Setting it Straight.
A re-analysis of the Mesolithic Barum burial according to the principles of *Anthropologie 'de terrain.'*

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Abstract

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The Mesolithic burial from Barum in Northeastern Scania has long been a subject of academic controversy regarding both the age of the burial and the sex assessment of the remains. A less public discussion has taken place regarding the initial position of the body in the burial. In this article, the documentation of the burial is analyzed in detail according to the taphonomic principles of *anthropologie 'de terrain,'* and a reconstruction is proposed based on the results.
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Introduction

The Early Mesolithic Barum burial, found in Bäckaskog Slottsmark 1:32 in Kiaby parish in Northeastern Scania in 1939, is a unique archaeological find, and as such, it is well known among both archaeologists and the public. Immediately after it was excavated, the age of the burial became the subject of intense debate. Some scholars argued in favor of a Mesolithic origin of the burial (Hansen 1941, Lidén 1942, 1948, Althin 1951, Welinder 1971) – an argument that placed Barum as the oldest burial known in Sweden. Others argued that the burial was Neolithic (Rydbeck 1945, 1950). This debate could finally be settled when a satisfactory AMS radiocarbon date was obtained, as part of a larger re-study effort of the burial in 1996. The result placed the burial between 7010 and 6540 cal BC (7895 +/- 75 BP, Ua-10667) (Sten *et al.* 2000, p. 80). Another debate concerned the biological sex of the buried individual. Initially the presence of a slotted bone point and a bone chisel in the grave led the archaeologists to suggest that the individual was a male (Hansen 1941). Later, a consideration of the human remains, carried out by Elias Dahr at the Museum of National Antiquities, indicated that while it was impossible to make a conclusive assessment of the biological sex (a problem due to the fact that the pelvis featured both female and male characteristics) the skeleton was overall gracile, and this led Rydbeck to suggest that the individual might have been a woman (Rydbeck 1948). In 1970 a new study was carried out that supported the hypothesis that the remains were female (Gejvall 1970, see also Iregren 1981).

This article focuses on another debate relating to the Barum burial that has not been as public and well published as the previous two,

but one that has been carried out more informally within the archaeological and anthropological communities. The question explored here relates to the initial position of the body in the burial and the reconstruction of the position in the exhibit at the Museum of National Antiquities in Stockholm.

When the burial was excavated, it was immediately noted that the individual was buried in a sitting position, described as "sitting hocker" (Hansen 1941, p. 16). While the position of the body was initially not of any central concern, it became integrated into the discussion about the age of the burial. When the grave was excavated, the position of the body was considered impossible to use as a clue to the age, since there was little or nothing to compare it to. Later, as the knowledge about Mesolithic burial practices grew, it was linked to similar burials on the European continent (Welinder 1970). It is interesting to note that the position of the body *per se* really only became a topic of academic debate when discussion emerged over the initial position of the grave goods, and especially of the slotted bone point (Hanlon & Nilsson 2002). While the published debate on the subject of the position of the body in the Barum grave is meager, it has been informally debated in the academic community. The reconstruction of the burial exhibited at the Museum of National Antiquities has been altered twice since the initial exhibit of the burial. These rearrangements indicate that the initial position of the body has been a topic of discussion and concern, but the reasons for the changes have never been widely published, with the possible exception of Göran Burenhult's brief discussion (1982, p. 93), as pointed out by Hanlon and Nilsson in a recent debate article (2002, p. 227). This almost informal approach to the problem of the initial position of the body in the burial contrasts with the detailed and concrete debates regarding both the age of the burial and the sex of the individual, and this probably reflects a general lack of interest from a more traditional perspective on graves that tended to focus the attention more toward other questions. While there has been a significant interest in the position of the body in archaeology, it has only recently been a field where scientific archaeological practice has replaced tentative suggestions that were often based on inductive – and often intuitive and reliable – experience-based observations. The Barum burial is an illustration of this phenomenon, and the ethical problems of the reconstruction and the lack of discussion and presentation of the evidence has been eloquently pointed out by Hanlon and Nilsson (2002, p. 229).

In this article I propose a more detailed study of the evidence, and as I do, I place the human body in the center of the study. Recent developments in biological anthropology and archaeology indicate that we need to look at burials as dynamic archaeological entities, where all elements, including the human body, are likely to influence the other elements in a taphonomic way during the processes of decomposition. A systematization of this insight allows us to reconstruct the processes involved in greater detail. This approach also provides a theoretical framework, based on taphonomy and site formation studies, allowing us to propose a reconstruction of the position of the body in the burial most consistent with the physical and biological processes that shape archaeological mortuary features. One comprehensive approach that allows us to reconstruct mortuary practices more in detail is provided by *Anthropologie 'de terrain'* (Duday *et al* 1990). The approach is taphonomically based and combines detailed observations of the spatial distribution of the bones in the field with knowledge in biology about the processes involved in the decomposition of the human body after death. The approach, which I have presented more in detail elsewhere (Nilsson Stutz 2003), is based on an understanding of the dynamics involved in the disarticulation of the skeleton and the

creation and subsequent infilling of empty spaces resulting form the decomposition of soft tissue. It allows us to separate the effects of natural processes from the traces of the mortuary practices, and we can make a more detailed reconstruction of the mortuary practices, including the initial position of the body. The approach has successfully been applied to documentation from older excavations (see for example Nilsson Stutz 2003, 2006), and it thus seems important to apply it also to the case of Barum. The approach proceeds almost entirely through a combination of understanding the taphonomic processes and reference to previous studies of similar situations. The burial in Barum presents an interesting challenge, since the position of the body - sitting in the burial feature - is unusual. However, the previous detailed study of the burials in Skateholm, according to the same approach (Nilsson Stutz 2003) provides a unique reference that allows us to better understand the dynamics involved in the decomposition of a human body placed in a sitting position.

Description of the burial

Since the *anthropologie 'de terrain'* approach is based on an analysis of the spatial distribution of the human remains in the field, a study devoted to an older excavation depends on the information registered at the time of the excavation. This analysis is based on the field notes by Folke Hansen, one drawing, and three photographs taken at the time of the excavation.

The limits of the burial feature are not indicated in the documentation and the details thus remain unknown. In the report, Hansen mentions that the body was placed in a 1,2 m deep feature measuring 50 c m in diameter (Hansen 1939). One larger stone in the region of the knees and two smaller ones in the vicinity of the feet were probably part of the burial feature.

The skeleton recovered from the Barum burial appears to be complete, and the preservation of the bones is very good. However, not all bones appear on the documentation. Some of them, like the bones of the hands, likely became disarticulated and descended toward the bottom of the burial feature during the processes of decomposition. They were recovered, but their exact position was never documented. Other bones, such as the skull, several vertebrae, the right humerus, a part of the right femur and parts of the right tibia and fibula were removed before the archaeological registration of the remains was carried out (Hansen 1939), and their exact location within the feature remains unknown. The bones left *in situ* were recorded and their position constitutes the basis for this analysis.

Of the skull, only the mandible was registered *in situ*, and it was lying disarticulated, with the superior side facing up, and the anterior side directed forward, on the right iliac blade.

The vertebral column was incomplete. Based on the drawing, the photographs and the report, it is clear that the part of the vertebral column that was left *in situ* was in articulation. However, the documentation does not allow a close examination of these vertebrae. It is possible that additional elements of the vertebral column were encountered disarticulated within the feature, but their location was not registered. The position of the documented segment indicates that the thoracic cage was upright in the burial. The highest z-value for the skeleton was obtained on the superior side of this segment, and it indicates that this segment was located 28 cm above datum (with the datum established at the level of the left talus and the proximal end of the left femur). The photograph in fig. 1 also shows that the part of the vertebral column that was *in situ* was oriented vertically or semi-vertically in the burial. The thoracic cage has collapsed and the ribs are lying close together. When viewed in plan, the ribs expose their upper side, with

Fig. 1: The Barum burial during excavation and seen from the lateral right side. Note the location of the mandible in the pelvic area, and the curving vertical posiotion of the ramainsa of the vertebral column. The photo also clearly shows the position of the left scapula covering the proximal end of the left humerus. Foto: Folke Hansen 1939. ATA, Riksantikvarieämbetet.

aspects of the anterior and posterior sides visible. The right hemi-thorax is characterized by the disarticulation of the ribs from the vertebral column and a projection anteriorly and possibly laterally during the process of decomposition (see fig. 2). According to the drawing, the slotted bone point was encountered in the right hemi-thorax. In the left hemi-thorax the ribs are lying relatively close together, but their order seems to be anatomically correct. One rib is lying disarticulated behind the left hemi-thorax (see fig. 1). It is unclear if this is a product of disturbance during the excavation of the burial or if an alternative explanation should be sought.

The pelvis cannot be observed in any detail on the photos, since they were taken prior to its full exposure. The schematic drawing indicates that the anterior and superior sides of the pelvis are facing up. The sacro-iliac articulation appears to be maintained, while the pubic symphysis is disarticulated, but since no detailed observations could be made, this information must be regarded as rather inconclusive.

The right scapula is present, and in plan view, it exposes its inferior and posterior sides. The *fovea glenoidae* is directed forward and laterally. Its position indicates that the scapula moved down and rotated forward during the process of decomposition. What could be the right clavicle is visible in fig. 2 and is lying disarticulated in the collapsed thoracic cage, but no further details regarding its position can be observed. According to the report, the right humerus was removed before the documentation. However, from the drawing, it seems like a distal part of the bone is present, lying more or less parallel to the medial axis of the body, and to the lateral side of the right iliac blade. Moreover, it seems like this bone is articulated with the right radius and right ulna. The position of these bones, from the very schematic drawing indicates that the arm was flexed at the elbow, and rotated inward, implying that at the time of burial, the forearm had been placed in front of the abdomen and pelvis. As noted above, the positions of the bones of the hands are not indicated in the docu-

Fig. 2: The Barum burial during excavation and seen from the anterior side. Note the articulated vertebral segment, the expansion forward and to the right of the right hemi-thorax, the position of the right scapula in the right hemi-thorax, and the collapse of the proximal end of the left humerus. Foto: Folke Hansen 1939. ATA, Riksantikvarieämbetet.

mentation. They were probably disarticulated and dispersed during the process of decomposition.

The left scapula is visible in the photographs in the upper part of the left hemi-thorax, with its posterior side facing upward (see fig. 1). It is lying above the proximal extremity of the left humerus (see below). The left clavicle is *possibly* indicated on the drawing – and is in an unclear location in the upper part of the left hemi-thorax. The left arm is represented by the humerus, the radius and the ulna. The humerus displays its lateral and posterior sides (again, when seen in plan view). The proximal end is disarticulated from the scapula and has moved toward the medial axis of the body, coming to rest over parts of the thoracic cage and below the left scapula. The distal end has remained in its original position and is articulated to the left radius and ulna. The articulation of the elbow is positioned to the lateral side of the pelvis. The left radius and the left ulna are articulated and lie horizontally in front of the pelvis. The hand-bones do not appear in the documents. They were probably disarticulated during decomposition in the grave, and thus, they dispersed during the *post mortem* degradation process.

The right lower limb is partially documented *in situ*. According to the report, a segment of the femur was removed before the documentation. It is possible that the part still *in situ* was affected by this, and therefore the position should be considered with caution. A fragment of the shaft is visible on the documentation (see fig. 1), and the position indicates that the femur was flexed at the hip and rotated outward. The tibia is also fragmented and only the distal part appears *in situ*, displaying the anterior and medial sides, lying diagonally proximal to distal, lateral to medial and up and down. According to the drawing, this fragment articulates with the articulated bones of the right foot. The fibula does not appear in the documents and is probably lying to the lateral side of the tibia and therefore not visible in this position. The position of the bones indicates a flexion at the hip and knee, and an abduction of the leg.

The left lower limb is represented by the left femur, the left tibia, the left fibula and the bones of the left foot. The position of the patella is not documented. These bones all display their lateral sides. The position of the bones indicates a flexion of the leg at the hip and the knee and an adduction of the entire limb. The proximal end of the femur is disarticulated from the pelvis. The z-values indicate that the distal end is located ca. 15 cm higher up than the proximal extremity of the femur and the left talus. The left tibia and the left fibula lie with their lateral sides up, and they are articulated with each other and with the bones of the left foot (also articulated). The bone chisel was found behind the left femur.

Analysis and reconstruction

The examination of the spatial distribution of the bones can elucidate details about the nature of the burial, the initial position of the body and the volume in which the body decomposed.

The nature of the burial

The burial is without a doubt a primary burial, which means that the body was placed intact in the burial, shortly after death and before the processes of putrefaction and decomposition had significantly altered the body and contributed to any disarticulation. These processes have all taken place within the feature and after burial. The main argument for this conclusion is that the skeleton is more or less complete, and the elements are anatomically articulated in a significant way. According to the drawings, the feet, including several of the phalanges, were well articulated, which is a strong indication for primary burial. The fact that the bones of the hands are dis-

articulated can be explained from their position in front of the abdomen, which exposed these bones to considerable instability when the soft tissues in the area decomposed. As the binding ligaments decomposed, the hand bones disarticulated and descended toward the bottom of the feature, falling through the volume created by abdominal soft tissue decomposition.

The position of the body in the burial

According to the report, Folke Hansen established that the body had been "placed in a sitting position with the knees pulled up, the arms bent in front of the abdomen and with the back somewhat flexed forward. The dead had been sitting leaning somewhat forward but otherwise with the torso straight up" (Hansen 1939, author's translation). This conclusion has later been questioned, and there are suggestions that the body was initially leaning backward or even lying down. This analysis of the position of the bones confirms Hansen's hypothesis of a sitting burial.

The analysis of the position of the elements of the vertebral column and the thoracic cage indicate clearly that the upper part of the body was placed in a vertical position. The first indication is the observation made in the field. While observations like these have a subjective component, it is important not to underestimate them entirely. A close examination of the documentation strengthens this hypothesis. In plan view the articulated vertebrae display their superior side, which indicates that the segment had a clear upright component. This impression is reinforced by the z-values obtained for the segment of the articulated vertebrae, which also indicates a 3-dimensional character for the burial. The top of the articulated portion was recorded as sitting 28 cm above the floor of the feature. That value might seem small, but similar observations of a rather dramatic vertical collapse of the upper part of a sitting burial have been observed in Skateholm (see for example grave XXII in Skateholm II, Nilsson Stutz 2003, appendice). The examination of the sitting burials in Skateholm suggest that the degree of the verticality of the upper part of the body might be linked to the degree of collapse. The more vertical the upper part of the body, the more dramatic the collapse. To this is must be added the fact that the skull was removed before registration in the field, and its position in the feature is actually uncertain. It is likely that if the skull remained *in situ*, the height value would have been higher.

The ribs were collapsed and compacted, but appear to have maintained a more or less correct anatomical order, probably supported by the surrounding sediment penetrating laterally. This pattern, with a more pronounced collapse of the vertebrae than of the ribs is characteristic for the collapse of a body in a sitting position and has been observed multiple times in Skateholm (Nilsson Stutz 2003, pp. 268ff). The positions of the ribs in Barum indicate that the thoracic cage collapsed downward and somewhat forward from an initially vertical position. The fact that the right hemi-thorax collapsed more forward and laterally indicates that the body initially was slightly rotated to the right.

The dynamics involved in the collapse of the thoracic cage of a sitting individual can be understood as a result of the processes of decomposition and the subsequent forming of considerable empty spaces within the initial volume of the body. Under normal circumstances, the putrefaction processes start in the abdominal region in organs that are highly vascularized and close to *in vivo* intestinal sources of bacteria. This region is particularly rich in soft tissues that decompose at a faster rate than the surrounding sediment can penetrate to stabilize the bones in their initial position. The process is also associated with the production of gases such as ammonia and carbon monoxide, as a by product of putrefaction, which in turn destabilizes the thoracic region through pressure (Polson 1955, p. 14,

Mant 1984, p. 146). While these processes are too complex to outline in detail here, it is important to understand that they influence the stability of the bones. As the ligaments and tendons decompose, the bones thus become destabilized and move under the influence of gravity. If there are spaces within the body that have formed during the process of decomposition and not yet filled in by penetrating sediment, the bones, if destabilized, can move within these. While this is the case for a body placed in any position, the result is particularly evident when the torso is upright. The result is a collapse of the thoracic cage that destabilizes the entire upper part of the body. The vertebral column sometimes collapses – especially when the position is upright rather than leaning (Nilsson Stutz 2003, pp. 268ff.)- and the ribs, which tend to be somewhat maintained by the surrounding sediment that penetrates from the outside, still collapse downward (for comparison, please see Nilsson Stutz 2003, pp. 270 ff.).

In the previous study of the sitting individuals in Skateholm, it could also be shown that the instability of the thoracic cage during decomposition, also affected the surrounding elements such as the upper limbs and the skull (Nilsson Stutz 2003, pp. 272ff.), and this is also the case in Barum. The exact position of the cranium is uncertain. However, the position of the mandible, registered *in situ* at the level of the pelvis, confirms the hypothesis of a sitting burial. The position at the level of the pelvis indicates significant movement during the processes of decomposition, which can be understood as a vertical one, starting out as the mandible was disarticulated from the cranium and then moving under the influence of gravity toward the bottom of the feature. For this to be possible, we have to have the combination of the creation of a temporary empty space into which the bone could move, and an initial position of the mandible that would allow it to descend vertically to a position close to the pelvis. These two criteria would be met if the body were placed in a sitting position in the burial, and possibly with the back or neck slightly flexed forward (to bring the mandible to a position approximately above the pelvis). As the soft tissues in the thoracic area and the abdomen formed, empty spaces underneath the mandible into which the bone could descend would have been created. The tempo-ro-mandibular articulation is relatively labile, which means that it becomes disarticulated at a relatively early stage of the process of decomposition. The fact that the cranium probably did not descend at the same time indicates that it still was attached to the atlas at the time of the dislocation of the mandible. When the cranium eventually became disarticulated, it was supported by the surrounding sediment and possibly also by other bones. A similar case has been observed in a sitting burial in Skateholm II (grave II). In this case the body was placed in a sitting position, slightly leaning backward, but with the neck flexed forward. The lower limbs were in extension. In this case the mandible had become disarticulated from the skull, rotated forward and started to descend down toward the bottom of the feature (Nilsson Stutz 2003, p. 272 f., and also fig.1, p. 214). The movement downward was stopped by contact with elements in the thoracic cage. Eventually several ribs were pushed in on top of the mandible as a result of lateral pressure of the thoracic cage as a whole. The case shows an interesting comparison, since it allows us to see the fall of a mandible in a sitting burial. The fact that the movement was halted in the case in Skateholm and not in Barum could be due to the difference in the position of the lower limbs that I will return to below.

The instability of the torso also affected the position of the bones of the upper limbs, and then especially the scapulae and the proximal part of the left humerus. We note a difference in the collapse on the different sides of the body. The right scapula has rotated forward and moved downward into the thoracic cage

during the process of decomposition. This movement could indicate that the shoulder initially was projected somewhat forward, and possibly leaning on the wall of the feature to the right, a position that would correspond well with the general tendency to the right observed for the thoracic cage and the lower limbs. On the left side the proximal end of the humerus moved downward and toward the medial axis of the body, covering several of the compacted ribs. While the proximal end of the humerus moved considerably, the distal end remained in its initial position and the articulations of the elbow remained intact. The left scapula eventually fell downward to partially cover the proximal end of the humerus. This indicates that the movement of the humerus preceded the movement of the scapula. The relatively early collapse of the proximal end of the humerus toward the medial axis of the body has been observed at several instances in Skatcholm (Nilsson Stutz 2003, pp. 273 ff.)

Despite the movements of the bones of the upper limbs, it is still possible to infer their initial position. Since the information about the right upper limb is limited, we can only suggest that it initially was placed along the body, slightly rotated inward and flexed at the elbow, bringing the forearm and hand in front of the abdomen and pelvis. For the left upper limb the position can be established as slightly abducted, and slightly rotated inward, with a flexion at the elbow and the forearm and hand placed in front of the abdomen. The movements described above further indicate that the body probably was rotated somewhat to the right.

The initial position of the lower members can be partially reconstructed and it appears that their position contributed to create additional instability during the process of decomposition. For the right lower limb we only have limited information, but it is possible to determine that the leg was flexed at the hip and knee and probably rotated outward. The left lower limb was flexed at the hip and knee, and rotated inward. The z-values for the left lower limb indicate that the knee was positioned c a 15 c m higher than the proximal extremity of the femur and the talus, which indicates that the knees were elevated, and that the members were placed partially in front of the body. The proximal end of the femur is disarticulated from the pelvis, a disarticulation that might be the product of an additional movement to the right as the soft tissues of the thighs decomposed. The general tendency to the right could indicate that the right knee was placed to lean on the limits of the feature, in turn supporting the left lower limb. As the soft muscle tissue of the legs decomposed the bones gradually moved somewhat downward and more to the right in order to obtain a balanced position.

This accumulation of soft tissue in front of the abdomen, which was the result of the position of the limbs, probably contributed to an elevated instability of the upper part of the body. As these soft tissues decomposed, additional empty volume were created, allowing further movement of bones of the upper skeleton during decomposition. This could help to explain the significant movement of the mandible.

Volume of decomposition

The analysis of the spatial distribution of the bones indicates that while the skeleton collapsed in the vertical direction, all of the movement (with the possible exception of a single rib, described above) took place within the initial volume of the cadaver. It can thus be established that body was placed in a pit that was filled with sediment immediately after the deposition. The fact that the collapse of the skeleton nevertheless was so considerable can be explained by a combination of the instability of the weight carrying elements, the considerable amount of soft tissue in the area of the thoracic cage, abdomen, and thighs, and a delayed infilling of these volumes due to their accumulation. This pattern, which leaves sig-

nificant volume for bones to move within, is, as argued above, typical for bodies buried in a sitting position and has been observed in detail in several burials in Skateholm (Nilsson Stutz 2003, pp. 266 ff). This phenomenon is likely to be even more exaggerated in a case like this, where the legs are placed in the same area (somewhat pulled up in front of the abdomen).

The position of the slotted bone point:
The initial position of the slotted bone point that was encountered in the right hemi-thorax remains a problem, mainly because the information relating to it is so sparse. It does not appear on the photographs, and there are no indications concerning the depths at which it was found. This makes it extremely hard to propose a suggestion for its initial position, especially considering the movement in the area of the thoracic cage. It might have originated from a shaft leaning against the shoulder of the dead, as is proposed in the current reconstruction at the Museum of National Antiquities. But it may also have been placed somewhere in the area of the thoracic cage or the abdomen.

Summary of the results and concluding remarks

The *anthropologie 'de terrain'* analysis has confirmed that the Barum burial was a primary burial and that the body was placed in a narrow and deep feature that was immediately filled in. The position of the bones in combination with the observations of the narrow and deep form of the feature (50 c m in diameter, and 1,2 m deep) indicates that the body was sitting up, probably supported by the walls of the feature to the right and to the back. The position of the mandible and the elements of the thoracic cage indicate that the torso was upright and the vertebral column possibly flexed slightly forward at the level of the neck. This upright position contributed to a high degree of instability during the processes of putrefaction and decomposition that resulted in a significant collapse of the upper skeleton. It also likely affected the resting position of slotted bone-point, probably placed as a grave-good in the immediate vicinity of the upper part of the body. The upper limbs were rotated inward and the forearms and hands were placed in front of the abdomen and pelvis. The lower limbs were rotated to the right and flexed at the hips and knees, bringing the thighs and forelegs in front of the upper part of the body. The position proposed here is thus similar to the reconstruction made in 1996 at the Museum of National Antiquities. However, I have presented a taphonomic analysis suggesting a position where the upper part of the body was more upright and slightly more rotated to the right, supported by the wall of the structure to the right and behind it.

In this article I have shown how a detailed analysis of the position of the bones, in combination with a taphonomic approach to human burial, can help set the record straight regarding initial position of the body. This approach is helpful when we proceed to analyzing mortuary practices in the past, since it allows a more accurate reconstruction, consistent with biological and physical factors that influence the formation of archaeological burial features. The comparison with the previous studies at Skateholm shows us how the publication of such results can help us ultimately focus in on the processes involved on a strictly anthropological level, and this helps us further our understanding and increase our knowledge, to the benefit of both archaeology and anthropology.

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