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## Phytolith analysis: from the fields to building earth

Claire Delhon, Souhair Alkalesh, Laetitia Riboud, Arnaud Mazuy

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Edited by / Sous la direction de

Jean-Denis Vigne, François Briois et Jean Guilaine

# Klimonas

An Early Pre-Pottery Neolithic Village in Cyprus

Un village néolithique pré-céramique ancien à Chypre

CNRS ÉDITIONS



*Gallia Préhistoire*

International Supplement, 1  
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# Phytolith analysis: from the fields to building earth

Claire DELHON, Souhair ALKALESH, Laetitia RIBOUD, Arnaud MAZUY

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**Abstract.** *In Klimonas, phytolith analysis was performed on building earth samples from the Communal building (St 10) and on palaeosoils interbedded in the sedimentary sequences of fluvial terraces and in the “road profile”, in the vicinity and at the edge of the site, respectively.*

*Phytoliths were abundant and well-preserved in the building earth. They evidence the use of a mixture of straw from wild plants and cereal chaff as temper. Wheat and barley are attested, and rye is suspected. These cereals probably grew on well-watered soils. Only one palaeosoil, slightly younger than the PPNA occupation (8872 ± 37 BP, [8224–7837] cal BC), provided enough data. Its phytolith spectrum is almost purely constituted by grass morphotypes, with a significant abundance of dendritic phytoliths, pointing to the presence of a cereal field during the soil’s formation.*

*Hence, phytolith analysis suggests the importance of cereals in the site’s economy and the integration of the chaîne opératoire for the manufacture of building materials in a technical system largely interconnected with the (proto-)agricultural system.*

## **Analyse des phytolithes: du champ à la terre à bâtir**

**Résumé.** *L’analyse phytolithique de Klimonas a porté sur des structures en terre crue du Bâtiment communautaire (St 10) et sur des paléosols mis au jour dans les séquences sédimentaires des terrasses fluviales et de la « coupe de la route », situées respectivement à quelques centaines de mètres et en bordure du site.*

*Les phytolithes sont des particules microscopiques d’opale de silice qui se forment dans les tissus végétaux au cours de la vie de la plante. Les graminées en produisent de grandes quantités et une grande variété de morphotypes, qui permettent des identifications taxonomiques mais aussi de reconnaître les différentes parties de la plante.*

*Les échantillons de terre crue se sont révélés très riches en phytolithes très bien conservés. L’analyse phytolithique montre que le dégraissant végétal ajouté à la terre à bâtir était constitué d’un mélange de paille d’herbes sauvages (graminées, cypéracées) et de balle de céréales, sauvages ou cultivées. La présence de phytolithes caractéristiques des roseaux et carex (*Phragmites* sp., *Cyperaceae*) suggère l’exploitation des milieux humides. Les phytolithes pluricellulaires de graminées ont permis de reconnaître la présence systématique de blé (*Triticum* sp.) et d’orge (*Hordeum* sp.) et de suspecter la présence de seigle (*Secale* sp.). Ces céréales poussaient sur des sols dont le statut hydrique était favorable à la formation de squelettes siliceux de grandes dimensions. Les phytolithes pluricellulaires observés dans la terre à bâtir présentent majoritairement les profils de coupe lisses ou concaves, liés à une action mécanique sur les tissus végétaux au cours des étapes de dépiquage, décorticage ou broyage des grains. Les coupes « en escalier », le long des limites cellulaires, qui marquent une désarticulation plus naturelle des tissus végétaux, sont moins fréquentes. Ainsi, il apparaît qu’une partie de la matière végétale utilisée comme dégraissant lors de la fabrication de la terre à bâtir de Klimonas correspond à des résidus du traitement de céréales.*

*Les prélèvements effectués dans les séquences naturelles sont apparus pour leur part extrêmement pauvres, même lorsqu’il s’agissait de niveaux pédogénésés. Un seul paléosol dont la matière organique a été datée de 8872±37 BP (8224-7837 BC, donc possiblement contemporain de l’occupation du site) a fourni un enregistrement exploitable. Il est localisé en bordure du site (« coupe de la route »). Son spectre phytolithique, presque exclusivement graminéen et riche en morphotypes allongés dendritiques, est compatible avec la présence de céréales lors de la formation du sol. Il est probable que cette zone ait abrité un champ de céréales, peut-être cultivé et très probablement exploité.*

*Ainsi, à Klimonas, alors que très peu de macrorestes sont préservés, les phytolithes démontrent l’importance des céréales dans l’économie du site et l’intégration de la chaîne opératoire de la fabrication des matériaux de construction dans un système technique largement interfacé avec le système (proto-)agricole.*

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## 1. INTRODUCTION

In Klimonas, building earth samples from the PPNA Communal building (St 10; Mylona *et al.* 2017a, chap. 11) and palaeosoils interbedded either in the fluvial terraces, located a few hundred metres south of the site in the sedimentary sequences, or the “road profile”, at the eastern edge of the site (Mylona *et al.* 2017b, chap. 3), were selected for phytolith analysis.

Phytoliths are microscopic silica opal particles that form in the tissues during the plant’s life. Because of the physical and chemical properties of the opal, they are well preserved in most sedimentary contexts (Lebreton *et al.* 2017). Grass (Poaceae) produce large quantities of phytoliths and various different morphotypes, allowing not only taxonomic identifications but also the recognition of plant parts (straw, leaves, husk; Carnelli *et al.* 2001). The so-called “grass silica short-cell phytoliths” (GSSCP) exhibit variable morphologies according to the grass subfamilies (Festucoideae, Panicoideae, Chloridoideae; Twiss *et al.* 1969, ICPT 2019). When fragments of silicified epidermal tissue are preserved in the form of multi-cell phytoliths, also known as silica skeletons, the identification of cereals can reach the genus or even the species level (e.g. Rosen 1992, Emery-Barbier and Thiébaud 2005, Ryan 2011, Madella *et al.* 2014).

Earthen building material may contain phytoliths from the raw earth or from plants added intentionally, in order to modify its properties (temper), or unintentionally during earth material preparation or drying (plant fragments trapped inside/on the earth). Phytolith analysis of the building earth from Klimonas aimed to document the composition of this material and to provide data on the use of plant resources in a context where organic remains are poorly preserved (chap. 23). The study of pedo-sedimentary sequences from the colluvial terraces aimed to record the local vegetation around the site and its evolution through time. The existence of several palaeosoils gave access to potential areas of plant gathering, or even real agricultural activities, for contemporary populations.

All the building earth samples proved to be rich in well-preserved phytoliths. On the contrary, samples from the natural sequences were extremely poor, even when pedogenized levels were involved ([appendix 22-1](#)).

## 2. METHOD

In order to extract phytoliths, the fine fraction (200 $\mu$ m) of the sediment was treated first with concentrated hydrochloric acid and then with potassium hydroxide in an ultrasonic hot bath. After several rinses, the phytoliths were concentrated by heavy liquid separation using a Thoulet solution (density = 2.35). They were then mounted on a microscope slide in a drop of immersion oil and identification was carried out through a transmitted light microscope, at a magnification of 1000x. Where needed, polarizer/analyser devices were used to differentiate amorphous silica opal from bi-refrangent particles.

This microscopic observation allowed the ascribing of phytoliths to previously described morphotypes whose taxonomic and anatomic significances are already documented (ICPT 2019). More than 250 identified phytoliths were counted for each sample, except when they were not abundant enough. In these cases, that only concerned the natural sequences, the data is purely qualitative.

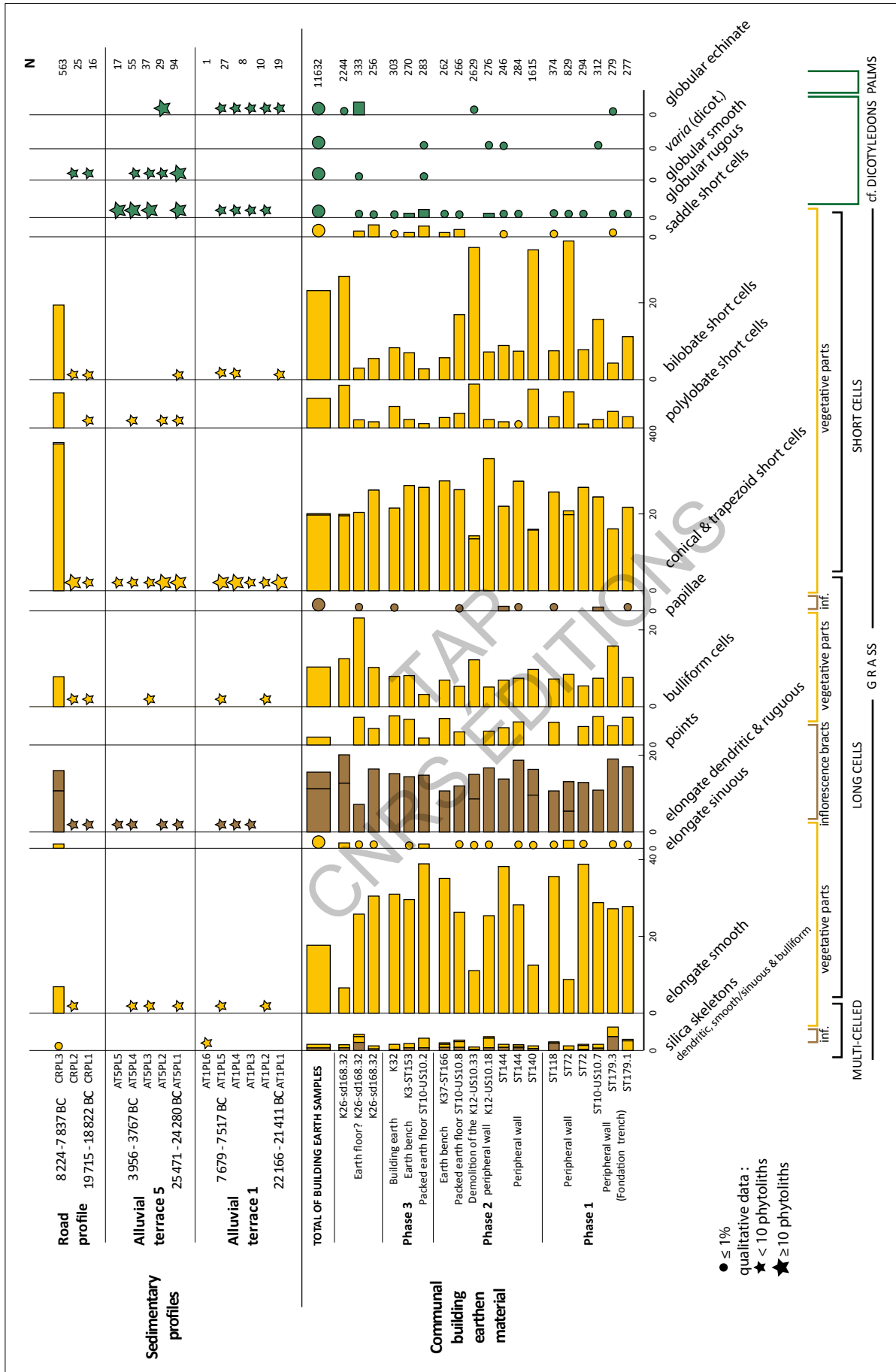
## 3. PHYTOLITH ANALYSIS OF BUILDING EARTH

### 3.1. PHYTOLITH SPECTRA

Nineteen samples of building earth were studied ([appendix 22-1](#), fig. 22-1). Most of the identified morphotypes were produced by grasses, but some particles that characterize dicotyledons and palms were also encountered. As no palm species is reported to be native from Cyprus, it is likely that the presence of the palm echinate morphotype attests to a low contribution of airborne phytoliths in the spectra.

The phytolith assemblages show little variation from one level to another. The only noticeable difference is the relative amounts of short (GSSCP) and long cells among grass phytoliths. Multi-celled phytoliths appeared in moderate but constant proportions in all the samples (0.9–6.1%). When phytoliths are naturally present in the earth used to prepare building material, they consist as individual particles, released during the decomposition of plant tissues. The constant and significant (although moderate) presence of articulated silicified cells in Klimonas building earth is consistent with fresh plant material added to the building earth during processing. The very low abundance of phytoliths in the samples from natural sequences (*infra*) suggests that the raw earth processed was in all likelihood poor in plant silica particles, supporting the hypothesis that the phytolith spectra from the earthen material is almost entirely attributable to the input of vegetal tempering material (see also chap. 11 and 23). Consequently, the phytolith spectra testifies more to human practices than to local vegetation.

Grass silica short cells were abundant. They refer mainly to two subfamilies: the Festucoideae, which mainly produces trapeziform, conical and conical-polylobate short cells; and the Panicoideae, which mainly produces bilobate short cells. The so-called “saddle” morphotype, typical of the Chloridoideae subfamily, was much rarer. Grasses from the Festucoideae subfamily exhibit a C<sub>3</sub> metabolism and thrive in temperate areas. Most of the cereals originated from the Near East (wheat, barley, oats) and nearly all the wild European grasses belong to the Festucoideae subfamily. Panicoid grasses are adapted to warmer conditions and mostly exhibit a C<sub>4</sub> metabolic pattern. They are mainly distributed over intertropical areas, except for a few species, such as wild and domestic millets (*Setaria* sp., *Panicum* sp.) that spread over the Mediterranean or even the temperate areas, where they nevertheless only account for a very small part of the herbaceous flora. In Cyprus, besides millets,



**Fig. 22-1** – Phytolith diagram of building earth samples and sediment from the natural sequences. **Brown:** phytoliths from grass inflorescence bracts, **yellow:** phytoliths from grass vegetative parts, **green:** dicots and palms. • Diagramme phytolithique des échantillons de terre à bâtir et de sédiments des séquences naturelles. **Marron:** phytolithes produits dans les inflorescences des graminées, **jaune:** phytolithes produits dans les parties végétatives des graminées, **vert:** dicotylédones et palmiers.

the genus *Digitaria*, *Echinochloa* and *Andropogon* can be found. Finally, the Chloridoideae subfamily is clearly of tropical affinity and is therefore weakly represented in the Mediterranean. In Cyprus, the genus *Crypsis*, *Sporobolus*, *Cynodon*, *Aeluropus* are reported (<http://www.flora-of-cyprus.eu/>).

Elongate morphotypes account for an important part of the phytolith assemblages (29–55%), mainly in the form of elongate entire phytoliths. These are produced in large quantities in grass stems, and to a lesser extent in leaves, and help to keep the plant erect. Elongate dentate morphotypes occur in the leaves epidermis. In the inflorescences, a continuum can be observed from the dentate to typical dendritic ornamentations, the latter being exclusive to ear bracts. The dendritic and dentate forms were particularly abundant in the building earth of Klimonas (10–20%; mean 15.6%, of which 11.2% dendritic and 4.4% dentate). Such amounts evidence that husks significantly contributed to the phytolith record. It has been shown that when grass straw (either cereal or wild species) is gathered without any contribution of husks, either because only stems and leaves are selected or because the plant is collected before flowering, typical husk phytoliths only account for one to a few percent of the assemblage (Lancelotti *et al.* 2014, Delhon *et al.* 2019). The abundance of dendritic long cells (close to 10%) suggests that inflorescence bracts contributed to the phytolith assemblage, while proportions over 30% were considered as an evidence of cereal processing, either wild (Emery-Barbier and Thiébaud 2005) or cultivated (Cabanes *et al.* 2009). According to Novello and Barboni (2015), the fact that dendritic morphotypes largely overpass 3% of the sum of grass silica short cells and dendritic elongate is a signature of anthropogenic activity. In Klimonas building material, this value is on average around 18% (ranging from 7.6 to 43.1%).

Thus, the phytolith spectra from the Klimonas building material attests to the abundance of husks in the vegetal temper, which could point to the use of grain by-product processing, like chaff. A closer observation of multi-celled phytoliths gives further arguments.

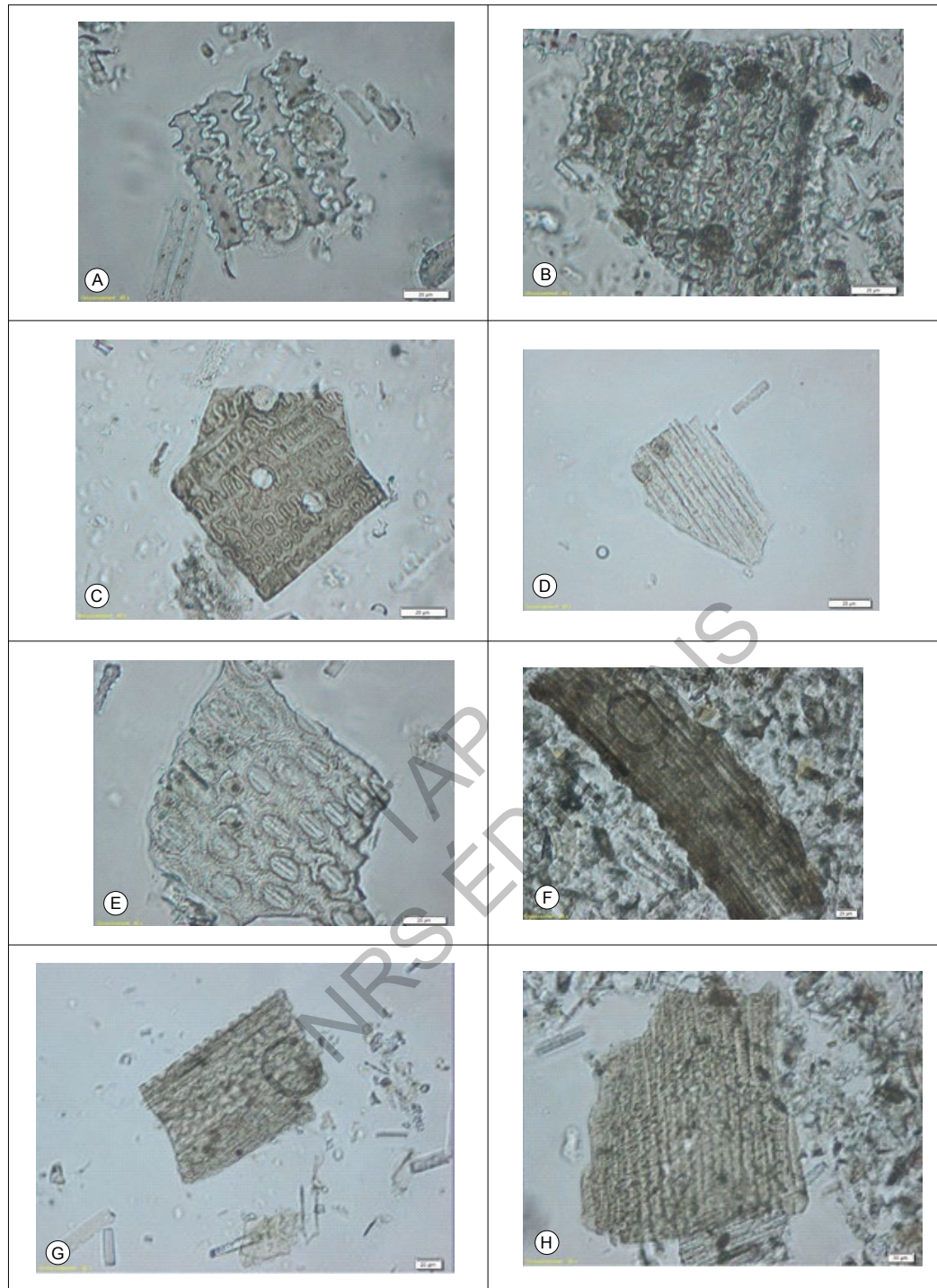
### 3.2. SILICA SKELETONS: CEREAL IDENTIFICATION AND BREAK MARK PROFILES

Sixteen samples of building earth from the Communal building (St 10) were selected for specific silica skeleton analysis, in order to identify the species – especially if cereals were involved – that could have been used as temper in the building earth, and to search for any possible stigmata left by the mechanical processing of the grasses. The anatomical origin (stem/leaf or husk) of around 100 multi-celled phytoliths for each sample was determined. Whenever possible, the characteristics of the observed silicified cells were compared to published descriptions of cereals phytoliths (Rosen 1992; Ball *et al.* 1996, 2001). Finally, the break mark profiles of each silica skeleton was described (shape and orientation; fig. 22-2).

In all the samples, multi-cellular fragments of the silicified epidermis presenting dendritic cells whose shape corresponded to that of wheat, barley (*Triticum* sp., *Hordeum* sp.: fig. 22-2, A, B) and non-cereal wild grasses were observed. Noticeably, the presence of *Phragmites* (reed) and Cyperaceae phytoliths evidenced the use of wetland plants (fig. 22-2, E, F). Some morphologies evoked that of rye (*Secale* sp., fig. 22-2, C), which is not attested among the plant macroremains at Klimonas (chap. 23) nor on any site of the island predating the Pottery Neolithic (Lucas and Fuller 2020). However, on the continent, the PPNA site of Jerf el-Ahmar (Syria) revealed the remains of wild rye (Willcox and Fornite 1999; Willcox and Stordeur 2012), making its occurrence at Klimonas plausible. In any event, the phytolith data should be consolidated to ensure the identification of that genus, which has been less extensively described than *Triticum* and *Hordeum* in phytolith literature.

Husk silica skeletons were noticeably abundant and large-sized in samples from US 10.2, St 118, St 144 and St 166. In the latter, they were often composed of 10 to 20 long cells, sometimes more than 30. The size of silica skeletons, given by the number of articulated cells that compose them, largely relies on the level of tissue silification. Hence, it is linked to maturity of the ears (silica impregnation of cell walls increases with time), genetic factors and, above all, on environmental conditions, as a good supply of water favours the optimal silicification of glume cells (Rosen and Weiner 1994). Furthermore, preservation of the large silica skeletons produced by the plant, once it has been torn to chaff, also depends on the aggressiveness of the processing methods, particularly during dehusking or grinding (Portillo *et al.* 2013, 2017). Mechanical actions such as cutting or crushing the organic matrix before its decomposition generate typical break mark profiles on multi-celled phytoliths which are different from those resulting from natural decay (Anderson 2003, Avner *et al.* 2003, Cummings 2003, Anderson *et al.* 2006, Danu *et al.* 2019). The silica skeletons extracted from the building earth of Klimonas, however, displayed mainly straight-smooth or concave profiles whose trajectories were not directed by cell boundaries (fig. 22-2, G, H). Stepped profiles, following some of the cell walls, were less frequent (fig. 22-3). Straight-smooth and concave profiles are only produced by mechanical treatments, linked to dehusking or the grinding of grains. Break mark profiles, together with the taxonomic attribution of some of the phytoliths, show that at least part of the vegetal material used as temper in the Klimonas building earth was made from the by-products of wild or cultivated cereal processing. The macroremains and the impressions left by temper in the cob also attest to the use of cereal chaff (chap. 11 and 23). This result echoes the phytolith study at the PPNB site of Çatalhöyük (Central Anatolia), suggesting that “the site was made of plants as well as clay” (Ryan 2011).





**Fig. 22-2** – Silica skeletons from the building earth: A, multi-celled phytolith from cereal husk, probably wheat (*Triticum* sp.); B, multi-celled phytolith from cereal husk, probably barley (*Hordeum* sp.); C, multi-celled phytolith from cereal husk, possibly rye (*Secale* sp.); D, multi-celled phytolith from grass stem; E, multi-celled phytolith from reed leaf (*Phragmites* sp.); F, multi-celled phytolith from sedge stem (*Cyperaceae*); G, multi-celled phytolith from cereal husk, probably barley (*Hordeum* sp.), showing a straight-smooth break mark profile; H, multi-celled phytolith from cereal husk, probably barley (*Hordeum* sp.), showing concave break mark profile. Photos S. Alkalesh, U. Panthéon-Sorbonne. • *Phytolithes pluricellulaires* issus de la terre à bâtir du bâtiment: A, phytolithe pluricellulaire de balle de céréale attribué au blé (*Triticum* sp.); B, phytolithe pluricellulaire de balle de céréale attribué à l'orge (*Hordeum* sp.); C, phytolithe pluricellulaire de balle de céréale, possiblement du seigle (*Secale* sp.); D, phytolithe pluricellulaire de tige de graminée; E, phytolithe pluricellulaire de feuille de roseau (*Phragmite* sp.); F, phytolithe pluricellulaire de tige de carex (*Cyperaceae*); G, phytolithe pluricellulaire de balle de céréale attribué à l'orge (*Hordeum* sp.) présentant un profil de coupe caractéristique à bords droits; H, phytolithe pluricellulaire de balle de céréale attribué à l'orge (*Hordeum* sp.) présentant un profil de coupe caractéristique à bords concaves. Clichés S. Alkalesh, U. Panthéon-Sorbonne.

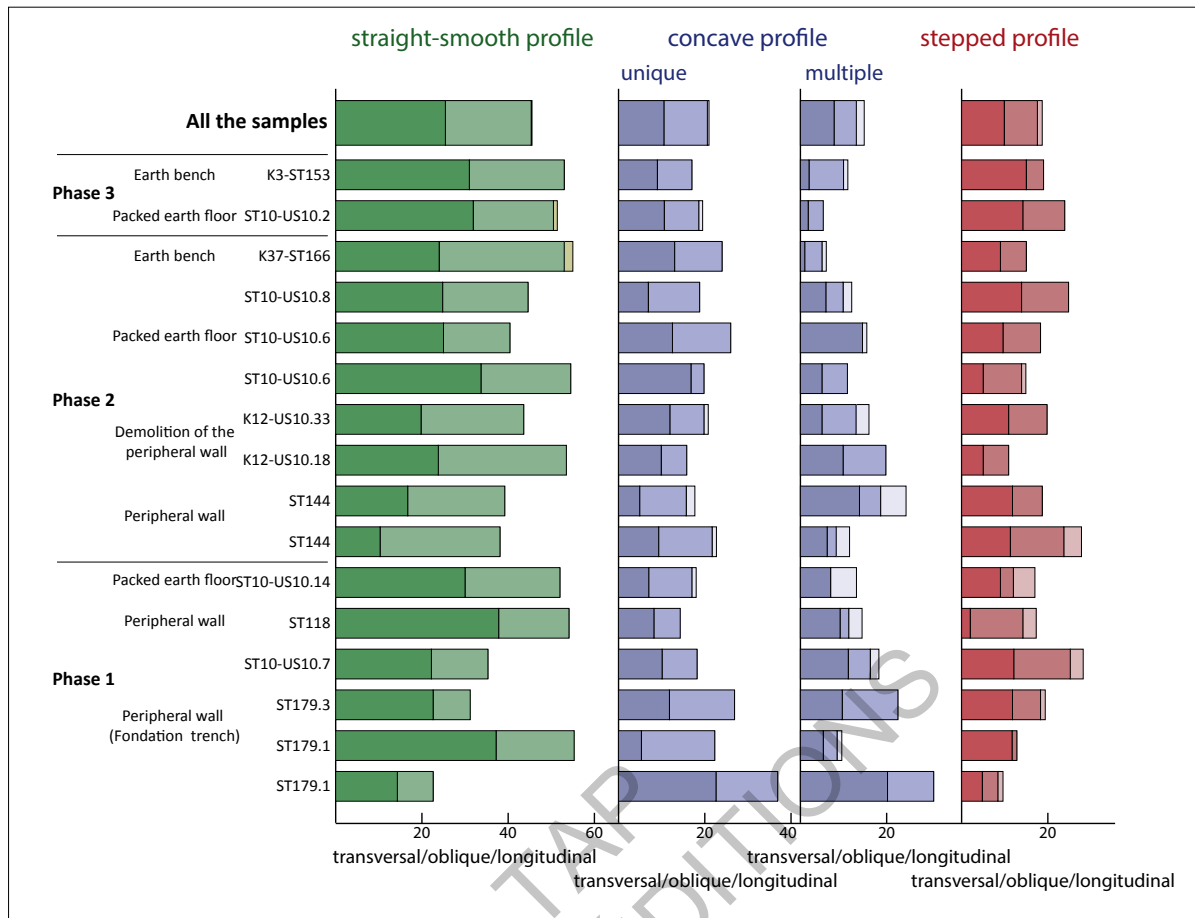


Fig. 22-3 – Proportions of break mark profiles on the silica skeletons. • Proportion des différents profils de coupe sur les phytolithes pluricellulaires.

#### 4. PHYTOLITH ANALYSIS OF SEDIMENTARY SEQUENCES

The sediment from the alluvial and colluvial sequences, located in the fluvial terraces or at the edge of the Klimonas site, turned to be almost sterile in phytoliths (tab. 22-1). Knowing that they preserve well in most of the sedimentary contexts, an extreme paucity of phytoliths usually characterizes deposits that formed without any contribution (or with a very low contribution) of plant material. In contrast, palaeosoils usually contain various amounts of phytoliths originating from the plants involved in pedogenesis. Phytolith concentration can be high where dense vegetation composed of silica rich plants (grasses, palms, etc) is concerned. On the contrary, it can remain rather low if the vegetal cover is sparse and/or if the plants involved produced few or no phytoliths (dicotyledons). In the Late Glacial and Early Holocene fluvial terraces close to the site, and in the earliest palaeosoils of the sedimentary “road profile” sequence, which date to the Late Glacial (chap. 3), phytolith concentrations are so low that for most of the samples it has not been possible to obtain quantitative results (Riboud 2017). Data is sufficient only in the uppermost palaeosoil of the “road profile”, which is the only sample that allowed the calculation of relative abundances

(appendix 22-1). Though poor in phytoliths, the preparations contained many radiolarian capsule fragments (siliceous microfossils of marine protozoa) of local geological origin (Moni limestone, chap. 3). Their morphology makes them easily recognizable, but confusion is still possible between small isolated fragments of radiolaria and some globular phytoliths produced by dicotyledons, in particular the cystoliths. Thus, the reported possible presence of dicotyledons phytoliths in the samples should be considered cautiously, especially in the absence of pedogenetic features.

The only interpretable sample comes from the most recent palaeosoil, which is also the one whose datation is closest to that of the PPNA village of Klimonas. Nevertheless, based on the available  $^{14}\text{C}$  date ( $8872 \pm 37$  BP, 8224-7837 BC), it appears to be a few centuries younger than the archaeological occupation. This may be due to a slight contamination of the organic matter by more recent plant roots (chap. 3). Thus it cannot be excluded that this palaeosoil is more or less strictly contemporaneous with the occupation of the Klimonas village. The phytolith spectrum records a vegetation largely dominated by grasses, mainly from the Festucoideae subfamily (rondel, trapezoid and polylobate short cells) and to a lesser extent the Panicoideae subfamily (bilobate short cells). Elongate entire and sinuate

grass phytoliths produced in the vegetative parts of the plants (stem and leaves) are unusually scarce. Four multi-celled silica skeletons were observed (including one from a husk epidermis), which is not anecdotal considering the usual scarcity of these morphotypes outside specific archaeological contexts, generally linked with cereal storage or processing. The elongate dendritic morphotype accounts for 10.7% of the assemblage; this is a high score for natural grassland (meadow, steppe) for which values of a few percent, at the most, are expected (see for example Pető 2013, Dal Corso *et al.* 2018). Novello and Barboni (2015), who studied surface assemblages from sub-Saharan Africa (Chad), in an area where useful grass species, including wild panicoid cereals, are abundant, observed that dendritic long cells represent less than 3% of the total phytolith counts from modern non-cultivated soils.

The accumulation of inflorescence bract phytoliths in the palaeosol CRPL3 makes the hypothesis for cereals growing on this plot of land. Non-cereal grasses produce less developed surface ornamentation that makes elongate inflorescence bract phytoliths fall into the “elongate dentate” morphotype rather than the “elongate dendritic” one. Moreover, the proportion of total biomass represented by ears is more important in cereals than in most wild grasses, which is one of the reasons why husk phytoliths are proportionally more abundant in that group. The absence of other usable samples in the natural sequences makes it difficult to have a clear-cut interpretation of the palaeosol’s phytolith spectrum. Nevertheless, the fact that the phytoliths almost exclusively come from grasses, together with the abundance of dendritic forms, make it likely that cereals largely contributed to the phytolith record. It is possible, therefore, that this plot of land hosted a cultivated – or at least exploited – cereal field in the course of the 9<sup>th</sup> millennium BC, either during the occupation of the village (cultivations near or even inside the village) or after the abandonment.

## 5. CONCLUSION

The use of herbaceous plants for non-food purposes represents an often underestimated part of the prehistoric plant economy. In Klimonas, the recipe for earthen building material includes an important quantity of plants (chap. 11), partly in the form of by-products of crop processing. Cereals were collected in order to respond to various needs, rather than just for food, and went through various technical systems; however, the data does not permit us to determine to what extent they could have been cultivated (see also chap. 23). These cereals grew at least partly on soils sufficiently watered to insure a high level of silification in epidemic cells. The use of wild plants from damp soils (reeds, sedges) evidences the exploitation of rivers, or lakesides, which is consistent with the presence of freshwater crabs (chap. 24) and waterbirds (chap. 26) in the archaeozoological records of Klimonas. Among the studied palaeosols, one displays a phytolith spectrum compatible with that expected in a cereal field, but its strict contemporaneity with the short period of occupation of the PPNA village cannot be ascertained.

The use of chaff as temper in building earth is widespread in populations who grow cereals and have an earthen architecture. In Çatalhöyük (PPNB, Turkey), the use of cereal chaff, together with leaves and stems from wild grasses, is interpreted as the opportunistic exploitation of materials available throughout the year, at least whenever glume cereals stored in the form of spikelets were involved (Ryan 2011). In that respect, the chaff supplied could have notably relied on emmer and einkorn, whose presence is attested by micromorphological analyses (Mylona *et al.* 2017a; chap. 11) and by macroremains (chap. 23).

Hence, despite the scarcity of preserved plant macroremains, phytolith analysis points to the importance of cereals in the economy, and to the integration of the *chaîne opératoire* for the manufacture of building materials into a technical system linked with the (proto)-agricultural system.

### Chap. 22 - Annexe • Appendix

**KLIMONAS-Ch22-A01**, <https://doi.org/10.34847/nkl.48b2f88>

*Results of the phytolith analysis and break mark profiles analysis, in relative abundance • Résultats de l'analyse des phytolithes et de l'analyse des profils de coupe, en abondance relative*

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# Gallia Préhistoire

International Supplement, 1

avec la participation de *Paléorient*



Klimonas is the oldest Mediterranean island village. Occupied ca. 8800 cal BC, it postpones by several centuries the Neolithic presence in Cyprus, at that time located more than 80 km offshore.

The village extended over more than 5,500 m<sup>2</sup>, facing the sea, 2 km from the famous pre-pottery site of Shillourokambos and near rich flint outcrops. Excavations (2009-2016) revealed that it was composed of circular or oval earthen buildings 3-6 m in diameter, notched into the slope, modestly fitted out and organised around a semi-buried 10 m communal building.

The construction techniques, the abundance of either knapped or polished stone material, together with ornaments, symbolic objects, and plants and animal remains, as well as the 52 radiometric dates, point to the end of the Levantine Pre-Pottery Neolithic A (PPNA). The presence of a communal building, rebuilt numerous times over the course of several decades, also points to the same conclusion.

The villagers gathered seeds and fruits and cultivated wild starch and einkorn, recently imported from the continent.

They primarily hunted small endemic wild boar, the only large mammal species attested on the island at that time and, secondarily, birds. They did not eat fish or marine shellfish. Domestic dogs, mice and cats brought from the continent also lived in the village.

The remains of this cultivator-hunter community testify to the early extension of the Near Eastern Neolithic and to unsuspected seafaring skills, substantially improving our knowledge of the Neolithic transition in the Mediterranean.

Jean-Denis Vigne, emeritus director of research at the CNRS and project leader at the Muséum national d'histoire naturelle, co-directed the excavation with François Briois, assistant professor at the EHESS. The latter took over the direction of the "Neolithisation" mission in 2014, following Jean Guilaine, emeritus professor at the Collège de France and member of the French Institute.

*Klimonas est le plus ancien village insulaire de Méditerranée. Occupé autour de 8800 av. n.è., il recule de plusieurs siècles le début de la présence néolithique à Chypre, à cette époque déjà située à plus de 80 km du continent.*

*Le village s'étendait sur 5 500 m<sup>2</sup> au moins, face à la mer, à 2 km du célèbre site pré-céramique de Shillourokambos et au contact de riches sources de silex. Les fouilles (2009-2016) ont montré qu'il était composé d'édifices de terre crue (bauge) de 3 à 6 m de diamètre, circulaires ou ovalaires, encochés dans la pente, modestement aménagés, organisés autour d'un bâtiment communautaire semi-enterré de 10 m de diamètre.*

*Les techniques de construction, l'abondant mobilier de pierre taillée, le macro-outillage, les parures et objets symboliques, les restes de plantes et les ossements animaux, tout comme les 52 datations radiométriques renvoient à la fin du Néolithique pré-céramique A levantin (PPNA). La présence d'un bâtiment communautaire, plusieurs fois reconstruit en quelques décennies, le confirme.*

*Les villageois pratiquaient la cueillette et cultivaient l'amidonnier et l'engrain sauvages, récemment importés du continent. Ils chassaient un petit sanglier endémique, seule espèce de grand mammifère attestée sur l'île à cette époque, et, secondairement, des oiseaux. Poissons et coquillages marins n'étaient pas consommés. Des chiens domestiques, des souris et des chats de souche continentale vivaient dans le village.*

*Les vestiges de cette communauté d'agriculteurs-chasseurs témoignent de l'extension précoce du premier Néolithique du Proche-Orient et d'une maîtrise insoupçonnée de la navigation. Il enrichit de manière substantielle nos connaissances sur la transition néolithique en Méditerranée.*

*Jean-Denis Vigne, directeur de recherche émérite au CNRS et chargé de mission au Muséum national d'histoire naturelle a co-dirigé la fouille avec François Briois, maître de conférences à l'EHESS. Ce dernier a pris la direction de la mission « Néolithisation » en 2014, à la suite de Jean Guilaine, professeur émérite au Collège de France et membre de l'Institut.*

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