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3D scanning of Gotland picture stones with supplementary material
Digital catalogue of 3D data

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The Gotland picture stones (dated to c. 400–1100 AD) are among the most spectacular and informative artefacts from the Iron Age and Viking Age to have been discovered in Sweden. The main aim of this paper is to make digital 3D documentation of the Gotland picture stones publicly available for analysis of their motifs, runic inscriptions and weathering processes. The data were collected within the project *3D scanning of the Gotland Picture Stones: Workshops, Iconography and Dating* (2006–2008), which includes analyses of these stones by means of a high resolution optical 3D scanner. The aim of the project is to clarify certain basic facts concerning the cutting technique, work organization and surrounding circumstances, iconography and dating. Four main issues are identified: workshops, iconographical interpretations, dating, and finally, documentation and enhanced interpretation of weathered and in places vandalised picture stones. The following report provides a short summary of the main results. The 3D data are provided in STL files that serve as supplementary material to this paper. They are available on the website of the Swedish National Heritage Board: http://3ddata.raa.se

Keywords: picture stone, rune stone, Gotland, Viking Age, Iron Age, 3D scanning

The Gotland picture stones as a resource for research

The Gotland picture stones (dated to c. 400–1100 AD) are among the most spectacular and informative artefacts from the Iron Age and Viking Age to have been discovered in Sweden. This treasure of images is generally considered to illustrate myths and cultural phenomena related to the Icelandic sagas and to shed light on religious beliefs and customs that prevailed over a long period of time and are relevant to phenomena located far away from Gotland. The Gotland Picture Stones are regarded not only as a pictorial counterpart to the Icelandic saga literature but also as illustrative of (early) medieval Germanic poetry, as they are thought to reflect early and/or local versions of the narratives and legends concerned. Consequently, the Gotland picture stones provide an important body of source material in an international context, of the utmost relevance to scholars in Germany, Great Britain and Iceland, for instance. Thus the motifs and images are important not only for Gotland and Scandinavia, but also for several disciplines practised over the whole of northern Europe, not forgetting the various institutions for Scandinavian studies in the USA and Russia. Comparisons can be made with picture stones discovered on the Swedish mainland and other stone raising cultures, e.g. the Romans and the Picts of Iron Age Scotland. It might be thought that such a treasure should already have been well studied, but there are indeed many problems still unsolved.

The present standard work on this topic, *Gotlands Bildsteine*, was compiled by Sune Lindqvist and published in 1941–1942. That is to say, it is 70 years old and it is based on even older documentation, mostly carried out by Gabriel Gustafsson and Fredrik Nordin

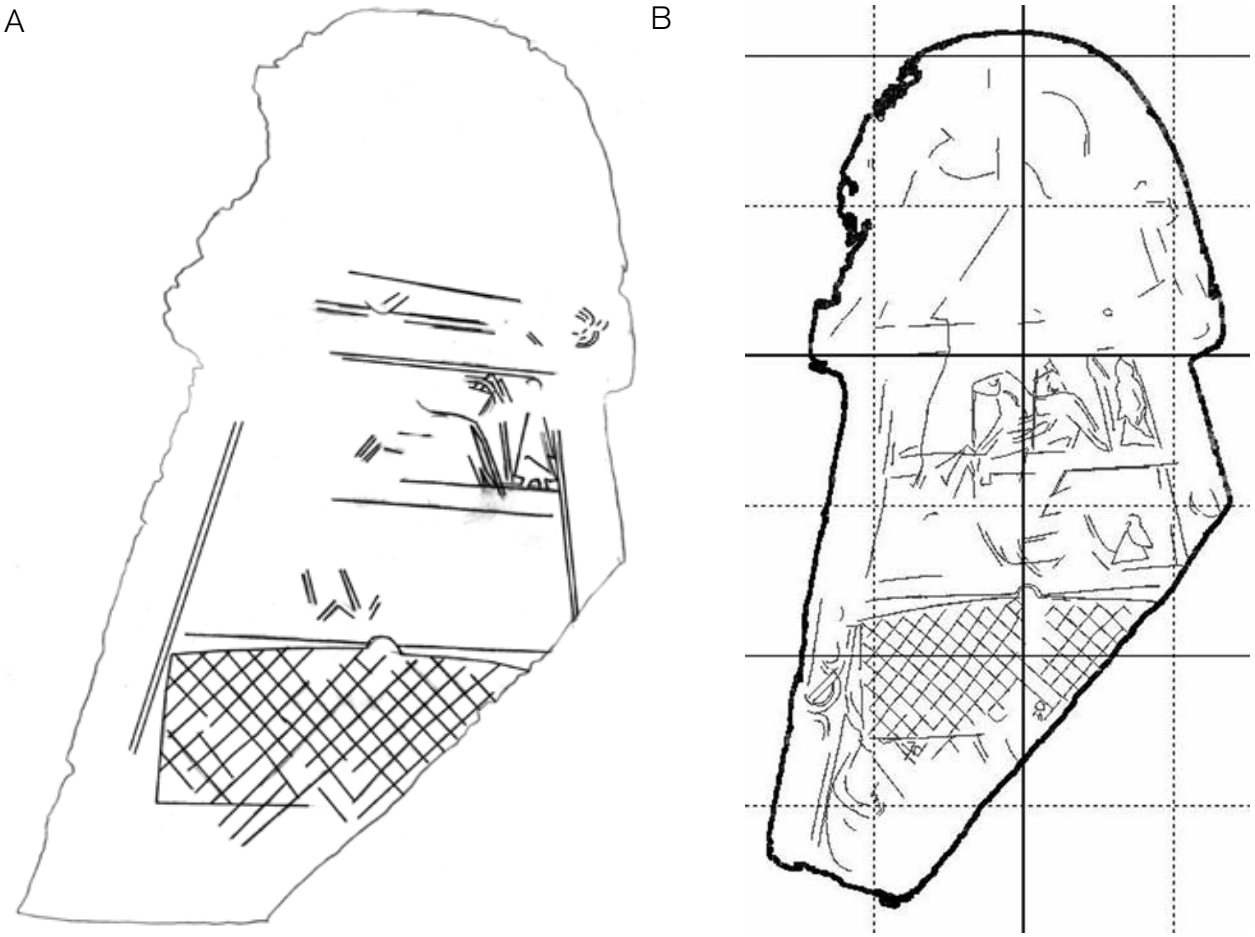

Figure 1. The picture stone found at Bro in 2001. A) Interpretation arrived at with traditional side lighting, after Widerström & Norderäng 2004:87. B) Interpretation based on high resolution 3D scanning by the author.

by the end of the 19th century. Since then, Erik Nylén and Jan Peder Lamm have published a catalogue in a number of editions of *Bildstenar* (Nylén & Lamm 2003), and in 2003 the Gotland archaeologists Johan Norderäng and Per Widerström started to compile a whole corpus of picture stones, continuously including the new finds as discovered in archaeological excavations and church restorations etc. Their main aim was to compile a database that included photographs, archive material and geographical coordinates. By 2004 this material amounted to around 565 picture stones, as compared with about 340 in Lindqvist's publication and 467 recorded in Nylén & Lamm's catalogue. Thus the amount of material has increased by some 70% since 1942 and new finds are appearing almost every year (Nylén & Lamm 2003; Norderäng & Widerström 2004:88). Nevertheless, given the progress made in related subjects such as archaeology, runology, the history of religions, saga research and limes research, the source material regarding the Gotland Picture Stones has clearly become outdated. With a few exceptions (e.g. Arrhenius & Holmqvist 1960), earlier scientific studies of these stones are virtually non-existent and technical analyses are conspicuous by their absence.

It is evident that Lindqvist's publication is still used as a trustworthy standard work within these disciplines, although it is clear that it was produced by obsolete methods and in a similarly obsolete theoretical framework influenced by the political ideals of the 1930s.

The project

As implied in its title, the project named *3D scanner analyses of the Gotland Picture Stones: Workshops, Iconography and Dating* includes analyses of these stones by means of a high resolution optical 3D scanner. The

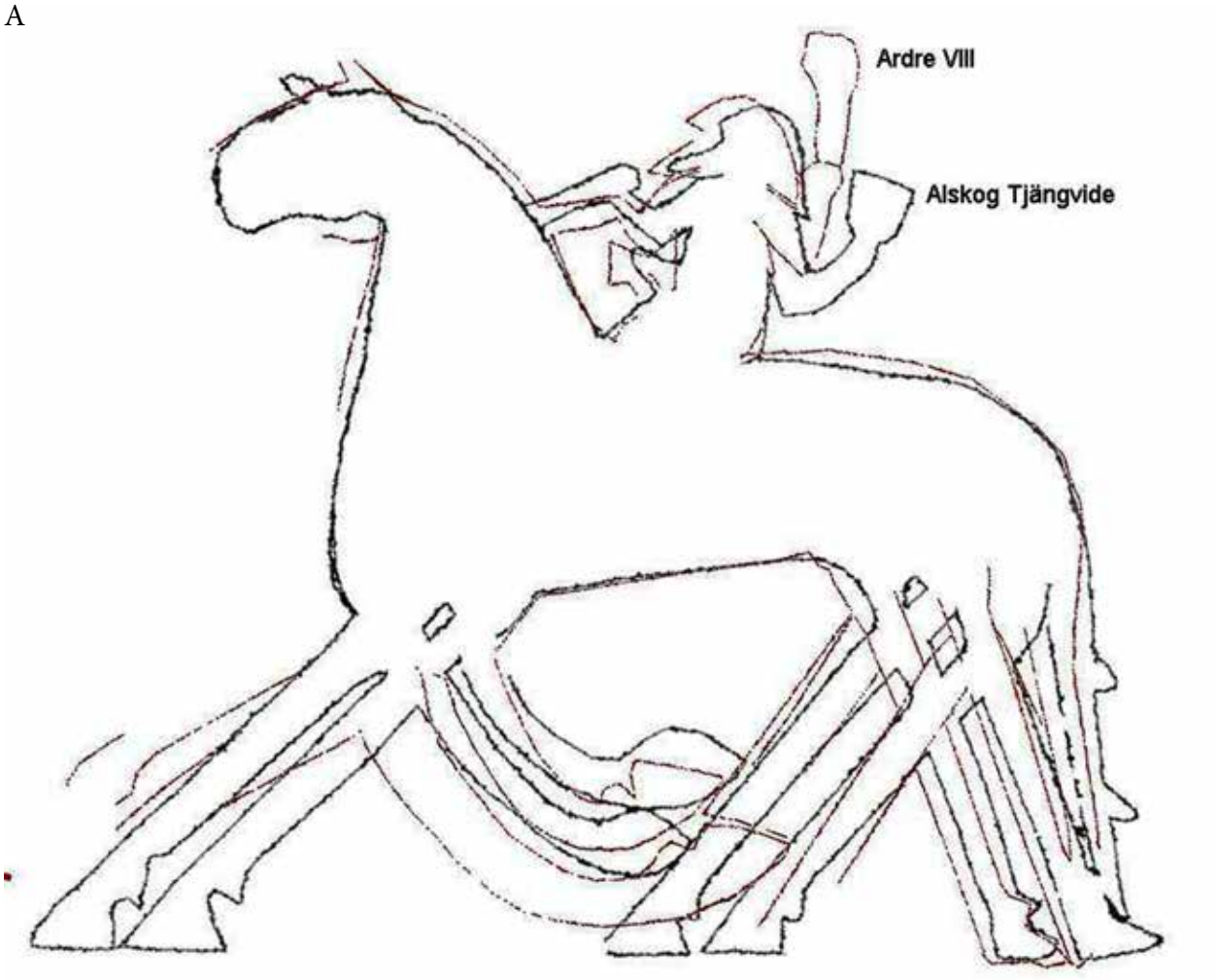

Figure 2. An example of template use. A) Comparison between horse and rider on Alskog Tjängvide and Ardre VIII. B) Comparison between two mirrored warriors on När Smiss I.

aim was to clarify certain basic facts about the cutting technique, work organization and surrounding circumstances, iconography and dating. Four main issues are identified; workshops, iconographical interpretations, dating, and finally, interpretation of the weathered and in places vandalised picture stones. The following report describes the progress made in the project and provides a summary of its main results. The main aim of this paper is to make the digital 3D documentation of the Gotland picture stones publicly available. Therefor, the data has been published in the form of STL files, a standard format that can be opened in most 3D software available on the market (http://3ddata.raa.se/). The author wishes to encourage readers of this paper to compare the 3D models of the carved surfaces with the pictures in Sune Lindqvist's *Gotlands Bildsteine* (1941–42). It should be remembered, though, that analysis may sometimes be difficult and sometimes the naked eye and the light of a torch are actually better for distinguishing the motifs. In the end, the best way may be to use a combination of these methods. One should therefore not

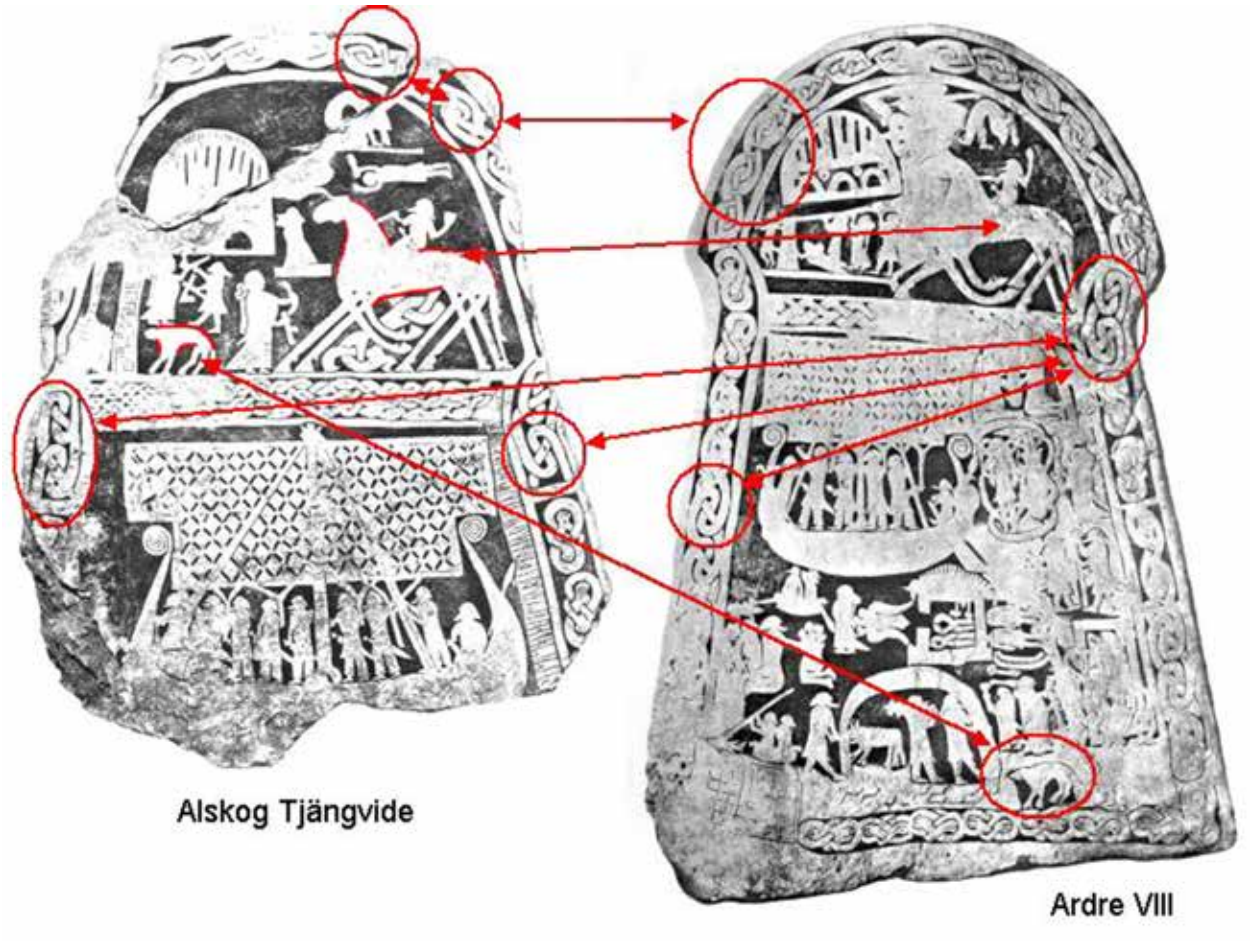

Figure 3. An example of the use of the same templates on picture stones.

judge Lindqvist's work too harshly before making an honest try at analysing the microtopographical surface by various methods.

The fieldwork was undertaken at the Gotland Museum (Fornsalen) and in its storerooms (Norra magasinet and Kajsarn in Visby), the Historical Museum in Stockholm (SHM) and the SHM museum store in Tumba (Depå Munkhättan). Altogether 68 picture stones and fragments have been documented by 3D scanning.

3D scanning – documentation, templates and groove analysis

The interpretation of the picture stones as pictorial counterparts to the Icelandic sagas is most often dependent on the identification of animals and their attributes, and 3D scanning may help to reveal details in the carvings which make these identifications more obvious – or change the meaning totally. It is also useful for the reading and interpretation of inscriptions and ornaments on weathered stone surfaces, and as this means of documentation loosens the ties with earlier paintings based on the pictures, it helps scholars to be more independent of tradition. Thus a 3D scanner is a useful tool for close iconographic scrutiny, since the visual impression of the topographical map is not disturbed by colours. Without touching the stone, and certainly without removing any paint, we can study the picture-stone as a new find, without prejudices about what we are going to see. The point of departure for most existing interpretations is the set of paintings made in the 1940s or even earlier, but the carved lines of the motifs are very tiny and earlier interpretations can be highly debatable. This is clear in the case of a picture stone found in 2002, for example, where analysis of the carving by 3D scanning yields better results than traditional side lighting (Fig. 1).

Another application concerns dating, namely the internal relative chronology of the motifs and inscriptions. Which came first? Is the runic inscription secondary to the pictures or is it integrated into the composition? Finally, local groups of handicraft traditions can be identified.

An additional advantage of 3D scanning is that the observer obtains a tangible model of the carved

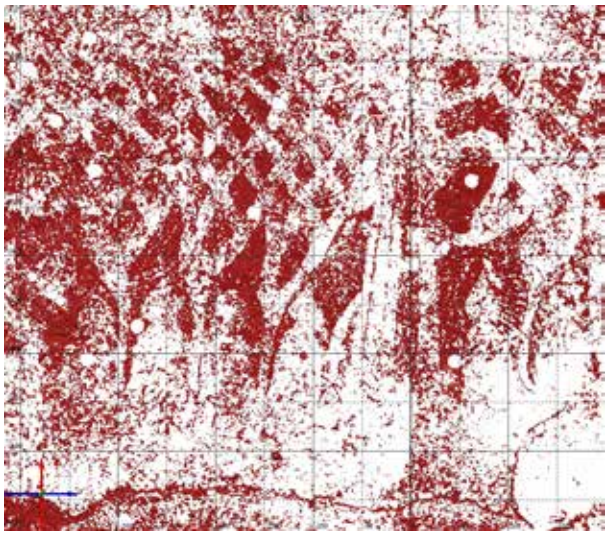

Figure 4. Stenkyrka Smiss I, detail, 3D image. The motif has been enhanced by means of the "Select by Curvature" function.

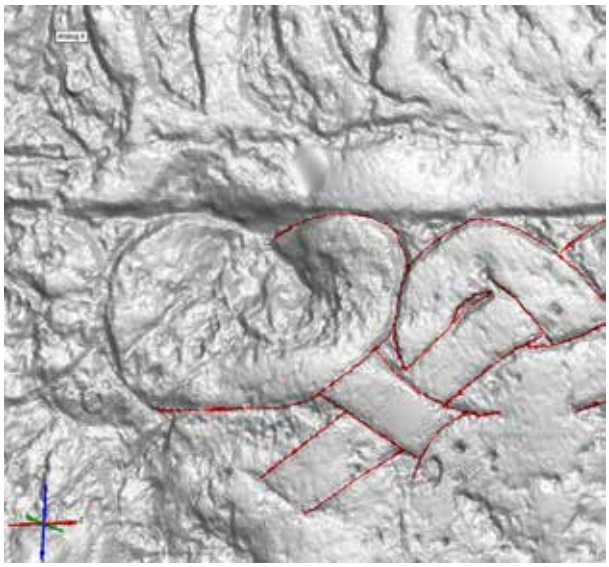

Figure 5. Alskog K, detail, 3D image. The contours have been filled in by an appropriate selection of points.

surface and is able to study minute details in its micro-topography. Lindqvist's interpretations are subjective, as he himself admitted, but the irresistible black and white paintings lend the interpretations an aura of objectivity. 3D documentation provides each scholar with an objective record that has not been filtered through the eyes of earlier observers.

Many of these advantages, e.g. the potential of 3D scanning for achieving optimal lighting, illustration, interpretation, monitoring decay and non-contact replica production, have been touched upon by Alistair Carty in his recording of Pictish sculpture in Scotland (Carty 2005:370374). 3D documentation is developing fast and will most probably be – or already is – regarded as one of the standard methods for use in archaeology and among the available curatorial techniques, e.g. for improving accessibility for the disabled (Jeffrey 2005:353–357). It has been said that traditional renderings focus on iconography at the expense of the sculpture's materiality and its relation to the landscape and other monuments, which in turn may cause a loss of some dimensions of its social and political contexts (Jeffrey 2005:357).

Material

The original objective of this project was to analyse all types of picture stones from all periods, ranging from the Roman Iron Age up to the early Middle Ages. The rationale behind this was to achieve an overview of the picture stone tradition. This aim had to be abandoned and revised, however. Due to the time-consuming nature of the analyses, it was simply not possible to analyse both the 3D material and the cultural contexts over such a long period of time. The fieldwork and analyses have been demanding in terms of servicing the equipment, making the necessary preparations and processing the raw data.

Method

The equipment used is a high resolution optical 3D scanner named ATOS II, purchased in 2005 from GOM Optical Measuring Techniques in Germany. The equipment is owned by the Archaeological Research Laboratory at the Department for Archaeology and Classical Studies at Stockholm University with finance from the Swedish Research Council.

The equipment is portable and can be used in the field as well as in the laboratory or in museums. The scanner can be adapted to the different tasks by changing the measuring volumes according to the size of the object and the resolution required. As most picture stones and rune stones cannot be brought to the laboratory in any way, the researcher is limited to making casts, if the measuring equipment cannot be taken to the site, and this, of course, causes loss of data and furthermore is not advisable with very fragile objects. Small fragments may be transported, but for security reasons it is still a great advantage to be able to take the 3D scanner to museums.

The measuring principle is that the object is photographed simultaneously by two cameras mounted at a certain angle. The equipment's software is then able to calculate 3D coordinates for up to 4 million points

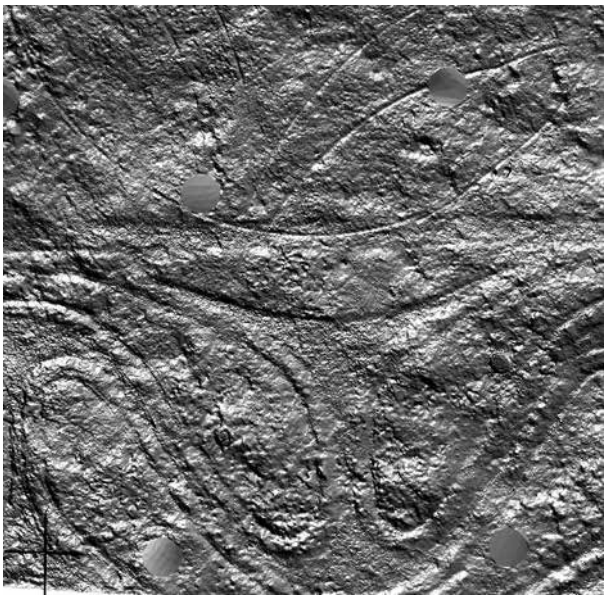

Figure 6. Vallstena Vallstenarum. Notice the secondary addition, a circle segment crossing the border of the meander ornament.

on the object. In order to measure the object from all angles and to reach into its cavities, the object (or the camera head) can be turned around and scanned from various directions, after which the overlapping views can be superimposed to form a 3D model. The lenses of the cameras are exchangeable and can be adapted to the object in question. One general characteristic of 3D scanners is that the resolution between the measuring points decreases with a larger measuring area. In this case, the measuring volume chosen was 350x280x280 mm, whereupon the resolution between the measuring points in the final result was 0.27 mm. The result of the scanning is a three-dimensional digital model of the object that can be analysed using various forms of 3D software.

The system can define the position of the sensor by means of reference points, small adhesive stickers of diameter 4.5 mm, and transform the separate measurements into a whole unit in a common coordinate system. One prerequisite is that the object should not move in relation to the reference points during measurement. The stickers cover some millimetres of the object's surface and are visible as either round holes or round flat surfaces in the complete 3D model.

The process is controlled during measurement by a Linux operating system, which automatically controls the calibration, movements and lighting conditions for each measurement. Shiny points may leave holes in the model where data could not be collected, and this is also sometimes the case with very dark areas, e.g. if the inventory number of the artefact has been written on it in black ink. If the structure of the surface is porous or has deep, narrow fissures, shadows may appear at points that cannot be reached by the cameras. This may be compensated for to a certain degree by making a large number of measurements from slightly different angles each time, but sometimes it may be simply impossible to collect data everywhere. A typical example is the porous structure of spongious bone. There were no such problems in the present case, however.

After the actual scanning, work continues with the post-processing of the data. The main step is to produce the 3D model from the raw data. In this process the separate files are corrected in relation to each other by means of the reference points and merged into a single unit, a 3D model from which the data noise can then be filtered out. The resulting 3D data are stored in the generic ATOS format c3D and the standard format STL. The latter can be handled by most forms of 3D software available on the market.

Research

Workshops

The first main issue, the possible existence of picture stone workshops, has been studied firstly by examining the use of templates (Kitzler Åhfeldt 2009a, 2009b) and secondly by noting similarities in the cutting technique (Kitzler Åhfeldt, MS. A). One outcome of this research is that it could be shown that the motifs on several of the picture stones had been transferred to them by means of templates, and that the very same templates had evidently been used on some stones. The fact that this was an accepted method has some further implications. The point of departure here is the insular Celtic attitude to ornamentation in contrast to the Roman/Continental attitude. The use of templates may imply the existence of pattern books or pattern collections of some kind, as these are known to be an integral part of the Continental handicraft tradition (Kitzler Åhfeldt 2009a, 2009b). In the first instance the question is how template use may reflect different handicraft traditions. The results of one study of picture stones in Sune Lindqvist's group D show a prolific use of templates on picture stones in a manner that may indicate attempts to apply insular Celtic ornamentation without mastering the underlying mathematical principles. The details show that full-scale templates have been used with various degrees of skill, probably by different individuals, and that certain attributes may have been exchanged (Fig. 2). This indicates that there may have been carver groups, including master-apprentice relationships

(Fig. 3; Kitzler Åhfeldt 2009a, 2009b).

It may be asked whether template use is a regional characteristic typical of the D stones and the parishes around Alskog and Tjängvide or a common trait shared by all sites on Gotland. Therefore another investigation was carried out to include picture stones of Sune Lindqvist's group C. Similar results were achieved, but with the addition that the quadrupeds that look rather dissimilar, in fact they seem to have been drawn with the same templates but with an exchange of attributes: e.g. a horse-like quadruped has been adorned with antlers. The results show that template use is a common feature of the picture stones in Lindqvist's groups C and D, which can be roughly dated to 750–1000 AD (Kitzler Åhfeldt, MS. A).

Template use has a number of implications regarding the relationships between craftsmen, variations in quality, dating criteria and various handicraft traditions. In order to analyse further the possible existence of schools and groups of carvers, the grooves and cutting techniques may also be analysed, as will be seen below.

Iconography

Work within the second problem area, iconographical interpretations, has mostly been devoted to methodological problems. Picture stones have a prominent place in iconographical studies within Saga and Viking research in Scandinavia and Northern Europe, but the relief on most picture stones is diminutive and the carving surfaces are weathered, which makes it extremely difficult to distinguish the motifs. Often several methods have to be used to analyse the carving surfaces (see, for example, Figs. 4–5), and still it is not always successful. Often the carvings are shallow and the pictures are separated by various scrapings on the surface. Investigations in relation to Germanic iconography are in progress under Dr Sigmund Oehrl at the University of Göttingen, partly using the 3D models presented in this paper (Oehrl 2012, see also Oehrl 2008, 2009).

Chronology

Chronology has been touched upon in relation to the above issues. Template use may in some cases show close chronological proximity, given that these templates would have had a limited lifetime and would have been used by one stone cutter or just a few. But template use may also complicate dating, since motifs circulating in the shape of robust templates and pattern collections may have a long lifetime. The picture stone from Vallstenarum in Vallstena is an example in which secondary additions (sun wheels) overcut earlier meander ornaments, indicating a chronological succession between various ornament types (Fig. 6).

As a part of this project, Anders Silenius Larsen wrote a master's thesis about the motifs on the earliest picture stones, generally thought to date from c. 400 AD, although even earlier dates have been suggested (Lindqvist 1941; Manneke 1984:88; Måhl 1990:13,16). These motifs could be reinterpreted with the aid of 3D scanning and new parallels were found that may suggest that the stones date from the 2nd century AD and point to a possible pictorial influence from a region covering southern France and northern Spain (Silenius Larsen 2009).

Weathering and vandalism

3D scanning gives a documentation of high quality. One of the advantages is the colour-neutral rendering, in which the eye is not disturbed by earlier painting or irrelevant colour nuances on the carved surface. Instead of painting directly on the stone, the pictures can be filled in and interpreted in the digital 3D model. The much debated and criticised practise of painting carved surfaces may thus be avoided (cf. Walderhaug & Walderhaug 1998; Bjelland & Helberg 2006). The painting of picture stones has several disadvantages. Firstly, it puzzles and prejudices the observer. Secondly, it destroys possible remains of original colours. But the most serious objection of all is that painting on limestone is irreversible due to the porous structure of the surface, so that the interpretation of the painter will be forced upon others forever.

Research into weathered and vandalised picture stones may best be exemplified by the stone found in the church at Bro in 2001 (Widerström 2002; Norderäng & Widerström 2004:87). There are no visible remains of colour on this stone, but parts of the motifs can be distinguished by touch and with side lighting. The archaeologist Per Widerström has investigated the picture stone using side lighting and has published an interpretation (Norderäng & Widerström 2004). In a joint effort, we made a 3D scan of the stone in 2007, which yielded a definitive positive answer to the question of whether 3D scanning is a better alternative for documenting the carvings on such stones, as more traces of the motifs could be distinguished, although the complete carving could not be reconstructed (Fig. 1). 3D scanning thus provides an acute rescue technique for use with picture stones threatened by weathering and vandalism, enabling documentation of the carved surface before it is completely lost. There

are also a large number of "blind" picture stones in existence, i.e. stones on which no ornamentation can be discerned any longer – either because there never was any or on account of weathering.

Vandalism is a threat, too. The most evident case is a magnificent picture stone in Klinte, situated on a hill in a park frequently used for barbecue parties. This unfortunate stone has now been covered with graffiti. To separate the original images from the colourful graffiti, a colour-neutral rendering of the relief carving in which the observer's eye is not disturbed and confused by irrelevant additions is needed.

Groove analysis of rune stones

Twelve of the stones referred to in this paper have runic inscriptions (9 inscriptions since some of the fragments belong to the same monument), and consequently they have earlier been published in *Gotlands runinskrifter* (9 entries in Gotlands runinskrifter and Gotlands runinskrifter 3 ms) and are also included in *Samnordisk runtextdatabas*. Several of these are apparently connected with the mainland rune stone tradition, and some of them can be understood as rune stones proper, although they maintain the typical mushroom or keyhole shape of the Gotland picture stones.

3D data can be used for groove analysis of the runic inscriptions and ornamentation following a method developed for rune stones at the Archaeological Research Laboratory, in order to analyse aspects of teamwork, skill, quality and attribution (Kitzler Åhfeldt 2002, 2008, 2009c). Some rune stones in Uppland, for example, have been 3D scanned and analysed in a number of earlier studies, mainly within the project *Similar but still different: The rune stones in and around 11th century Sigtuna as a reflection of urban-rural relations* (project leader Professor Anne-Sofie Gräslund; Kitzler Åhfeldt 2008) and in my own dissertation (Kitzler Åhfeldt 2002). Groove analysis has also been carried out on mainland picture stone fragments found at Tomteboda in Stockholm (Gustavson, Hamilton & Kitzler 2006).

The present data are being used for a comparison of cutting techniques between 11th-century rune stones on Gotland and contemporary rune stones on the Swedish mainland (Kitzler Åhfeldt, MS. B), in the context of which the matter of dating will also be further discussed. The runologist Thorgunn Snædal suggests that the rune stone tradition went out of fashion on the mainland by the end of the 11th century, causing rune carvers in the province of Uppland to look for another area. In her opinion this might be the reason for the popularity of rune stones on Gotland at that time, a little later than on the mainland (Snædal 2005; cf. Snædal 2002:100–101, 230). One implication of this is that some rune carvers who had earlier been active in Uppland could theoretically have been found later in Gotland. Even though such connections cannot be expected at the level of an individual carver, there may exist some similarities in handicraft traditions. Research into the relation between Gotland and the mainland forms a part of the current research project *Dynamics of rune carving* (Runristandets dynamik, 2009–2014) that is still in progress. It is an illustration of the fact that once collected, 3D material may be used in various applications.

Summary

Sixty–eight complete or fragmented Gotland picture stones (c. 400–1100 AD) have been scanned by means of a high resolution optical 3D-scanner within the project *3D scanning of the Gotland Picture Stones; Workshops, Iconography and Dating* (2006–2008). Some interesting results have appeared, but several investigations are still in progress.

One of the most important results is that there is evidence for template use among the carvers, which has consequences for dating and for judging which handicraft traditions the carvers adhered to. This template use may indicate an attempt to apply insular Celtic ornamentation without mastering the underlying mathematical principles. Furthermore, details show that several individuals have shared the same templates, which ought to indicate that the carvers were working in groups, as has been shown earlier to have been the case with the mainland rune carvers (cf. Kitzler Åhfeldt 2002; Kitzler Åhfeldt 2009a, 2009b).

3D scanning produces an excellent form of documentation that may contribute to the discovery and reinterpretation of more pictures and motifs, and to research into other questions related to handicraft traditions, such as master-apprentice relations and connections between sites. The main aim of this paper is to make the digital 3D documentation of the Gotland picture stones publicly available, in order to encourage further analysis of motifs, runic inscriptions and weathering processes.

Catalogue

Sixtyeight picture stones and fragments have been recorded by optical 3D scanning in 2007–2009 (Table 1). The 3D data can be downloaded as STL–files

Table 1. 3D-scanned Gotland picture stones. Parish=Antiquarian documentation is based on the parochial system, Site=Site within the parish. Lqvt 1941–42=Page number in Lindqvist's Gotlands Bildsteine I & II (1941–1942). JP Cat.no.= Catalogue number in Nylén & Lamm's Gotlands bildstenar (2003, 3rd Swedish edition). [1)] Published in Norderäng & Widerström 2004. SRI=Entry number in Gotlands runinskrifter, Sveriges runinskrifter, Bd 11 (1962), Bd 12 (1978). Inventory no.=SHM + no. Inventory number at the Historical Museum, Stockholm. GF + no. Inventory number at Gotland Museum, Visby. Identification no.=(Föremålsid) Additional identification number at the Historical Museum, Stockholm. Group Lqvt=Group according to Sune Lindqvist (1941–42), A–E. [2)] Not included in Lindqvist's Gotlands Bildsteine, but assigned to a group by the author on the grounds of shape.

Parish	Site	Lqvt 1941–42	JP Cat.no.	SRI	Inventory no.	Identification no. (Föremålsid)	Group Lqvt
Alskog	Alskog K	135	2		SHM 6562	44502	D
Alskog	Tjängvide I	137	4	G110	SHM 4171	108203	D
Ardre	Ardre I	166	12a	G114	SHM 11118:1	45675	E
Ardre	Ardre II	167	12b	G114	SHM 11118:2	45674	E
Ardre	Ardre IV	157–158	14	G111	SHM 11458:4	44512	E
Ardre	Ardre V	164	12c	G114	SHM 11118:5	44510	E
Ardre	Ardre VI	165	12d	G114	SHM 11118:6	44509	E
Ardre	Ardre VII	155–156	15	G112	SHM 11118:7	45539	E
Ardre	Ardre VIII	139	16		SHM 11118:8	108199	D
Bara	Nederbjärs II	69	22		GF C4640		C
Bro[1]					GF C21905		C[2]
Endre	Endre skog	50	53		SHM 1687	44496	B
Fole	St. Tollby	42	58		GF C9018		
Fole	Tollby	–	57		GF C4366		B
Garda	Bote	141	68		SHM 15098	145754	D
Garda	Smiss II	355	70		GF C3644		C
Grötlingbo	Uddvide	–	82		GF C10977		
Hablingbo	Havor I	18	91		SHM 6915	122965	A
Halla	Broa IV	105	104		GF A2263		C
Halla	Broa V	45	105		SHM 12709	44518	B
Halla	Broa VI	44	106		SHM 12709	44519	B
Halla	Broa XIV	22	114		GF C6612		A
Halla	Broa XVII	400	117		SHM17391		
Halla	Broa XVIII	70, 399	118		GF C7888		B
Halla	Broa XIX	–	119		SHM20517		
Halla	Broa 21	–	444		GF C11606		
Hellvi	Ire III	37	141		SHM 20550:162	44495	B
Hogrän	Hogrän K	145	150	G203	GF C10645/B1063		E
Klinte	Hunninge I	128	153		GF C9286		C
Lokrume	Lauks	38	172		GF C1401		B
Lokrume	Lokrume K	93–94	171		SHM 14342	45257	C
Lärbro	Källstäde	43	176		SHM 4051	44497	B
Lärbro	Norder-Ire I	136	177		SHM 15099:1	44535	B
Lärbro	Norder-Ire II	46	178		SHM 15099:2	44536	B
Lärbro	Norder-Ire III	445	179		SHM 15099:3	44537	A
Lärbro	Norder-Ire IV	–	180		SHM 15099:4	44538	A
Lärbro	Nors	446	182		SHM 16430	44560	A
Lärbro	Pavals	3	183		SHM 14749	44531	A
Lärbro	Tängelgårda I	86	189		SHM 4373	108186	C
Lärbro	Tängelgårda III	449	191		SHM 4373	108200	C
Lärbro	Tängelgårda IV	91	192		SHM 4373	44501	C
Martebo	Martebo K	6	194		SHM 11696	120550	A
När	Mickelgårds	150	201	G94	SHM 15050	44532	E

När	Rikvide	35	202		SHM 484	44494	B
När	Smiss I	142	203		SHM 11521	108202	D
När	Smiss II	–	204		SHM 17432:4	44562	
Sanda	Sanda I	177	212	G181	SHM 13127	108188	E?
Sjonhem	Sjonhem I	146	220	G134	GF B1061		E
Sjonhem	Sjonhem II	149	221	G135	GF B1062		E
Stenkyrka	Lillbjärs I	103	277		SHM 13742	45680	C
Stenkyrka	Lillbjärs II	511	278		SHM 13742:3	45167	C
Stenkyrka	Lillbjärs III	104	279		SHM 13742:2	44520	C
Stenkyrka	Lillbjärs 17	107	292		GF C2483		C
Stenkyrka	Smiss I	97	295		GF 3428		C
Stenkyrka	Stenkyrka K 13	–	241		GF C10982		
Stenkyrka	Stenkyrka K 18	–	246		GF C10987		
Stenkyrka	Stenkyrka K 23	–	251		GF C10992		
Stenkyrka	Stenkyrka K 24	–	252		GF C10993		
Vallstena	Vallstenarum	16	322		SHM 14127	108205	A
Västkinde	Björkome I	10	335		SHM 7570	44506	A
Västkinde	Butter	65	337		GF C5179		B
Västkinde	Västkinde K 5	–	332		GF C10397:1		
Väte	Mölner	–	341		GF C10976		
unknown			351		GF C11003		
unknown					GF C10089		
unknown					GF C20115		
unknown					SHM45110:1		
unknown					SHM45110:2		

Table 2. Numbers of 3D scanned picture stones representing the types defined by Sune Lindqvist (1941–42), including those identified by the author.

Type Lqvt	**Number**
A	9
B	16
C	16
D	5
E	11
undefined	11
Total	68

from the website of the Swedish National Heritage Board: http://3ddata.raa.se/. Sixty–three of them are included in the catalogue in *Bildstenar* by Jan Peder Lamm (Nylén & Lamm 2003), and 12 have runic inscriptions and have been recorded in *Gotlands runinskrifter* (9 entries in Gotlands runinskrifter and Gotlands runinskrifter 3 ms) and are also included in *Samnordisk runtextdatabas* (http://www.runforum.nordiska.uu.se/samnord/). Sune Lindqvist sorted the picture stones into "Abschnitt A–E" according to their shape, size and motifs (Lindqvist 1941–42). The present material includes all of these five types (Table 2). Even though the chronology Lindqvist attached to these types needs to be discussed, the types are useful to give a general idea of what kind of stone we are dealing with and whether it belongs to an early or late phase in the picture stone tradition. Where possible, the author has defined the type for those picture stones not included in *Gotlands Bildsteine*.

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