

Biography of the Fossum Panel

The Fossum panel is doubtless one of the most famous rock art sites in the World Heritage of Tanum (Fig 1). The highly narrative performance of the images and scenes and the general composition of the entire panel have been stressed by yet many scholars over the years (Almgren 1927, Bertilsson 1987, Kaul 1998, Fredell 2003, Ling 2008). In fact, during the initial discussion with the UNESCO World Heritage Centre, to nominate Swedish carvings to the World Heritage List, it was initially considered that it could only apply to one single site in Sweden and the site in Fossum was suggested for this purpose. In retrospect, it may seem strange but the reason then was the

fact that, according to UNESCO, the Swedish legislation was not strong enough to protect the larger coherent archaeological areas. This fear proved to be completely unfounded and when the Rock carvings in Tanum finally was inscribed onto the World Heritage List the area included, except the Fossum hob, more than 600 rock carvings.

The site in question is located at higher ground, at the northeastern part of the World Heritage of Tanum (Fig 2). It follows a trail with several figurative rock art sites, one of these is the panel Balken that include the famous depiction of a sun horse as well as other images and designs. Hence, none of these complex sites were facing the

Fig. 1. The famous and complex rock art site from Fossum, Tanum 255:1, showing warriors and ships along with a variability of social and ritual representations. Photo: Gerhard Milstreu. Source: SHFA.

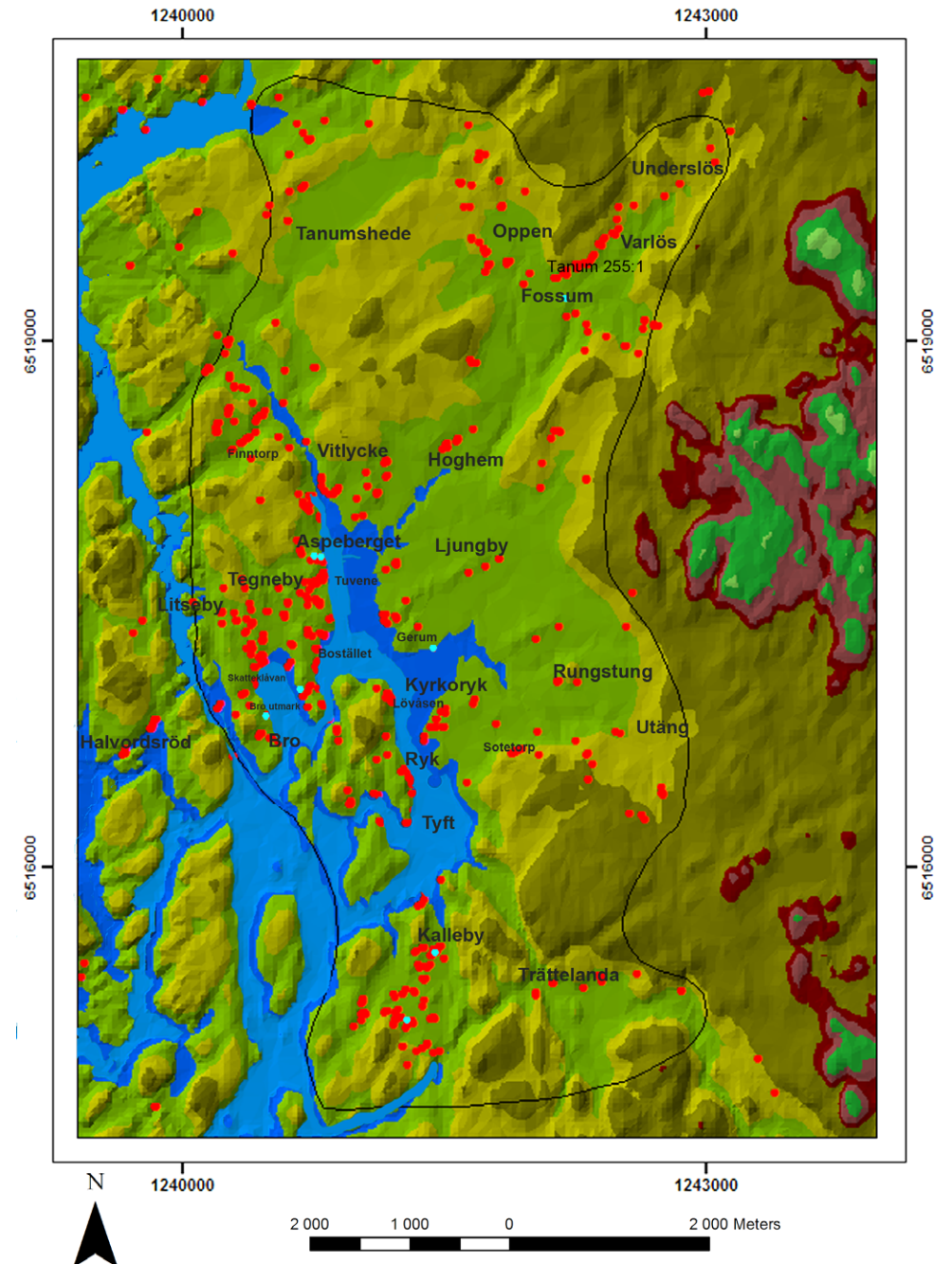


Fig. 2. The distribution of rock art (red dots) in the landscape of Tanum during the Bronze Age, with a sea level form Early- (dark blue, 15 m.a.s.l) and Late Bronze Age (light blue 12 m.a.s.l) illustrated. The Fossum panel marked with number 255.

sea in the Bronze Age. The location of the rock art in the landscape of Bohuslän tend to follow two general strands; complex rock art sites located at accessible places on lower former maritime grounds and complex sites at accessible places in the landscape on higher ground, sited close to old roads, trails or natural passages in the landscape (Ling 2008). The current site, Tanum 255:1, can be related to the latter category.

Turning to the more specific information about this monumental site; it faces south and south east, the pecked panel covers about 65m² and includes 35 anthropomorphic beings, 25 ships, 15 animals, two pair of foot prints and some complex circular designs. Thus, the panel shows many and varied staged scenes with warriors, lure blowers, a proposed female being (to be discussed later), highly stylized ships, in different sequences, animals and anthropomorphic beings in antithetic scenes and some highly ritualistic features and elements (Fig 3).

Over the years, it has been subject to a number of different interpretations, the most dominant strands has focused on narrative aspects on Bronze Age religion, cult, cosmology and warfare (Almgren 1927, Bertilsson 1987, Kaul 1998, Fredell 2003, Ling 2008, Ling & Cornell 2010, Melheim 2013). For instance, Kaul argues for that a major part of composition, with special reference to the direction of the ships, narrates or illustrates the journey of the sun. Other scholars have stressed that the panel includes highly specific narrative features that could be linked to Indo European religion or cosmology (Kristiansen 2012, Melheim 2013). The panel has also been quoted frequently in discussions of ritual combat and warfare but also in terms of gender relations and warrior-hood (Almgren 1927, Nordbladh 1989. Ling 2008, Bevan 2015).

We will not account in detail for all these interpretations here; instead we will focus our attention on some recent observations that challenges some of the prevailing ideas about the dating, significance and

the biography of this particular panel. For this purpose, we have used the documents made with five different techniques that we have analyzed carefully; three traditional of which two tactile, paper rubbing and plastic tracing but also black and white photography with artificial light; two none tactile, high precision three-dimensional documentation techniques, scanning with optical laser but also digital photography, with Structure from Motion (SfM).

Method & Theory

Over the years, scholars have tried to detect the techniques used by prehistoric carvers to identify different events within the carvings. This regards also this particular site. However, up until now, research has not been able to identify specific carving techniques or distinguish the different carving events due to the inadequacies of existing analog documentation methods. These issues can now finally be addressed due to new groundbreaking 3D documentation techniques, which allow the rock carvings to be analyzed in a more detailed way revealing the techniques used to produce the images and the different temporal sequences of carvings. This will allow us to unlock the rock art biographies and ultimately re-evaluate the interaction between the makers, the material, and their images and narratives (Kopytoff 1984; Gosden & Marshall 1999). SHFA - Swedish Rock Art Research Archives has already implemented 3D techniques such as Laser Scanning and Structure from Motion (SfM) (Bertilsson et al 2014).

Thus, the new 3D techniques have enabled us to forward some of the mentioned issues. The Fossum panel was recorded with the latest, none tactile, high precision three-dimensional documentation techniques, first, scanning with optical laser but also digital photography, with Structure from Motion (SfM). The documentation process, with a hand held optical laser instrument, Handyscan 700TM, operates by sending out about 480,000 measurement points per second over the hob reproducing the pecked images with an accuracy of 0.06

millimetre. However, it should be stressed the most important images were scanned at the highest resolution corresponding to 0.03mm. The scanner being connected to a laptop enabling to check the results directly and rapidly make the necessary additions of the documentation, filling any gap that may have arisen at the first attempt.

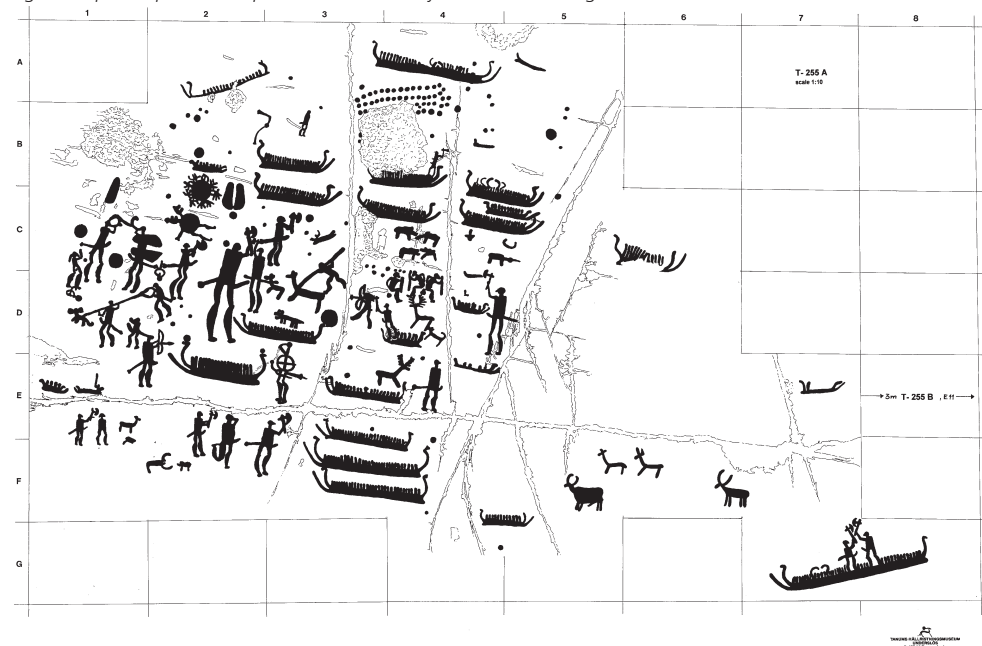
Additionally, SfM applications with a digital camera give a true orthographic representation of the rock art panels with high accuracy. In short, these methods so far provide the most precise recording of images; detect previously unknown images, and record images in relation to rock morphology. For example, by analysing the detailed 3D documentation of the spearhead at the famous Litsleby carvings in Tanum, it has become possible to identify at least three different Bronze Age spearheads that can be dated and attributed to a period of 800 years (Bertilsson 2015a).

Theory

Researchers in cognitive psychology have found a positive relationship between the ability to visualize and the use of visualization tools. The implication is that the better the visual tool, the better the explanation and the comprehension of information (Hermon & Nikodem 2008). The new digital 3D documentation will now allow researchers to unlock the complexities of rock art. This new evidence demands a similar re-theorizing of the role of visual images and cognition, as well as the role of the carver. Thus the new 3D techniques provide a more objective and less interpretative method than the traditional manual approach (Sevara & Goldhahn 2011, De Reu et al. 2012, Domingo et al. 2013, Cerrillo-Cuenca et al. 2013). Moreover, theories about object biographies and materiality connected to craftsmanship, agency, and cognition, which have been a recurring theme in recent archaeological studies, as well as studies in rock art (Helms 1993; Vandkilde et al 2015, Goldhahn 2014).

There are also theories about the techniques used by the prehistoric carvers. Stone hammers of quartzite have been found in

Fig. 3. Graphic of parts of the panel Tanum 255:1. by Tanums Hällristningsmuseum Underslös. Source: SHFA.



front of rock carvings indicating that the prehistoric carvers used stone tools (Ling & Ragnesten 2009). Moreover, experiments have indicated the use of stone tools with an indirect technique (Lødøen 2015). The traditional analogue documentation methods like rubbing and tracing cannot verify or falsify none of these theories or observations due their inaccuracy. However, the new 3D documentation technique enables the recording of such details and observations for the first time.

Regarding the dating of this particular panel, the ship chronology has constituted

the major tool for later attempts and most scholars have therefore related it to the Late Bronze Age (Kaul 1998, Ling 2008, Melheim 2013).

The question is if the ships should date all the images on this panel? Moreover, were all images made at one occasion or at several phases in the Bronze Age? Can the new 3D techniques reveal new details and features on this particular panel and thereby challenge some of the prevailing ideas of both dating, significance and function of the images?



Fig. 4. Axe bearers, boats and other features at the central part of the panel. Note how the axes being held by the warriors. Of special interest in this study is the central scene with one enlarged axe bearer and his opponent. Note the pal staff at the upper part of the panel. Graphic: Tanums Hällristningsmuseum Underslös. Source: SHFA.

In the following we show that the recording of the images on the Fossum panel, with new 3D techniques, revealed many new details and features that in turn indicates that the panel was transformed and altered many times through prehistory.

Descriptions and Observations

Before accounting for the given observations, we need briefly to discuss the dating methods applied for this attempt. There exists a long tradition in dating the South Scandinavian rock art to the Bronze Age. For instance, a Bronze Age dating of the Scandinavian rock art was proposed already back in 1869 by Bror Emil Hildebrand, whose main contribution was a stylistic comparison between typologically determined BA swords from period II and the

pecked swords on rock art panels at Ekenberg in Östergötland (Hildebrand 1869, cf. Bertilsson 2015b). This approach has been used and developed by yet many scholars, ever since (Kaul 1998, Ling 2008). The method of dating of this attempt is mostly based on so-called comparative typological / chronological method (Kaul 1998) with reference to shoreline dating (Ling 2008, 2013).

Turning to our case, this particular site includes many representational images that favor this kind of approach, especially the many and varied depictions of metal artifacts (Fig 3-5). The interesting thing is that most of the metal artifacts at this site are depicted in action, staged in different combat scenes. The first category of metal artifacts that could be dated on comparative grounds is the depicted axes (Fig 4-5).

Fig. 5. Paper rubbing documentation of the Fossum panel. Rubbing: Tanums Hällristningsmuseum Underslös. Source: SHFA.



Most of the depicted axes are connected to a warrior, axe bearer, however, one axe, located on the higher part of the panel, have been depicted by itself. It represents most probably a pal stave axe from period II (Fig 3-4), a highly functional axe both in terms of woodworking and combat. It is not surprising that the axe is depicted on the rock here because it is the most common type of axe in Scandinavian from this phase, about 400 have been found solely in Sweden (Oldenberg 1974). However, it should be stressed that there exist also "none functional" pal staves with more elaborated designs and ornamentations from this phase, although these are less in numbers and also different in shape.

Turning to the other example of axes depicted on this panel, it includes a total number of 16 axe bearers, staged in different scenes, the most quoted scene show two axe opponents fighting in a boat. The closest analogy for the kind of axe depicted on these scenes is the so-called ritual axes of Skogstorp type (Fig 6a-b) that could be dated to the Bronze Age period II (Montelius 1917: 37,58; 1922: 29). There are only a few examples found in Sweden (3) and Denmark (2). In two cases they have been found in two pairs (Montelius 1917, 37,58; 1922, 29; 883-884). An account of the Bronze Age axes of similar types is available in Jan-Erik Sjöberg's book (Sjöberg, 2008). However, the dating proposed there for the different types is not accurate because they are based solely from ornamentation and do not take into account the shape (Sjöberg, 2008: 80-81). Thus, Montelius dating of these particular axes seems far more logical (Montelius 1917: 37,58). Broholm dates these axes to period III, (Broholm 1943: 154-155) thus a closer dating of these axes than to II-III cannot be determined.

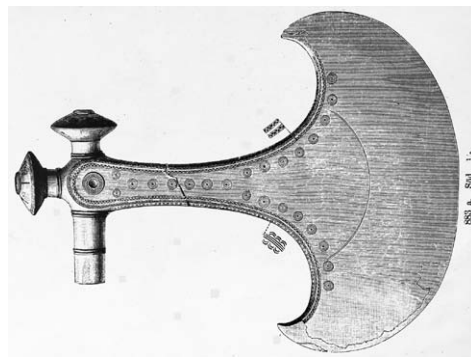
Many artifacts from the Bronze Age have been found in pairs indicating some kind of dual sacred significance (Montelius 1917, Bradley 1998, Kristiansen 1998). In this context it is intriguing to see that many scenes on this particular panel displays two opposed axe bearers. Some are aiming and pointing at a turned away opponent and at one scene an axe bearer hits an escaping

bow armed opponent in the shoulder (Fig 4-5). Another intriguing feature of importance is that the warriors here are fighting with these highly ritualistic axes whilst the type of axe that in turn would be best suitable for combat, is depicted exclusively. Given this aspect of the case, it could as well be a way of illustrating combat with axes and that the larger ritualistic axe worked better for this purpose than the pal stave? However, this is probably a far too simplistic view of this matter and there is obviously more complex socio- ritual aspect at play here connected to the Bronze Age ideology and worldviews, which we cannot decode or comprehend.

A detail of importance is how the axes are held and it is this is very obvious in all cases expect one. This scene is located at the very center at the left section of the engraved panel. (Fig: s 4-5). It includes a



Fig. 6a-b. Bronze Axe of Skogstorp type dated to the Bronze Age period II. After Montelius 1917: 37,58.



large axe bearer opposing a smaller axe bearer, but there is an odd thing regarding this smaller axe bearer when it comes to how the axe is held. In fact there exist not a clear case in the existing documentations that shows how this particular axe bearer grips or holds the axe, which is the case with all other axe bearers on this panel. Instead, it seems as if the arm extend directly to the axe head, which is not the case regarding the other fighters. Then the question arises; is this really an axe bearer?

In the following we intent to demonstrate, with four different documentation methods, that this particular warrior do not hold or grip an axe but rather a sword. To be able to demonstrate this, we have to include the small axe bearer located just above the presumptive sword bearer. Prior attempts have argued that the sword scabbard of this axe bearer ends before the suggested axe of our sword bearer. But is it this actually the case? When examine this particular depiction with fingertips and eyes during field work it became obvious that this sword sheath did not end with a chape, rather it extended, and that this entire "sword" image have been chopped in in the same manner. We will now try to demonstrate this further by taking a look at the different documentations made of this part of the panel. Starting with the paper rubbings made by THU and by Evers (Fig 5, 7), none of these rubbings indicates or shows that this particular feature that earlier been interpreted as a sword scabbard ends with a chape, rather it extent into the feature that earlier been interpreted as an "axe arm" (sic!). Moreover, the rubbings indicate also that the hilt of this sword is attributed with a large pommel (Fig 5, 7).

Nevertheless, the rubbings cannot solely verify this observation, it has to be tested by none manipulative documentation methods as for photography with artificial light and not the least and Structure for Motion and laser scanning. In terms of photography with artificial light, there exists an interesting example of this particular part of the panel (Fig 8), performed by Bertil Almgren back in 1969. First of all, this photo shows that this feature (the sword) extends be-



Fig. 7. A detailed paper rubbing of the warriors, on central part of the panel. Note how the warrior on the left grips his item, the question arises; is this axe bearer after all. Rubbing: Dietrich Evers. Source: SHFA.

neath and under the adjacent axe bearer at the upper left, and this speaks strongly for that it has been made in an earlier event (Fig 8). The photo indicates also that it has been pecked with a slightly more smooth technique than the axe bearer and that the sword is attributed with a large pommel that reminds strongly of the pommels of metal hilted swords from the late phase of period II or rather III. However, these observations need to be verified by far more accurate methods.

Turning to outcome of the two of the most accurate and at the same times less manipulative documentation methods, SfM and laser scanning, of this section of the



Fig. 8. The same scene documented by Almgren 1969 by the use of photography with artificial light. This photo shows that this feature (the sword) extends beneath and under the adjacent axe bearer at the upper left. Source: SHFA.

Fig. 9. SfM on the same section and scene showing how the sword extend beneath axe bearer at the upper left, indicating that this feature was made somewhat earlier. Photo: Ellen Meijer. Source: SHFA.

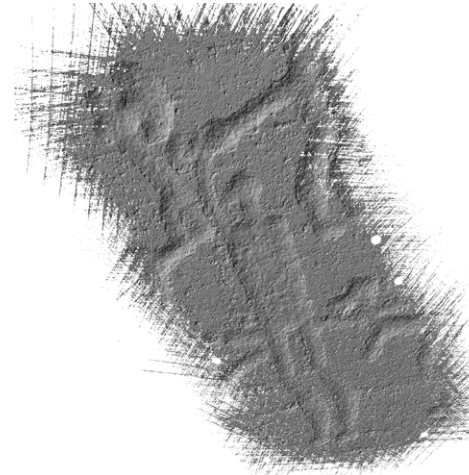


Fig. 10. Laser Scanned section of the panel with the sword wielder at the Fossum. Laser scan: Lst VG-län.

panel, we account for the following observations;

Both of these methods show clearly that the sword extend beneath the axe bearer indicating that it has been pecked before the former representative image was made (Fig 9-10). Moreover, it shows also that the sword has been pecked with a slightly more smooth technique than the axe bearer. Another thing that appears clear with these methods, especially with the scanning,

is that that the sword is attributed with a large pommel similar to flange hilted swords dated to period II-IV or those on metal hilted swords from the late phase of period II or rather III (Kristiansen & Larsson 2005, Aner & Kersten 1974, Broholm 1943-1949).

Thus, with regards to the pommel we argue that the closest analogy for the depicted sword in the hand of the warrior at Fossum is flange a hilted sword. In this context it is intriguing to stress that this type of sword constitute a true functional war sword unlike the metal hilted sword.

This is also the case with the swords depicted in hands of the sword wielders in Brastad, not metal hilted swords as claimed by Toreld 2012.

The scanning showed also how obvious the warrior's grip of the hilt appears and the "axe arm" theory appears very unlikely with this in mind (Fig 10-11, 13).

In short, both the fact that this sword is located under and made with a different technique than the left axe bearer speaks against the notion that it is the scabbard of the axe bearer.

Given the new fact that this particular warrior is holding, gripping and swinging a sword, against a larger opponent with an axe, this fact puts, gives and/or forward this particular scene into a different chronological and interpretive context (Fig 3-5, 10-11,

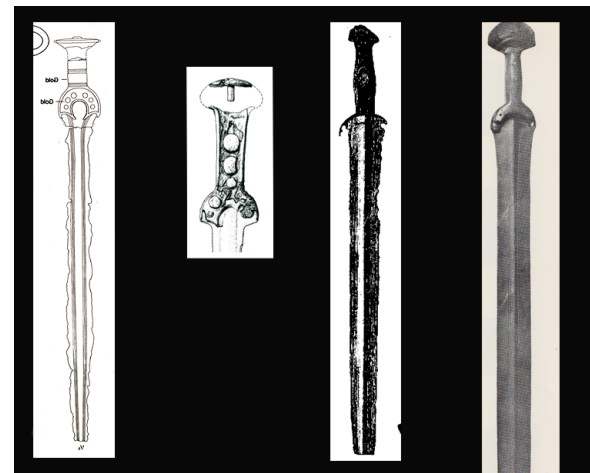


Fig 11 Sword from Period II- IV with large pommels. To the left metal hilted swords and to the right flange hilted swords with organic pommels. Note that the sword on the rock art shows the best resemblance with the latter ones. After Aner & Kersten 1974, Oldeberg 1974, Kristiansen & Larsson 2005



Fig. 12. The sword wielders motif occurs in other carvings in northern Bohuslän including at Kville No 165 documented already by Fredsjö in the 1940s where two men with uplifted sword standing on both ends of a ship. Here the one at the fore. Photo: Ellen Meijer. Source: SHFA.

13). Throughout Scandinavia, swords are very rarely depicted in an active fashion. Generally, these weapons hang passively on the warrior's hip. However, panels showing sword wielders from early Bronze Age were recently discovered at Brastad in western Sweden (Toreld 2012; Ling and Cornell 2015). But this is not the only and case, there exist also potential sword wielders at some sites in the parish of Kville that could be dated to both early as well as late Bronze Age (Fig 12. See Fredsjö 1981:165,200) Furthermore, the case we just have revealed here at Fossum shows, first of all that this is not an exclusive phenomenon connected to a certain confined valley or area in Bohuslän (Toreld 2012), secondly it opens up for a re-examination of panels, that have been painted or documented with traditional analogue techniques, with the use of high precision three-dimensional documentation techniques.

What about the dating of the other images at this panel? Is there something else that could be related to period II? We have already accounted for the Skogstorp axes and the pal stave that could be related

to this phase whilst the ships on the same panel has clearly been pecked during the Late Bronze Age period IV-V (Ling 2008). However there are in fact a few more images that favor a dating to this particular phase. For instance, at the left section of the panel there is a stage scene with two opposed lure blowers. These lures appear very similar to the ones depicted in the Kivik grave that in turn has been dated to this late phase of period II (Goldhahn 2013). In fact both the lures in Kivik as well as the ones depicted here shows strong typological similarities with "real" bronze lure that was found, in Gullåkra moor in Scania, back in the 1840s, dated to period II-III (Oldeberg 1974:18). There is yet another feature, although somewhat more vague, on this particular panel that probably could be related to this phase, namely the scabbard of the swords. Looking at the depicted warriors at the panel most of them are attributed with a chape that appears conical or square in their shape (Fig 1,4-5).

These chapes diverge clearly in shape from the ones that are dated to Late Bronze Age V- VI (Vogt 2006, 2011) which are more

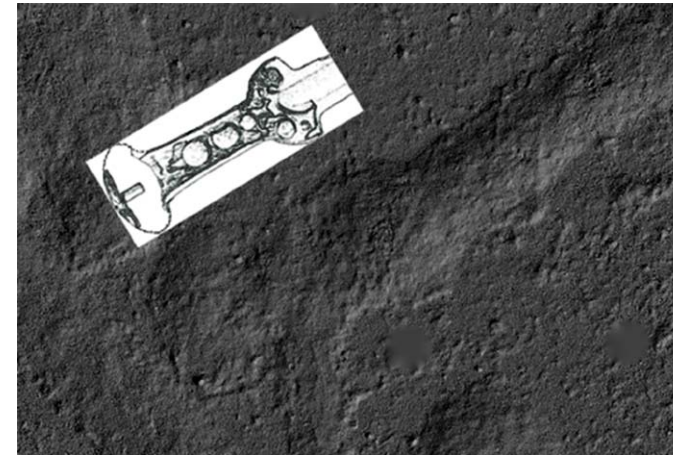


Fig 13 Laser Scanned section of the panel and the flange hilted sword from period II from Jutland mounted beside the carving as a comparison. Laser Scan: Lst V-G län. Sword after Kristiansen & Larsson 2005: 276. See also Aner & Kersten 1978.

by ship depictions from period II (Ling 2008). Furthermore, there are several examples of rock panels elsewhere in Bohuslän and Scandinavia (Ling 2013) that shows a long history of carving

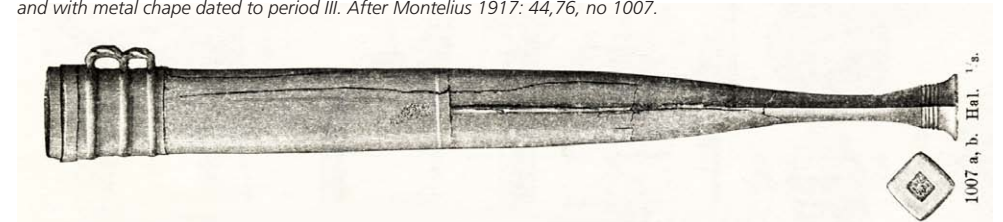
events, indicating that the panels was recut, revitalized and updated many times during prehistory (see Ling 2014; 250). In addition to this, there are several panels with ships from period II-III in Tanum that include warriors that could or should be linked to the same phase (Tanum12: 1,18:1, 25:1.). But why haven't these images been connected to this period in earlier dating attempts? Simply by the fact that there has existed an interpretative norm/ paradigm that in turn has stressed the statement that the warriors in general should be associated with the Late Bronze Age (Coles, 2005, Vogt 2006, 2011). Thus there exists therefore a general need to look over and re-evaluate the dating of the figurative in Tanum and elsewhere. This is a task that we intend to pursue in the following.

Another implication of the chronological re-evaluation of this particular panel is that it becomes difficult to continue to argue for that it was made on a single occasion. Moreover, it challenges also the popular

Conclusion

The re-dating of many of the war related representational images at the site in Fossum is a significant result with clear implications for the interpretation of the meaning, function and use of this particular panel. Clearly, most of the warriors seem to have been made during the transition between period II-III. This is not surprising at all, rather very logical. In fact there are several panels in Tanum are dominated

Fig. 14. Sword with preserved scabbard of organic material and with metal chape dated to period III. After Montelius 1917: 44,76, no 1007.



interpretative notion that this panel illustrates a grand cosmological or ideological narrative from a certain phase in the BA. It points rather to that this particular panel was the subject of several occasions of carving and storytelling that also changed and transformed.

Additionally, it shows clearly the need to analyze and evaluate existing documentation, before painting, (if this at all should be done!), in order to give as accurate a picture as possible of a carved image and to avoid the risk to convey a faulty picture of the carving to the visitor. This is of great significance for the interpretation and dating, not only of the current figure, but also of the entire carving. For instance, the sword bearer on which we focus here on was previously interpreted as an axe carrier and the very reason for this is to be found in the documentation of Vitlycke Museum archives made by Torsten Högberg in 1968 and then repeated in 1972 (c.f. scanned tracings in SHFA Bild). This while Almgren's photo documentation from 1969 clearly shows that it rather concerns a sword bearer, as does Dietrich Evers rubbing from 1970 and not the least our 3D documentation.

Thus, the new 3D techniques have enabled us to forward and ultimately re-evaluate and challenge some of the prevailing ideas about the dating, significance and the biography of this particular panel.

Clearly, most of the warriors seem to have been made during the transition between period II-III while others images such as the ships were added (and some updated) a later stage, presumably during VI or early phase of period V. Notably, a high percentage of the figurative scenes seem to have been produced on the panels during the Nordic Bronze Age period II and V and it is interesting to stress that this correlates this with the peaks in the amount of metal arriving in southern Scandinavia (Kristiansen 1998, Ling & Uhnér 2015) All this indicates that many rock art sites, that includes depictions of weapons and warriors, can be linked to the significant periods when Scandinavian societies became involved with long distance exchange of metal. And several of the coastal rock art regions could

have served as important arenas for metal distribution in southern Scandinavia. Thus, the travelers/warriors/traders depicted on the rocks were probably local agents engaged in this particular praxis during the Scandinavian Bronze Age. These agents made rock art to announce their presence and actions in the landscape, but moreover utilized this medium to display their social position within the Bronze Age society.

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