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## THE HULDREMOSE FIND. AN EARLY IRON AGE WOMAN WITH AN EXCEPTIONAL COSTUME

### Introduction

Over the last two centuries bog bodies found in Northern European bogs have horrified, mystified, thrilled and fascinated people. Many books have been dedicated to descriptions and interpretations of such Late Bronze and Early Iron Age phenomena<sup>1</sup>. The flourishing and independent literary and artistic afterlife of the bog peoples has also been revealed in a recent book<sup>2</sup>. Who would have thought that a woman who lived and died more than 2100 years ago could surprise and fascinate modern people? An important chapter has been added to the story of the Huldremose Woman; new analyses of the body and the costume<sup>3</sup> have revealed unforeseen information that not only tells about textile technology, but also about prehistoric society and life.

### Recovery

The Huldremose woman (Huldremose I) was found as a consequence of peat cutting on the 20<sup>th</sup> of May, 1879, in a bog in Northern Djursland – Jutland, Denmark. At first, the workman who discovered her thought that it was the body of a man from the local area who had disappeared some years earlier. Therefore he informed the local authorities and the following day, the police chief, the district

medical doctor and a pharmacist arrived to inspect the body. The first action was to remove it from the bog and bring it to a nearby farm. Here the body was undressed and examined, and it was soon discovered that it was in fact the body of a woman. Since it also became clear that she was ancient, the National Museum of Denmark in Copenhagen was informed<sup>4</sup>.

The body had lain on its back in the bog with its legs drawn up; a willow stick had been placed across it. It was fully dressed and the upper part of the body was covered by a large skin cape. Although the skin cape had been kept in place around the body by a narrow leather strap, the right hand had not been covered by the garment, and when found it was separated from the body. Likewise, the right hand had almost been cut in two by the peat spade during the first recovery. The left arm on the other hand was bent across the chest and secured underneath the outer skin cape.

When it was recognised that no crime had taken place, the body was placed in a simple wood coffin and buried in the local churchyard. Fortunately, at the request of the National Museum it was unearthed a few days later and brought to the local hospital in Grenå, some 40 km away. The district doctor had already brought the costume items to his home in Grenå, where his wife had washed and cleaned them. In a letter the doctor explains how they were hung to dry in his yard – despite the unusual, and for modern standards, rough handling of the finds they were and still are in an excellent condition. Eight days after the recovery, the find was sent by steamboat to Copenhagen and added to the museum collection (Fig. 1).

The Huldremose Woman is in fact the first complete bog body that was acquired by the National Museum of Denmark. However, a letter indicates that already back in 1904 the National Museum was no longer interested in keeping the body in its collection<sup>5</sup>. The reason is not known, but probably it was due to the fact that human remains even from prehistoric peoples, were not considered to be archaeological artefacts. For instance, the National Museum declined

<sup>1</sup> See for instance: P.V.Glob, *The bog peoples, Iron-Age man preserved*, London 1998; W.A.– B. van der Sanden, *Through nature to Eternity – The Bog Bodies of Northwest Europe*, Amsterdam 1998; J. van der Plicht, W.A.– B van der Sanden, A. – T. Aerts, H. J. Streurman, *Dating bog bodies by means of <sup>14</sup>C-AMS*, “Journal of Archaeological Science”, Vol. 31 (2004), pp. 471-491.

<sup>2</sup> K. Sanders, *Bodies in the Bog and the Archaeological Imagination*, Chicago 2009.

<sup>3</sup> The findings presented in this article are the result of the conducted collaboration between The Danish National Research Foundations Centre for Textile Research, University of Copenhagen and the National Museum of Denmark. I would like to thank Margarita Gleba, Karin Margarita Frei, Irene Skals, Anne Lisbeth Schmidt, Anette Hjelm Petersen, Anna Nørgård, Roberto Fortuna, Pia Bennike, Niels Lynnerup, Jan Heinemeier, Lena Hammarlund, Martin Ciszuk, Bodil Holst, Christian Bergfjord and Ina Vanden Berghe who contributed to the analyses. A short version of this article has recently been published in collaboration with Margarita Gleba. M. Gleba, U. Mannering, *A Thread to the past: The Huldremose Woman revisited*, “Archaeological Textiles Newsletter” 50 (2010), p. 32-37.

<sup>4</sup> D. Brothwell, D. Liversage, B. Gottlieb, *Radiographic and Forensic Aspects of the Female Huldremose Body*, “Journal of Danish Archaeology”, Vol. 9 (1990), pp. 157-178.

<sup>5</sup> *Ibidem*, p. 157.



Fig. 1. The body of the Huldremose Woman. Photo Roberto Fortuna, National Museum of Denmark.

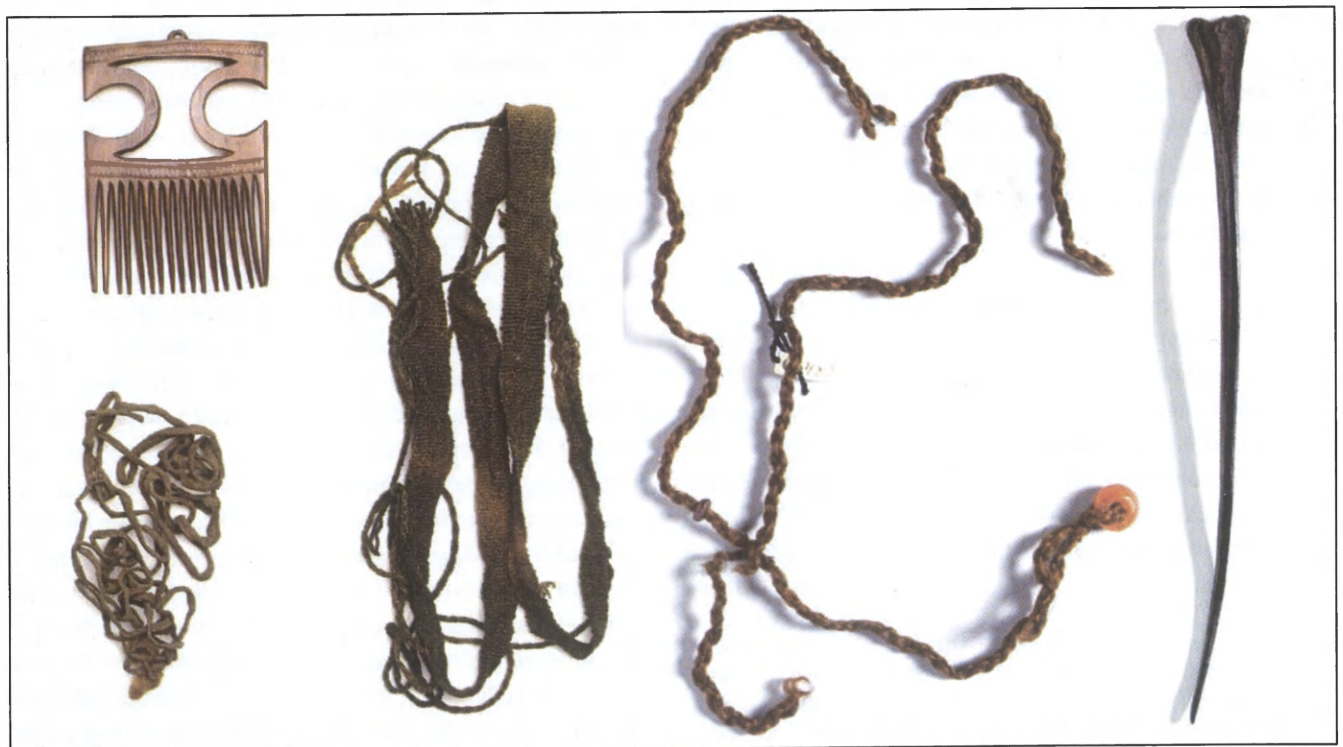


Fig. 2. Left: The horn comb, the leather thong and the hair band which was found in the inner cape. Middle: The amber beads on the wool cord. Right: The bone pin. Photo Roberto Fortuna, National Museum of Denmark.

the likewise well-preserved body of the Auning Woman, which was unearthed in the same local area in 1886<sup>6</sup>. Fortunately, the Anatomical Institute (Normal Anatomisk Institut) at the University of Copenhagen agreed to receive the Huldremose Woman and it was kept there undisturbed

in storage facilities until 1976, when it was rediscovered and returned to the National Museum.

### Body

The fascinating and dramatic afterlife of the Huldremose Woman means that the body was most likely not touched by human hands from its recovery until the first scientific analysis in 1976. In the following years, the body was X-rayed and CT-scanned several times and samples were taken for pollen analysis, 14C-dating and gut sampling

<sup>6</sup> E. Stidsing, *Saa at det endog havde et tydeligt Udtryk af Smerte eller som grædende. En fremlæggelse af jernalderens moseelig på Kulturhistorisk Museum*, "Kulturhistorisk Museums Randers Årbog" 2001, pp. 24-33.

for food remains<sup>7</sup>. The first 14C-analysis, which was performed on samples from the body, showed that the body dated to somewhere between 200 BC-AD 350<sup>8</sup>. The new 14C-analysis performed on the textiles has provided more precise result and shows that the Huldremose Woman lived and died sometime in the period 350-41 BC<sup>9</sup>. In archaeological terms this corresponds with the Scandinavian Pre-Roman Iron Age (500-1 BC).

The results of the first anthropological and forensic examinations showed that a cut in her right upper arm had caused the flesh to come away from the bone while in the bog. This was interpreted as the cause of death, maybe as the result of an unsuccessful amputation above the elbow – this is the only part of her body which was not preserved in the bog. In general the body has many injuries to the bones which are difficult to interpret. The many minor cuts, breaks and deformations of bones and soft tissue were interpreted in the 1980s as pre and post-mortem injuries. Similar injuries have been recorded on many other bog bodies, but more recent research indicates that they are primarily caused by peat cutting instruments or during the recovery, rather than as signs of mutilations and post-mortem actions<sup>10</sup>. The acidic environment of the high bogs causes human bones to decalcify and the still wet rubberlike bones were therefore easy to cut through or bend before they were locked in their dry condition.

Another suggestion for the cause of death is that she was strangled with a wool cord found wound around her neck, but this would not have been strong enough to strangle a person. Winding the cord around the neck was probably a symbolic act, and it is known from several other bog bodies<sup>11</sup>. Therefore, and in spite of several and different indications, the cause of death cannot even today be determined with certainty, except that her death was probably less dramatic and most likely not an act of a human sacrifice as previously suggested<sup>12</sup>.

A new and surprising detail discovered during the most recent examination of the Huldremose Woman is that she

has a very clear and evident groove in her skin around the ring finger on the left hand. In spite of many and thorough examinations this was not identified previously. Nothing similar is recorded on any of the other well-preserved fingers. The most obvious explanation is that she was wearing a ring when she died.

Finger rings from the Pre-Roman Iron Age are extremely rare archaeological finds and are linked to the elite<sup>13</sup>. It is not known whether the ring was removed before the body was put in the bog or at the time of its recovery. Judging by the clear mark in the skin it is most likely that it was removed some time during the recovery. If this is the case, the ring was probably made from gold, as a silver object would have turned black in the bog environment and not been easy to see.

As the body lay exposed in the bog for more than 24 hours before it was removed, either the labourer who found her or somebody else from the local community could have removed it. At this stage, the body was thought to be a murder victim, a workman with low social status who had mysteriously disappeared from the area some years before. The find generated a great deal of attention from the local community. Indeed, the man on whose land the body was found had to place guards while the body was still in the bog.

An argument against this hypothesis is that a wool cord with two small amber beads (Fig. 2 middle) were later sent to the National Museum with the explanation that they were found in a wheelbarrow on the farm where the Huldremose Woman was undressed, and that some children had found them in the remaining peat. This exemplifies how things could easily have been overlooked at first glance, but also demonstrates the attention the find was subjected to in the local community and the care that was taken in getting all the items sent to the museum. If indeed the Huldremose Woman possessed a (gold) finger ring and a necklace with amber beads this reveals important and previous overlooked information about her social status and economic capacity.

### Costume

The costume offers fascinating insight into Pre-Roman Iron Age design and technology. The items removed from the body in 1879 consist of two skin capes, a scarf and a skirt<sup>14</sup>. According to the archaeological find description<sup>15</sup>, the outer cape was placed with the furry side out – the

<sup>7</sup> D. Brothwell, D. Liversage, B. Gottlieb, *Radiographic and Forensic Aspects...*; D. Brothwell, T. Holden, D. Liversage, B. Gottlieb, P. Bennike, J. Boesen, *Establishing a minimum damage procedure for the gut sampling of intact bodies: the case of the Huldremose Woman*, "Antiquity", Vol. 64 (1990), pp. 830-835.

<sup>8</sup> H. Tauber, *Kulstof-14 datering af moselig*, "KUML. Årbog for Jysk Arkæologisk Selskab", Vol. 1979, pp. 73-78.

<sup>9</sup> U. Mannering, G. Possnert, J. Heinemeier, M. Gleba, *Dating Danish textiles and skins from bog finds by <sup>14</sup>C-AMS*, "Journal of Archaeological Science", Vol. 37 (2010), pp. 261-268.

<sup>10</sup> *Grauballe Man. An Iron Age Body Revisited*, P. Asingh, N. Lynnerup (eds.), Højbjerg 2007; U. Mannering, M. Gleba, *Designed for Life and Death*, Copenhagen (forthcoming); M. Ravn, *Burials in bogs – Late Bronze Age and Early Iron Age Bodies from Danish Bogs*, "Acta Archaeologica", Vol. 81 (2011) (forthcoming).

<sup>11</sup> C. Fischer, *Tollundmanden. Gaven til guderne. Mosefund fra Danmarks forhistorie*, Silkeborg 2007.

<sup>12</sup> U. Mannering, M. Gleba, *Designed for Life and Death...*

<sup>13</sup> J. Jensen, *Danmarks Oldtid. Ældre Jernalder 500 f.Kr.-44 e.Kr.*, København 2003, pp. 165-167.

<sup>14</sup> M. Hald, *Ancient Danish Textiles from Bogs and Burials*, Copenhagen 1980, pp. 47ff; A. Nørgaard, *A Weaver's Voice: Making Reconstructions of Danish Iron Age Textiles*, [in:] *Dressing the Past*. Ancient Textiles Series, Vol. 3, M. Gleba, C. Munkholt, M.-L. Nosch (eds.), Oxbow Books (2008), pp. 43-58; U. Mannering, M. Gleba, *Designed for Life and Death...*

<sup>15</sup> D. Brothwell, D. Liversage, B. Gottlieb, *Radiographic and Forensic Aspects...*

opening probably placed to the right. The inner cape had the furry side turned inwards and – according to the description – it did not cover any of the arms. Therefore, one may assume that it was placed with the opening to the left. In order to remove the inner cape from the body it was necessary to cut it open – today these cuts are difficult to locate, as the top part is quite damaged.

In the find description, it is further stated that a horn comb, a leather thong and a narrow woven band were found in a pocket in the outer skin cape (Fig. 2 left). These items were wrapped in a bladder skin. An X-ray examination of the capes has revealed that the items were not placed in the outer but in the inner cape. In a large three-dimensional patch, that is now cut open, small pieces of the leather thong can still be observed.

The scarf was placed around the head or neck of the woman. In order to get the scarf off the body, it was necessary to cut it in two halves. Only then was it recognised that it had been fastened with a bone pin underneath the left arm (Fig. 2 right). The lower part of the body was covered by a long skirt and the feet were bare. According to the find description, the long red hair was tied at the neck with the above-mentioned wool cord, which was also wound several times around the neck. The hair is now missing.

In spite of having been subject to quite a rough retrieval and more that 130 years of storage in the National Museum of Denmark, the costume items are very well preserved. The two skin capes are made from well-prepared, curly fleeces. The outer cape is the largest, measuring 82 cm in height and 170 cm in width (Fig. 3). It is constructed of five primary, rectangular skin pieces, with two minor triangular pieces under the yoke. Most pieces are from dark sheep skin, but on the fur side it has an insertion of four light goat skin pieces. On the flesh side it has an upper, front lining of dark sheep skin, which is a unique detail. The inner cape is slightly smaller, measuring 80 cm in height and 150 cm in width (Fig. 4). It is constructed of 7-8 primary sheep skin pieces, mostly rectangular and 22 secondary patches of sheep, goat and deer skin. Both capes have an asymmetrical design with a slanting neckline.

The wool scarf measures 139-144 cm in length and 49 cm in width (Fig. 5). It is made in plain 2/2 twill with tubular tabby selvages. It is woven on a tubular warp and has closed fringes at both short ends. The yarn is s-twisted and there are 6-7 threads per cm in both thread directions. During the new examination of the Huldremose Woman, distinct imprints of a textile were discovered on the chest and shoulders, which has not been previously noticed. As they originate from a twill textile, they most probably come from the wool scarf.

The wool skirt measures 220-252 cm in length, which is the circumference of the costume and 81-84 in width, which is the length of the skirt (Fig. 6). It is woven in plain 2/2 twill. The yarn is s-twisted and has 7-10 threads per cm in both thread directions. The skirt is constructed

in such a way that one of the selvages constitutes the garment's waistband. The other selvedge is made in tubular tabby. As the ground weave and the waistband are made in different bindings, twill and rep tabby respectively, with a different thread density, it required significant technical know-how to make the waistband and the ground weave fit together seamlessly while weaving. It would definitely have been much easier to sew a separate ribbon onto the fabric once the weaving had been completed. The skirt was woven with a tubular warp, probably as a tube with a closing cord/stick. The weaving was not continued right to the end, as is seen in many other Danish bog textiles<sup>16</sup>. Instead the lock of a cord/stick was removed, creating a rectangular fabric, and the remaining warp ends were cut off and the edge hemmed. Afterwards the skirt was sewn together with regular feather stitches.

The narrow band found inside the inner cape measures 74 cm in length and 1.5 cm in width (Fig. 2 left). It is woven in tabby with simple selvages in s-twisted yarn. It is woven with a tubular warp and has closed fringes at the two short ends. Two cords (S2z2z) attached perpendicular to the length of the band are 77 and 78 cm long respectively. This item could have been used as a hairband, but as it was sewn into the costume we do not know if it was worn by the Huldremose Woman.

A common feature of Pre-Roman Iron Age textile garments is that they are almost all finished on the loom and that they are rarely made from cut and shaped pieces. Only small alterations were made or added after the textile was taken off the loom. Clothes made from textiles were mainly draped or wrapped around the body and the legs, and fastened in various ways with cords or dress pins, as is the case with the Huldremose Woman.

Besides skirts and large tubular garments, which are known from several other locations, the most ordinary types of garments consist of various rectangular textiles. In this connection it is important to stress that the large tubular garment, often referred to as the Huldremose "peplos"<sup>17</sup> and now called the Huldremose II tubular garment, is a single find not connected to the Huldremose female body<sup>18</sup>. Rectangular textiles are generally found in three standard sizes. The first group is made up of textiles about 150x50 cm, with fringes at both short ends. An example of this is the above-mentioned Huldremose scarf. The second group consists of larger rectangular textiles with typical measurements around 150x100 cm. Examples of this type have been found in Borremose in North Jutland for instance, and were also used for draping or wrapping around the body. The third group consists of large pieces of approximately 250x140 cm, like the textile from Thorup in North Jutland. This type could have served

<sup>16</sup> U. Mannering, M. Gleba, *Designed for Life and Death...*

<sup>17</sup> M. Hald, *Ancient Danish Textiles...*, pp. 53-54, 139-379.

<sup>18</sup> U. Mannering, M. Gleba, *Designed for Life and Death...*



Fig. 3. The outer skin cape seen from the fur side. Photo Roberto Fortuna, National Museum of Denmark.



Fig. 4. The inner skin cape seen from the flesh side with its many patches. Photo Roberto Fortuna, National Museum of Denmark.

different purposes such as blankets or cloaks, or were perhaps draped around the body.

As in the case of the Huldremose textiles, the majority of the Pre-Roman Iron Age textiles are woven in 2/2 twill; this type of weave has a characteristic surface with diagonal lines. The textiles often have an open structure with minimal surface treatment and a density of 5-10

threads per cm. The visual features of these textiles differ significantly in comparison to the textiles from other periods, and no doubt this give a characteristic look to the Scandinavian Pre-Roman Iron Age costumes. Furthermore, the low thread density, the high yarn twist and the minimal surface treatment make the textiles unsuited for cutting. However, this does not mean that sewing was



Fig. 5. The wool scarf with detail of the weave. Photo Roberto Fortuna, National Museum of Denmark.



Fig. 6. The wool skirt with detail of the waistband. Photo Roberto Fortuna, National Museum of Denmark.

not used during this period. Evidence of sewing generally appears in connection with repairs or reuse, and is clearly different from other types of textile techniques. For instance, the sewing thread used is often coarser as well as in a different colour than the thread used in the weave, like in the case of the seam in the Huldremose skirt. Perhaps sewing was not considered important compared to other textile techniques, but it was definitely not because they were poor craftsmen.

Skin garments from the Danish bogs constitute almost half the costumes from this period and they prove that this raw material was as important as textiles<sup>19</sup>. Garments made from skins are generally well made, and it is likely that they belong to a much older costume tradition dating back to the Stone Age. In general, skin capes come in two standard

<sup>19</sup> U. Mannering, M. Gleba, *Designed for Life and Death...*

models, which were produced from several pieces of skin that were cut to size. Asymmetrical capes with a slanting neckline, like those found in Huldremose, are not as common as symmetrical capes. The latter has a trapezoid shape with a collar, revers and often reinforced lacings for tying, and is made of seven separate larger pieces of skin: five in an almost rectangular shape, placed with two at the top and three at the bottom on the back, and two oblong L-shaped pieces of skin as the front. Smaller pieces could make up the corners at the low parts of the front. Evidence suggests that the capes were made to fit the size of the wearer. Design, cuts and seams also show that the producers were skilled craftsmen. Some capes have been almost completely worn out, and it is not uncommon that they were repaired or continuously patched, as in the case of the inner cape from Huldremose. Apart from the Huldremose skin capes, several other capes have been found in pairs and in most cases they were worn one on top of the other. The outer cape with the fur turned outwards, and the inner cape with the fur turned inwards. In all likelihood capes were used flexibly depending on the season, weather and gender. The majority of the skins used came from domesticated animals such as sheep, goats and cattle. There are only a few examples of skins from wild mammals such as deer, otter and wolf, which is interesting as hunting still formed part of the subsistence economy in this period<sup>20</sup>.

### Raw materials

During the new examination of the Huldremose Woman's body, it was discovered that remains of spun threads in plant fibre could be seen in many folds on the skin, on the pelvis and the legs. Some of these threads were also found in pollen samples taken from the body in 1981<sup>21</sup>. There is no doubt that the threads were part of a weave since they are preserved in a wavy shape usually acquired by yarn when it is locked into a fabric structure. The greatest sensation is in fact that the remains of this tabby weave still is preserved on the back of the body. The weave is made from z-twisted threads with 9-10 threads per cm in both thread directions.

Plant fibres textiles in a bog context have not been recognized previously. Therefore the first concern was to determine whether the threads were ancient or intrusive, perhaps as contamination from packing material used in 1879. The high bogs in Jutland are primarily conducive to the preservation of animal or proteinacious materials, such as wool, skin or fur, and until now, only cords and ropes made of tree bast had been found in the bogs<sup>22</sup>. Fortunately

the examination of the threads under a microscope indicated that they were ancient, since the fibre surface was severely degraded. A DNA analysis of a small thread sample has led to the same conclusion, as there was no DNA surviving in the sample. That DNA quickly disintegrates in an acidic environment is a well-known phenomenon.

If the DNA test had been successful, it could have determined what kind of plant fibre that was used for the tabby weave. Now other methods have to be employed, and in the future an advanced microscopic analysis will hopefully determine which plant fibre, that was used for this tabby textile. In Scandinavia, textiles of plant fibres before the Roman Iron Age (AD 1-400) are extremely rare<sup>23</sup>. The earliest plant fibre textile from Denmark is the Late Bronze Age (8<sup>th</sup> Century BC) find from Voldtofte on Funen. Recently this textile has been securely identified as nettle<sup>24</sup>. As Roman Iron Age textile finds in plant fibres are rare in grave contexts, this is also the main reason why plant fibre textiles dated before AD 400 most often are interpreted as imports<sup>25</sup>. It is not known whether these textiles are made from flax, nettle or hemp. Hopefully the new fibre analysis methodology developed for the identification of different plant fibres will be used to clarify this question<sup>26</sup>.

Bundles of flax stems found in bogs and linseeds found in the stomach contents of the Tollund man, show that the plant was known and cultivated in Scandinavia already in the Pre-Roman Iron Age (500-1 BC)<sup>27</sup>. Likewise it has been possible to document the existence of a specialised textile production linked to flax cultivation in several settlement sites on Funen<sup>28</sup>. This production goes back to the Late Bronze Age and documents that the know-how and desire to produce textiles in plant fibres were present much earlier than previously assumed.

<sup>23</sup> L. Bender Jørgensen, *Cloth of the Roman Iron Age in Denmark*, „Acta Archaeologica”, Vol. 50, 1979 (1980), pp. 1-60; L. Bender Jørgensen, *Forhistoriske Textilier i Skandinavien*, Nordiske Fortidsminder Serie B (1986), Bd. 9; U. Mannering, *Der Fadeninhalt der Silberamulettedose H1/84, 1949-2*, [in:] *Himlingøje – Seeland – Europa: ein Gräberfeld der jüngeren römischen Kaiserzeit auf Seeland, seine Bedeutung und internationalen Beziehungen*, ed. U. Lund Hansen, København 1995, pp. 168-169.

<sup>24</sup> C. Bergfjord, K. M. Frei, U. Mannering, M. Gleba, A. Bruselius Scharff, I. Skals, M.-L. Nosch, B. Holst, *First Identification of the Earliest Nettle Textile*, „Science” (forthcoming).

<sup>25</sup> L. Bender Jørgensen, *Forhistoriske Textilier...*

<sup>26</sup> C. Bergfjord, B. Holst, *A new method for identifying textile in bast fibres using microscopy*, „Ultramicroscopy”, (forthcoming).

<sup>27</sup> C. Fischer, *Tollundmanden...*, pp. 43-45; S. Karg, *Friggas hellige plante – hør i offerkar fra jernalderen...*, „News from the National Museum of Denmark”, Vol. 100 (2003), pp. 10-13; S. Karg, *Seltame Gruben in einem Feuchtgebiet in Jütland, Dänemark*, „Nachrichtenblatt Arbeitskreis Unterwasserarchäologie“, Vol. 10 (2003), pp. 43-46.

<sup>28</sup> M. Runge, P.S. Henriksen, *Danmarks ældste hørindustri. Fynske minder*, Odense 2007, pp. 145-165; A.B. Gotfredsen, M.B. Henriksen, J. Kviborg, K.G. Therkelsen, *Fjordfiskere, strandjægere, håndværkere og handelsmænd i jernalderens Seden*, „Fynske Minder” 2009, Odense 2009, pp. 77-109.

<sup>20</sup> J. Jensen, *Danmarks Oldtid...*, p. 133.

<sup>21</sup> K.M. Frei, I. Skals, M. Gleba, H. Lyngstrøm, *The Huldremose Iron Age Textiles, Denmark: an attempt to define their provenance applying the Strontium isotope system*, „Journal of Archaeological Science”, Vol. 36 (2009), pp. 1965-1971.

<sup>22</sup> M. Hald, *Ancient Danish Textiles...*, pp. 33-34, 125-128; W.A. B. van der Sanden, *Through nature to Eternity – The Bog Bodies of Northwest Europe*, Amsterdam 1996, pp. 16-18.

Fibre analysis of the wool used in the Huldremose textile and skin costumes has demonstrated that their makers had access to very high quality raw materials. Judging by the fibre diameter ranges in the samples, it is evident that great attention was paid to the selection and sorting of the wool before spinning and weaving. The wool from the textiles is surprisingly fine and has given the textiles a nice drape and soft handle. Likewise the wool used in the textiles matches the fleeces in the skin costumes; thus it can be concluded that the same sheep variety was used for textiles and skin costumes<sup>29</sup>.

On this basis, it can be concluded that besides the skin and wool garments, the Huldremose Woman wore a garment, made from plant fibres next to her skin which reached from the shoulders to below the knees.

### Provenance

Strontium is a good indicator for the provenance of archaeological textiles. A recent research project conducted by Karin Margarita Frei for her PhD project at the University of Copenhagen has developed the methodology for strontium isotopic tracing of wool textiles, but other materials such as plant fibres and skin have also been tested<sup>30</sup>. Samples from the Huldremose scarf, the plant fibre textile, peat collected on the Huldremose Woman's body and a piece of her skin were analysed. The results indicate that the wool scarf has a local provenance, while the plant fibre textile and probably the Huldremose Woman herself have a non-local origin. This means that the Huldremose Woman and her inner garment came from an area with a Precambrian terrain, which is geologically different from Denmark<sup>31</sup>. The closest area with this geological composition is middle and northern Sweden, Norway and the island Bornholm in the Baltic Sea. Together with similar results for the Huldremose II find, this opens up new interpretations regarding the exchange and circulation of raw materials, in these cases wool and plant fibres, in a period and area where self-sufficiency and local production is expected. No other characteristics in the analysed costume objects could have provided information on their provenance. This result forces archaeologists to look more carefully into cultural

connections and exchange routes over much larger distances than previously anticipated.

### Design and colour

A highly characteristic feature for the scarf and the skirt is that they are made from yarn with different natural pigmentation to create a chequered pattern. Furthermore, recent dye analyses have demonstrated that the textiles were also coloured with plant dyes.

In the scarf, five different threads used in the warp direction and the four different threads in the weft direction show different dye test results. Two warp threads had no dyes detected, while the other three had different combinations of two unknown dyestuffs (unknown 3 and 5), which would have given a red hue, in one case supplemented with rhamnetin, a yellow ingredient. The same applies to the weft threads<sup>32</sup>. The skirt is chequered in a regular pattern with the same light and dark natural pigmented threads in warp and weft. The light threads contain luteolin, indigotin and an unknown dye component (unknown 5), which lies in the spectrum of red dyes. The dark warp has the same dye combinations, whereas the dark weft only contained luteolin and unknown 5<sup>33</sup>. How this combination of yellow, blue and red dyes may have looked like is difficult to determine. The combination of indigotin and unknown 5 would probably have given a purple colour, while the yellow would have changed the hue towards a brown palette. As luteolin, in contrast to the other dyes, is present in all threads, it is likely that this was the last applied colour possibly used to refresh or change the appearance of the colour when the textile lost its bright colour due to exposure to the elements.

The mentioned dye sources represent both mordant and vat dyes, and these dyeing processes must have been practised in several steps. On the other hand, it is not known if the garments were dyed in the yarn or as whole pieces, and both methods are testified in the Pre-Roman Iron Age textiles<sup>34</sup>. Previously, it was believed that textiles from the Pre-Roman Iron Age in Denmark were not dyed<sup>35</sup>, and that the patterns in the fabrics were made only by combining various shades of naturally pigmented wool: white, black,

<sup>29</sup> U. Mannering, M. Gleba, *Designed for Life and Death...*

<sup>30</sup> K. M. Frei, R. Frei, U. Mannering, M. Gleba, M.-L. Nosch, H. Lyngstrøm, *Provenance of ancient textiles – a pilot study evaluating the strontium isotope system in wool*, "Archaeometry", Vol. 51:2 (2009), pp. 252-276; K. M. Frei, I. Skals, M. Gleba, H. Lyngstrøm, *The Huldremose Iron Age Textiles, Denmark: an attempt to define their provenance applying the Strontium isotope system*, "Journal of Archaeological Science", Vol. 36 (2009), pp. 1965-1971; K. M. Frei, I. Vanden Berghe, U. Mannering, R. Frei, H. Lyngstrøm, *Removal of natural organic dyes from wool: Implications for ancient textile provenance studies*, "Journal of Archaeological Science", Vol. 37, Issue 9, September 2010, p. 2136-2145.

<sup>31</sup> K. M. Frei, I. Skals, M. Gleba, H. Lyngstrøm, *The Huldremose Iron Age Textiles ...*, p. 1969.

<sup>32</sup> I. Vanden Berghe, M. Gleba, U. Mannering, *Towards the identification of dyestuffs in Early Iron Age Scandinavian peat bog textiles*, "Journal of Archaeological Science", Vol. 36:9 (2009), pp. 1910-1921; I. Vanden Berghe, M. Gleba, U. Mannering, *Dyes: to be or not to be? Investigation of dyeing in Early Iron Age Danish bog textiles*, [in:] *North European Symposium for Archaeological Textiles X*, E. Andersson Strand, M. Gleba, U. Mannering, C. Munkholt, M. Ringgaard (eds.), Oxford 2010, pp. 247-251.

<sup>33</sup> *Ibidem*.

<sup>34</sup> I. Vanden Berghe, M. Gleba, U. Mannering, *Towards the identification of dyestuffs...*, pp.1910-1921.

<sup>35</sup> L. Bender Jørgensen, P. Walton, *Dyes and fleece types in prehistoric textiles from Scandinavia and Germany*, "Journal of Danish Archaeology", Vol. 5 (1986), pp. 177-188; P. Walton, *Dyes and wools in Iron Age textiles from Norway and Denmark*, "Journal of Danish Archaeology", Vol. 7 (1988), pp. 144-158.



grey and brown. The new results challenge this perception, and show that fabrics often were dyed in the same colour throughout, although sometimes threads of yarn in a different colour than the ground weave formed part of the weave.

If white and naturally pigmented wool is dyed with the same colour, it results in different shades and colours. For instance, a yellow dye on a white and grey yarn results in a yellow and green colour. Furthermore, the presence of several different dyes in the same textile can also be the result of repeated dyeing and a revival of the colours. This result completely changes the visual perception of this period, since the majority of the analysed textiles from the Danish bogs were found to contain traces of dye<sup>36</sup>.

### The Huldremose Woman

Based on all the different analyses performed on the Huldremose Woman and her costume, it can be concluded that the peoples of the Scandinavian Early Iron Age had knowledge of and used a wide range of textile and skin technologies that have not previously been recognized.

Sheep wool and fur for textiles and skin costumes were the most commonly used raw materials, but traces of a plant fibre textile as imprints, threads and textile on the back of the Huldremose Woman demonstrate that this material was used for textiles as well. Although this find is unique, it allows us to believe that other bodies found in the bogs could have worn similar garments made from plant fibres, which have not survived the millennia in bogs. For example, the two most famous Danish bog bodies – the Grauballe Man and the Tollund Man – have little or no clothing associated with them<sup>37</sup>. Although the opposite has often been stated, the vast majority of Danish mummified bog bodies dated to the Early Iron Age have been found with textile and skin garments and accessories, indicating that garments played an important part in the deposition ritual<sup>38</sup>. Thus, the naked bodies are exceptional and now we must ask if perhaps originally they were clothed. Could it be that underneath his leather belt, the Tollund Man also wore a garment made of plant fibres which did not survive burial in the bog? A close examination of his torso by the author in 2007 regrettably revealed that no remains of textiles or imprints of textiles were preserved. On the other hand, the plaited leather rope, which was placed around his neck, had made clear imprints on the back. Therefore this question may never be answered, but at least the possibility that the bog people could have worn garments made of plant fibres must be considered. In this way, a little thread may sometimes lead to a big change in our understanding of the past.

<sup>36</sup> I. Vanden Berghe, M. Gleba, U. Mannering, *Towards the identification of dyestuffs...*, pp. 1910-1921; I. Vanden Berghe, M. Gleba, U. Mannering, *Dyes: to be or not to be?...*, pp. 247-251.

<sup>37</sup> *Grauballe Man. An Iron Age Body...*; C. Fischer, *Tollundmanden...*

<sup>38</sup> U. Mannering, M. Gleba, *Designed for Life and Death...*

It is not known whether the plant fibres used in the tabby textile was brought to Jutland as raw material to be processed further into a textile in this area, or if it was acquired as a finished product. In general, the textiles from the Pre-Roman Iron Age have a very uniform design, which indicates a craft with close contact between the different producers. These textiles were not mass produced and are believed to come from local, individual households. Nevertheless, a close examination of the many textiles found in the Danish bogs has revealed that the textile craft was taught and performed with specific rules for production and a know-how that have given the textiles a similar look and appearance<sup>39</sup>. The Pre-Roman Iron Age costumes have their own specific visual appearance, which both surprises and challenges our perception of this period. In the Pre-Roman Iron Age striped and chequered fabrics were preferred, and patterns were used consciously to form part of the design. The patterns were created partly by using a combination of white and naturally pigmented wool but also by dyeing the fabrics. Analyses have also demonstrated that dress in the Early Iron Age were very colourful, typically held in yellow shades, but also in blue and red. By combining naturally pigmented wool with plant dyes, it was possible to produce several different shades and hues in the same textile. Therefore, it can be concluded that in the Early Iron Age plant dyeing and many other textile techniques were used in multiple ways. People possessed a thorough knowledge of sheep breeding for high quality wool, cultivation and preparation of various plant fibres, and possibly dyes that could be used to make costumes in intricate designs and patterns.

When the Huldremose Woman was placed in the bog, it was done with great care. She was dressed in three different textile items, a white inner garment in plant fibres, a red wool scarf, and a wool skirt in blue or a shade of purple, and two skin garments. It was one of the latter garments into which the amulets of the probably already old horn comb, the blue hairband and the leather thong were sewn. The objects must have been precious to her and have had a symbolic rather than practical value. Some of the textiles were almost new, like the skirt, while the inner cape was very worn and patched many times. Some garments were produced locally, like the wool and skin costumes, while others were probably imports, like the tabby inner garment.

Based on this, the Huldremose Woman must have been an esteemed woman in local society, and the amber beads and the presence of a (gold) finger ring show that she had access to and ownership of many different resources. The strontium isotopic analysis has suggested that the woman herself did not originally come from Jutland, but it is uncertain when she arrived to this area. In the future, a strontium isotope analysis of her teeth may be

<sup>39</sup> *Ibidem*.

able to reveal more about her origin, as this can tell where she was born<sup>40</sup>. If she was a foreigner who travelled to the area where she ended her life, this could explain why she was not cremated and buried in the local burial ground as was common in this period.

For many years it was believed that bog bodies in general comprised marginalised people of their time who ended their lives in the bogs, for instance because they were criminals punished for breaking societal laws, or because they had been sacrificed to the gods. The same interpretations were applied to the Huldremose Woman who was seen as a person of very low rank. The broken and wounded arm was previously interpreted as a sign of physical punishment, maybe in connection with a sacrifice to the gods symbolized by the wool cord which was wound around the neck. Although the

cause of death cannot be determined with certainty today, the re-examination and analysis of her costume reveal that the Huldremose Woman was more than an ordinary woman with no or few personal belongings, and with her 40 years of age it is likely that she held a high position in the local community. The garments worn by the woman from Huldremose reveal detailed and interesting information about craft, capacity and creativity. In this way the Huldremose Woman has changed from being a not very appreciated category in the National Museum collection to becoming a fascinating window into prehistoric society. If treated and analyzed with modern scientific standards the North European bog bodies can still contribute unprecedented information about life and customs in the Early Iron Age.

### Streszczenie

W ostatnich wiekach, w bagnach Europy Północnej znajdowano liczne pochówki osób. W 1879 r., w bagnie we wschodniej Jutlandii zostało znalezione ubrane ciało młodej kobiety, nazwanej kobietą z Huldremose.

Ciało kobiety z Huldremose jest znaleziskiem pochodzącym z bagna, które charakteryzuje się największą liczbą przedmiotów związanych ze strojem. Jednakże należy pamiętać, że poza tym znaleziskiem Dania posiada jedną z największych kolekcji prehistorycznych tkanin i ubrań skórzanych datowanych na późną epokę brązu i wczesną epokę żelaza (900 p.n.e. – 400 n.e). Strój kobiety z Huldremose składa się z dwóch skórzanych pelerynek, wełnianego szala i wełnianej spódnicy. Ostatnie analizy dowiodły, że miała również na sobie bieliznę z włókna roślinnego. W wewnętrznej pelerynie, zaszyte pod łątką, znajdowały się: kościany grzebień, skórzany troczek oraz wełniana przepaska na włosy. Przedmioty te prawdopodobnie były niedostępne dla kobiety za życia i dlatego zostały zinterpretowane jako amulety. Na szyi miała wełniane sznureczek

z dwoma bursztynowymi paciorkami. Jest również wysoce prawdopodobne, że kobieta z Huldremose nosiła na palcu lewej dłoni pierścienek.

Wcześniej kobieta z Huldremose uważana była za osobę wykluczoną, złożoną w ofierze lokalnym bogom lub nawet ukaraną za złamanie praw wspólnoty. Najnowsze badania, zarówno ciała jak i ubioru, udowodniły niezbicie, że nie była ona osobą ubogą, pozbawioną przedmiotów osobistego użytku i godności. Strój jest również dowodem na to, że technologia skórzana i włókiennicza tego okresu była wysoko rozwinięta, i że dostęp do różnych rodzajów materiałów włókienniczych i wiedzy o technologii farbiarskiej w okresie przedrzymskim epoki żelaza był bardziej powszechny niż pierwotnie zakładano. Dokładna analiza znaleziska z Huldremose w sposób fundamentalny wpłynęła na naszą wiedzę o technologii skórnicy i włókienniczej i będzie miała zdecydowany wpływ na przyszłe interpretacje ciał wydobytych z bagien.

<sup>40</sup> K.M. Frei, R. Frei, U. Mannering, M. Gleba, M.-L. Nosch, H. Lyngstrøm, *Provenance of ancient textiles – a pilot study evaluating the strontium isotope system in wool*, "Archaeometry", Vol. 51:2 (2009), p. 253; K. M. Frei, I. Skals, M. Gleba, H. Lyngstrøm, *The Huldremose Iron Age Textiles, Denmark: an attempt to define their provenance applying the Strontium isotope system*, "Journal of Archaeological Science", Vol. 36 (2009), pp. 1965-1971.