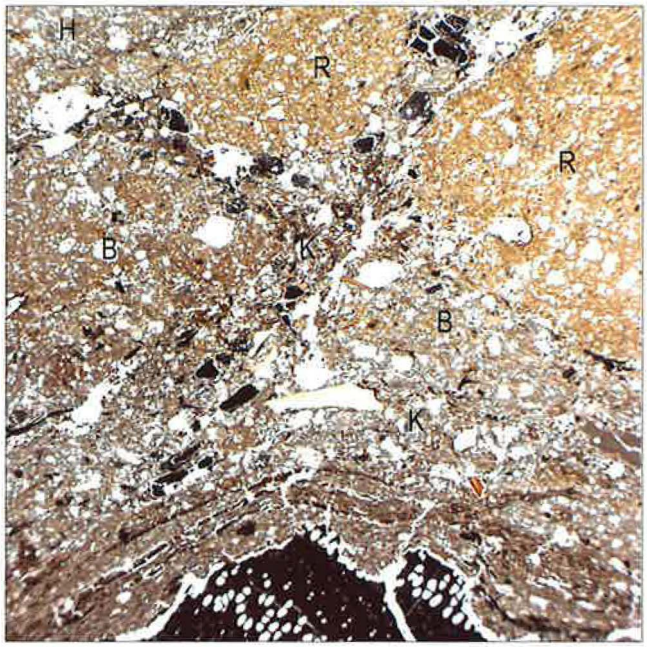

Fig. 2 Photomicrogaph showing the compact agglomeration of clay aggregates facies-type, among which the following nodule types can be distinguished:
R: yellow-orange, burnt, polyhedral, undeformed.
H: brown, humiferous, polyhedral or platy.
B: beige, platy, often flattened after compaction.
Compaction is also evident in a refuse layer with micro-charcoal (K), found underneath this facies, which is although pinched between the sandy clay nodules.
Plane-polarized light; frame length 14 mm.

Compact agglomeration of clay aggregates: This is an agglomerate with a massive microstructure, formed by aggregates of different shapes and nature, partly scorched (fig. 2). Post-depositional compaction is clear (shearing, deformed nodules). This unit is comprised at its base of large hearth fragments in a secondary position. At its top, a trampling horizon is sometimes associated with a beige sandy clay lens. The relatively varied nature and, more importantly, the heat reddening of some of these aggregates indicate their relation to the destruction of a hearth base. The obvious post-depositional compaction may be attributed to trampling, at least when an activity surface is identifiable at the top of this accretion (Guélat & Federici-Schenardi 1999, 60). The upper beige sandy clay lens may be the result of the rebuilding of the hearth base, after its complete or partial dismantling.

Sandy clay input of construction material: homogenous beige sandy clay with low porosity and massive microstructure has been identified in L22, a sequence located in the extreme west of the site. Obvious indications of trampling are generally found at the summit of these lenses.

4. Discussion

Among these three main groups of deposits, the first one corresponds to organic remains accumulations produced by domestic activities that occurred in the houses or at their proximity. The two other types are mainly composed of sandy clay sediments. The most frequent of them is represented by burnt clay nodules which result from the dismantling of the hearths initially installed on the raised floor of the houses. The other one corresponds to sedi-

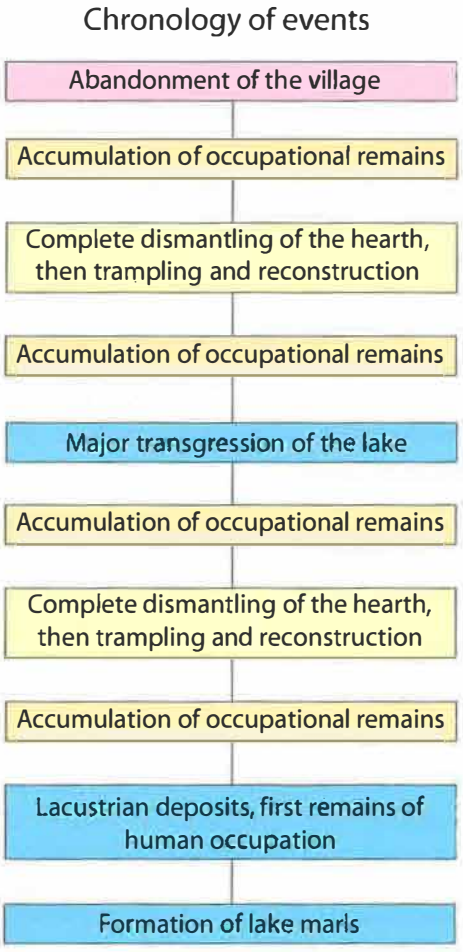

Fig. 3 Summary and interpretation of the events recorded in the six analysed sequences.

ment intentionally brought to the site as embankment or for building purpose.
A phenomenological reconstruction has been established according to the interpretation of the recurrent facies and their succession within the studied features (fig. 3). The correlation of the events between each accumulation is based on the similarities within the facies types successions, but also on the transgressive layer that serves as a stratigraphic marker horizon. The comparison of the six analysed sequences reveals astonishing similarities between the observed phenomena in the habitation areas located east of the mound and those located to the west. These similarities indicate that the majority of the events recorded within each feature are not only of local significance, but actually relate to the entire village. The results of micromorphological study gives the general impression of a long period of site occupation interspersed with transgressions from the lake, and interrupted by hearth destruction phases followed by reconstruction. The repetitive and systematic dismantling of the hearths must be linked to the collapse of the raised floor of the houses. This sequence therefore suggests two cycles of construction and destruction, succeeded by a third and final construction phase, followed by abandonment.

5. Conclusions

The micromorphological analysis applied to a lakeside settlement is an efficient tool to define the conditions of formation of sediments and to precise the origin and the evolution of anthropogenic layers. In the case of Marin/Les Piécettes the analysis shows that the constitution of clay accumulations results partly from the dismantling of raised floor houses. Moreover a comparison of the different micromorphological sequences issued from diverse locations of the site offers the possibility to identify important episodes of the village history.

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