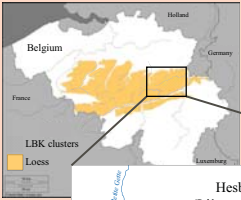


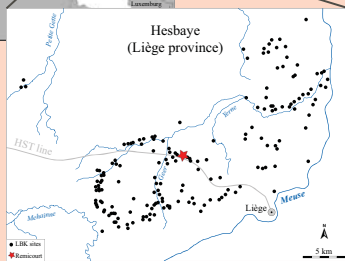
Presence of *Avena* sp. in Early Belgian Neolithic sites just a weed or real food?

Alexandre Chevalier¹ (alexandre.chevalier@naturalsciences.be)
Dominique Bosquet², Aurélie Salavert³, Mona Court-Picon¹

Between 1993 and 1999 archaeological rescue operations have been undertaken by the Belgian Walloon region in collaboration with the Royal Belgian Institute of Natural Sciences on the high-speed train line between the French border and the town of Liège on the eastern part of Belgium. Since 2000 different kind of analyses, including four combined archaeobotanical methodologies - seed, wood charcoal, phytolith and starch grains - have been applied to the LBK sites found on the High Speed Train path.

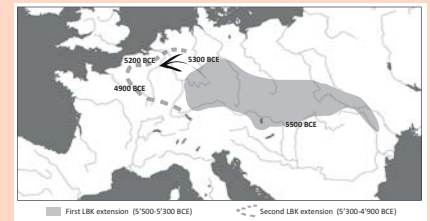


Both wood charcoal and palynological data clearly indicate a progressive forest clearing, with the implementation of cereal agriculture and a soil degradation during the LBK occupation of this region. Seed analyses indicate a heavy dietary reliance on cereals, mostly wheat with very scarce barley evidence. In contrast with the eastern LBK settlers that seem to prefer einkorn wheat (*T. monococcum*), emmer wheat (*T. dicoccum*) dominates the assemblage not only in Remicourt «en Bia Flo II» but also in the other sites in Middle Belgium, which cannot really be explained by different ecological conditions, but local cultural differences. No oat caryopsis has been found in the Hesbaye LBK sites, and only one occurrence of *Avena* sp. is documented at the genus level for the Northwestern Europe LBK at Weiler-la-Tour/Holzdreisch in Luxembourg.

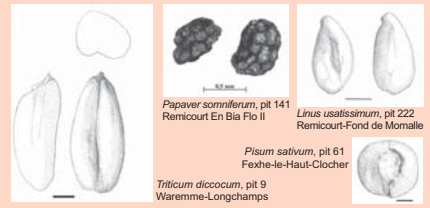


Map of Belgium with LBK sites in the Hesbaye region

Pulse (*Vicia* sp.) and lentils (*Lens* sp.) as well as couple of wild plants, either weeds or fruits, complement the LBK everyday diet at Remicourt en Bia Flo II. Opium poppy seeds (*Papaver somniferum* L.) found at Remicourt «en Bia Flo II» come from the structure 141 that is associated with the external house MV, in other words with the first LBK peopling phase in Belgium. It is however impossible to know whether the seeds are from the domesticated subspecies *P. somniferum* subsp. *somniferum* or from the wild one *P. somniferum* subsp. *setigerum* and therefore if opium poppy was cultivated for its seeds or narcotic properties, or was a weed associated with wheat and barley agriculture.



Map of Europe with LBK apparition dates



Papaver somniferum, pit 141 Remicourt En Bia Flo II
Linus usatissimum, pit 222 Remicourt-Fond de Momalle
Pisum sativum, pit 61 Fexhe-le-Haut-Clocher
Triticum dicoccum, pit 9 Wareme-Longchamps

Phytolith and starch grain analyses have been applied to grinding stones from the site of Remicourt «en Bia Flo II» in order to identify more precisely the plants processed and, most probably, eaten by the LBK settlers.

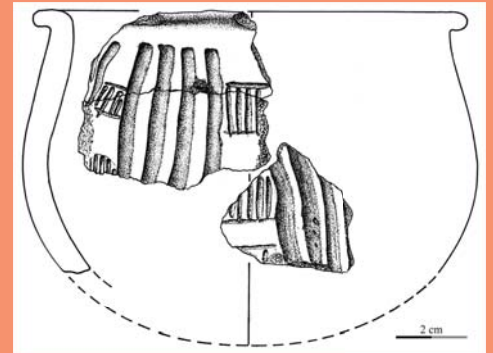
The archaeological site has been excavated between 1997 and 1998 on 6 847 m². It comprises 235 structures distributed in two sectors : a village of at least 10 houses surrounded by a wooden fence with an opening on its eastern side divided by a schlitzzgrube, namely a ditch with a profile in V, and a house located 130m away from the village, facing the opening. Among the structures there are 182 pits whose function are unknown. Most of them uncovered charred botanical remains, flint industry, sickles, ceramic sherds and querns.

Based on ceramic typology the external house was dated from the Middle to Late LBK while the village was dated from the Late to Final LBK. This chronology has been confirmed by C14 dates. The external house is dated between 5301BCE and 4990 at 2σ and the village is dated between 5286 and 4941BCE at 2σ.

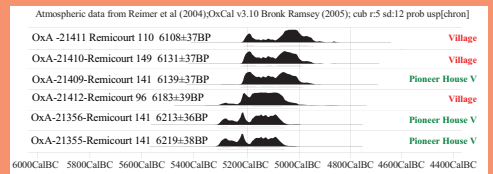
Nine grinding stones from different pits have been selected among a collection of 358 querns reflecting as much grinding activities (47%) than polishing and abrasion ones (39 %).

Phytoliths analyses are not very informative: the identification taxonomic level is very high, and with the exception of the grinding stone #277 on which we found a small number of very specific morphologies we couldn't associate to any taxon, all the querns seemed to have been used to grind various kind of plants, including dicotyledons, but none with any evidence of cereals processing

Map of the excavated areas of Remicourt En Bia Flo II indicating the pits where querns have been tested for phytoliths and starch grains.



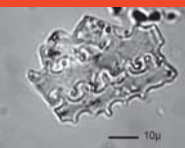
Sherds coming from the pioneer house 1 at Fexhe-le-Haut-Clocher



In turn, starch grain analyses were very informative and we could identify wheat (*Triticum* sp), barely (*Hordeum* sp), oat (*Avena* sp.) peas (cf *Pisum* sp.) and acorn (*Quercus* sp.).

Sample	RS#273	RS#274	RS#275	RS#276	RS#277	RS#278	RS#278	RS#279	RS#280	RS#281	
Structure	91	125	211	125	79	251	251	193	193	36	258
<i>Triticum</i> sp.		11					10				7
of <i>Triticum</i> sp.		2									
<i>Hordeum</i> sp.											63
of <i>Hordeum</i> sp.		6									1
<i>Avena</i> sp.		6									
of <i>Avena</i> sp.		2									
<i>Quercus</i> sp. (most are damaged by pounding)		5				2					11
Fabaceae cf <i>Pisum</i> sp.					2						

The presence of oat starch grains on one of the querns could be considered as a potential contamination if there weren't other evidences of oat presence in Hesbaye. Analyses on sediments from the pit 89 associated with the pioneer house at Fexhe-le-Haut-Clocher indeed uncovered evidence of *Avena* sp. phytoliths.



Phytolith of *Avena* sp. from Fexhe-le-Haut-Clocher, pit 89, phy#04

It is unlikely that these phytoliths and starch grains come from the domesticated oat, *A. sativa* L., which appears way later in northwestern Europe, around the Second Iron Age. *A. sterilis* L. cannot be considered, for its starches are really different and it has also a more southern natural distribution than Belgium. *Avena fatua* L., would fit both the ecological conditions and the morphology, however it is smaller than the archaeological starch. Bristle oat *Avena strigosa* Schreb. may also be suggested for it fits better the archaeological morphology and size than *A. fatua* L.



Starch of *Avena* sp. in bright and polarized light from structure 125, #SR274

Starch of *Avena sativa* L. in bright and polarized light (RBINS reference collection)

Starch of *Avena fatua* L. in bright and polarized light (RBINS reference collection)

Starch of *Avena sterilis* L. in bright and polarized light (RBINS reference collection)

Starch of *Avena strigosa* Schreb in bright and polarized light (RBINS reference collection)

Because of its very low archaeological occurrence, both as macro- and microremain, we don't think that oat has been grown separately. However it may have been more than a tolerated weed, and grown together with barley or wheat as a "cultural contaminant". In fact bristle oat originates from the Mediterranean area, as do opium poppy and barley. Together with other material culture features, such as Egozwil type sickle blades, bristle oat may have constituted some sort of initial cultural package brought up north by the first LBK settlers, that would eventually be abandoned by subsequent LBK settlers.

Chevalier A. et Bosquet D., 2010. Apports de l'analyse des phytolithes en contexte néolithique ancien : résultats obtenus sur cinq sites ruraux de Hesbaye (Belgique). In: Dailhon C., Thiery-Paréat L., Thiébaud S. (eds), Des hommes et des plantes. Exploitation du milieu et gestion des ressources végétales de la préhistoire à nos jours. 33-68. Actes des XXXèmes RIAA/HA, 22-24 oct 1999. Antibes, Editions APDOCA-Hamon C., 2008. Functional analysis of stone grinding and polishing tools from the earliest Neolithic of north-western Europe, Journal of Archaeological Sciences 35: 1502-1520
Rusin M.-P. et Zech-Matterne V., 2012. Les avoines dans les productions agro-pastorales du Nord-ouest de la France. Données carpologiques et indications textuelles. In: Carpentier V. et Marigny C. (eds), Des hommes aux champs: pour une archéologie des espaces ruraux du Néolithique au Moyen-Âge. Rennes: Presses Universitaires de Rennes, pp. 327-365.
Salavert A., 2011. Plant economy of the first farmers of central Belgium (Linearbandkeramik, 5 200-5 000 B.C.), Vegetation History and Archaeobotany 20: 321-332
Zohary D., Hopf M., Weiss E., 2012. Domestication of plants in the Old World : the origin and spread of cultivated plants in West Asia, Europe, and the Nile valley. Oxford: Clarendon Press.