Populations of the Nordic countries
Human population biology
from the present to the Mesolithic

Proceedings of the
Second Seminar of Nordic
Physical Anthropology
Lund 1990

University of Lund
INSTITUTE OF ARCHAEOLOGY
REPORT SERIES No. 46

Populations of the Nordic countries
Human population biology
from the present to the Mesolithic

Proceedings of the
Second Seminar of Nordic
Physical Anthropology
Lund 1990

Editors

Elisabeth Iregren

Rune Liljekvist

Scientific advisors
Jesper L. Boldsen
Elisabeth Iregren
Berit J. Sellevold

Language consultants
Muriel Larsson
Marianne Thormählen

University of Lund
INSTITUTE OF ARCHAEOLOGY
REPORT SERIES No. 46

Surface studies of cut marks on a Neolithic cranium from Sweden

Ebba During

The skull comes from a Middle Neolithic site, Alvastra pile dwelling, dated to about 3000 B.C. by several ^{14}C- analyses (Malmer 1978, 1987, Malmer & Bartholin 1983). The site is situated in a calcareous spring mire at Alvastra in the province of Östergötland, central southern Sweden. This part of Sweden has, since Boreal times (about 7100 B.C.), offered good possibilities for human settlement (Göransson 1988). The pile dwelling has been subjected to previous excavations in the years 1908-1919 and 1928-1930 (Frödin 1910). The skull (Fig. 1) was found during excavations at the site in the summer of 1917, just outside the south-eastern part of the pile dwelling and east of the foot-bridge which connected it with dry land. According to the subsequent report (Frödin & Fürst 1919), the cranium was found in the mud with the mandible dislocated. Parts of the first two cervical vertebrae were found in their natural positions. No other skeletal elements were present.

Some "scratch marks" on the very well-preserved cranium made the excavator, Dr Otto Frödin, suspect scalping (Fig. 2). In 1918 Carl M. Fürst, Professor of Anatomy at the University of Lund, Sweden, carried out an anthropological examination. He established that the skull came from a male individual about 20 years of age with all teeth preserved, except for the third lower molars which were supposed to be congenitally absent. Many teeth still had some tartar on them. He concluded that the cut marks on the cranium indicated a deliberate removal of the scalp, carried out on fresh bone, and that the victim was possibly decapitated before the act, since only the skull and first vertebrae were to be found. He also established that the cut marks were of different depths at different places on the frontal bone and that they seemed to be deepest on the left side, indicating a right-handed perpetrator. He concluded that the number of cut marks was due to unsteadiness on the part of the perpetrator, or to a poor instrument, rather than to an obstinate and struggling victim (Frödin & Fürst 1919).

No other cases of crania with scalping cut marks from prehistoric times in Sweden are known. Therefore, in connection with recent excavations at the site in 1976-1980 under the guidance of Professor Mats P. Malmer at the University of Stockholm (Malmer 1978, 1987, 1981), a renewed examination of the skull became a matter of current interest. In addition,

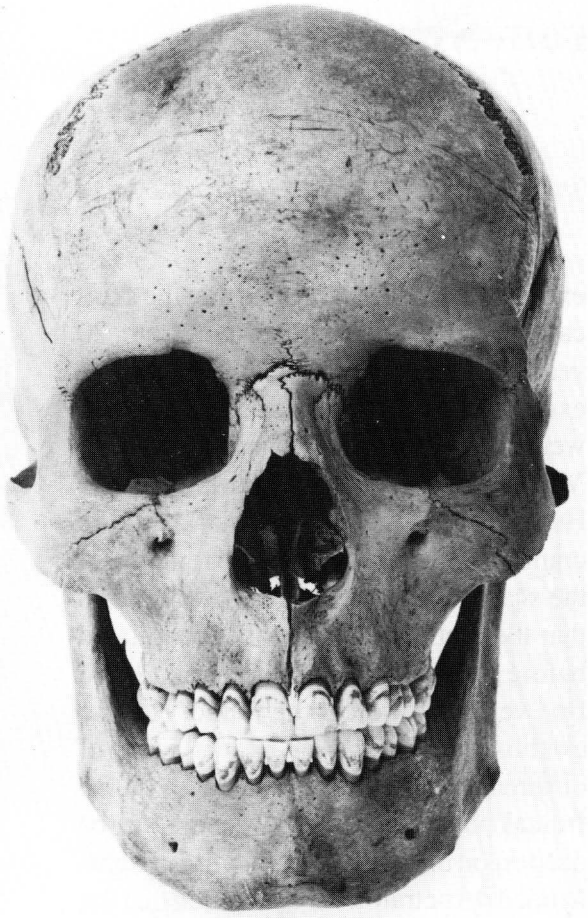

Fig. 1. Frontal view of the cranium x 0.7. Photo Bo A. Zachrisson, Department of Archaeology, University of Stockholm.

among the human skeletal remains (all recovered from within the site) no more complete and undamaged crania have been found. In general, all human remains are fragmented. So far, however, there is no evidence of cannibalism in the material, such as indications of fracturing of the long bones in order to extract the marrow (Villa et al. 1986).

Visual studies of skulls from known cases of scalping within the US, which were not available to Professor Fürst in 1918, have verified the original assumption of scalping.

Since it has been questioned whether or not the skull is contemporary with the site (being found outside the construction), radiocarbon dating by tandem accelerator has been carried out using a small piece of the styloid process from the right temporal bone. This dated the cranium itself to 4870 CAL BP (+150,-40 years). The dating was performed by Dr Göran Possnert at the Tandem Accelerator Laboratory, University of Uppsala, Sweden (Ua 114).

Unfortunately, in spite of several attempts, the remains of the two vertebrae have not been recovered. Therefore, up to now, it has not been possible to ascertain the previous assumption of decapitation.

In connection with the renewed anthropological and osteological analysis, signs of enamel hypoplasia have been established on teeth both in the upper and lower jaw. The presence of enamel hypoplasia on teeth usually takes the forms of "bands" of depressions, grooves, or pitting on the crown. Such irregularities on enamel surfaces are considered to be the result of faulty structural development (Brothwell 1981). The skull has also been X-rayed to ascertain the true dental status. The odontological investigation was carried out by Professor Gunnar Johanson. The radiographs show no rudiments of the third lower molars and make it clear that the root membranes of the third upper

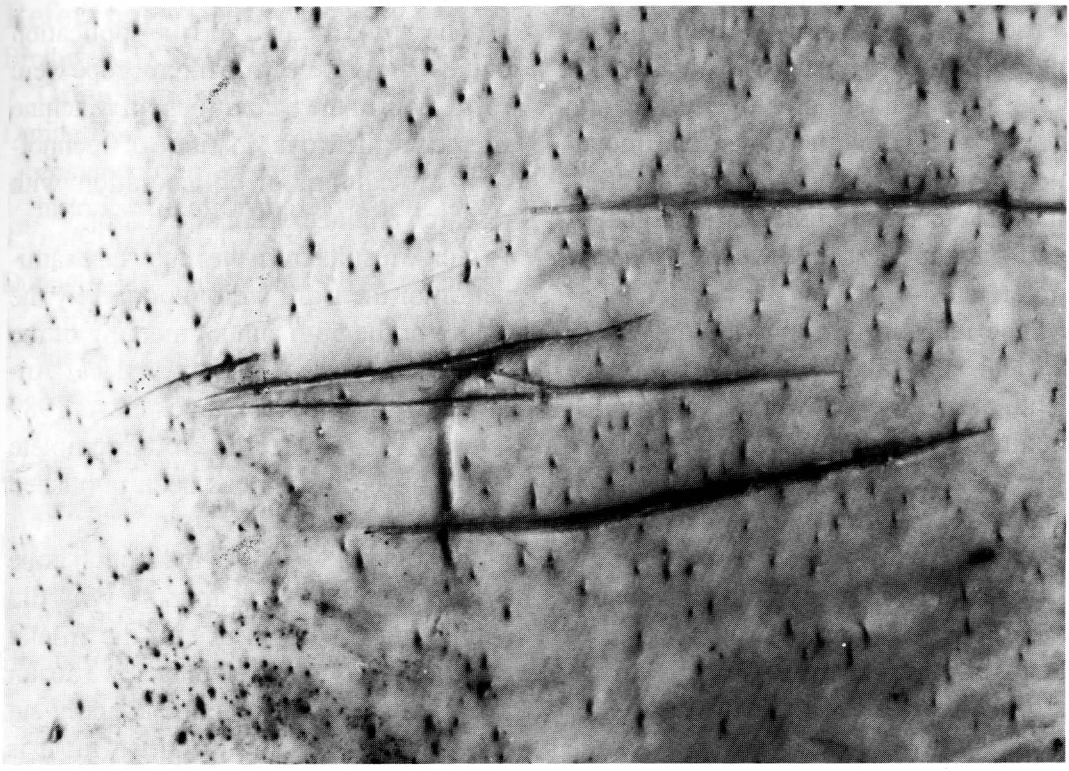

Fig. 2. Detalied photograph of the cut marks in the middle of the fontal bone. x 7. Photo Bo A. Zachrisson.

molars are just fully developed. The X-ray confirms the age of the individual to between 20 and 22 years.

The cut marks have been examined by means of both optical and scanning electron microscope (SEM). For the SEM study castings were made. With the SEM technique, it is very easy to obtain a magnified view of an arbitrary area from a test sample, and it is used by scientists in many fields, including osteology and archaeology. However, this technique does not disclose much about vertical variations in the surface structure of the sample. Topographical studies of a surface structure can, however, be made by means of surface-analysing equipment. In investigation, the cut marks were studied – this by such a mechanical method. The method means that measurements were made by using a diamond-tipped stylus instrument, FORM TALYSURF, with a wide dynamic measuring range. The range is achieved by using a laser interferometric transducer, the signals from which are transmitted to a microcomputer for detailed processing. The diameter of the stylus is 2 μm($2x10^{-6}$m). It moves (horizontally) with a velocity of 0.5 mm per second. The maximum transverse length is 120 mm, the minimum 0.5 mm. The vertical range is 4 mm. The horizontal

resolution is 20 nm (20 x 10^{-9}m), the vertical 10 (10 x 10^{-9}m) nm. The instrument thus provides a high resolution. The stylus is conducted across the surface and the pick-up converts its vertical movement, caused by surface irregularities, into an electrical signal. This signal is amplified, processed to yield various parameters.

The measuring method supplies numerical data, valuable information on the depth of the cut marks and also a detailed picture of their profiles. The raised sharp edges of the cut marks are clearly shown and are different from natural irregularities. Consequently, the data obtained by means of this technique also provide valuable information on the cutting edge of the instrument in question. In this case, it is probable that a flint implement – for example a flint blade, alternatively a flake – with a sharp rough cutting edge was used. As a result of cutting with the blade, frictional retouch may have occurred on the cutting edge.

The current study is a pilot investigation, where laborious and time-consuming manual work has been carried out with a view to obtaining appropriate models in order to show detailed, three-dimensional pictures of the cut marks. This can also be achieved by processing collected data in a computer, using an appropriate program for three-dimensional plotting. The PC-Matlab program was used in this study.

It should be emphasized that the method is non-destructive and can be employed directly on the original surface of the object. In addition, the size of the object can vary over a wide range.

The stylus method and the application of the scanning electron microscope were carried out at the Department of Machine Elements, the Royal Institute of Technology, Stockholm, in collaboration with research engineer Lennart Nilsson.

Some results from the renewed examination of the skull were reported by the author at the 58th annual meeting of the American Association of Physical Anthropologists in San Diego, USA, 1989 (During 1989). Later on, a more complete report of the results has been published (During & Nilsson 1991).

To sum up, why does the frontal bone of this skull carry cut marks? Why did people make such marks on the frontal bone of this young man? In fact, we do not know for sure that someone actually cut away his whole scalp or part of it. It is possible that someone just made those cuts in order to violate or "mark" his skull. However, there are no signs of healing, that is bone remodeling. What can the reason(s) has(ve) been for such an action? One can only guess and then go on to offering some suggestions, such as:

Was he sacrified for some religious or other reason?

Was he punished by a contemporary law system/custom for something he had done?

Was he a violated enemy and/or prisoner?

Was he killed in battle?

Was he the victim of some kind of criminal act?

References

Brothwell, D.R. 1981. *Digging up bones.* Oxford University Press.

During, E.M. 1989. Cut marks on a Neolithic cranium from Sweden: A case of prehistoric scalping in the Old World. *Am. J. Phys. Anthropol.* 78:216 (Abstract).

During, E.M. & Nilsson, L. 1991. Mechanical surface analysis of bone: A case study of cut marks and enamel hypoplasia on a Neolithic cranium from Sweden. *Am. J. Phys. Anthropol* 84:113-125.

Frödin, O. 1910. En svensk pålbyggnad från stenåldern. *Fornvännen* 29-77.

Frödin, O. & Fürst, C.M. 1919. Har skalpering förekommit i Norden under stenåldern? *RIG* 2:193-204.

Göransson, H. 1988. *Neolithic Man and The Forest Environment around Alvastra Pile Dwelling.* Lund University Press.

Malmer, M.P. 1978. Forskningsprojektet Alvastra pålbyggnad. *Fornvännen* 73: 149-158.

Malmer, M.P. 1981. The explanation of a pile dwelling. *Striae* 14:26-28.

Malmer, M.P. 1987. Norra Europas enda pålbyggnad. *Populär Arkeologi* 5 (3):4-8.

Malmer, M.P.& Bartholin, Th.S. 1983. Alvastra paelebygning. *Skalk* 4:18-22.

Villa P., Bouville C., Courtin J., Helmer D., Mahieu E., Shipman P., Belluomini G. & Branca M. 1986. Cannibalism in the Neolithic. *Science* 233:431-437.