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Micromorphological perspectives on the stratigraphical excavation of shell middens: a first approximation from the ethnohistorical site Tunel VII, Tierra del Fuego (Argentina)

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ABSTRACT

Due to their problematic stratigraphy, shell middens have traditionally been excavated by artificial stratigraphical cuts. This approach has often led to the obliteration of the original depositional sequence, removing important information regarding depositional and post-depositional processes, and human frequentation. Since the 1970s, an Argentinian team has been excavating archaeological shell middens in the Beagle Channel with a detailed stratigraphical approach, based on the excavation of actual depositional units (peeling), rather than artificial cuts. In the 1980s, Spanish archaeologists joined the Argentinean team and launched a series of new projects involving the excavation of ethnohistorical Yamana fisher-hunter-gatherer sites. The first excavated midden site was Tunel VII, from which two monolith columns of about 50 cm each (C11 and C12) that spanned the whole stratigraphy were extracted. The two columns were consolidated with resin, and two series of thin sections produced to corroborate stratigraphical observations made in the field, and to verify hypotheses related to the formation of archaeological shell midden sites. We present here the first results obtained from the microscopical observation of seven thin sections from column 11 (West column), extracted from a portion of the profile originally described as corresponding to the hut entrance and associated floor. The observation of microscopical features invisible in the field has provided supplemental information about the depositional and post-depositional processes affecting shell midden sites. We have also preliminarily defined a number of micromorphological characteristics identifying human activities such as discrete shell deposition events, phases of preparation of the hut floor, and compression by repeated trampling. Finally, we have explored the possibility of establishing some guidelines to characterise the length and character of frequentation phases of the site previous to its final abandonment at the beginning of the 20th century.

1. Introduction

An international team of researchers from the CONICET, the CSIC, and the UAB,[1] have been excavating archaeological and ethnohistorical shell middens in Tierra del Fuego since 1988 (Estévez et al., 2007; Vila, 2004). The sites of Alashauaia, Lanashuaia and Tunel VII were excavated in extension, and following actual, rather than artificial, stratigraphical units (Orquera, 1995; Orquera and Piana, 1992). One of the best documented of these sites was the ethnohistorical site Tunel VII, occupied by Yamana groups during the 19th century (Estévez and Vila, 1995; Piana and Orquera, 1995). Thanks to the contribution of ethnographical and historical information, and to the limited time elapsed between site abandonment and excavation, Tunel VII offered a unique opportunity to test archaeological methods employed to study the formation and use of shell middens. Micromorphology is used here in an ethnographical context (Taulé i Delor, 1995), to develop a microstratigraphical approach to the excavation of archaeological shell middens (Goldberg and Macphail, 2006; Homsey and Capo, 2006; McEwan et al., 1997; Simpson and Barrett, 1996; Stein, 1992). Only microscopical observation in thin section provides the level of definition needed to characterise stratigraphical units using evidence not visible to the naked eye in the field.

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Tunel VII is an open-air site located along the northern coast of the Beagle Channel (Tierra del Fuego). The site is situated between 0 and 5 m above the present-day line of high tide, on the slope of a moraine facing the sea to the south. The archaeological evidence from the excavation of Tunel VII agrees with the ethnographical description of the site. The formation of Tunel VII is considered the result of repeated occupation of a round hut with the deposition of shells and other consumption residues around its perimeter (Estévez and Vila, 2006). This process produced a ring with a central depression and an entrance facing the sea (Fig. 1). The site was excavated between 1988 and 1993, following a grid system subdivided in areas of 4 by 2 m, separated by 1-m wide baulks that were later removed (Orquera and Piana, 1995). Tunel VII was excavated in extension, recording each unit in a three-dimensional grid system.

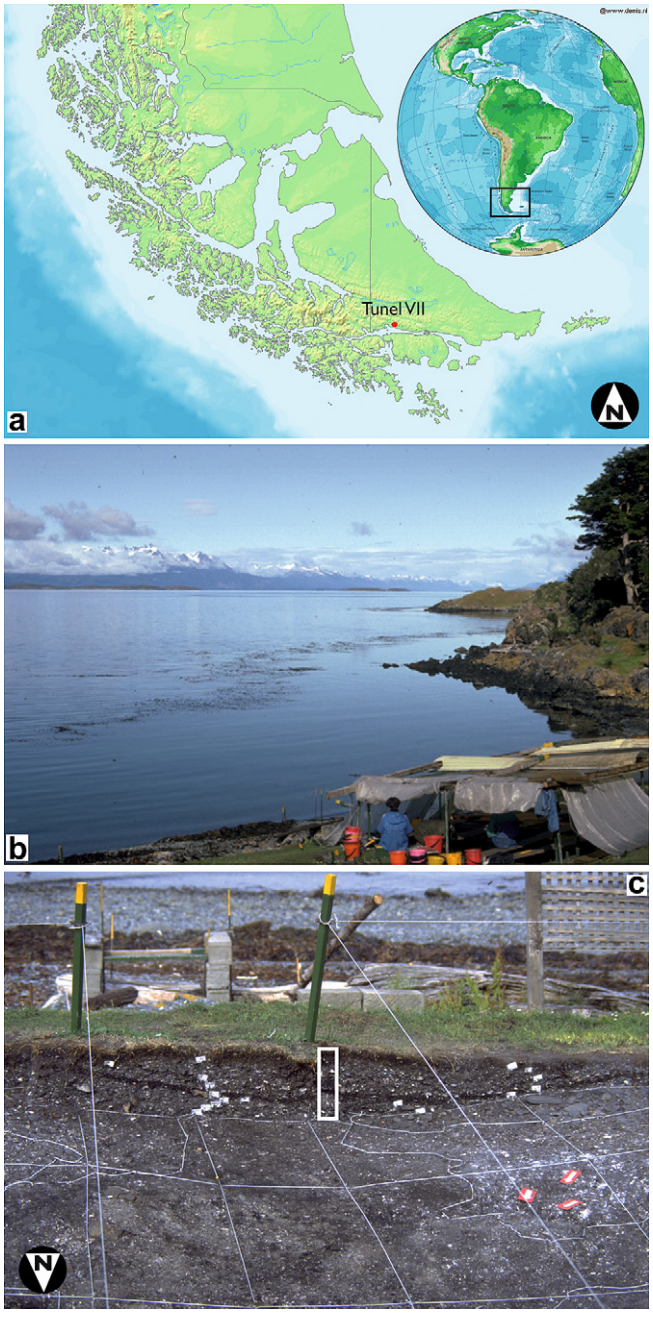

Fig. 1. Site location (a) and overview (b) and the position of column 11 (c) in the excavated site.

The units were excavated using a detailed stratigraphical approach. Their classification was based on the identification, during the excavation, of stratigraphical discontinuity surfaces, and on the systematic recording and quantification of over ten variables, such as matrix, shells, bones and lithic artefacts (Estévez et al., 2001). However, traits such as the level of fragmentation, inter-connection, compaction and distribution of the shells, which are unambiguous under the microscope, were not systematically recorded in the field. In 1993, two monolith columns were taken from the southernmost profile, closest to the shore. Column 12 (East column) was taken from sector III, while column 11 (West column) was taken between sectors II and III, after removing the baulk. Micromorphological samples from column 11 are used here to examine the details of stratigraphical observations made in the field, and to test some of the original working hypotheses put forward to explain shell midden formation and use in Tierra del Fuego (e.g. the stratigraphical changes noticed during fieldwork, and the intercalation of occupation and abandonment episodes).

2. The application of micromorphology to the excavation of shell middens

Two contiguous series of thin sections (A and B) were originally obtained from column 11, and numbered from 1 (uppermost) to 7 (lowermost) (Solé Benet, 1991). It was not possible to analyse all thin sections from both series because some of the units rich in organic matter were over-ground during production. Therefore, thin sections from both series were selected to obtain the complete stratigraphy (Fig. 2).

A high-resolution scan of the impregnated monolith was used to locate the thin sections, and to draw a first macroscopical stratigraphy of this portion of the site. Each microscopical sedimentological unit was defined using an alphanumerical coding (e.g. T7C11TS5AU22), indicating site name (T7), column number (C11), thin section number (TS5A), and unit number (U22). The actual boundaries and main characters of each unit were defined using a Leica MZ 95 stereomicroscope, and the fine groundmass was described using a Leica DM 2500. Thin sections were observed under plane-polarized light (PPL) and cross-polarized light (XPL), following established guidelines (Bullock et al., 1985; FitzPatrick, 1993; Kemp, 1985; Stoops, 2003).

3. Thin section description

Throughout column 11 the dominant fine groundmass is made of microfaunal faecal pellets organised in porous spheroidal subround crumbs, composed of more or less humified sub-millimetric plant tissues and charcoal fragments (Vera et al., 2007). The coarse component is mainly made of shell, charcoal, gravel and sand, with occasional bone fragments and sharp clasts (possible artefacts). Stratigraphical units have been grouped on the basis of their microstructure as *spongy* and *blocky*. The most common is the spongy type that relates to the main phases of shell accumulation, and is characterised by spongy microstructure, enaulic c/f related distribution, aggregation in porous crumbs, weak separation, and is unaccommodated with packing voids. The blocky type, which relates to phases of incipient soil development, is characterised by sub-angular blocky microstructure, porphyric c/f related distribution, aggregation in sub-angular blocky peds, moderate separation, and is partially accommodated with planar voids.

The fine groundmass being homogeneous throughout the profile, stratigraphical units have been differentiated based on the characterization of the coarse fraction. Most relevant to the microscopical differentiation of units were the concentration and size of shell fragments and clasts together with the degree of shell