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TRACING HUMAN NETWORKS IN PREHISTORIC BALTIC EUROPE : THE INFORMATIVE POTENTIAL OF KRZYŻ 7 AND DABKI 9 (POLAND)

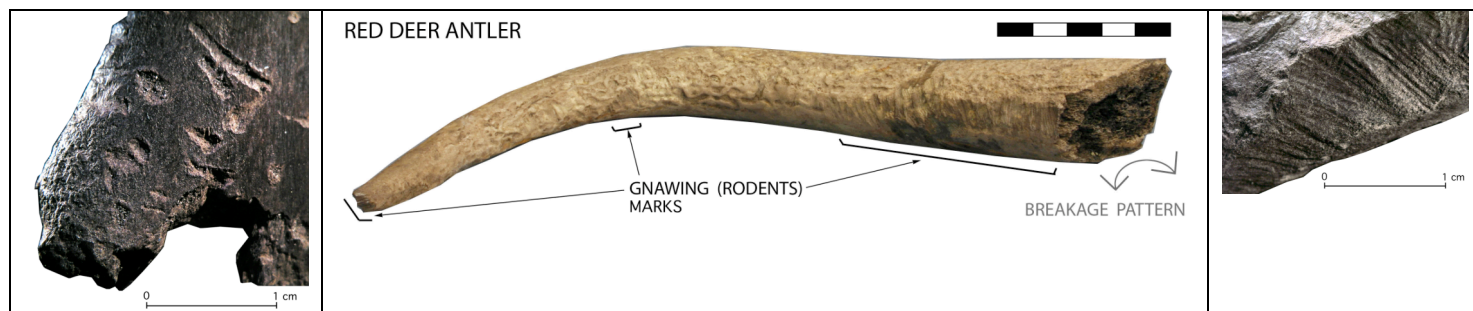
PRELIMINARY RESULTS ON BONE AND ANTLER WORKED MATERIAL

Eva DAVID*

Recent archaeological investigations in Poland, at the Krzyż 7 and the Dabki 9 archaeological sites, open discussion about presence or extend of human networks in the Baltic Europe at the both 9th and 5th millenium BC. By networks, it is meant here transports or transferts of goods, ideas or technology that can possibly be highlighted by archaeological studies, by means of reconstructing human behaviours. It concerns all kind of human activities that have generated a displacement or exchange of people or objects. With no written nor iconographic sources on these last european prehistoric societies, networks can be trace via the archaeological artefacts; their raw materials, the nature of the goods (animals or objects), the shape of the items, the way they were manufactured, the associate items and their destination (grave/sanctuary/hunting camps...), together with the associate features (archaeological structures, other industries, distribution patterns...) within define regional contexts. It implies also a large scale of observation with consideration of the regional paleogeography, reliefs of which might have played an important role in the distribution of networking. It includes thus numerous contemporary sites of main regions around the North- and the Baltic Sea.

Bringing out networks for prehistoric Holocene societies will unearth understanding the type of relationships that eventually occured between human groups at the 9th millenium BC in the North of Europe, and the circumstances implicate in the start or the extenstion of economic trade overseas or across lands at the 5th millenium BC. This might finally enable us to rediscuss as well what prehistoric archaeology means by « cultures ».

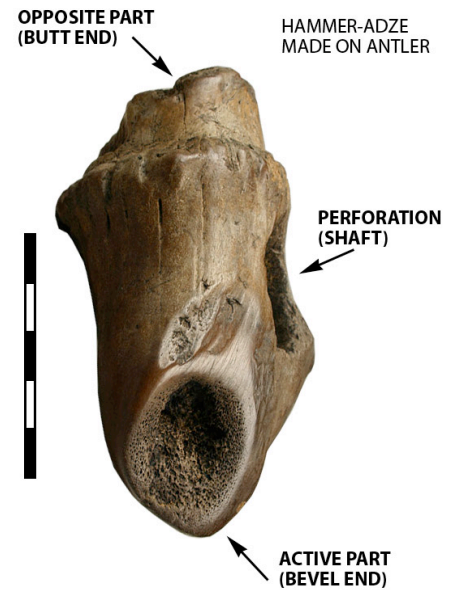
Focussed on this topic, present author made in 2007, thanks to the invitation of Dr. Jacek Kabacinski, the Polish Academy of Sciences and the Poznan Archaeological Museum, a preliminary study of the worked bone and antler artefacts of Krzyż 7 and Dabki 9 (Poland). The manufactured items have been sorted out from the whole faunal remains and the type of tools and objects have been recognized, as well as their manufacturing methods and techniques. For both sites, items are exceptionnaly well preserved. Anaerobic conditions of organic soils made possible indeed a high quality of preservation of both osseous assemblages, with respect of the original shape of the artefacts. These have been discarded there by prehistoric populations in the form of debris, consumption or manufacture (see below), or in the form of entire tools displaying no more efficient active ends. Together with the presence of some modifications of taphonomic origin (see below), it indicates a relative short time exposure of the Krzyż 7 and Dabki 9 bone assemblages before beeing completely buried.



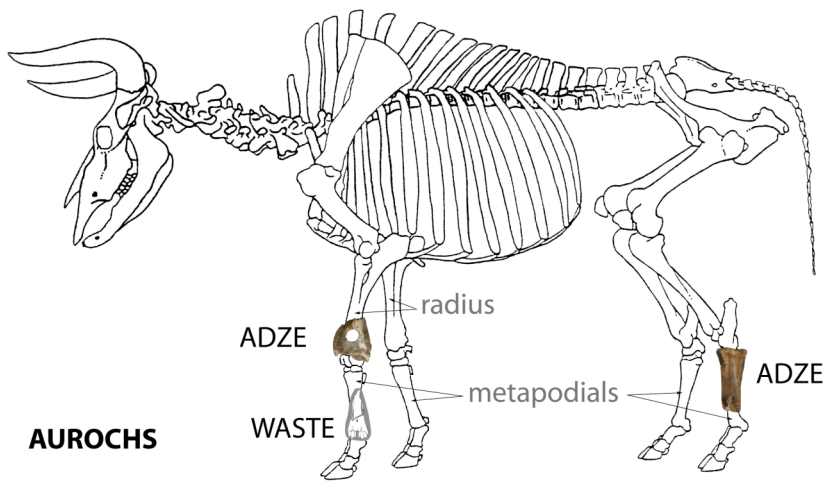
Scores made by dog on a scapula of beaver (left, Dabki) and by rodent on antlers of red deer at Krzyż 7 (middle) and Dabki (right). Pictures: M. Jordeczka (middle)/ E. David

| Implements / Sites | Adzes/ Axes | Blade-axes | Daggers | Punches | Engraved Objects | Total tools | Manufacture debris | Indetermined | Total Number of Pieces |
|--------------------|-------------|------------|---------|---------|------------------|-------------|--------------------|--------------|------------------------|
| Krzyz 7 | 11 | 1 | 0 | 0 | 0 | 12 | 11 | 0 | 23 |
| Dabki 9 | 4 | 0 | 2 | 1 | 1 | 8 | 14 | 8 | 30 |

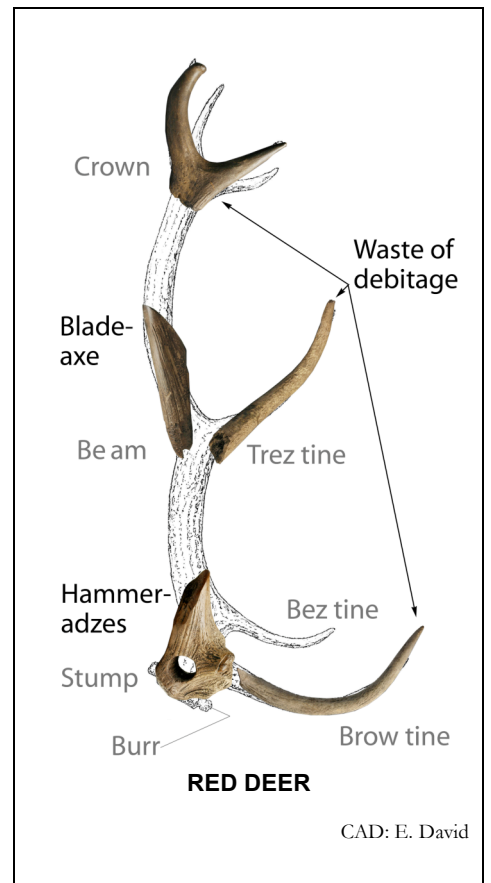
Typological classification of all artefacts can be made thanks to the presence, morphology, aspects and location of working parts (See David 2004-a:58). Among the 53 worked pieces recorded here, it is noticeable that there is no projectile point, as these are usually found in peatbog sites (table above). Most of the manufactured items are adzes or axes made of bone or antler. These tools show a hafting system (shaft hole or sleeve) and display a bevelled active part, that is located at the opposite side of a butt end. When made on metapodials, it has been recently demonstrated that they were used, as wedges, to work wood (David 2005-a). Another class of tools concerns the daggers which are kind of massive points. Their use can be related here with the fishing activities recorded on site (Dabki) when considering similarities they show with present day boathooks. The last category of tool-types concerns an item showing a scratched aspect on the active part that express its use on stone raw materials. With consideration of known experimental works, the use of an item for knapping flint is evoked here. Apart from these tools, among the items with no proper active end(s), a single engraved piece is finally recorded. Last artefacts are manufacture debris or undetermined. Descriptions of the pieces are summarized in table-lists (see Annex).



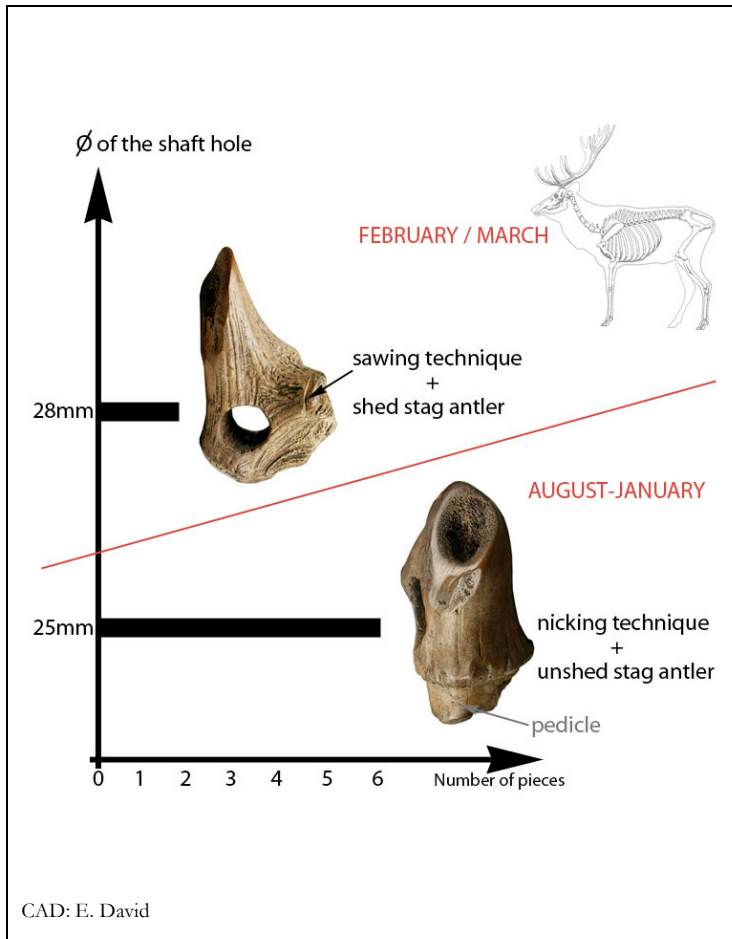
I. KRZYZ WIELKOPOVSKI 7 : A KEY SITE TO DISCUSS KNOW-HOWS IN THE 9th MILLENIUM BC



At Krzyz 7, only two animal species have been used to produce the whole assemblage (23 artefacts), the Red deer and the Aurochs (Kabacinski *et al.* 2006). As the first species did provide the antlers, the second were used for some of its limb bones. On both, heavy-duty tools of axe/adze-types have been produced. However, to the contrary of the red deer, and even so it exists one manufacturing debris, there is no waste of debitage corresponding to the manufacture of the bone adzes when made on aurochs. These tools are identical, in their anatomical location, to those found in Northern Germany, Southern Sweden and Denmark (David 2004-a:175 and 370).



Two different « styles of manufacture », two different seasons of occupation at Krzyz 7 ?



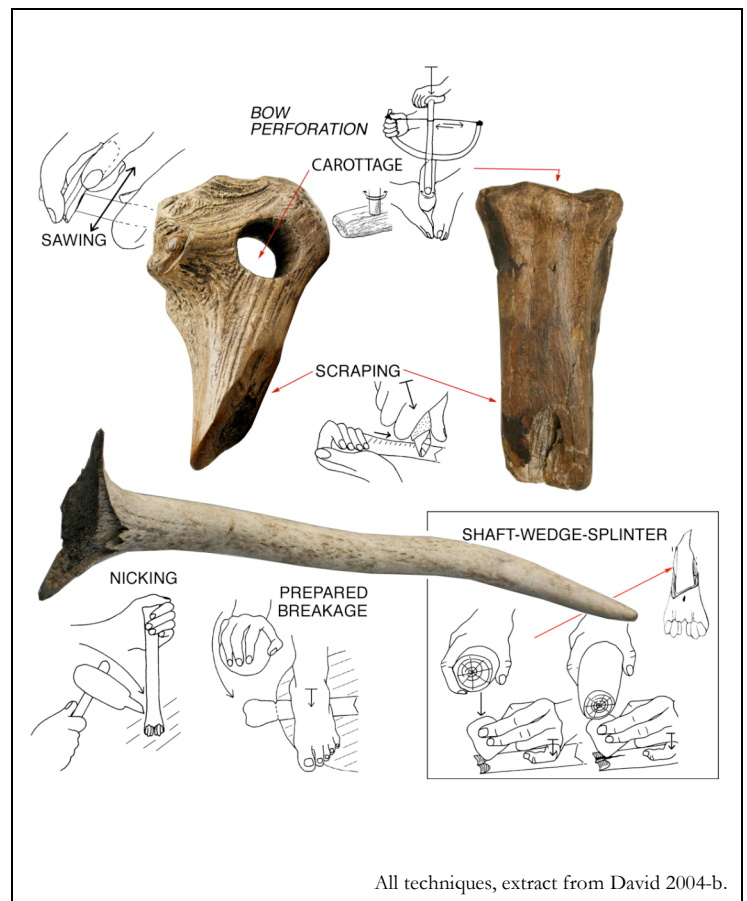
Considering how the antler tools have been made at Krzyz 7, there is two different « styles » of manufacturing the hammer-adzes using the *groove and truncated breakage* process (David 2007-a:40). Together with the *flexion break*, beams and tines have been removed either by *sawing* or by *nicking* techniques. While the first technique (*sawing*) concerns the two tools made on shed stag antler, the second technique is related to six hammer-adzes on unshed stag antler. Moreover, a larger shaft hole (28mm) occurs on the first type than for the hammer-adzes made of killed animals (25mm). If all bevel ends are fashioned a same way, by *scraping*, the anatomical blanks they are made on highlight two different time-periods of the year unless one type of hammer-adzes has been brought to the site in its entire state (antler waste are not complete enough to make any proposal); February-March when (adult) red deers loose their antlers, and August to January when they are headdressed. Both types of adzes, probably used for a similar purpose, show a similar way of processing the hafting system. As mentioned for other contemporary assemblages of Northern Europe, different « styles » of manufacture does not mean different « cultures » unless a single site would define by itself a whole culture (David 2006-a).

A Maglemosian form made with a non-Maglemosian technique

On the contrary to the other european adzes made of aurochs metapodials, those from Krzyz 7 show a different technique of manufacturing their shaft-hole, using the *carottage* technique (David 2007-b:72). Usually, this technique is only recorded to perforate the antlers, when these are used for making heavy-duty tools, as it is also the case at Krzyz and on other Polish sites. In North-Western Europe, where this aurochs adze-type is at the basis of characterizing the Maglemosian culture, it is made using another perforation technique (David 2003). Moreover, besides Ageröd, these bone adzes are not recorded so far in the Eastern and Western Europe (David 1998, 2000, 2001, 2005-b and 2006-b). However, our recent re-observation of the entire bone adze of Ageröd indicates as well the use of *carottage* to perform its shaft hole.

As it is extensively used in the North-Eastern European industry, the *shaft-wedge-splinter* is as well recorded here to remove a blank made of an aurochs metapodial.

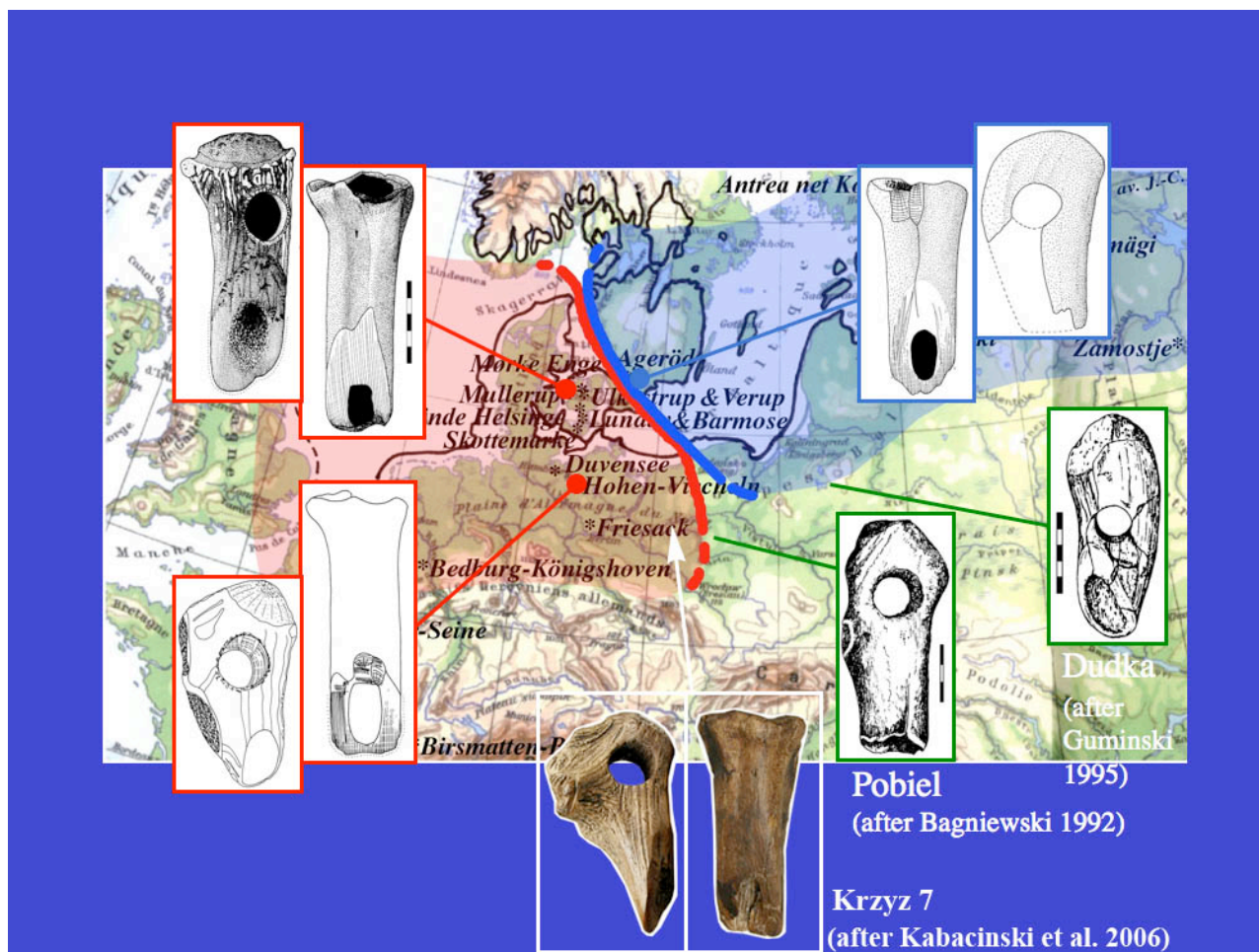
The other techniques are usual Mesolithic techniques, but the way tines have been removed, by *nicking* both-sided (instead of all around basis), gives another stylistic specificity of the Krzyz 7 material.



Krzyz 7 with its European context

Last prehistoric hunters-gatherers of Europe have settled at Krzyz 7 at the middle of the 9th millenium BC. One worked piece made of antler (2005/23) has been dated : 8520 ± 50 BP ($7605-7500$ Cal BC) and 8530 ± 50 BP ($7610-7500$ Cal BC)¹.

For that period, the North of Europe is divided in two areas showing different cultural traditions. Whereas on North-Western Europe, there is a « Maglemose » tradition (Figure below, red), a « Kunda » tradition occurs in other regions around the Baltic Sea (blue). These traditions have been recognized after the technological study of numerous bone and antler worked pieces yielded by similar and secure archaeological Early Mesolithic contexts (Preboreal and Boreal chronozones). The way these items were manufactured highlights two distinct areas, on either side of an axis that presumably stretches from the Øresund Strait, in Scandinavia, to the Vistula river, in Poland (David 2006-a).



Extract from David 2005-a (modified, with addition of Krzyz 7 material and its geographical location).

Both manufacturing traditions yield similar types of tools and objects, used for similar purposes. However, adzes made on both bone or antler are only found in the border-zone regions, at Mullerup, in Denmark, at Hohen Viecheln, in Germany, at Ageröd, in Southern Sweden. In Poland, previous to Krzyz 7 excavation, only a few antler adze-types were known, at Pobiel (Bagniewski 1992), Dudka (Guminski 1995, Guminski/Fiedorczuk 1989) and on another finding place (Goslar *et al.* 2006:20). The fact that these bone and antler heavy-duty tools are only found in the border-zone regions possibly points to a certain permeability of the Maglemosian and Kunda traditions. Moreover, the manufacture debris of the aurochs metapodial adzes have only been recorded in the Maglemosian. This could imply either exchange processes or Maglemosian forays into foreign territory. Presumably, the second is more likely, since no Eastern other items have been found so far in the Western area for that chronological frame. With the Krzyz material, where these adzes are identical to the Maglemosian ones but made with non-Maglemosian techniques on similar anatomical parts, these border-zone regions show a more complex reality, interpretation of which requires further archaeological investigations at Krzyz 7.

¹ OxCal 3 has been used to calibrate the datings that were kindly given by Dr. J. Kabacinski for this preliminary study.

It is assumed that the extension of the excavation will unearth more data about season and function of the Krzyz7 site. One asks here if the stylistic variability recorded in manufacturing tools, on antlers and on aurochs metapodials, are linked with the type of activities that have taken place on or around the site. According to the results presented above, expected scenarios are suggested here with focuss on either cultural patterns or adaptive strategies:

1/The Krzyz prehistoric people have chozen different techniques than those known in the rest of Europe because they are different. This would imply the presence of a specific archaeological culture, i.e. the Komornica *versus* Maglemosian or Kunda cultures. This « culture » has been classically ascribe to regions of Poland on the basis of typological studies of the worked stone material mainly (Kozlowski 1973, 1989, 2003 and Kozlowski/Kozlowski 1977). It would be caracterized by these heavy-duty tools showing Maglemosian forms but made with another know-how. Considering our previous results on Maglemosian worked bone material, one asks what are the necessarily conditions under which a single technique or even a single category of tools may define by itself a distinct cultural tradition?

2/The Krzyz prehistoric people have chozen different techniques because they are away from their home land, and thus are not willing to produce their usual stone tools, i.e. they can't use their own techniques abroad because they don't have their entire tool-kit with them or the appropriate stone ressources to implement their usual tools (It is known from previous experimental works that, in Denmark, the flint tool used to perforate the aurochs metapodial, for making the shaft of the bone adze, is also a specific Maglemosian flint tool²).

This could fit with a scenario where Maglemosian people adopted different technical behaviours depending on where they are compare to the whole territory they use and for what purpose, i.e. they have to adopt different technological strategies depending on the nature and the reasons of the displacement (the involved seasonal time span, the distance to the expected ressources, the composition of the travellers, the type of ressources they are coming for, the duration of the stay). Thus, Maglemosian forms made of bone and antler would continue to be created, generating a specific need in the tool production, and, why not, a specific lithic technology (possibly seen nowadays as an original « Komornica » archaeological culture). Considering the previous results on sites of Maglemosian tradition, the nature of the ressources that make the border-zone regions attractive to Maglemosian people, as well as the reasons why they would build up such a broad network within a large geographical frame, and with no integration of any bone Eastern feature (at least for the Boreal), would have then to be stressed.

Finally, future excavations at Krzyz 7 are expected to estimate the value of the archaeological collection itself. There is obviously a lack of debris concerning the production of bone tools. We don't know yet wether both types of bone adzes made on aurochs have been imported or produced on site. Excavations must be extend to the whole settlement area, in open surface. The presence of an engraved adze is remarkable when considering that such tool is rare in Europe for that period, only at Hohen Viecheln (Germany) and at Mullerup (Denmark) and, when found in its entire state, is recorded almost completely engraved (Figure below). It is important to be able to

consider the Krzyz 7 collection as a complete assemblage, i.e. yielded by a whole settlement area (and not as a part of it).

One has to recall here that it is always the quality of the archaeological excavation which allows enabling interpretations and not, at first, data resulting of an expertise on prehistoric production (recorded techniques).



Picture* of the Krzyz's fragment of adze made of a radius of aurochs compared with the Danish ornamented Late Maglemosian (Atlantique chronozone) entire bone adze from Højby (See balloon), on same anatomical part (extract from Sorensen 1979).

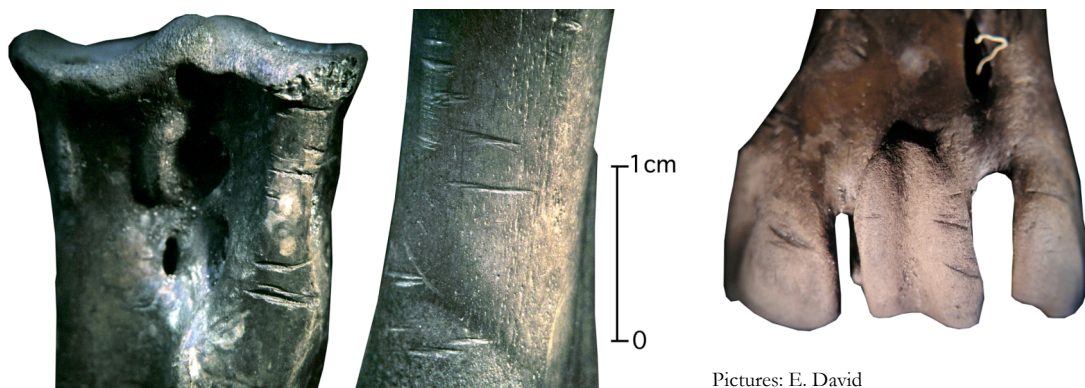
² DAVID É. ; JOHANSEN L. (1996) Report of the Grant Haf 26/96 « Maglemosian barbed points made of metapodials : reconstructing the chaîne opératoire by experiments ». Experimental Centre, Lejre (Danemark) : 24 p. (in English).

* With no mention on them, pictures of the Krzyz wonderful worked bone and antler material have been made by Maciej Jordeczka.

II.DABKI 9 : FISHERMENS AT THE DAWN OF COLONIZED EUROPE

In the mean time Central Europe is fully colonized by farmers, Dabki 9 (Pomerania) was occupied from ca. 5250 to 4150 Cal BC³. Apart from clear Neolithic sherds of the Early Funnel Beaker Culture, the assemblage is characterized by special vessel forms (pointed bottom pots/lamps) together with trapezoidal hunting flint arrow-heads which are also found in contemporaneous context of the (Mesolithic) Ertebølle. As for this latter, the subsistence economy is based in Dabki on hunting and fishing. A large set of wild game is indeed represented among the faunal remains which result not only of food consumption of large mammals (cervids, suids, carnivorous), birds and fishes⁴, but apparently also of removing fur as well, when made on Beaver (See figure below). The butchering activities and that related to the exploitation of fur are yielded by the location and depth of cutting marks recorded on the bone remains (See below)

The cutting marks (*sawing*) are clearly visible here on a tibio-tarse of bird (right) and on tibias of beavers (upper and distal ends -left). They suggest a food consumption when on bird, and an exploitation of fur when on beaver.

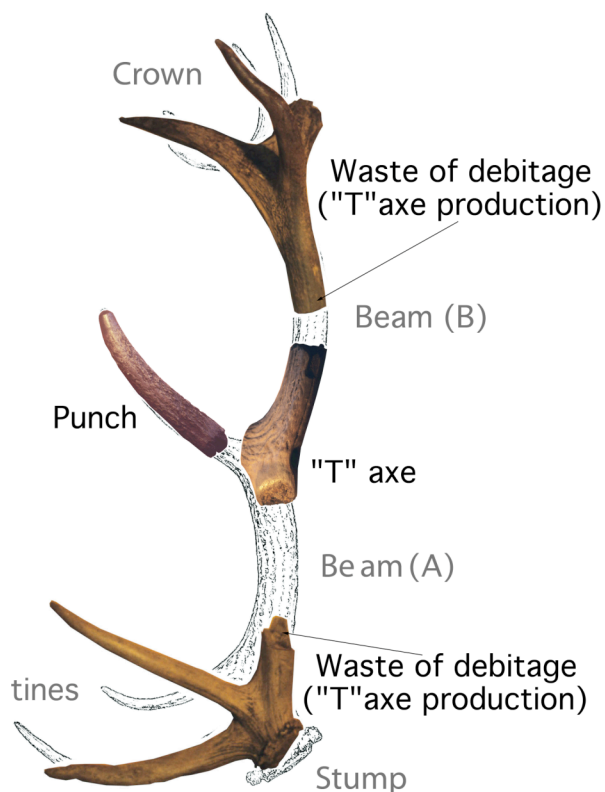


Although it has been yielded by refuse layers (secondary deposit), that have been excavated since 2004 by J. Kabacinski and Th. Terberger, the composition of the bone and antler industry forms an homogenous assemblage. Indeed, the waste of debitage corresponds mainly to the tools manufactured on site.

Almost all artefacts on red deer antler refer to the production of «T» axes. As all other Mesolithic bevel end tools made on antler, its active end is manufactured using *groove and truncated breakage* (See David 2004-b:133, fig.7). However, to the contrary of the Early Mesolithic heavy-duty tools, the stump here is not used; the axe is made on the beam antler, with a shaft hole that is centrally placed, at the junction of beam A and B. While the bevel end is fashioned by *scraping* lengthwise, the opposite end and the extra tine have been removed by *sawing and flexion break*. Thus, on all waste of debitage of antler, tines and stump, traces of using these techniques are recorded.

No other tools are made on the beam so far, but a punch as been made using a tine antler.

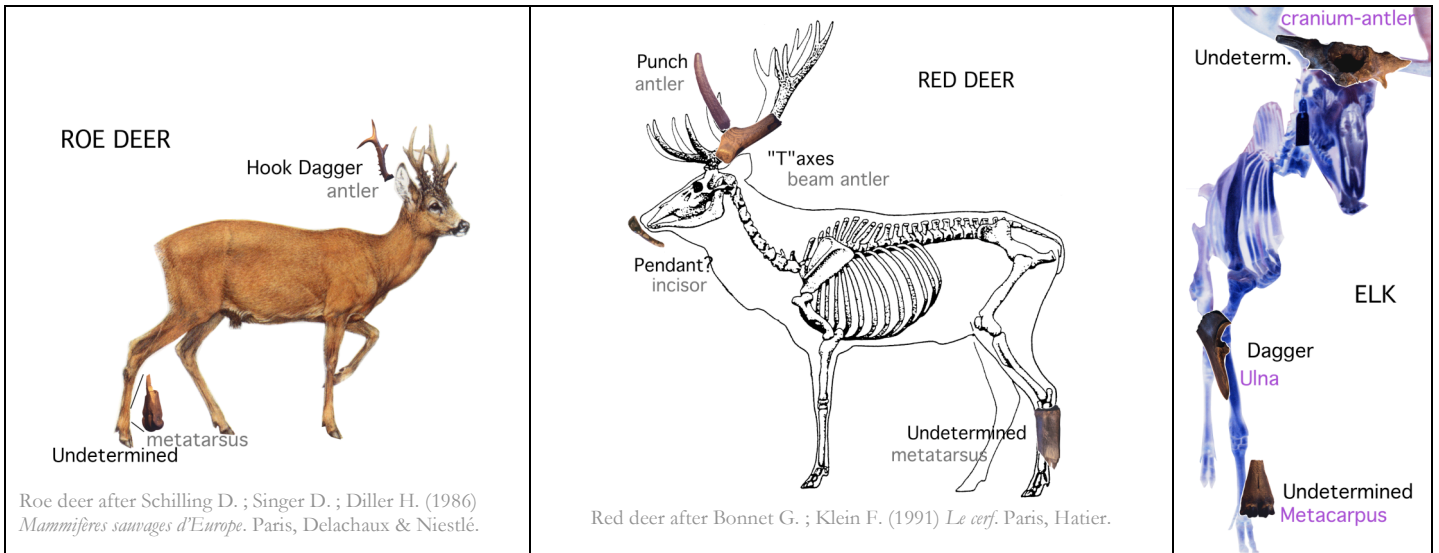
The homogeneity of the worked bone and antler assemblage is also recorded via the kind of anatomical parts that went to be used whatever the available species -Roe deer, Red deer or Elk-; these are mainly antlers and metapodials (there is no worked material on other species).



CAD: E. David

³ Extract from Kabacinski J. ; Heinrich D. ; Terberger Th. (in press) *Dabki revisited – New evidence on the question of earliest cattle use in Pomerania*.

⁴ After Kabacinski J. ; Terberger Th. (in press) *Pots and pikes at Dabki 9 – The Early Pottery on the Pomeranian coast*.



PUNCH

Red deer antler



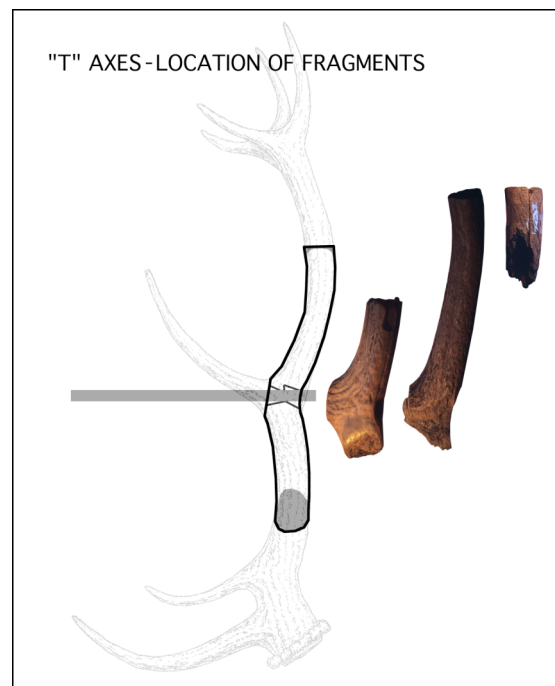
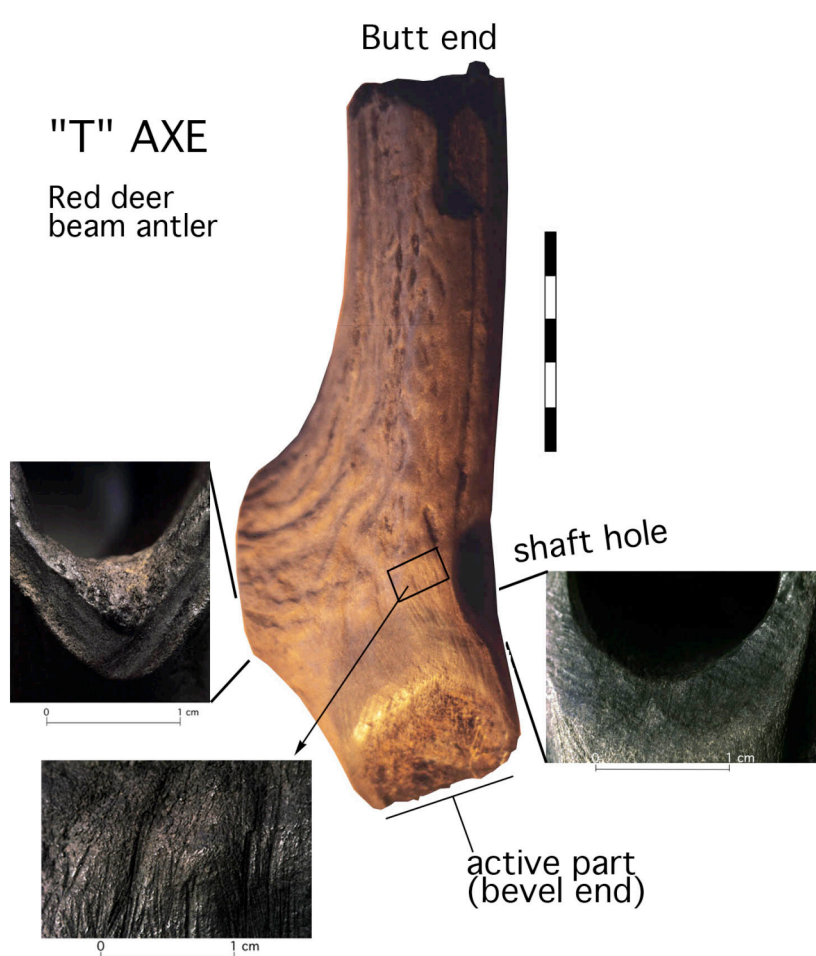
Specific tools for specific needs

The quality of the assemblage is yielded by some entire pieces discarded while their working part became too damaged to continue to be used efficiently. Among them, a piece made on a red deer antler shows an end that is worn out and an opposite extremity that has been roundly-shaped by *grinding* in planes (See punch, under magnification x4). Apart from the general form of the tool, the way this extremity has been shaped and also the presence and the type of scars that have developed on it, upon the manufacture traces related to *scraping* aside and (then) *grinding* the end, show that this tool has been used for knapping flint.

Similar items dated from contemporary contexts have been recorded, notably at the eponymous Ertebølle site where they are described as tools used for « pressure flaking » (*loc. cit.* Andersen/Johansen 1986:57). Experimental works show that similar tools, called punch or *chasse-lame*, are efficient for the debitage of blades by indirect percussion (Pelegrin/Texier 2004:30). Both knapping techniques are used for the debitage of flint blades and they are both recorded for that chronological frame.

Six punches have been already identified for the Early Mesolithic (David 2004-a), but no specific study of the bone and antler tools themselves, archaeological and experimental, as been undertaken yet (David/Pelegrin forthcoming). The study of the shape and the aspect of the working parts, together with that of the corresponding flint technology, will eventually help distinguishing which one of both knapping techniques mentioned above has been used at Dabki.

One «T»-shaped axe has also been found as an entire piece. Its bevel end is so close to the shaft hole that the axe could hardly been used (See below). Apart from the bevel end that has been many times re-sharpened by *scraping* axially, a side show patterns of removing the tine antler by *sawing* (it) all around before *breakage* (left). On the other way around, the antler has been flattened aside by *scraping* lengthwise all around the perforation (right). The shaft-hole itself has been made by *scraping* inside the spongy core. The butt end is worn out. Other fragments of «T» axes suggest that the tool was very long at the start (See below, right).



Theoretical reconstruction of the hafting system of the «T»-shaped axes as proposed by S.H.Andersen and P.O.Nielsen (1982:32) and replicate efficiently for removing wood by G. Jensen (1991), and fragments of the «T»-shaped axes found at Dabki.

Pictures and CAD: E. David

These «T»-shaped axes, also called «mattocks» (type «C» of Smith 1989), do not occur before the Early Atlantique chronozone in the North-Western Europe where they are mainly related to Mesolithic contexts. They are indeed yielded by Ertebølle settlement sites, in Denmark for instance (Madsen *et al.* 1900:fig.1&5). These latter are very similar to the «T» axes from Dabki although no «scraping aside the perforation» can be observed from the publications (Mathiassen 1948:n°125). The closest comparisons we have found are recorded in the Netherlands, at Hardinxveld-Giessendam (Koojman 2001-a:296) and De Bruin (Koojman 2001-b:340) as well as on the Scottish shell middens (Clark 1955:94 & 95 fig.2). They are usually recorded together with similar debris showing the use of the *sawing* technique for removing the tines and the beam antlers (see also in Luxemburg in the Mesolithic Montbani context -Gob 1982:110). But, when looking these contemporary «T»-shaped axes of neighbouring regions, this special way to flatten the side of the perforation can not be recorded as well. They show either a perforation that gets directly across the beam antler, that is done using other techniques (Clason 1983:89), or a shaft hole that is round instead of oval-shaped as for Dabki (Street *et al.* 2002:426). The «T»-shaped axes are almost absent from contemporary Neolithic contexts (Jeunesse 1997) where they (a few pieces) are seen illustrating the antler industry of the Grossgartach and Cerny cultures (Sidéra 2001:123). A complete Danish experimental work of the Ertebølle «T»-shaped axes has shown that these tools have been used for «splitting off wood [trunk axially] between two notches [opposite and transverse grooves]» (Jensen 1991:18). Accidental features observed then (*ibid.* 19) are very similar to those visible on the other fragments of «T»-shaped axes at Dabki 9.

Thus, this « scraping aside the perforation » looks like is a specific « style » of fashioning the hafting system of the Mesolithic(Ertebølle) « T »-shaped axes in Polish Pomerania, at Dabki. One supposes here that a complete study of the morphology and the way of processing the perforation of these « T »-shaped axes might be of some help to emphasize stylistic variations, into the Late Mesolithic and even between Mesolithic and Neolithic, that might refer to cultural patterns.

Dabki human groups did use antler tools for working wood and making there hunting weapons on flint. For what concerns the worked bone and antler material, a last activity is recorded at Dabki 9: the fishing. It is evoked here by at least one of the two daggers which are respectively made of an ulna of elk and of an antler of roe deer (See below). This last item shows use wear on its pointed ends that evokes its use as a « gaffe » or a tool that enables to pick and catch large game from the water. Among the possible species taken with this tool, the Pike is a good candidate at Dabki, while it has been found in high amount (notes n°3&4). The item looks also very different to the harpoon heads showing a similar shape when made on an identical blank on Ertebølle sites (Andersen 1971:99, fig.30). The dagger made of an ulna has been used with a lateral motion as suggested by the use wear. With its articular surface in hand, the tip has been used from the right to the left and *vice versa*, probably more to open the flesh (to remove fish eggs/beaver fur ?) than to perforate an animal. This last piece shows, although its active end remains still very efficient, an upper end that has been damaged by some gnawing actions, from carnivorous. The presence of other bone remains of dog on site suggests that this animal could have been quite close (companion ?) to fishermen.



© internet

Nowadays, boat hooks are still used to hooked large fish (France) with a similar form hafted on a very short or long stick, depending mainly on the type of prey.

Pictures: E. David



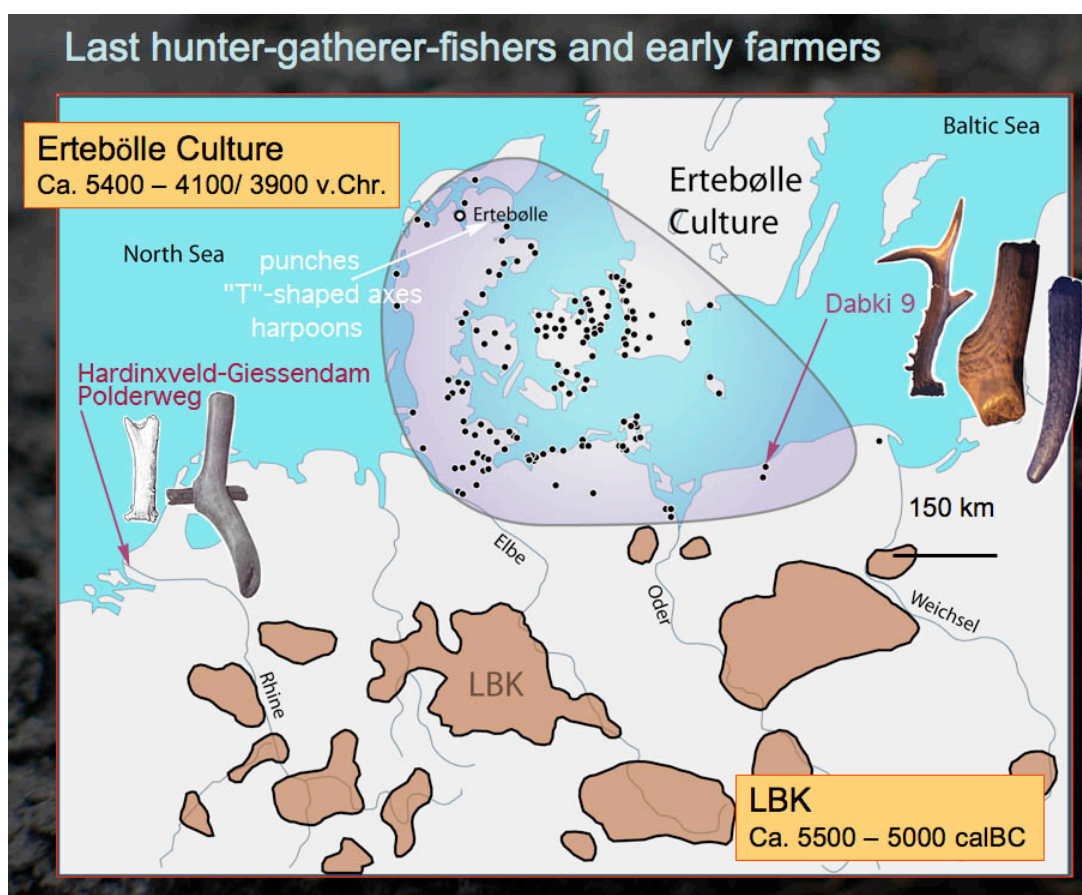
Similar gnawing marks are also recorded on the last but unfortunately undetermined items made of metapodials (See left). The heavy and lengthwise scraping traces they show on their lateral sides suggest point-blank a use of these bone as matrix possibly exploited for obtaining bone matter. A certain quantity of bone powder can indeed resulted from a so deep scraping that have removed the cortical part until it was no matter left. This suggestion requires further investigations, notably on the organic residue yielded by Dabki pots.



Undetermined pieces made of metapodials of a Roe deer (above), a Red deer (right) and an Elk (left).

With Dabki 9 bone and antler remains, archaeologists question as well not only the start of husbandry in Baltic regions, but also the relationship that did eventually occur between Mesolithic (non farming) and Neolithic (farming) communities. As cattle remains have been recently found at Dabki (see notes n°3), question arises for the Baltic coastal regions whether there is also two time spans, and two different roads, when domesticated animals have been introduced on non-farming areas as for the most Western parts of the Northern Europe; a first introduction of cattle on Late Mesolithic contexts and then a second introduction corresponding to a real start of farming, at the very same time, a few centuries later, when humans did completely left marine diet for a terrestrial ones (Tresset 2002).

The quality of the bone and antler remains makes Dabki 9 an important archaeological site that requires to be excavated more. It is not often that organic remains can be observed with a possibility of reconstructing the prehistoric past. Its quality relies mainly on the fact that bone and antler tools are yielded in a complete stage, not mentioning the fact that they probably all belong to a relatively short time span, delivering thus a kind of a snapshot on the 5th millennium BC.



Map made by J. Kabacinski and Th. Terberger (2006) on which comparative data on bone and antler industry have been added.

With new excavations, the Ertebølle starts to be questioned again, after having first been discovered a century ago. As did the bone and antler industry characterized the Early Mesolithic in Northern Europe, we assume here that the Dabki bone and antler industry will also take part of characterizing Late Mesolithic cultures. How far Dabki belongs to the Ertebølle sphere knowing that similar assemblages from the Netherlands are more close to it than those from Scandinavia, not only in terms of forms and techniques, but also precisely in terms of subsistence economy they show, based either on marine (Danish sites) or fresh water (Polderweg & Dabki) resources. Knowing that the archaeological sites of this period have all delivered trapezoidal forms of arrow-heads, is this a matter of economic activities on sites that makes antler tools been alike or is it a matter of cultural convergences ?












With concerns of the bone and antler industry, it is obvious that the potential of study, also by revisiting the old collections of the site, is enormous when considering that only a few clear assemblages are precisely dated in the Northern Europe for that chronological frame.

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**ANNEX 1 -
KRZYZ 7**

| | Inventory numbers | Artefact types | Animal Species | Anatomical parts | Hafting Ø | Manufacture techniques | Hafting techniques |
|--|-----------------------------|--|-----------------------|--------------------------|------------------|---|---------------------------|
|  | 2003-1 (collected find) | Hammer-adze (entire) | Red deer | (Right) stag antler | 25mm | Groove (nicking) and troncated breakage | carottage |
|  | 2003-2 (collected find) | Hammer-adze (entire) | Red deer | (Right) stag antler | 25mm | Groove (nicking) and troncated breakage | carottage |
|  | 2003-3 (collected find) | Hammer-adze (entire) | Red deer | (Left) shed stag antler | 30mm | Groove (sawing) and troncated breakage | carottage |
|  | 2003-4 (collected find) | Hammer-adze (entire) | Red deer | (Left) stag antler | 25mm | Groove (nicking) and troncated breakage | carottage |
|  | 2003-5 (collected find) | Hammer-adze (entire) | Red deer | (Right) shed stag antler | 25mm | Groove (nicking) and troncated breakage | carottage |
|  | 2003-6 (collected find) | Hammer-adze (almost entire) | Red deer | (Right) stag antler | 26mm | Groove (nicking) and troncated breakage | carottage |
|  | 2003-7 (collected find) | Hammer-adze (entire + recent marks) | Red deer | (Right) stag antler | 25mm | Groove (nicking) and troncated breakage | carottage |
|  | 2003-8 (collected find) | Blade axe/adze (entire) / partially damage | Red deer | Beam (B ?) antler | 34mm | nicking | nicking |
|  | 2003-9 (collected find) | Manufacture debris (entire) + gnawing marks (rodent) | Red deer | Rigth (brow) tine antler | | nicking (facial) | |
|  | 2003-10 (collected find) | Manufacture debris (entire) | Red deer | Rigth (bez) tine antler | | nicking (bifacial) | |
|  | 2003-11 (collected find) | Manufacture debris (entire) + gnawing marks (rodent) | Red deer | Rigth (brow) tine antler | | nicking (facial) | |



| | | | | | | | |
|--|--|--|----------------------------|---|------------------|---|------------------|
|  | 2003-12 (collected find) | Manufacture debris (entire) | Red deer | Left (trez) tine antler | | nicking (facial) | |
|  | 2003-13 (collected find) | Manufacture debris (entire) | Red deer | Right ? (trez) tine antler | | nicking (bifacial) | |
|  | 2003-14 (collected find) | Manufacture debris (entire) | Red deer | Left ? (bez) tine antler | | nicking (bifacial) | |
|  | 2003-15 (collected find) | Manufacture debris (entire) | Red deer | crown antler | | nicking (all around) | |
|  | 2003-16 rejoining with 2003-20 (collected) | Manufacture debris (entire) | Red deer | crown antler | | nicking (all around) | |
|  | 2003-17 (collected find) | Manufacture debris (entire) | Red deer | (brow) tine antler | | nicking (bifacial) | |
|  | 2003-19 (collected find) | Manufacture debris (entire) + recent marks | Red deer | crown antler | | nicking (all around) | |
|  | 2003-21 (collected find) | Adze with a transverse hafting (prox. fragment) | Aurochs | Left radius (distal end) | 29mm | | carottage |
|  | 2003-26 a&b (collected find) | Hammer- adze (entire + wooden shaft) | Red deer | (Right) shed stag antler | 28mm | Groove (sawing) and troncated breakage | carottage |
|  | 2003-29 (collected find) | Manufacture debris (entire) | Aurochs (small size) | (Left) metatarsal bone (dist. end) | | Shaft-wedge- splinter | |
| Missing piece (C14 laboratory) | 2005-31 (<i>in situ</i>) | Adze similar as below | Missing piece | Missing piece | Missing piece | Missing piece | Missing piece |
|  | 2005-32 (<i>in situ</i>) | Adze with an axial hafting (entire) | Aurochs | (Left) metatarsal bone (prox. end) | 28mm | To damage to see | carottage |

Rejected from the Mesolithic worked bones and antlers : 2003-18 (indetermined tool with a modern sawing mark) ; Belonging to the faunal remains : 2003-22, 146, 2003-23, 2003-24, 2003-25, 2003-27, 2003-28 and 2003-34.

**ANNEX 2-
DABKI 9**

| | Inventory numbers | Artefact types | Animal Species | Anatomical parts | Hafting Ø | Manufacture techniques | Hafting techniques |
|---|----------------------------------|---|-----------------------|------------------------------------|--------------------------|--|---------------------------|
| Picture not available | 2/2004/ profil/ n°1 | Manufacture debris (entire) related to producing a T axe | Red deer | crown antler (but one tine broken) | | sawing & flexion break (beam) | |
| Picture not available | 1/2004/2 d/II/ n°6 | Manufacture debris (fragment) | Red deer | (Right) metacarpus (prox. end) | | axial groove (lateral) | |
| Picture not available | 1/2004/3 d/XII/ n°25 | T axe, upper end (2 fragments) | Red deer | beam antler | | sawing all around=lustr | |
| Picture not available | 1/2006/1 d/4/ n°36 | Pendant? (idem 305 same animal?) 2 fgts (entire) | Red deer ? | incisor | | cutting marks ? | |
| Picture not available | 1/2006/3 a/VII/ n°64 | Manufacture debris (fragment) | Red deer | antler | | flexion break | |
|  | 1/2005/7 a/XIV/ n°70 | Indetermined (fragment) | Red deer | (left) metatarsus (proximal end) | | deep scraping (bilateral) | |
|  | 1/2004/3- 4c/VII/n °98-100 | Indetermined (3 fragments), (entire) | Elk | Cranium with Pedicle& stump | | deep scraping (bilateral along beam) & cutting marks (pedicle) | |
|  | 1/2005/7 d/XV/ n°101 | T axe roughout (fragment) | Red deer | beam « B » antler | 10mm (perf. oval shaped) | sawing all around (trez tine)=fresh & break (perf) when making perforation | |
|  | 1/2006/5 b/VIII/ n°123 | Manufacture debris (fragment) 1rst use as undetermined | Red deer | (Left) metacarpus (distal end) | | axial grooves (1/8splinters) & deep scraping (lateral) | |
| Picture not available | 1/2005/6 c/16/ n°128 | Indetermined bevel ended tool (chisel?), (fragment) | Large ungulate | limb bone | | ? | |
| Picture not available | 1/2004/3 d/XI/ n°157 | Manufacture debris (fragment) | Large ungulate | limb bone | | axial groove (lateral) | |
|  | 1/2004/4 c/13/ n°205 | Pendant ? (entire) | Red deer | incisor | | cutting marks (sawing ?) | |
| Picture not available | 2/2005/5 a/14/ n°206 | Manufacture debris (3 fragments) | Red deer | antler | | flexion break | |

| | | | | | | | |
|---|-------------------------------------|--|--------------------|--|--|--|--|
|  | 2/2004/4 a/13/ n°213 & 214 | T axe, upper end (2 fragments rejoining) | Red deer | beam antler | | sawing all around=lustr | |
|  | 1/2004/4 c/16/ n°265 | Dagger (entire) | Elk | (Right) Ulna (proximal end) | | | |
|  | 1/2006/? /XIII/ n°289 | Punch (entire) | Red deer | tine (bez) antler | | nicking & flexion break | |
| Picture not available | 2/2005/3 a/16/ n°296 | Manufacture debris (fragment) | Large ungulate | limb bone | | Shaft-wedge- splinter ? | |
|  | 1/2005/9 a/21/ n°308 | Indetermined (idem n°70 same animal?) (fragment) | Red deer | (Right) metatarsus (proximal end) | | deep scraping (bilateral) | |
| Picture not available | 1/2006/5 b/XIII/ n°309 | Manufacture debris (entire) | Red deer or Elk | crown antler | | flexion break | |
| Picture not available | 1/2005/5 d/X/ n°316 | Manufacture debris (entire) related to producing a T axe | Red deer | shed stag antler (two 1st tine antlers) | | groove (sawing) and truncated breakage | |
|  | 1/2006/6 c/XI/ n°344 | Indetermined (fragment) | Elk | (Right) metacarpus (distal end) | | deep scraping (bilateral) & gnawing dog | |
|  | 1/2006/? /?/ n°387 | Indetermined (fragment) | Roe deer | (Right) metatarsus (distal end) | | deep scraping (bilateral) | |
|  | 1/2006/7 b/XII/ n°407 | T axe (entire) (200g weighth) | Red deer | beam « B » antler | 14mm (perf. oval « V » shaped) | sawing all around (trez tine)=lustr & nicking (beam)=bouc h | |
| Picture not available | 1/2005/1 5ac/XVII / n°414 | Manufacture debris (entire) | Red deer | tine antler | | flexion break (& gnawing rodent) | |

| | | | | | | | |
|---|--|--|--------------------|----------------------------|----------------------------------|--|--|
|  | 2/2005/1 d/V/ n°425 | Ornamented piece showing modern sawing marks (fragment) | Red deer | antler | 8mm (perf. oval shaped) | sawing all around=fresh | |
| Picture not available | 2/2005/1 d/IV/ n°426 | Manufacture debris (fragment) 1rst use as a mini Taxe? | Red deer | tine antler | 8mm (perf. oval shaped) | sawing all around=fresh | |
|  | 1/2006/7 a/11/ n°412 & 1/2006/7 a/14/ n°428 | Hook Dagger (entire), 2 fragments refitting | Roe deer | (Left) shed stag antler | | sawing & flexion break (brow tine) | |
| Picture not available | 2/2005/1 d/?/ n°470 | Manufacture debris (fragment) | Red deer | antler | | flexion break | |
| Picture not available | 2/2005/2 b/21/ n°523 | Manufacture debris (fragment) | Red deer or Elk | antler | | flexion break | |
| Picture not available | 2/2005/2 c/22/ n°546 | Manufacture debris (fragment) | Large ungulate | limb bone | | axial & inverse groove | |

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