

"PRESSBLECK" FRAGMENTS FROM THE EAST MOUND IN OLD UPPSALA ANALYZED WITH A LASER SCANNER

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ABSTRACT

Eighteen "Pressbleck" found in the east Mound at Old Uppsala are analyzed with drawings compared to measured contourmaps and profile maps. The latter which appeared to be very useful were made with a laser scanner instrument constructed and described by Henry Freij. The identification of the small fragment made it possible to show that of 9 antropomorphic motifs known from the so called Vendel helmets seven were used on this helmet. Opposite from what is known from other helmets no duplicates of the antropomorphic motifs were found, whereas the interlace motif was found in several cases. The interlace ornaments are very close to these ornaments on Vendel XIV and most probably have adorned the helmet cap in the same way. However the total lack of the iron parts of the helmet in Old Uppsala makes it probable that this helmet was made of leather, the only more heavy metal details being an animal head used as mount to nocepiece. As the size of the antropomorphic pressbleckpanels are smaller than on the other helmets, and has only been set in one row, (because of the lack of duplicates), the helmet size must have been fairly small. This may indicate that the helmet was intended for an infant prince like the leather helmet in the Cologne Cathedral grave. The old discussion of the missing male skeleton in the east mound at Old Uppsala must therefore be taken under new consideration.

Introduction

Sune Lindqvist, who published the archaeological record from the mounds in Old Uppsala (Lindqvist 1936), also reproduced some figures from a collection of fragments of so called "pressblecks" found in the east mound. He compared the fragments with "pressblecks" from the helmet of Vendel XII and they have since then been regarded as evidence of the existence of a helmet in the east mound.

One of these "pressblecks" has become famous as it appeared that the fragment was showing the right part of a man holding two spears. This is part of a motif with two warriors, found among others on the helmet in the boatgrave from Sutton Hoo (cf Bruce Mitford 1978).

As already Lindqvist made clear (Lindqvist 1936:171), the fragments were extremely brittle due to the cremation. After many years of exhibition in different montages, the fragments have to some extent become rudimentary, obviously because of the detaching from montages which has caused small chips to fall off.

It was therefore urgent to carry out a full documentation of the fragments. It was also decided to make the documentation in a way that enabled researchers to work further with the fragments without too much handling of the brittle items. The documentation started with photographs, but it soon appeared that the photographs recorded very little of the original ornaments due to the distortion of the original surface through corrosion. A draughtsman, Tage Fredriksson, worked for a long time making drawings of fragments with visible ornamentation, mostly in scale 10:1 or 5:1. In this connection we had long discussions on each item and I realized that my interpretation highly influenced the drawings, but at the same time the drawings could not be made without an interpretation. We have here the same problems which Hauck for a long time has dealt with in connection with his studies of Nordic gold bracteates (cf Hauck 1985:18 ff). As a complement to the drawings I therefore asked Henry Freij to make three-dimensional measurements of the fragments with the laser scanner he has constructed. A description of the instrument is given at the end of this paper.

The measurements were made independent of the drawings and I will on each item comment where the drawing and the measured mapping do not converge. The mechanical recording made by the laser beam has many advantages to drawings and photos but it also needs an interpretation and the objectivity is not total as the direction of the measurements, the density of the measurements and, of course, the degree of corrosion affect the pictures. There is a general possibility to smooth and level out the more regular corrosion layers (cf Freij later in this paper), but breaks and fissures generally make greater distortion in a mechanical recording, whereas the human eye can adapt and overlook such things. We have recorded the measurements on the front side of the "pressblecks", assuming that this side was meant to be seen and most probably has been worked over in details and polished before mounting.

Item 1 (figs 1, 3-4)

This we could for example follow on item 1, the dancing warriors (figs 1-4). In the mechanical recording (fig 3) we found evidence for that one spearhead had bosses and the other one was barbed. These details have not been recorded in earlier publications and were not seen by the drawer (fig 1). On the back, which in many ways looks sharper than the front (and also was pictured by Lindqvist 1936:fig 89a) these bosses and barbs could only be traced as shallow cavities without clear borders (fig 4). Altogether the front side here gave a clearer picture than the back which I think indicates that the front sides were worked over, perhaps in connection with the modelling (cf Maryon 1971:124ff, who recommends this practice). That the depressions after all existed, convinced us that the presence of the bosses and the barbs was not accidental but deliberate.

The motif of item 1, characterized by Arwidsson as motif E, the "weapon dancers" (Arwidsson 1977:119,

cf also the table, p.117), is also found on the helmets from Sutton Hoo and Valsgärde 7. In Valsgärde 7 the spear with barbs is also noted but placed differently, being closest to the leg (fig 2). Bosses on spearheads are shown on several other pictures of helmets, and Hauck has pointed out the significance of two kinds of spearheads in connection with the picture of the weapon dancers (Hauck 1981:203), thus anticipating what we have found here. I also want to remark on another boss close to the man's coat. This boss had a pointed top and could not at all be traced in the pattern on the back. In this case I am inclined to explain the boss as an accidental swelling on the sheet itself. These observations show that also on a well-known motif, like the dancing warriors, the laser scanner can add new elements. Before we turn to the other fragments, I will also demonstrate a contour map measured with the laser scanner of one of the Torslunda plates (figs 5 and 42). Although we here use a coarser grid in order to show the whole picture, it gives a very detailed account. One can for example compare the coarse contours of the cramps on the edges of the patric (cf Axboe 1987 for an explanation of the function of the cramps) and the smooth lines of the actual picture. Before leaving the plate I will also point on one famous detail on the picture, the missing right eye (of Oden) which is clearly marked. In a closer contour map (fig 6) we can observe that this eye is removed by a sharp cut, probably in the original model used for the mould, that was made for the casting of the plate. The profile (fig 7) further illustrates this and gives us an insight into the importance of this element on the picture. This is even more interesting, considering the many pictures of a man with a horned helmet and weapons from the Viking period not being one-eyed, for example from Ribe (cf Jensen 1992). If the man with weapons and a horned helmet could be identified as Oden, the saga telling how Oden lost his eye seems to go back on traditions many centuries earlier than the Viking period.

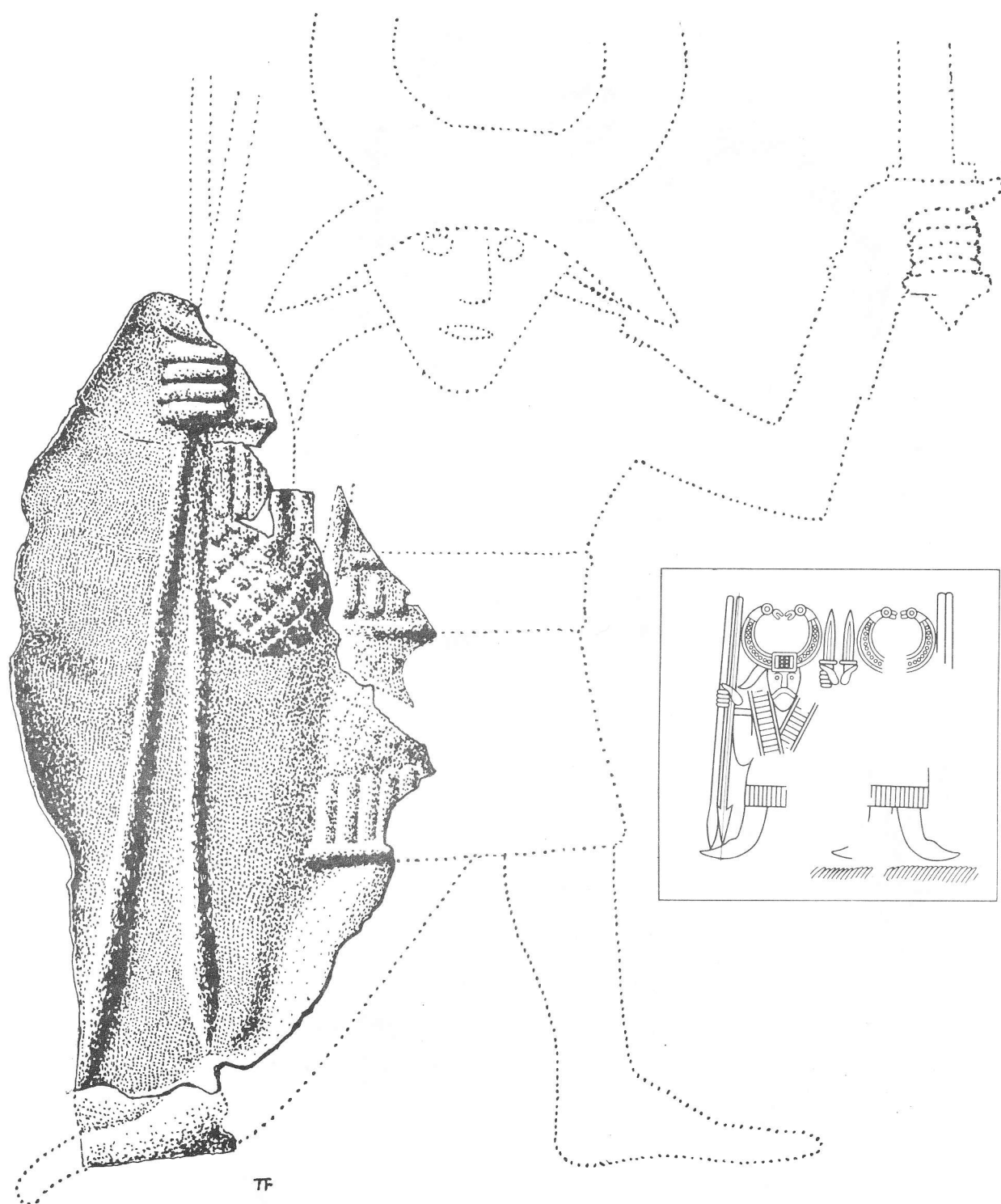


Fig 1. Drawing of motif E, item 1, the Weapon dancer. Scale 5:1.

Fig 2. Motif E from Valsgärde 7. After Arwidsson 1977. Scale 1:1.

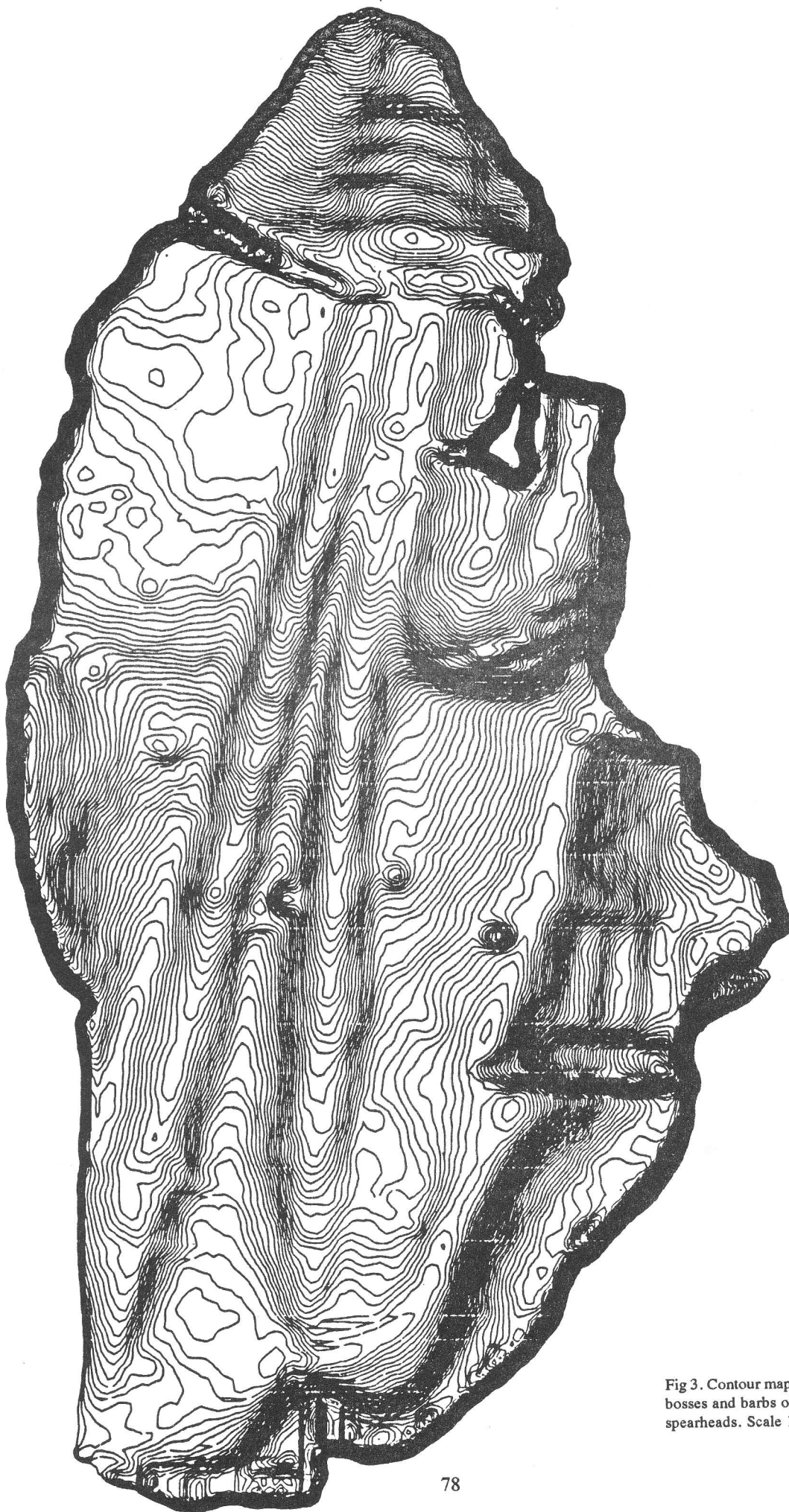


Fig 3. Contour map of item 1. Note the bosses and barbs of the spearheads. Scale 10:1.

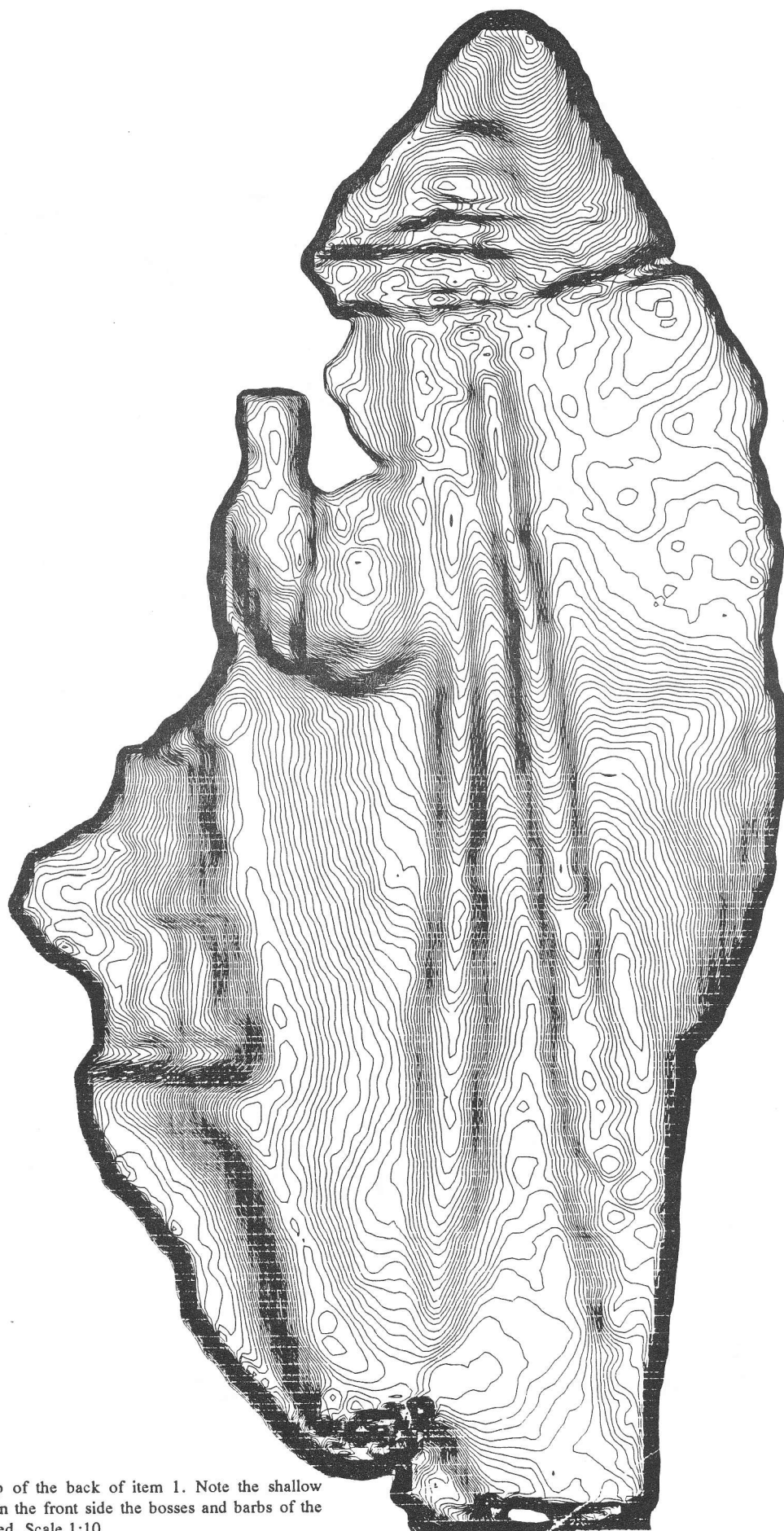


Fig 4. Contour map of the back of item 1. Note the shallow depression where on the front side the bosses and barbs of the spearheads are marked. Scale 1:10

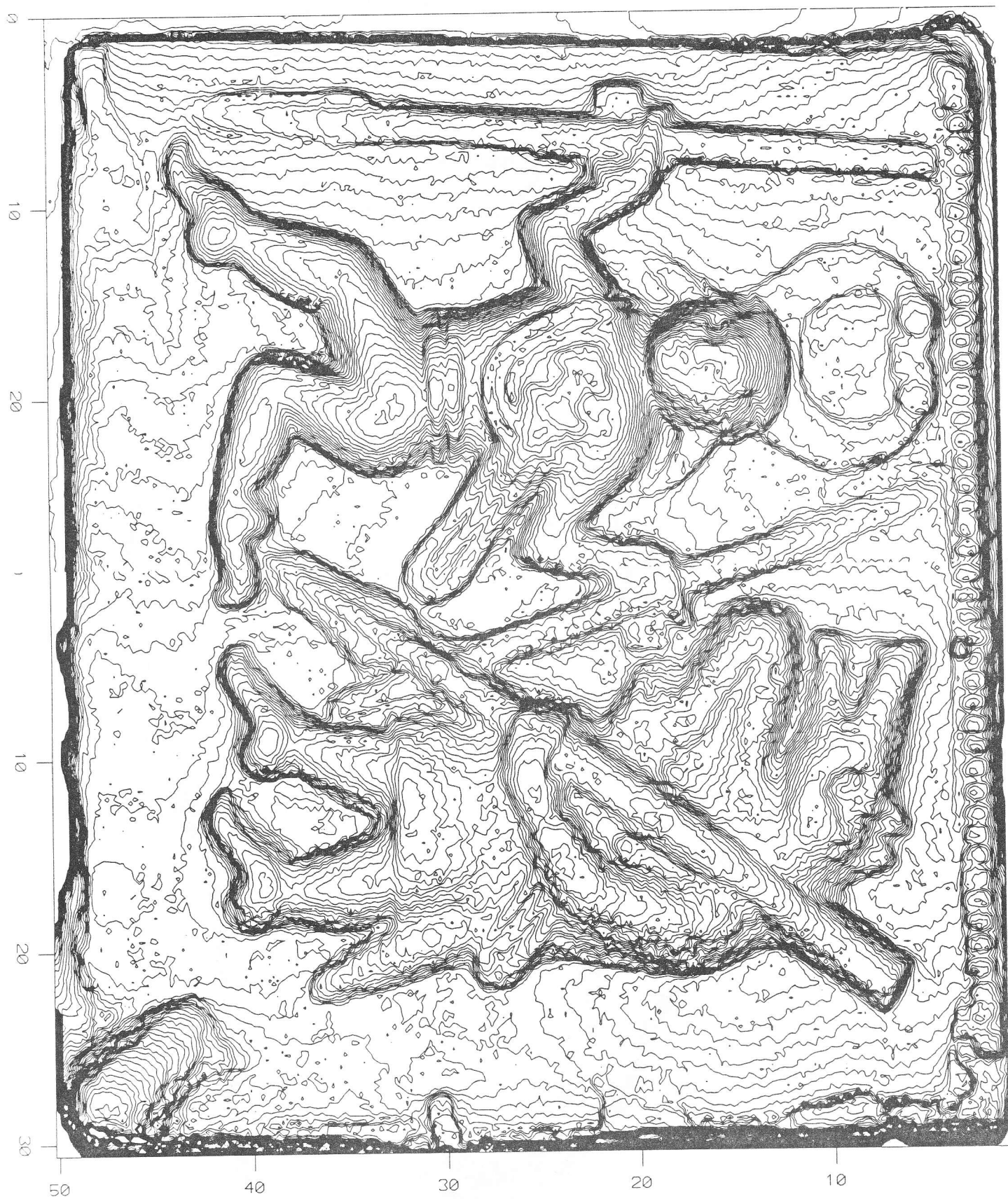


Fig 5. Opposite page. Contour map of the plate, fig 42 from Torslunda, Öland. Scale in mm as drawn unities.

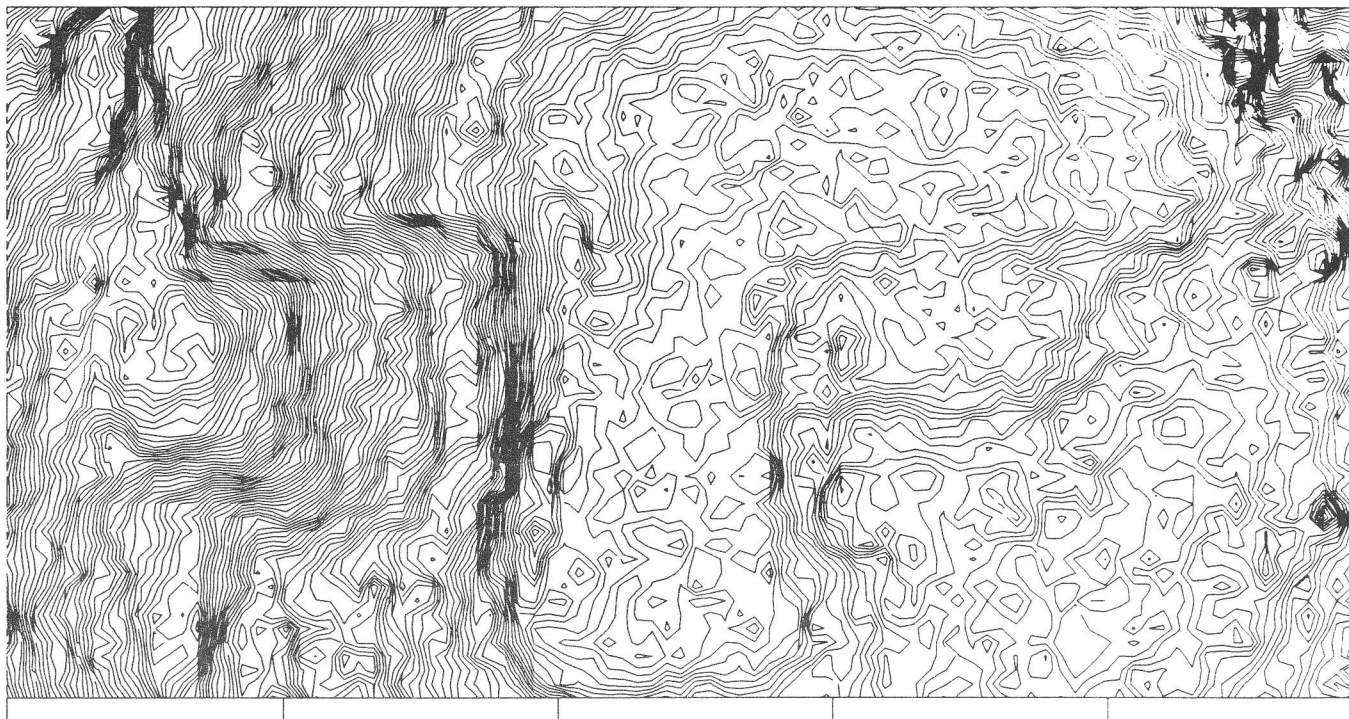


Fig 6. Detailed contour map of fig 5 showing the missing eye on the Torslunda plate. Scale in mm as one unity .

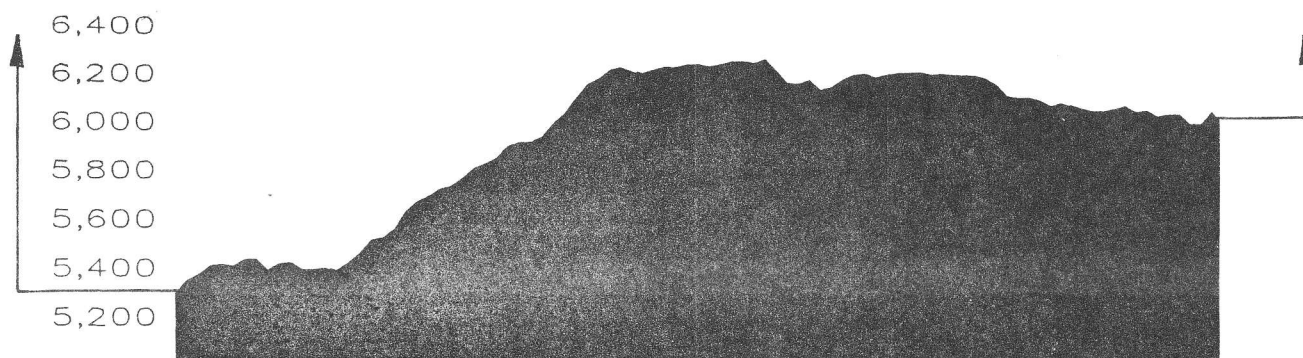


Fig 7. Profile drawn over the Torslunda plate showing the engraved depression from the missing eye. Scale as fig 6.

Item 2 (figs 8-10)

The most complete picture fragment, except for the dancing warriors, is item 2 - a fragment (figs 8-10) showing a warrior with a shield. The drawing and the contour map give a somewhat different picture. The contour measuring was complicated because of several fissures and it might be that these fissures were the reason the drawer, and earlier Lindqvist (1936:172), thought that the warrior's arm and hand were grasping the outer edge of a shield - indeed a strange way to handle a shield! The contour map indicates that what was understood as a hand is part of the outer beaded border of the shield and it is due to a fissure that the border is not quite in level. The man obviously also wears beaded borders on his coat, which may also have evoked the referred interpretation. The profile map (fig 10) strongly supports the interpretation we got from the contour map. On the contour map we can also note a set off relief, indicating an armllet.

The motif has its parallels in Valsgärde 7 and Vendel XIV (figs 11-12) and is characterized by Arwidsson as motif B, "the warrior walking leftwards" (Arwidsson

1977:118, cf also the table, p.117). A difference compared to the same motif from Valsgärde is that the man from the east mound carries the shield somewhat raised in front of him, with the arm marked. This detail is a close parallel to the figure from Vendel XIV, although here the shield is held in a still lower position. Contrary to the motif B of Vendel and Valsgärde the man in the east mound wears a coat and not a frock.

Item 3 (figs 15-16)

Item 3 is another fragment with a shield (figs 15-16) that may be from a motif of a walking warrior, in this case however most probably a warrior walking rightwards, motif A (cf fig 13) following Arwidsson (1977, 118). The shield is ornamented as a whirl and the whirl moves to the right which makes it probable that also the carrier moved in that direction. The whirl ends or starts at a border with six knobs, most probably the place where the handle is attached to the back. It has broken at this point and the unhampered outer edge indicates that the shield was raised in the way characteristic of motif A.

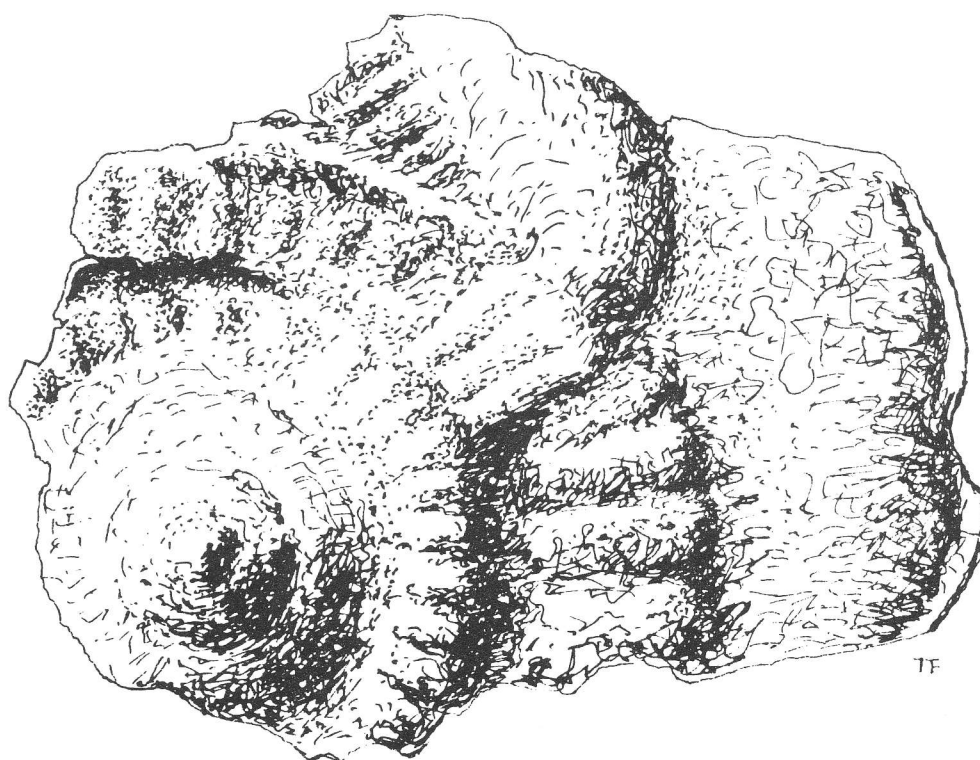


Fig 8. Drawing of item 2, Motif B, the warrior walking leftwards. Scale 10:1.

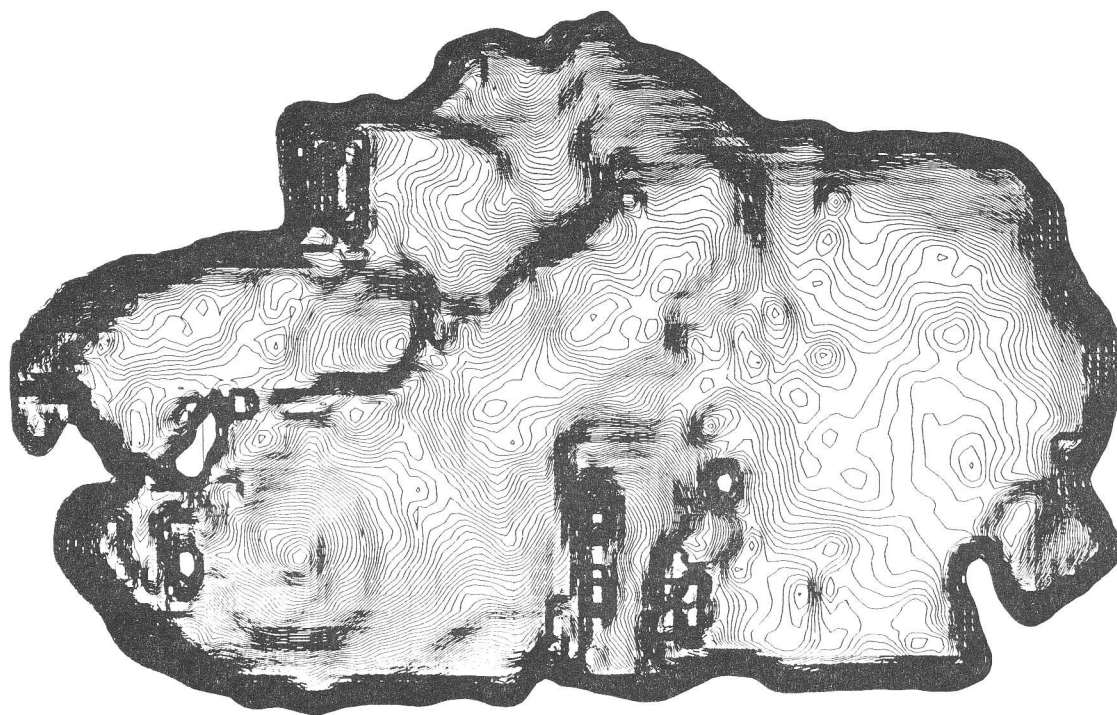
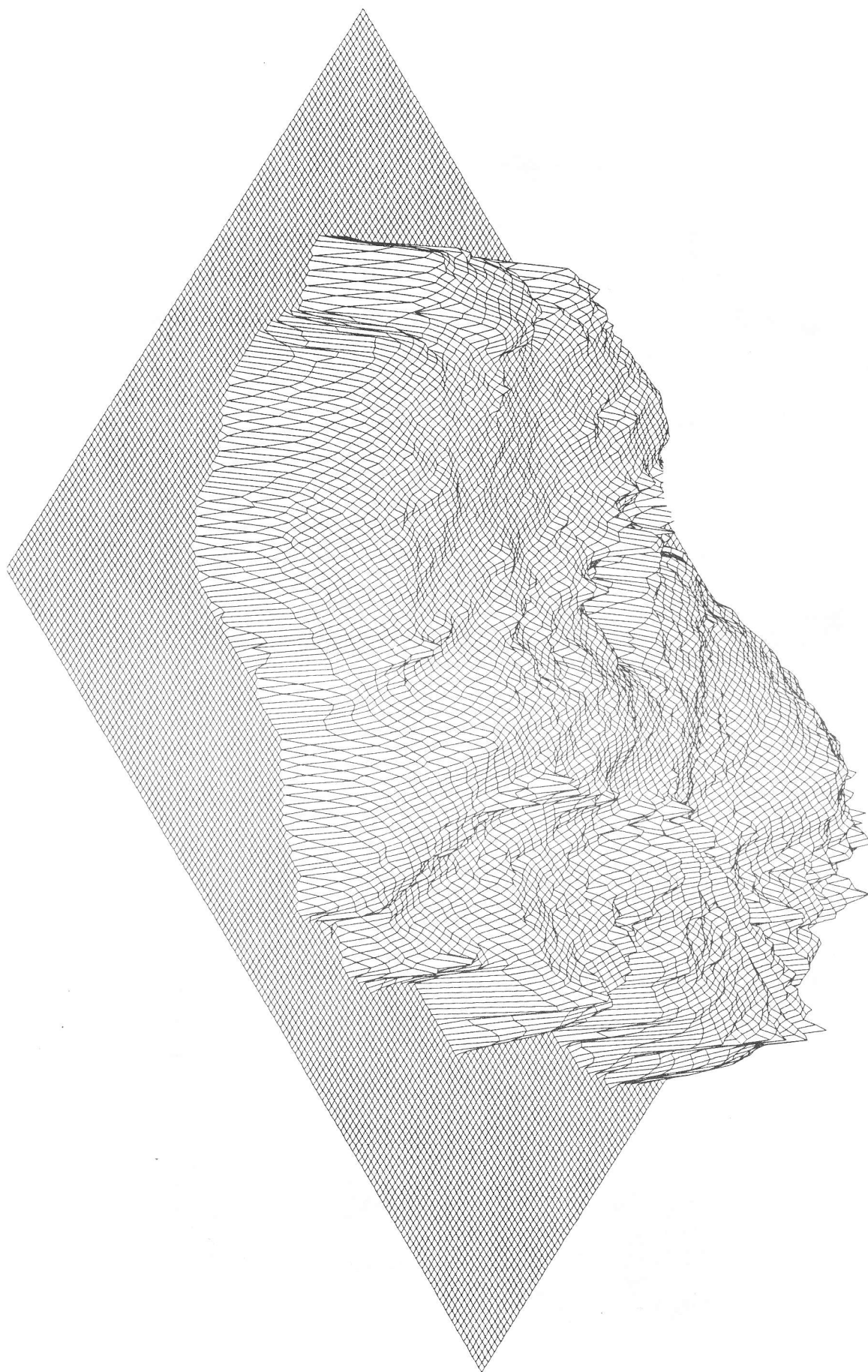


Fig 9. Contour map of item 2. Scale 10:1.

Fig 10. Profile map of item 2. Scale 10:1.



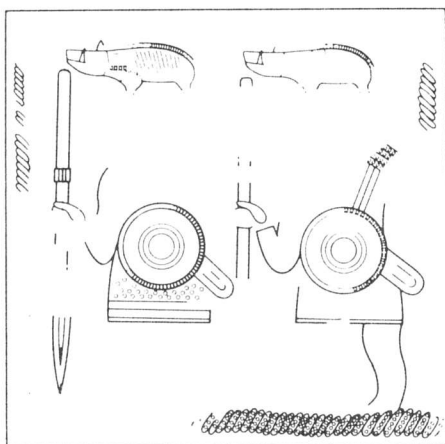


Fig 11. Motif B, the warrior walking leftwards. After Arwidsson 1977. Scale 10:1.

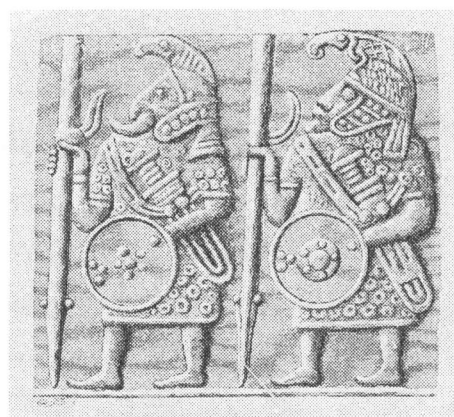


Fig 12. Motif B from Vendel XIV. After Stolpe and Arne 1912. Scale 1:1.

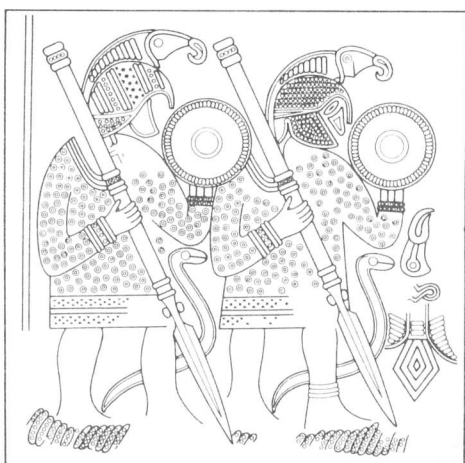


Fig 13. Motif A, the warrior walking rightwards, from Valsgärde 7. After Arwidsson 1977. Scale 1:1.

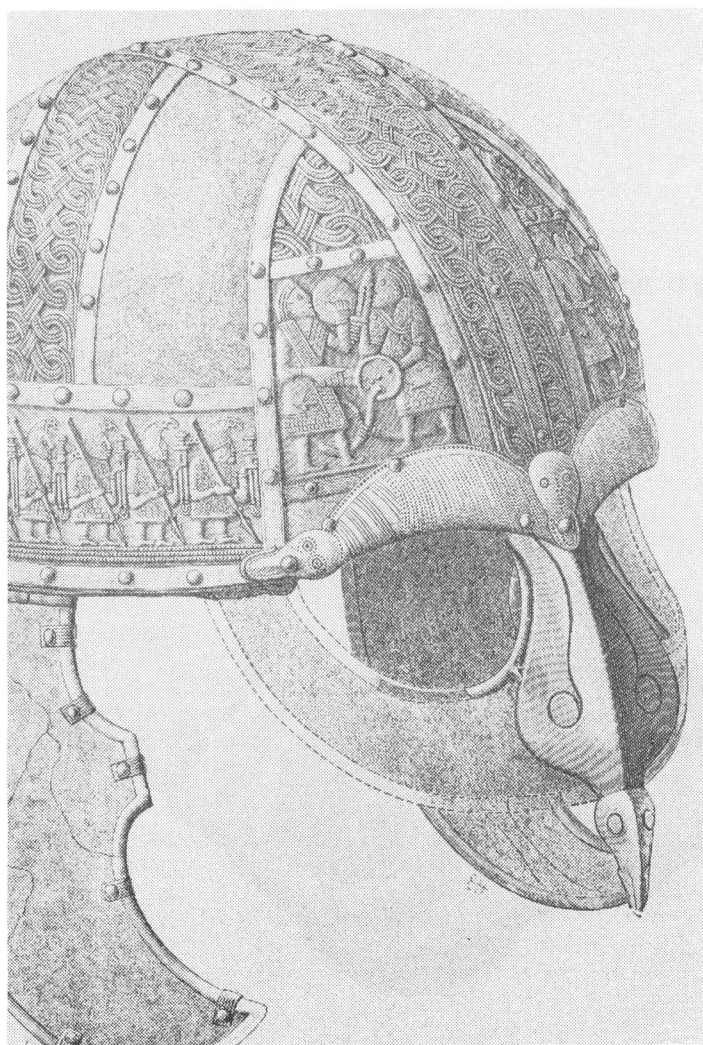


Fig 14. The helmet from Vendel XIV, with motif A. After Stolpe and Arne 1912. Scale 1:2.

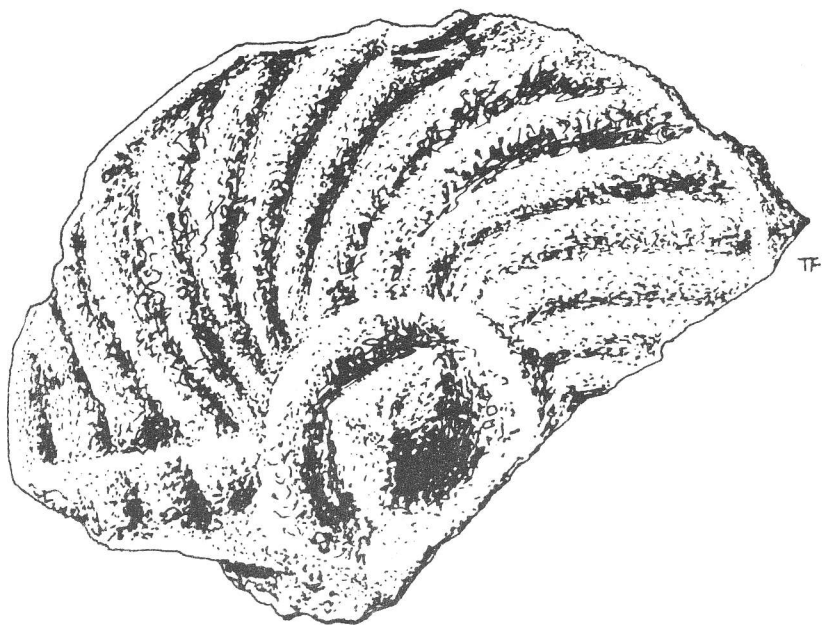


Fig 15. Drawing of item 3, a shield from motif C, cf fig 13. Scale 10:1.

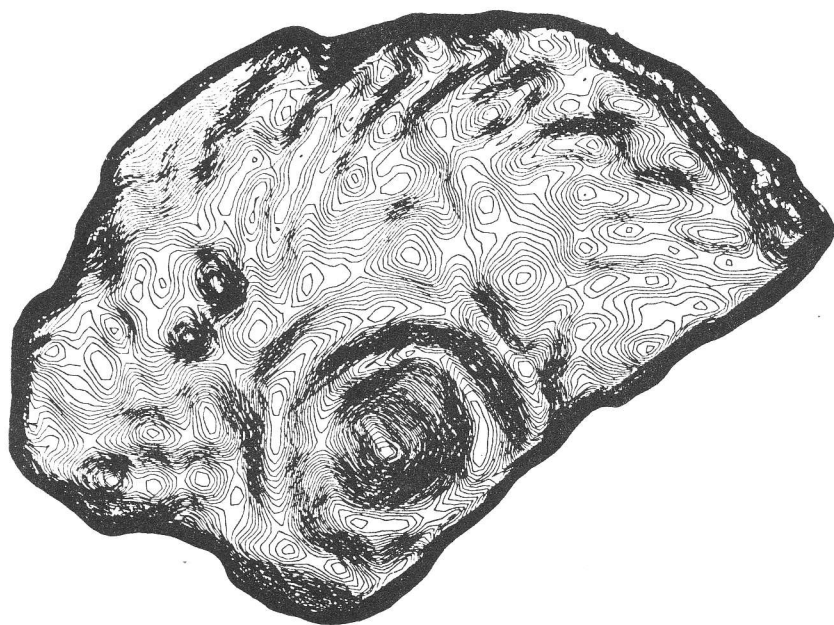


Fig 16. Contour map of item 3. Scale 10:1.

Item 4 (figs 17-19)

There is yet another fragment, item 4, which might belong to motif A (figs 17-19), showing the head of a snake and beside it perhaps a part of the wing of a bird. In the drawing the head of the snake has no eye but this detail is undoubtedly there on the contour map (fig 18) as well as the profile map (fig 19).

Item 5 (figs 21-22)

A more intricate figure is represented on item 5 (figs 21 and 22). The drawing and the contour map follow each other except on the upper right, where the contour map shows some more lines. I have interpreted this fragment as a part of motif C (cf Arwidsson 1977:118), a man riding rightwards, with a fallen warrior below the horse (cf fig 23). The fragment is showing a part of the body of the fallen warrior and his raised shield. I am inclined to see the lines to the right as part of one

horseleg treading on the fallen man. The man is dressed in a striped frock. There are probably more details from motif C (cf below).

Item 6 and 7 (figs 20, 25-26)

A tiny fragment, item 6, might be the head of the fallen warrior (fig 20, no drawing). Item 7 (figs 25-26) can probably be identified as the big knot belonging to the harness on the belly of the riding horse, which here has a more rounded shape than in Valsgärde 7 (fig 30) and comes close to the knot on this motif in Vendel I (fig 24). It also resembles the motif of Vendel I in showing vertical lines, probably parts of the saddle blanket (in Vendel I only depicted in the front, probably due to secondary corrosion). The drawing (fig 25) and the contour map (fig 26) differ, as the contour map gives clear indications of the continuation of the band upwards and to the right, just as in Vendel I.

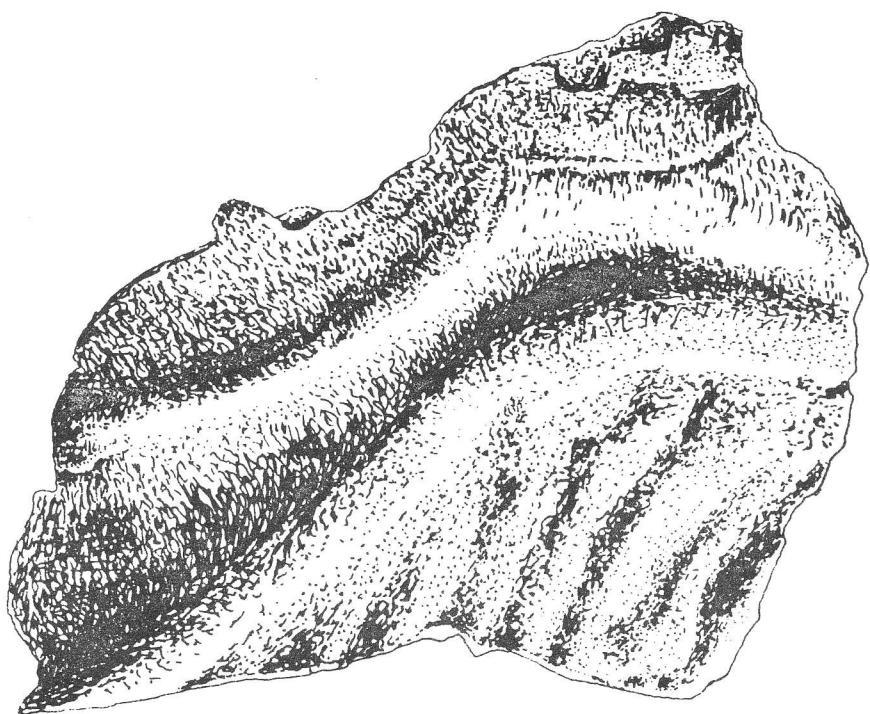


Fig 17. Drawing of item 4, the head of a snake and part of a bird's wing from motif A, cf fig 13. Scale 10:1.

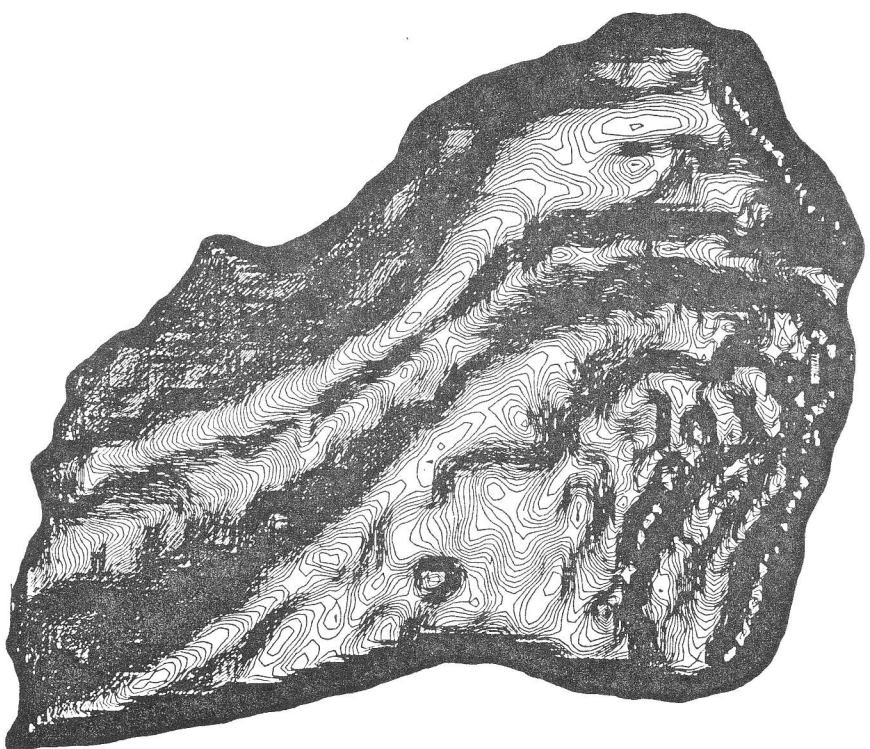


Fig 18. Contour map of item 4, where the head of the snake is more clearly marked. Scale 10:1.

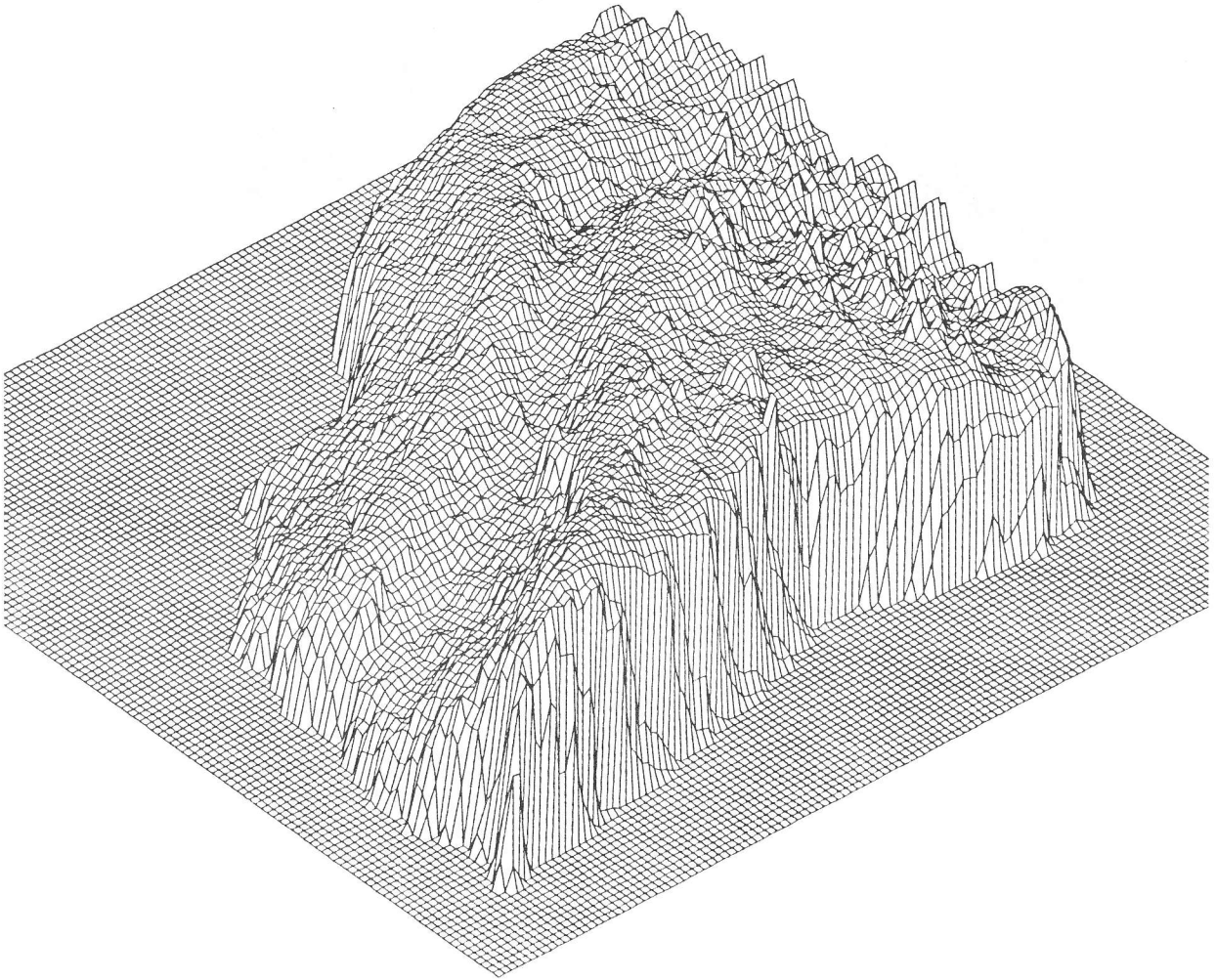


Fig 19. Profile map of item 4, showing that the head of the snake with its eye. Scale 10:1.

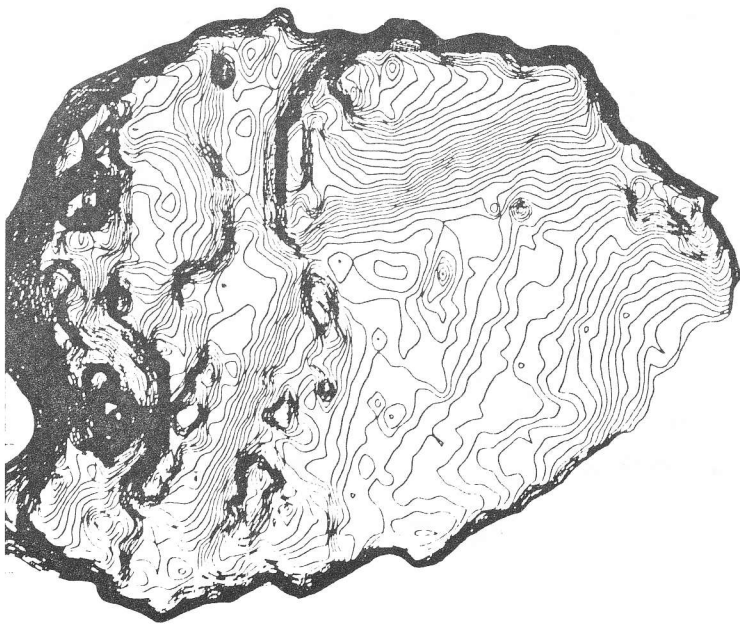


Fig 20. Contour map of item 6, perhaps part of item 5, fig 21 showing the head of a fallen warrior. Scale 10:1

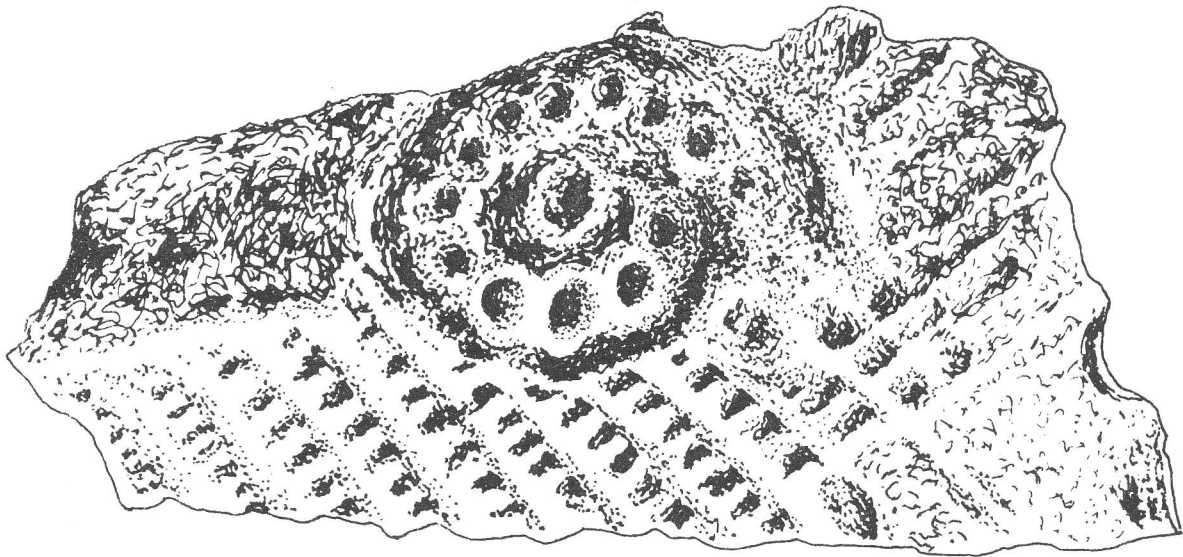


Fig 21. Drawing of item 5, the fallen warrior, part of motif C, a rider riding rightwards. Scale 10:1.

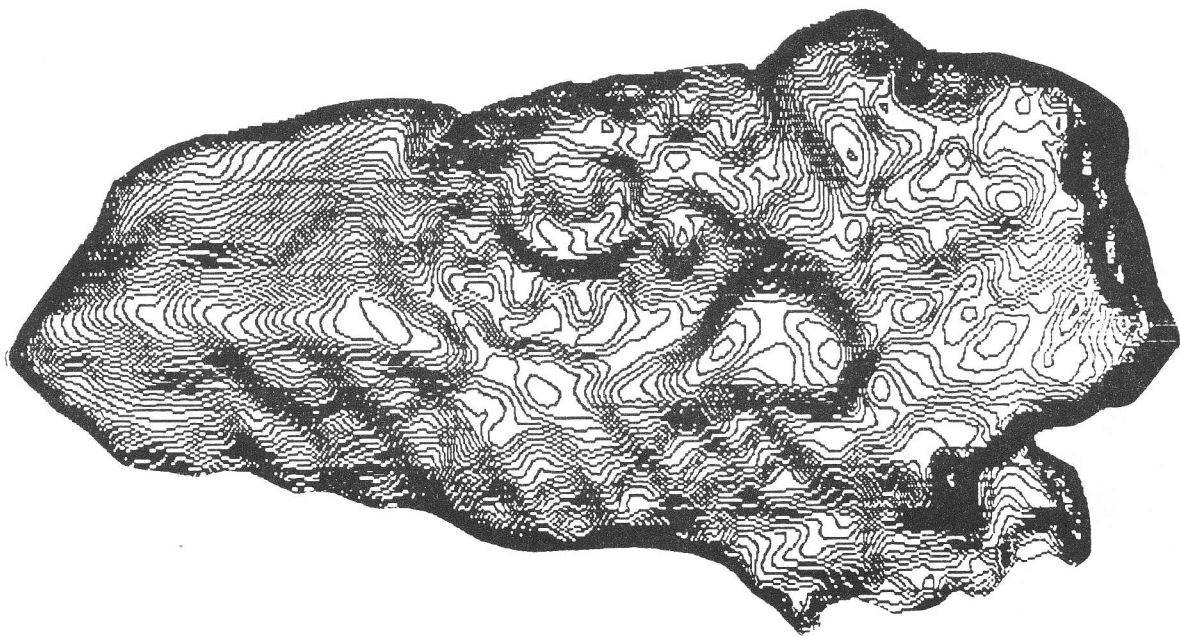


Fig 22. Contour map of item 5. Scale 10:1.

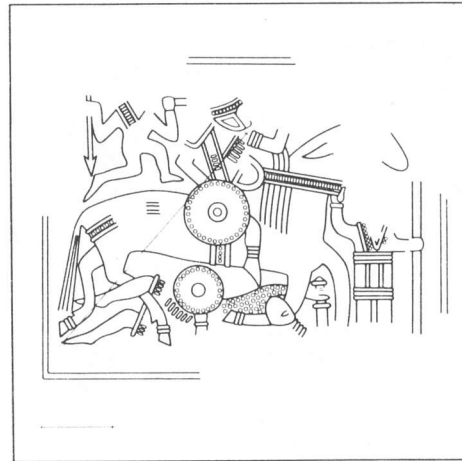


Fig 23. Motif C, a rider riding rightwards with a fallen warrior from Valsgärde 7. After Arwidsson 1977. Scale 1:1.

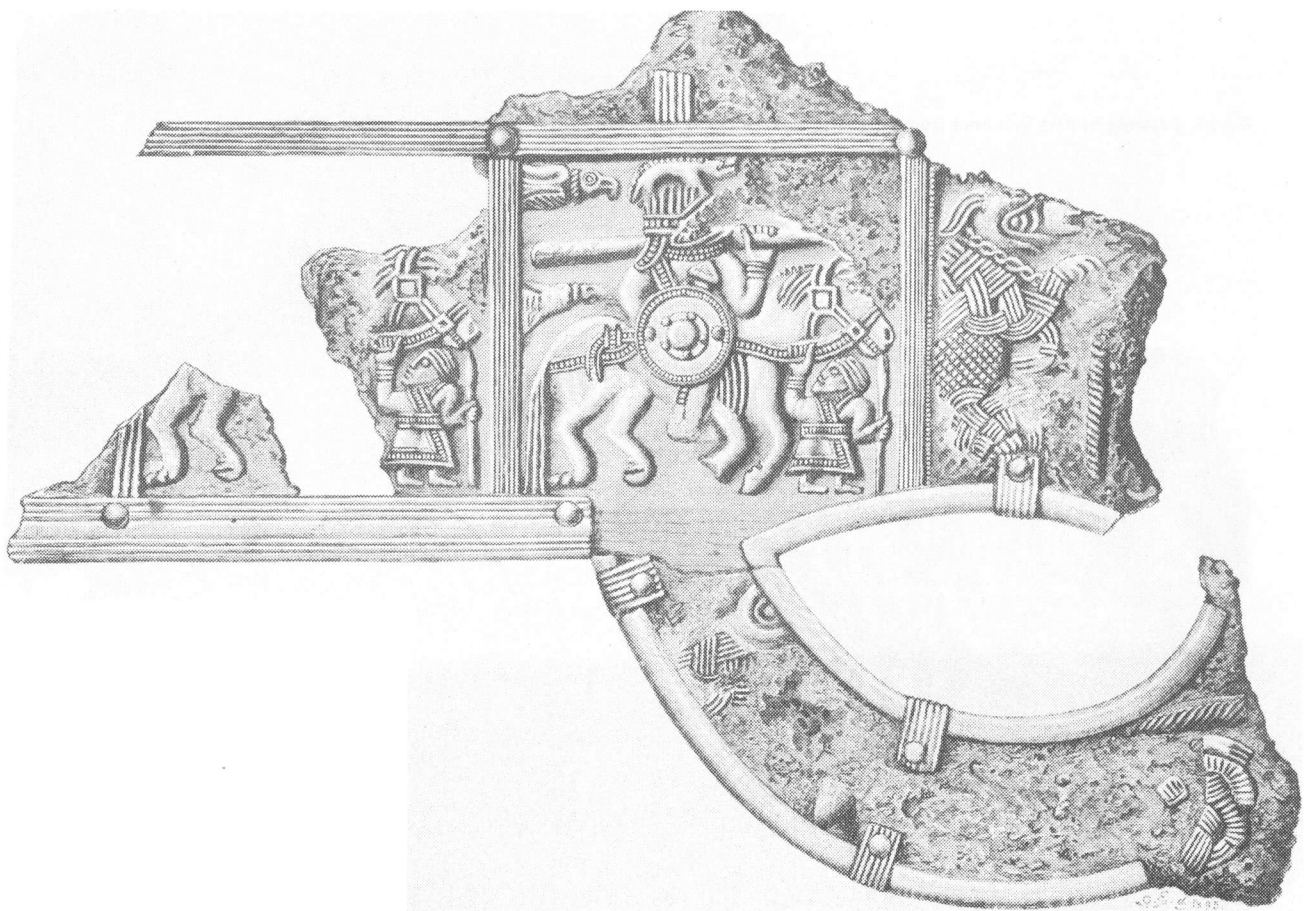


Fig 24. Motif C, a rider riding rightwards from Vendelgrave I. Note that here no fallen warrior is depicted. After Stolpe and Arne 1912. Scale 1:1.

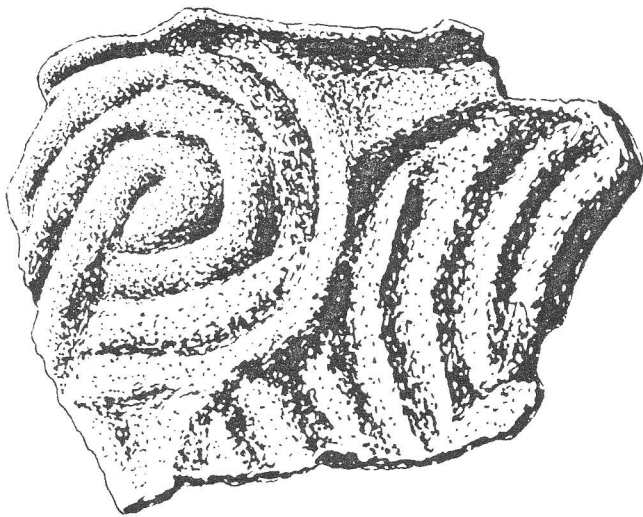


Fig 25. Drawing of item 7, a knot from the harness on the belly of a horse belonging to motif C. Scale 10:1.

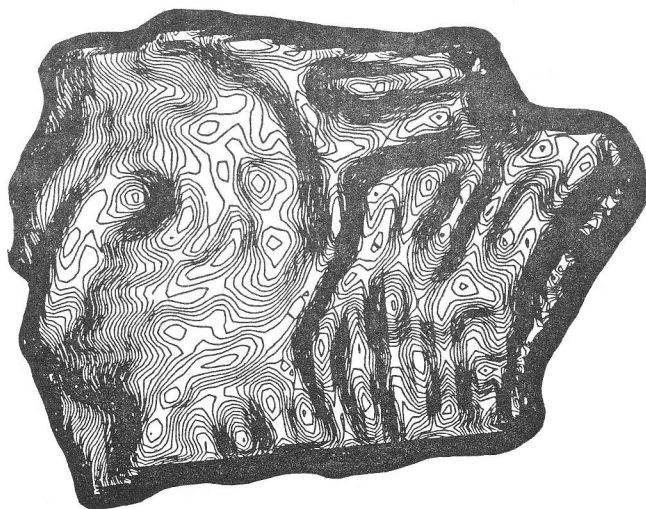


Fig 26. Contour map of item 7. Scale 10:1.

Item 8 (figs 27-28)

Item 8 (figs 27-28) shows the face in profile of a small man, an attendant turning his head upwards. Most probably the attendant is holding the rein of the horse (cf fig 29) but the beaded shape of the rein is different from the band consisting of three ribbons which form the harness on motif C (figs 25-26). Like in Vendel (cf fig 29) but also in Valsgärde and Sutton Hoo, the band in the harness has the same shape as the rein. Therefore this item most probably belongs to the other rider's motif, motif D, a man riding leftwards. Motif D has no such attendant in Vendel I (cf fig 32) and Valsgärde 7 (fig 30); on the other hand the attendant exists in Valsgärde 8 (fig 31), although here with the man seen from the front. This might be one of the minor differences that altogether characterize these motifs (thus in Vendel I the fallen warrior is missing, etc). The drawing (fig 27) differs from the contour map (fig 28) in that the nose is more distinct on the contour map. The line bordering the rein is also more clear on the contour map.

Item 9 (figs 33-34)

There is another fragment, item 9, that may belong to a rider's scene, although it is difficult to interpret (figs 33-34). It is a three-parted oval detail which might be part of the intertwined legs of the horse and the fallen man, but I am not sure of this interpretation.

Item 10 (figs 36-37)

With item 10 (figs 36-37) we have a part of another motif, probably motif F, a man between two bears (cf Arwidsson 1977:119; and here, fig 38; compare also fig 43). The fragment represents the box-shaped body and seems to be broken at the top just at the bear's neck and at the bottom where the legs protrude. The body is bordered with a beaded line, and the same beaded lines, but now slanting, fill the body. The contour map (fig

37) and the drawing (fig 36) are very close, but the transition to the neck is more distinct on the contour map.

Item 11 (figs 45-48)

One fragment, item 11 (figs 45-47), gives evidence of the motif with a man and a beast (cf figs 39, 40, and 44). Arwidsson has not described this motif, as it does not occur in Valsgärde, but following her scheme (Arwidsson 1977:table p.117) it would be appropriate to call it motif H (the beast to the right) and I (the beast to the left). The fragment has obviously been broken since Lindqvist first published it (Lindqvist 1936:fig 88c; here fig 45, and the old drawing, fig 35), and was repaired with heavy glue. When I tried to dissolve the glue, it appeared that some parts only consisted of glue and therefore disappeared. That there was originally bronze is clear from the drawing (fig 35), published originally by Lindqvist 1936. Our drawing (fig 46) was made before the dissolution of the glue, whereas the laser beam measuring was made afterwards. The glue obviously has affected the drawing (fig 46). The contour map (fig 47) although missing one part on the upper right and one part on the lower left, gives a more detailed picture. On the fragment the body of the beast is depicted to the left, and the right leg of the man to the right. Between the man and the beast a heavy leash is seen. The leash also makes the collar around the neck of the beast. The leash can be especially well studied on the profile map (fig 48), where it is indicated that it consists of a twisted cord. On the contour map (fig 47) it looks as if the man wears trousers with a three-part pattern. On our drawing (fig 46) and on the old drawing (fig 35) there are indications of this pattern being striped. The body of the beast is clearly striped. Most probably the man's arm and hand keeping the leash were shown on the part now lost, and altogether we seem to have a picture close to the one from Torslunda (fig 44), but the patterns on both the beast and the man's trousers differ.

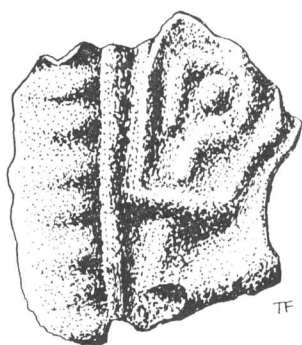


Fig 27. Drawing of item 8, the face of an attendant belonging to motif D. Scale 10:1.

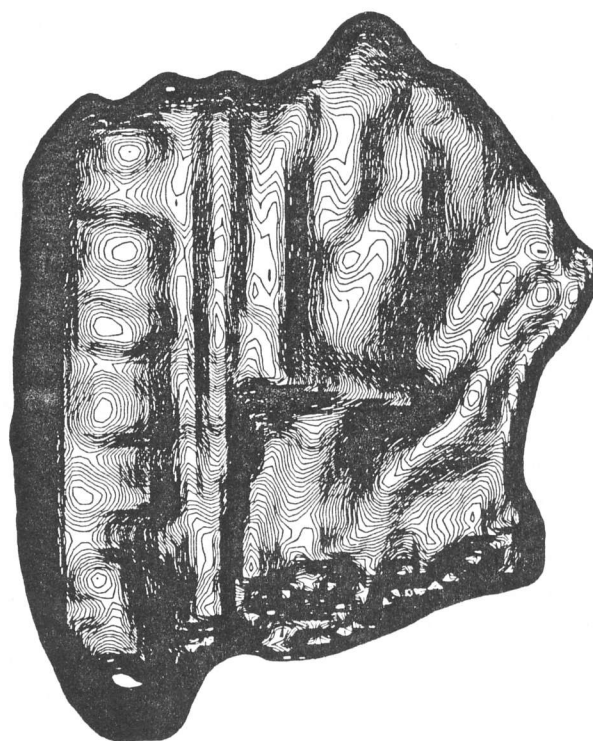


Fig 28. Contour map of item 8. Scale 10:1.

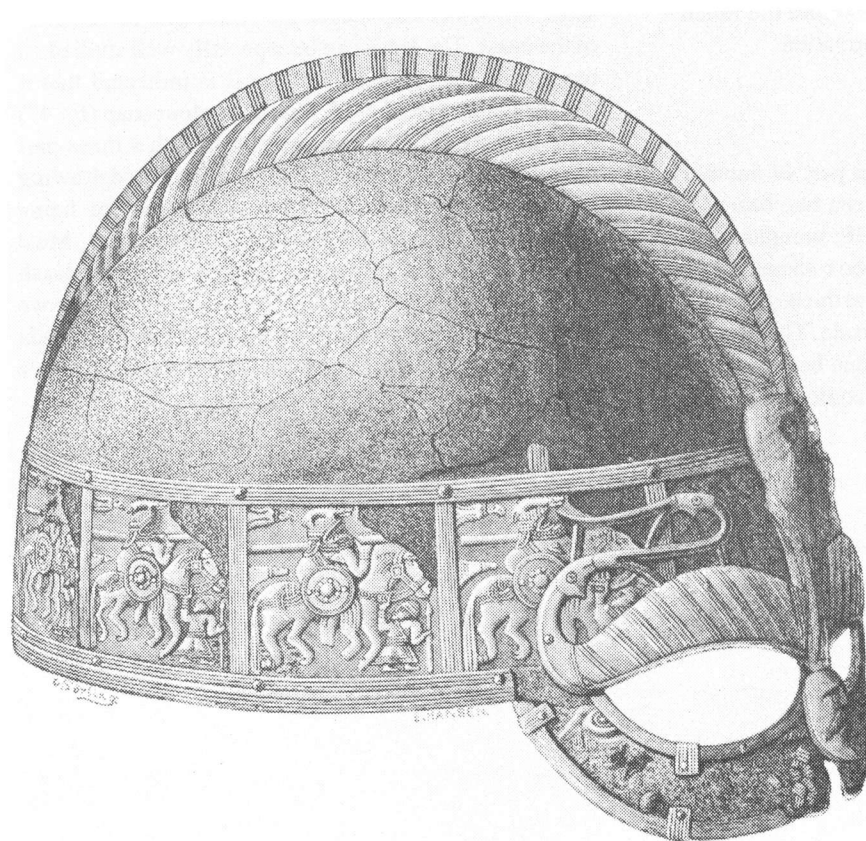


Fig 29. Helmet fragment from Vendel I with motif C. After Stolpe and Arne 1912. Scale 1:1.

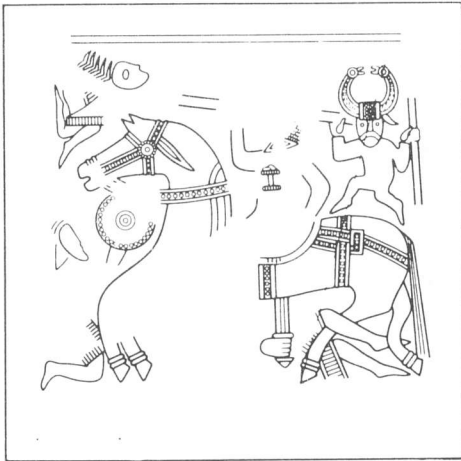


Fig 30. Motif D from Valsgärde 7. After Arwidsson 1977. Scale 1:1.



Fig 31. Motif D from Valsgärde 8. After Sandvall 1980. Scale 1:1.

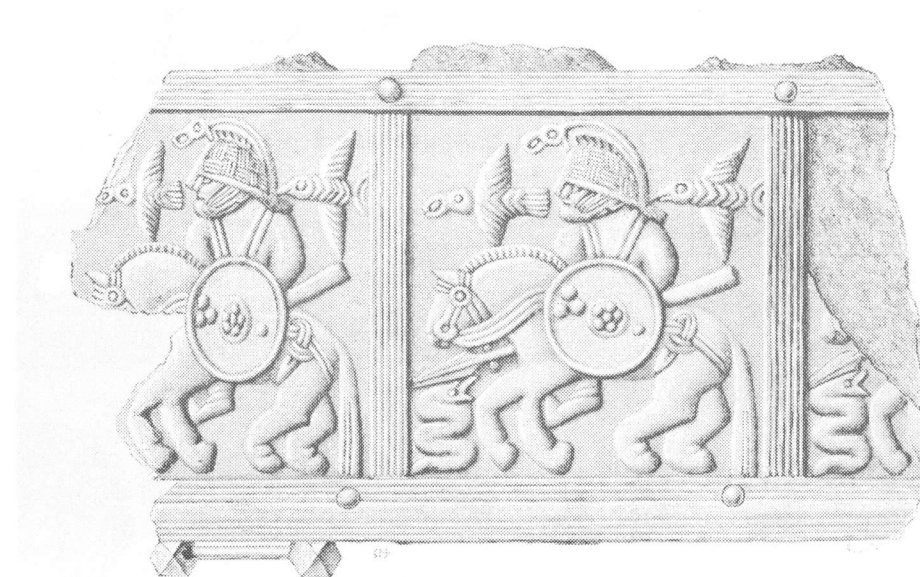


Fig 32. Motif D from Vendel I. After Stolpe and Arne 1912. Scale 1:1.

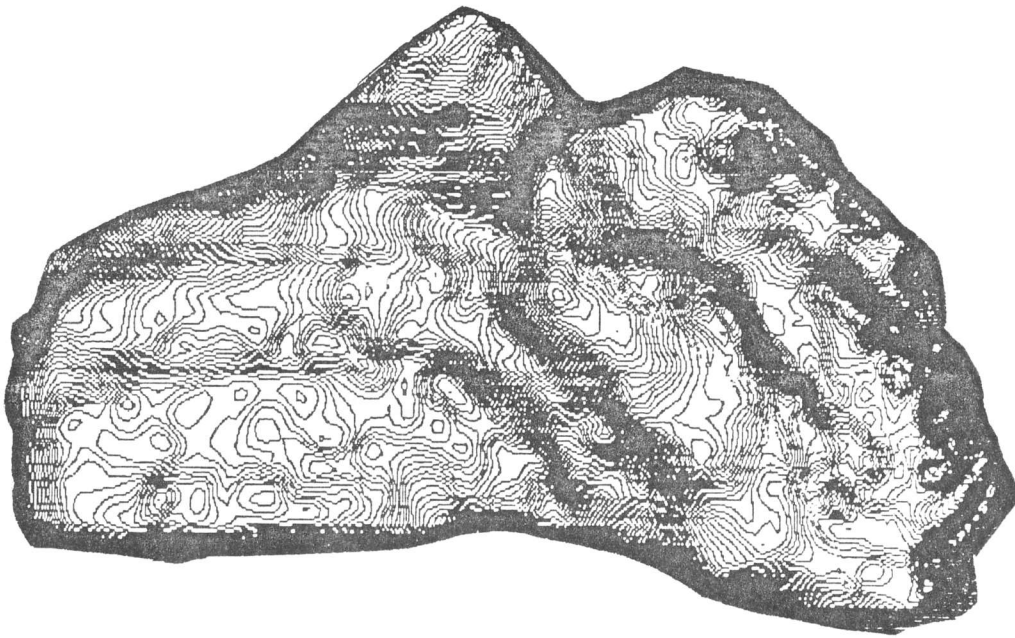


Fig 33. Contour map of item 9, part of the legs of a fallen warrior (?). Scale 10:1.

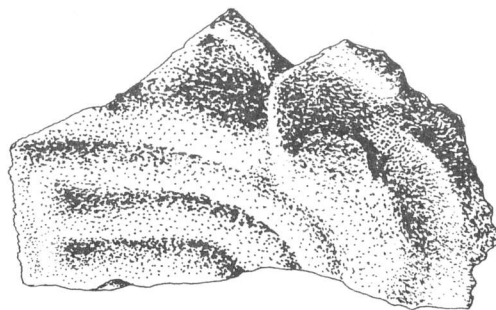


Fig 34. Drawing of item 9. Scale 5:1.

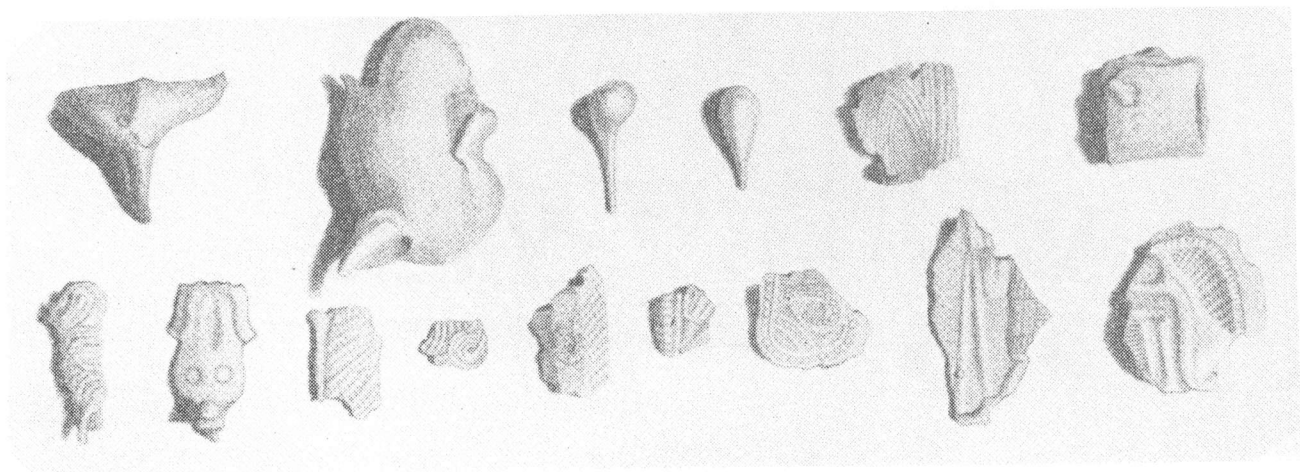


Fig 35. Old drawing of some of the "pressblecks" from the east mound at Old Uppsala. After Lindqvist 1936. Scale 1:1.

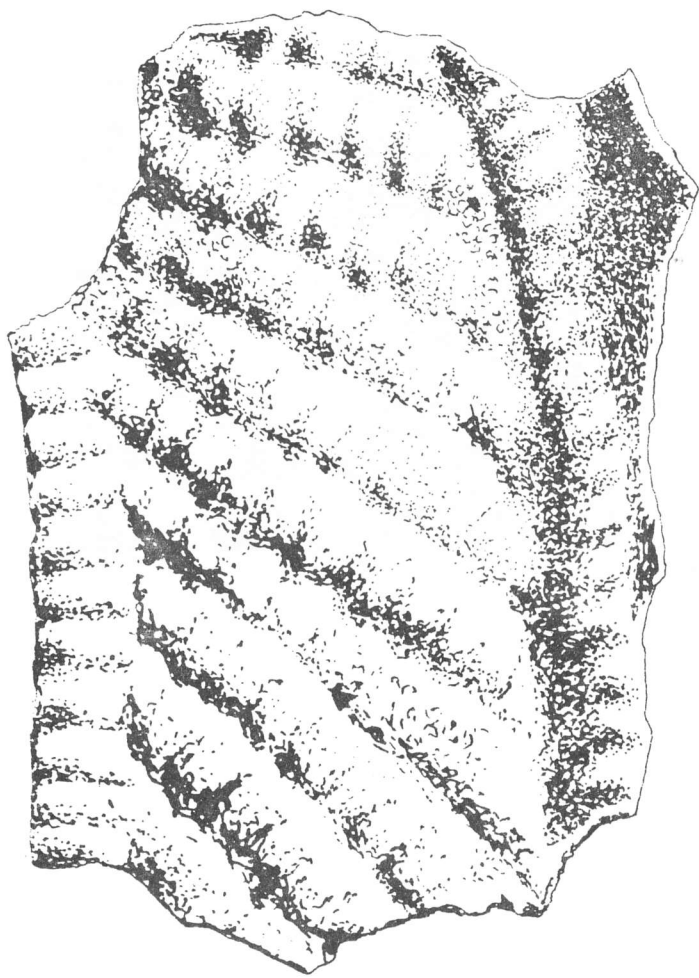


Fig 36. Drawing of item 10, the body of a bear from motif F. Scale 10:1.

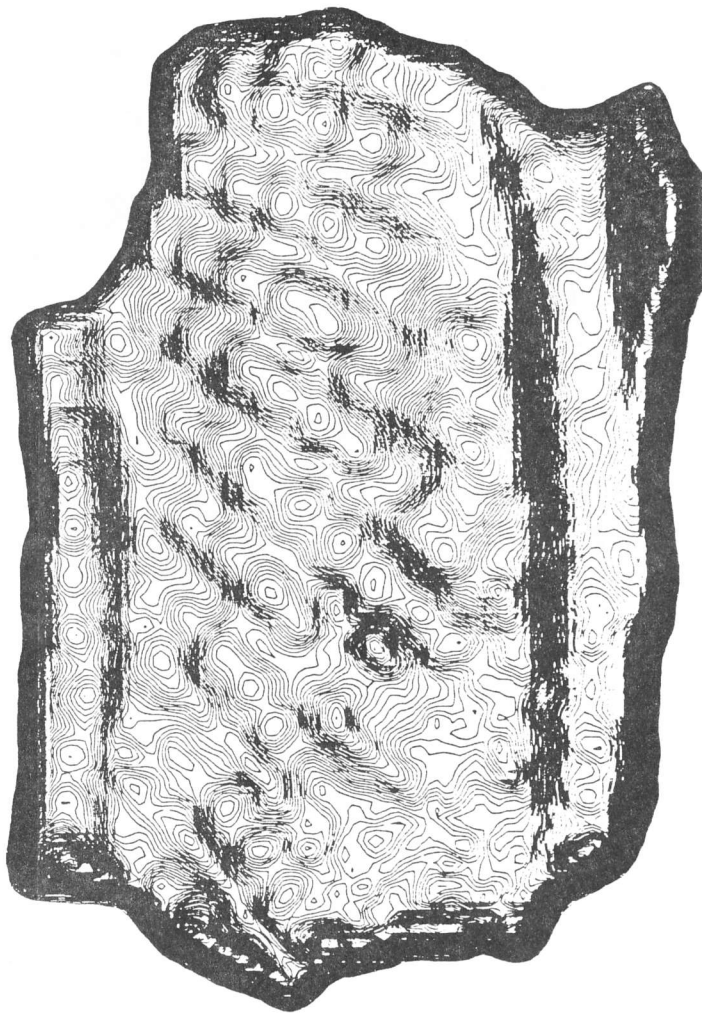


Fig 37. Contour map of item 10. Scale 10:1.

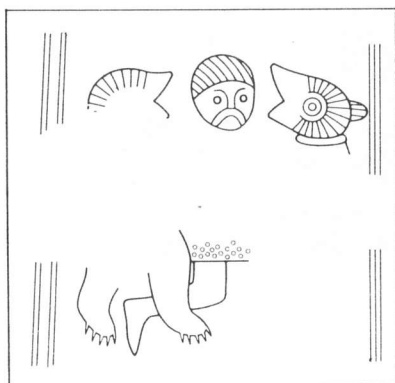


Fig 38. Motif F from Valsgärde 7. After Arwidsson 1977. Scale 1:1.

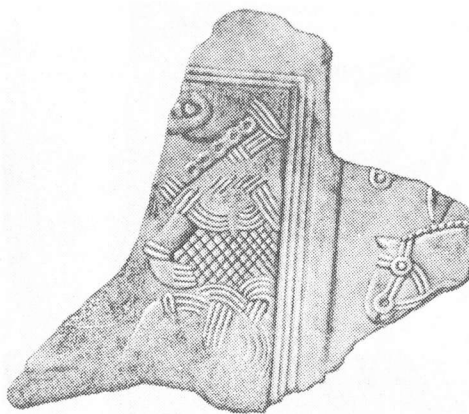


Fig 39. Motif H, a man with a beast to the right, from Vendel I. After Stolpe and Arne 1912. Scale 1:1.

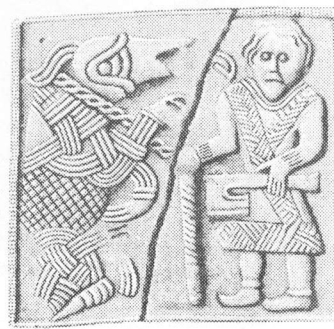


Fig 40. Motif I, a man with a beast to the left, from Vendel I. After Stolpe and Arne 1912. Scale 1:1.



Fig 41.



Fig 43.



Fig 42.



Fig 44.

Fig 41-44. Drawings of the Torslunda plates. After Sandvall 1980. Scale 1:1.



Fig 45. Photo of item 11. After Lindqvist 1936. Scale 2:1.

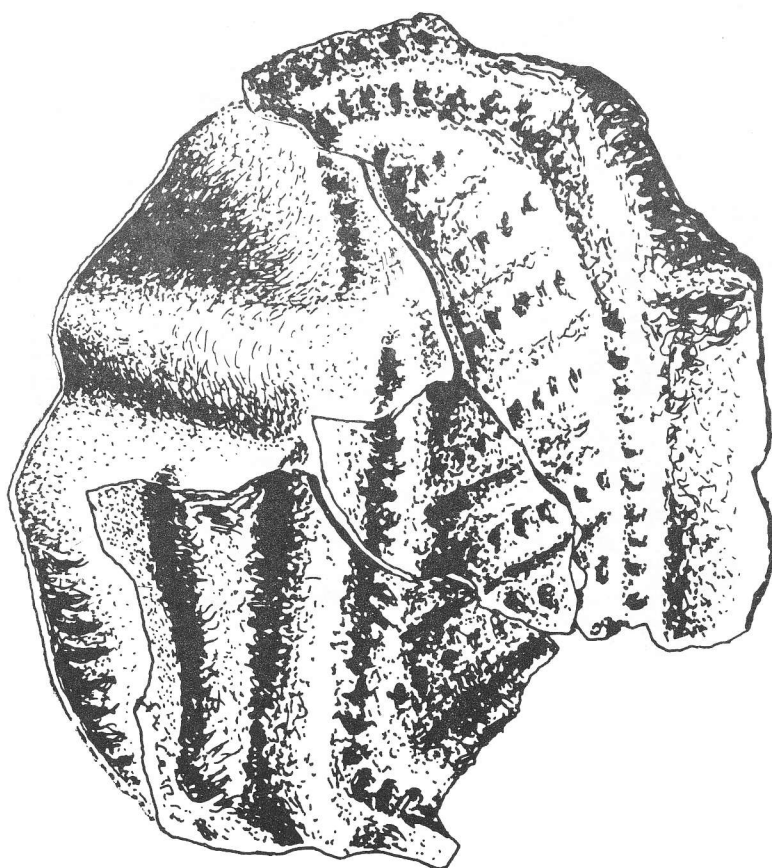


Fig 46. Drawing of item 11, motif H, a man with a beast to the right. Scale 5:1.

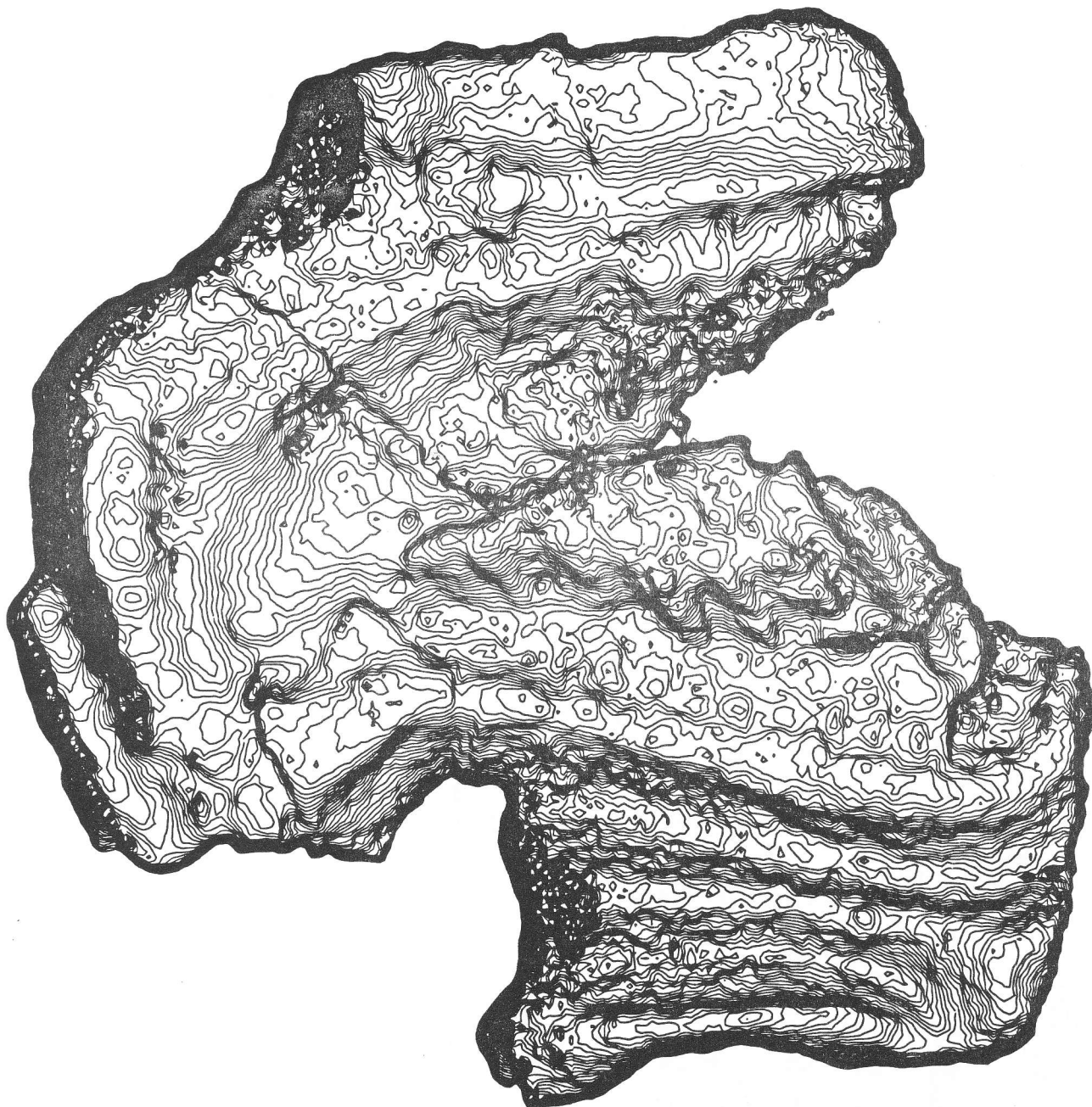


Fig 47. Contour map of item 11.
Scale 10:1.

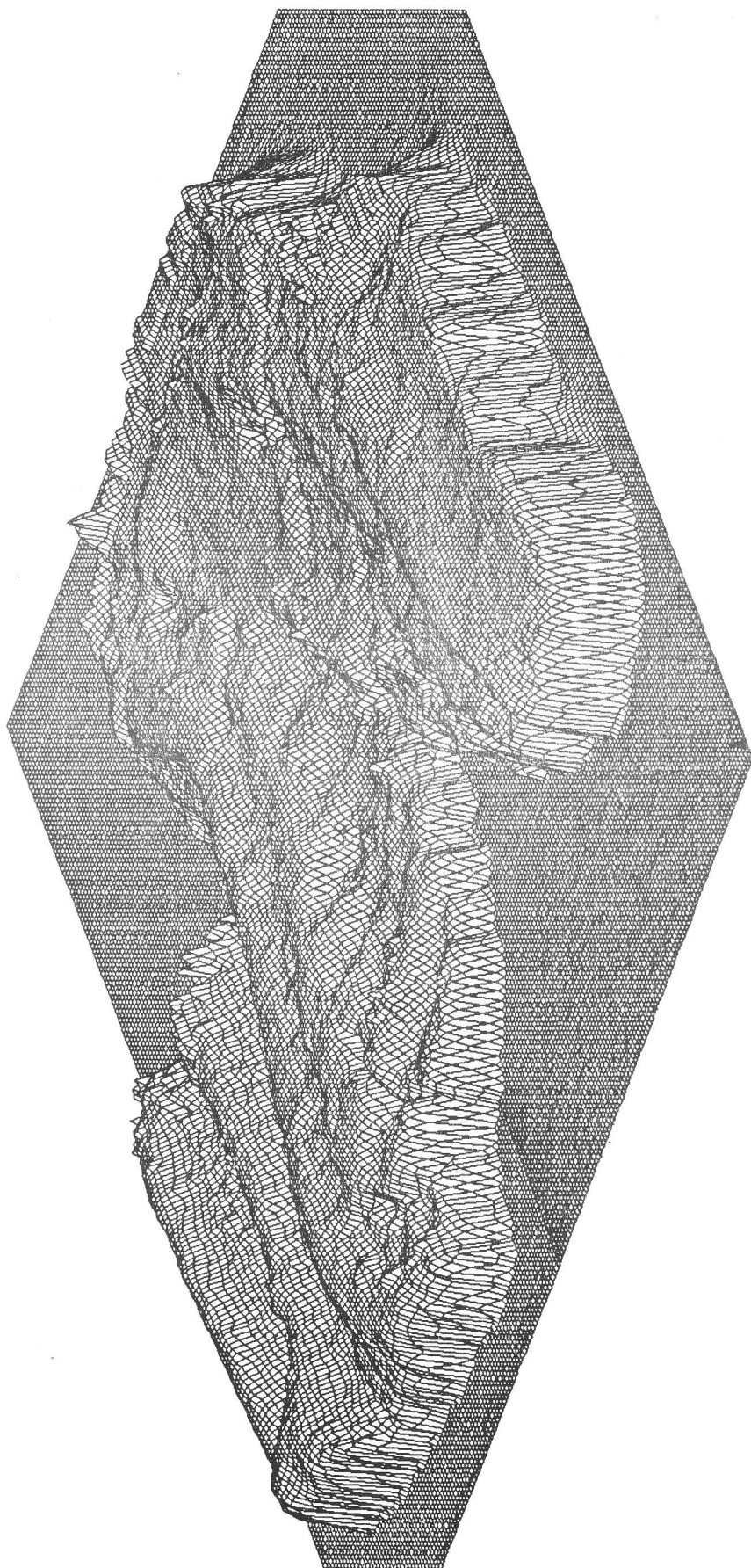


Fig 48. Profile map of item 11. Note the twisted cord of the leash. Scale 10:1.

Item 12-14 (figs 49-50, 52-55)

Besides these fragments with anthropomorphic ornamentation there are three fragments with interlace (figs 49-50, 52-53, and 54-55), which all show interlaces based on beaded strands. The pattern is very close to Vendel XIV (figs 14 and 51). The drawings and the contour maps are close, one can only note that on figs 54-55 a repair with heavy glue in the center of the fragment has distorted the contour map. I am not quite convinced that this repair is really correct, i.e. that the two parts of the fragment have true fitting.

Item 15 (figs 56-57)

There is another fragment with interlace, item 15 (figs 56-57), however in this case made with fine lines and no true beading. The fissures have caused great distortions on the contour map (fig 56), although the very fine lines on this fragment are clearly depicted. It might be that this fragment is a secondary repair as it has no parallels on other helmets. For secondary repairs on helmets cf Arwidsson 1977:25.

Item 16 (figs 60, 62)

Besides the fragments mentioned above there is a fragment, item 16, with beaded moulding (figs 60 and 62). Mouldings of this kind can either border pictures (cf figs 41, 42 and 44, the Torslunda plates) or it can represent the ground, as on the pictures from Valsgärde 7 (figs 11 and 13). In this case I am however inclined to judge the fragment as part of the ground belonging to an actual picture, probably the motifs with the walking warriors (cf figs 11 and 13). The reason for this is that there are remains of a bronze sheet on both sides of the moulding.

Item 17 (figs 63-64)

Finally a large animal head, item 17, is depicted (figs 63-64). The head is clear and very typical of the period. The drawing (fig 63) and the contour map (fig 64) follow each other closely, although a fissure crossing in the middle of the head makes some damage to the contour map. The head is cast in one piece with a bandlike mount, bent in an angle and penetrated with a nail. I am therefore inclined to believe that this is the mount connecting the nosepiece to the helmet cap. An animal head has this function on for example the helmet from Vendel XIV (fig 14). On the helmet from Vendel XIV the head is passing over in a bandlike mount, fixed with nails to the calotte band and most probably the nail on our Uppsala mount have had this function. The head is broken just where the nail fastening the nosepiece should be. There is another example of this kind of mount used on the animal head (fig 58). Most probably these types of mounts have been used as borders all around the lower edge of the cap of the helmet.

Item 18 (fig 61)

The "pressbleck" fragments described above seem to consist of seven of nine known motifs found on the Swedish helmets. No duplicate of a motif was however found. For a long time I thought that item 18 (fig 59) was a duplication of the shield from the motif with the fallen warrior. However, when Lindqvist (1936) published that fragment (fig 61), he added another piece to it which shows that the shield cannot belong to a fallen warrior, but most probably to the rider or his attendant (cf figs 30-31). The fragment is now so broken that a contour map gives no more elucidation.

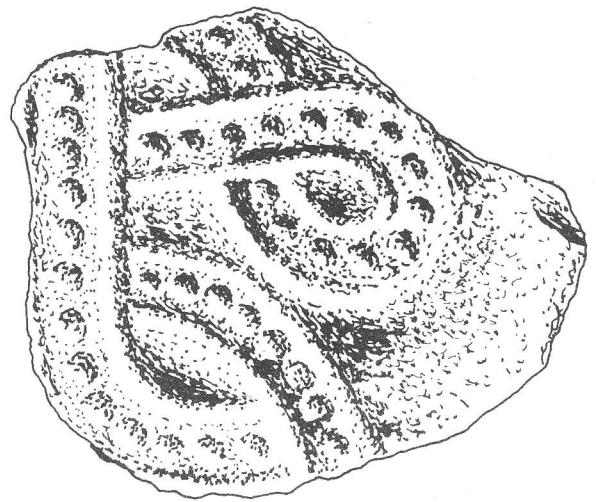


Fig 49. Drawing of interlace, item 12. Scale 5:1.



Fig 50. Contour map of interlace, item 12. Scale 10:1.

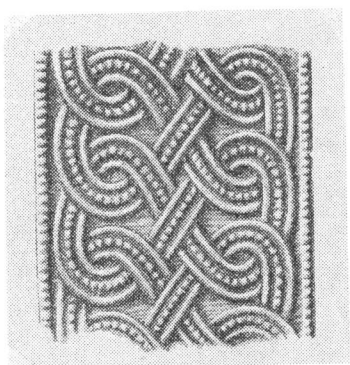


Fig 51. Interlace from Vendel XIV. After Stolpe and Arne 1912.
Scale 1:1.

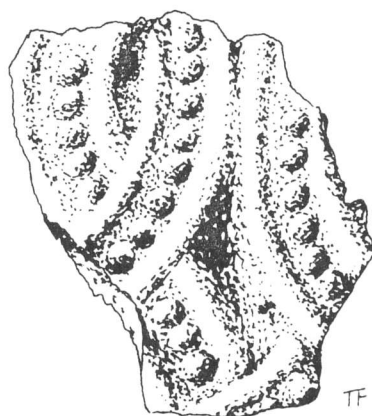


Fig 52. Drawing of interlace, item 13. Scale 5:1.



Fig 53. Contour map of interlace, item 13. Scale 10:1.

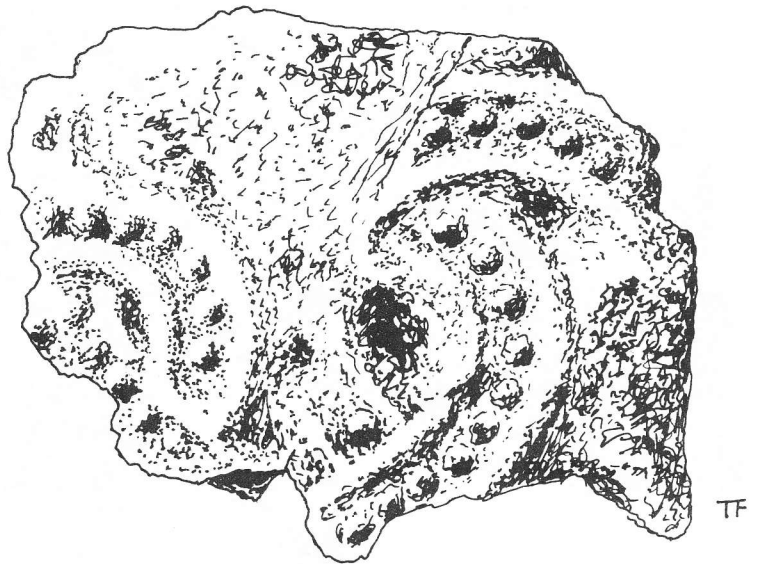


Fig 54. Drawing of interlace, item 14. Scale 5:1.

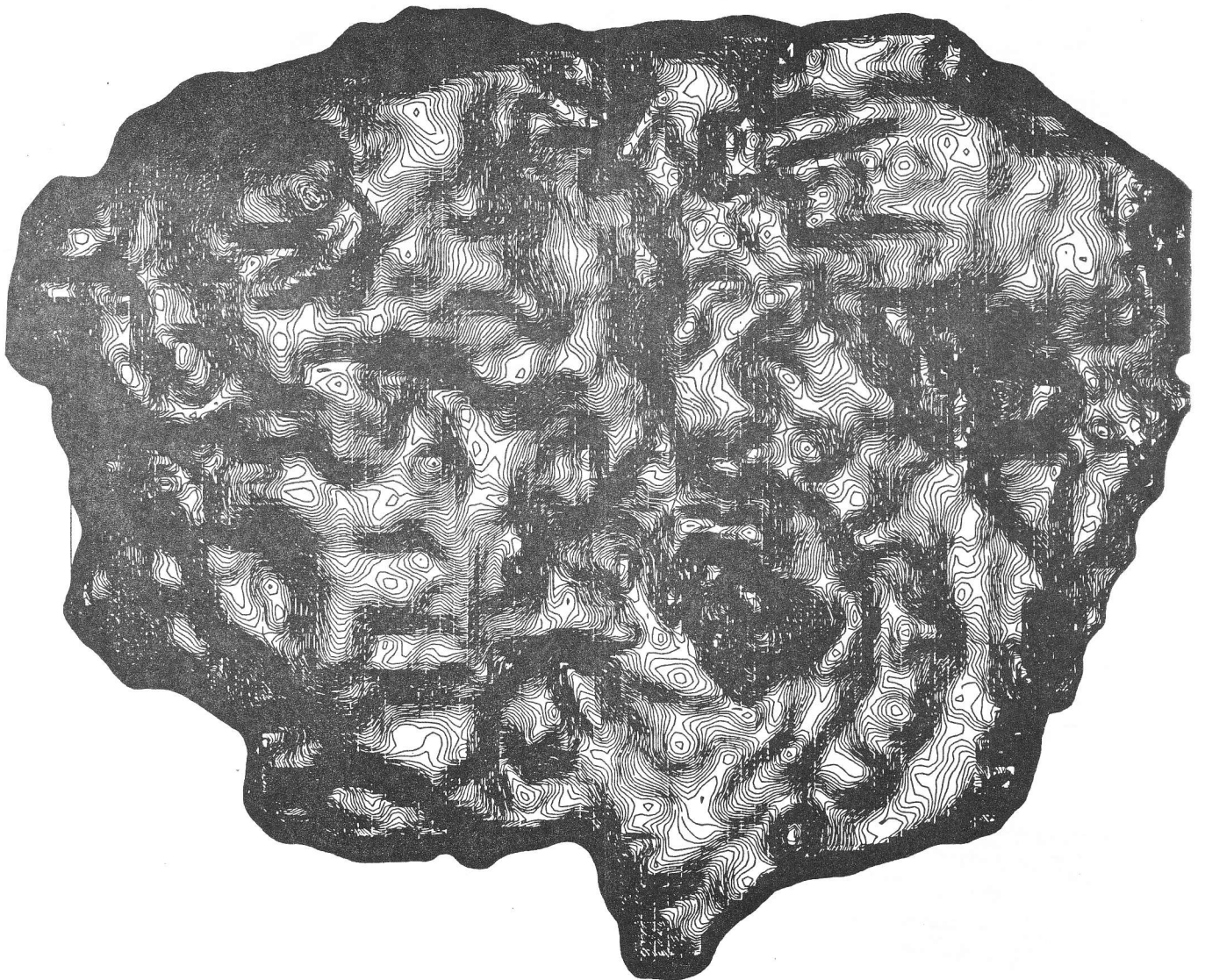


Fig 55. Contour map of interlace, item 14. Scale 10:1.

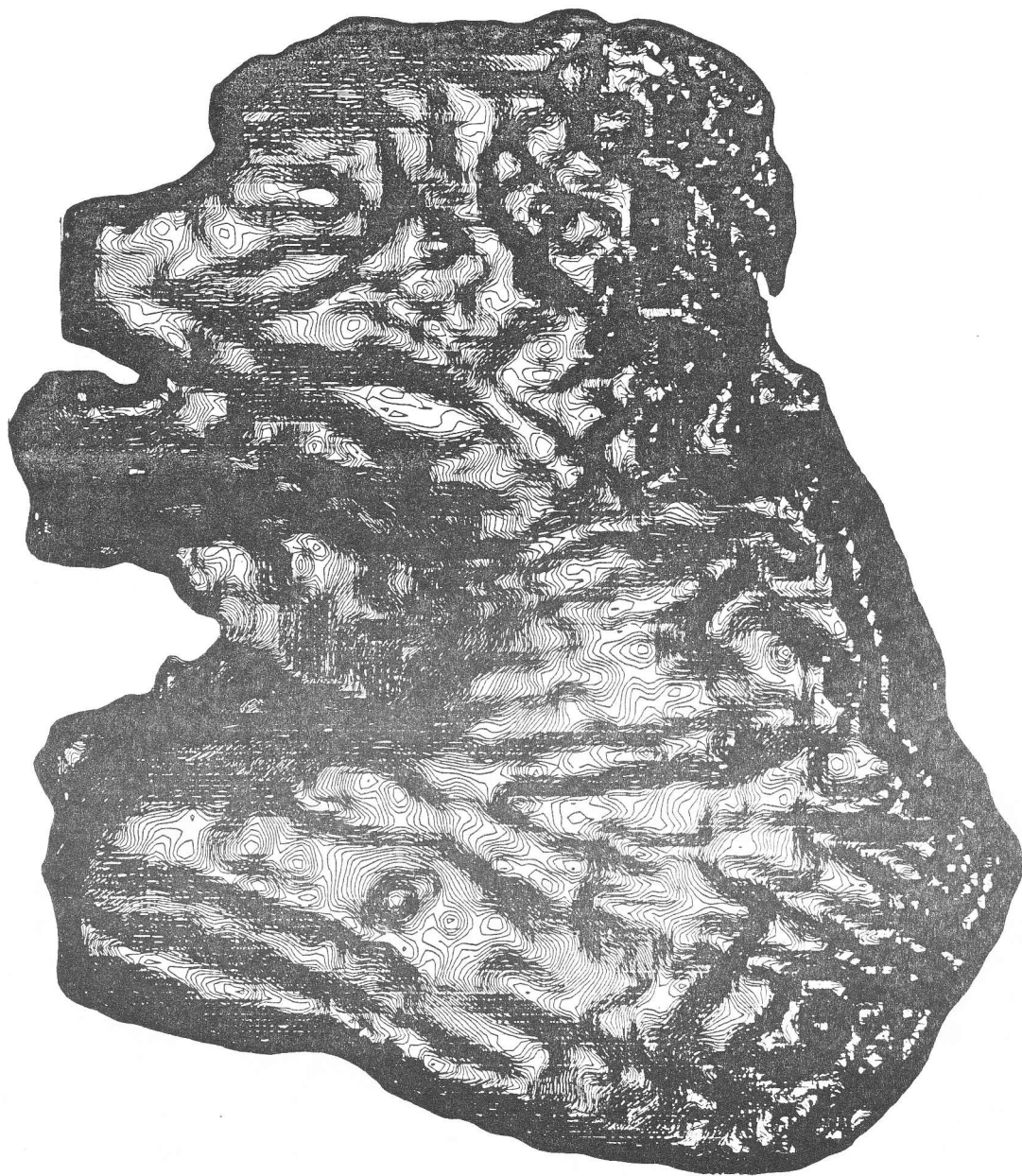


Fig 56. Contour map of interlace, item 15. Scale 10:1.

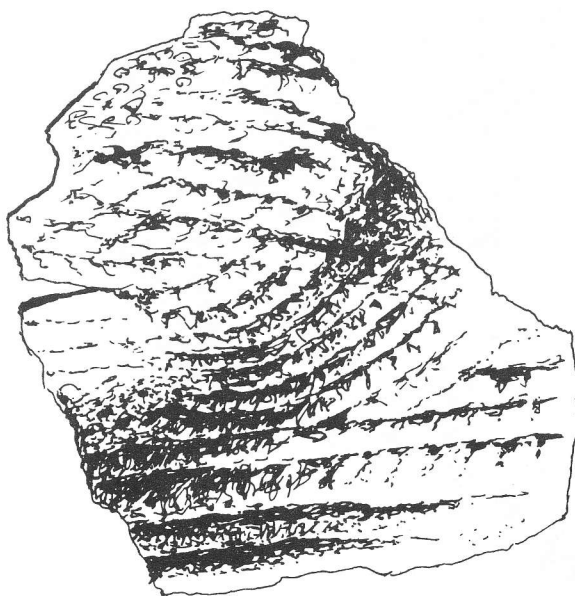


Fig 57. Drawing of interlace, item 15. Scale 10:1.

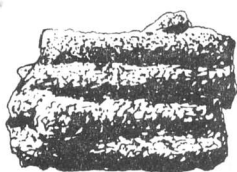


Fig 58. Drawing of a rectangular mount with mouldings. Scale 10:1.

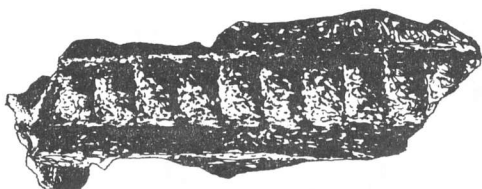


Fig 60. Drawing of item 16, beaded moulding. Scale 5:1.

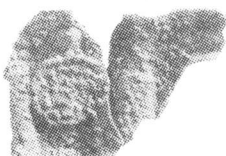


Fig 61. Photo of item 18 with addition of a part now missing. After Lindqvist 1936. Scale 2:1.

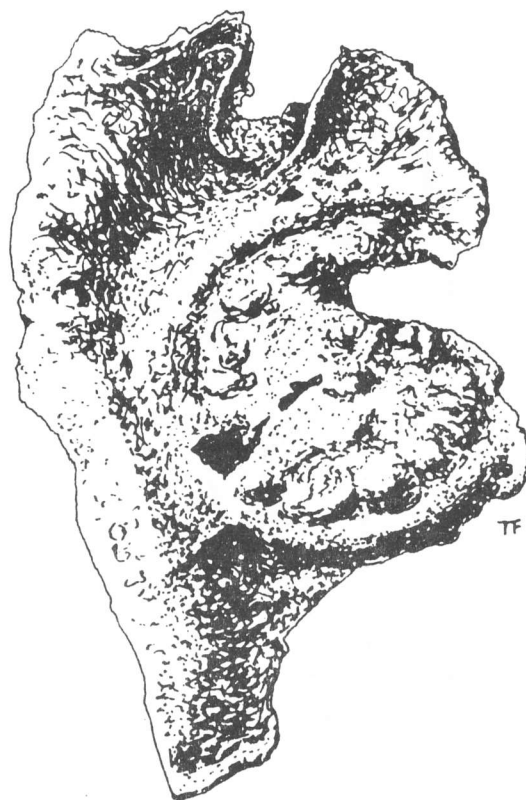


Fig 59. Drawing of item 18, probably a shield of a rider from motif C or D. Scale 5:1.

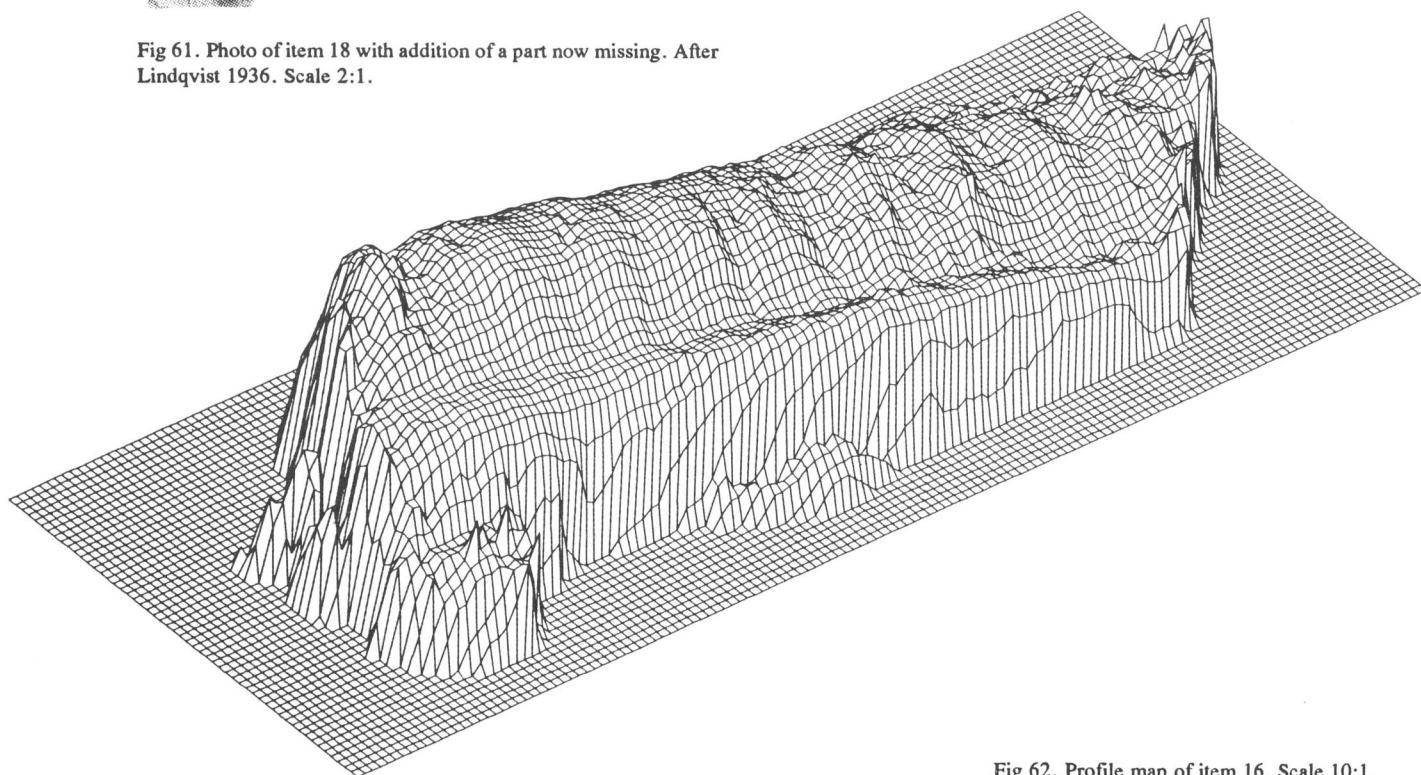


Fig 62. Profile map of item 16. Scale 10:1.

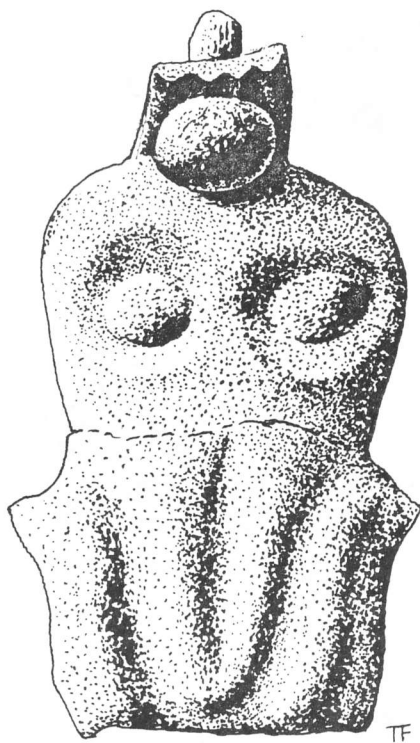


Fig 63. Drawing of animal head, item 17. Scale 10:1.

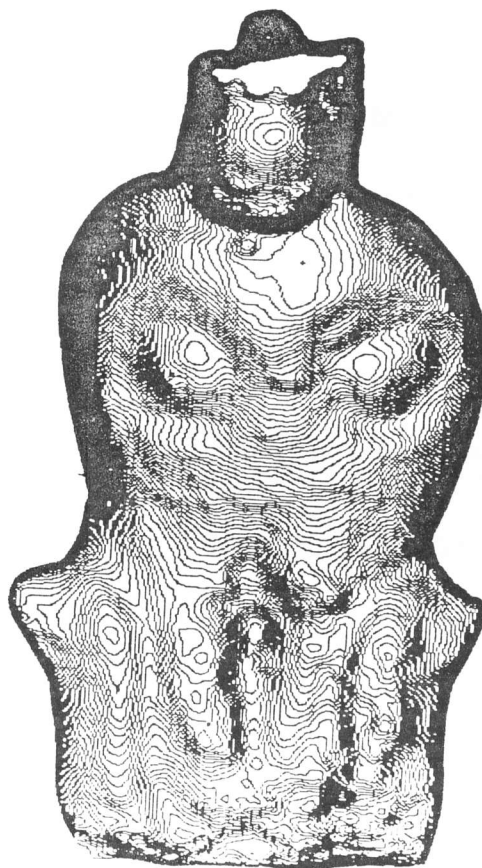


Fig 64. Contour map of item 17. Scale 10:1.

Conclusions

The comparison made above between the contour maps and the drawings show that the contour map is an excellent tool for verifying interpretations made with the naked eye. This means that a contour map cannot be used alone, as it always needs an interpretation. I am, however, convinced that a renewed study of other "pressblecks" with the aid of contour maps will reveal many new details.

Although the examined "pressblecks" from the east mound only represent one fifth of the existing fragments, the other being without ornaments or too tiny to make an interpretation possible, the fact that no duplicates of the "pressblecks" with anthropomorphic designs exist, is remarkable and is in clear contrast to the "pressblecks" with interlace, which occur in several duplicates. It is also in contrast to what we know from the ornamentation of the other helmets where the anthropomorphic "pressblecks" occur in rows containing several pictures with the same motif. But it is also remarkable that the gravefind does not contain any pieces of iron parts from the helmet. This fact makes it plausible that there was no iron helmet at all, but a helmet made of leather. Leather helmets, made of laced thongs, are known from Avarian graves at Kerch (cf Thordeman 1939:281ff), and the find of a leather helmet in the grave of the infant prince at Cologne (cf Werner 1964) indicates that leather helmets were well known in the period when the grave in the east mound was arranged. It is beyond the scope of this paper to go further in the discussion of the occurrence of leather helmets. One should, however, consider the fact, which Monica Alkemade also observed dealing with the Vendel helmets (Alkemade 1991:290), that the helmets depicted on the "pressblecks" are of another type than the true Vendel helmets. I agree with Alkemade that the pictures show an older helmet type, and the reason that this type is never found must be that the helmets were made of organic material, most probably leather. It is of importance that this type of helmet was not only depicted on "pressblecks", but also on Migration period ornaments, the so called "helmet and hand"-style (cf Kendrick 1938:fig 14). That the leather helmet had a fringe of decorative "pressblecks" is very possible and could mark the beginning of putting more metal on the helmets. The observation, made by Arwidsson 1977 (24) that the "pressbleck" on the helmet from Valsgärde 7 were mounted on leather may also indicate that the metal helmets have had predecessors in leather.

Before we leave the "pressblecks" from Uppsala, it should be pointed out that they seem to have had a size somewhat smaller than the other known "pressblecks".

The fragmentation has made it necessary to estimate their size, which seems to have been around 3.5 cm, whereas the "pressblecks" from Vendel and Valsgärde measure around 4.5 cm. One can not exclude that the small size of the helmet, indicated by the "pressblecks", shows that the leather helmet, just as in Cologne, was made for an infant prince. The old discussion of the missing remnants from a man (cf Lindqvist 1936:207) should perhaps be reevaluated. A renewed study of the cremated bones may here give new aspects.

Technical description of the laser scanner (by Henry Freij)

The figures are produced by an equipment for three-dimensional documentation and analysis of surfaces, developed at the Archaeological Research Laboratory at Stockholm University. It consists of a laser scanner, a data unit and a small gasoline generator for power supply if needed. It is portable, but due to the demand for stability and precision, the total weight is about 70 kilograms. The scanner can operate on both horizontal and vertical surfaces.

On areas up to 20x20 cm a laser beam takes deep-measures with intervals down to 0.025 mm. As a light beam with very low energy is used, there is no risk of damaging fragile objects. Scanning parameters are set on the data unit, scanning and measuring are synchronized and fully automatic, and the result is stored in a computer. Within a 12 mm interval 60 mm from the laser source, the beam diameter is less than 0.1 mm and the distance is measured with an accuracy better than ± 0.002 mm. 3½" data disks are used for permanent documentation. Visual presentation can be made on ordinary MS DOS computers in many different ways by standard graphic programs. The surface can be presented in perspective as a net connecting the measures (profile map), by level-lines (contour map), or, by grey- or colour-scales. It can be viewed from any optional direction in optional perspectives. Scales of length, width and height can be changed independently of each other, and a part of an area can be magnified. Dimensions on the axis can be labeled, coordinates for interesting points defined and profiles through the object shown. To answer specific questions, mathematical-statistical work up of data by adapted programs is possible.

One figure contains about 47,000 vertical measures using about 50% of a 3½" diskette. It takes about 12 hours for the scanner to make this automatic measuring. The figures are based on deep-measures with 0.1 mm intervals.

On the contour map, the data are worked up to suppress slight surface roughness due to corrosion. Every measure is modified by the 24 closest measures, the influence exponentially decreasing with distance. The interval between the level-lines is 0.025 mm. As on topographical maps the line closeness indicates inclination.

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