The raw material preferences for producing picture stones on Gotland

By Patrick Hänsel, Sigmund Oehrl, Per Widerström, Lena Ideström and Axel Munnecke

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The picture stones on Gotland are monuments from the late Scandinavian Iron Age, which are important for the archaeological research about the North Germanic culture. Their imagery is also a valuable source for the pre-Christian religion in Scandinavia. Most of them are produced of Silurian limestones which are dated 423 to 433 million years. The Gotlandic picture stones were produced of thickly bedded limestones which are exposed in the vicinity of fossil reefs and carbonate platforms. Archaeologically, the picture stones can be classified into five groups (A to E stones), and an informal sixth group (so-called blind C/D/E stones). Geologically, the picture stone raw materials can be sorted into six different types based on visual facies analysis. The purpose of our paper is to investigate the raw material preferences for single picture stone types. According to our results, coarse and fine reef debris limestones were the most frequently used rock types. For the B stones, crinoidal limestone was preferentially used because of its sparkling effect of the crinoid remains in sunlight. However, the availability of nearby thickly bedded limestones was the most important prerequisite to produce most of the picture stones.

Keywords: crinoidal limestone, Gotland, picture stones, raw material preferences, reef debris limestone

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Introduction

On Gotland, numerous picture stones from the Iron Age are a subject of many archaeological investigations (Oehrl 2019, pp. 9–19). Even though all these monuments were produced of Gotlandic rocks, the exact origin of the raw material is still unknown for most of them. Isotope geochemical studies have shown that most of the analysed picture stones originate from geological units which are exposed not far from the picture stone standing or find places (Hänsel et al. 2023, p. 237). However, as most of these geological units contain different rock types, the present study will attempt to narrow down the origin of the rocks by a more detailed macro- and microscopic examination. In addition, it will be examined whether there were preferences for certain rock types and, if so, to which picture stone type it can be attributed.

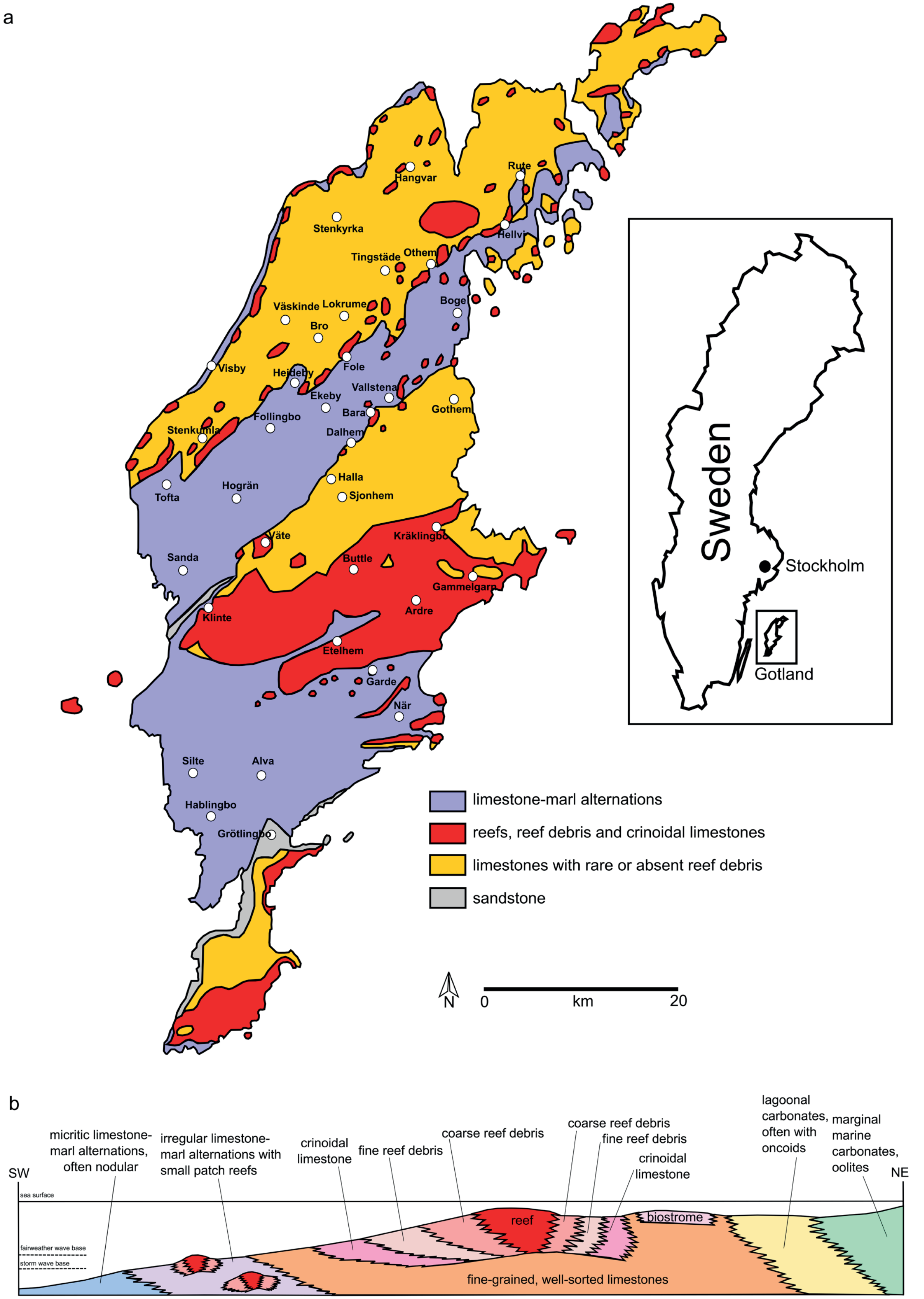
The geological background

The island of Gotland is in the central part of the Baltic Sea, and is entirely composed of limestone, marl, and sandstone from the Silurian (443 to 419 million years ago). In geology, the island is renowned for its abundant and well-preserved fossils as well as for its exceptionally preserved reefs. During the Silurian, Gotland was positioned slightly south of the equator on the palaeocontinent Baltica and reached low equatorial latitudes by the beginning of the Silurian period (Baarli et al. 2003, p. 4). One reason for the exceptional preservation is the lack of tectonic alterations because the rocks on Gotland have not been affected by orogenetic processes and have never been deeply buried. In addition, later diagenetic changes such as dolomitisation are absent.

Geologically, Gotland is a fossil carbonate platform built up by several stacked platforms and shows a broad spectrum of different limestone types. The limestones are composed of the mineral calcite ($CaCO_3$), and of other minerals such as clay minerals, dolomite ($CaMg(CO_3)_2$), and pyrite (FeS_2) in minor amounts (Munnecke 1997, pp. 27–28). All rocks on Gotland have a total thickness of about 500 m and are divided into 13 stratigraphic units (Hede 1921, pp. 1–100; Jeppsson 1983, pp. 126–137; Calner et al. 2004, pp. 113–127). These units are in the order of decreasing age as follows: Lower Visby Formation, Upper Visby Formation, Högklint Formation, Tofta Formation, Hangvar Formation, Slite Group, Fröjel Formation, Halla Formation, Klinteberg Formation, Hemse Group, Eke Formation, Burgsvik Formation, and Hamra-Sundre Formation.

On Gotland, a wide range of fossil depositional environments is represented from deeper water towards the shoreline (fig. 1). This range goes from the shelf environments containing limestone-marl alternations via reefs and reef-related environments built up by sessile, reef-building organisms to the platform environments which are characterized by well-sorted, medium- to fine-grained limestones formed in high water-energy settings in shallow waters (Samtleben et al. 2000, pp. 6–18). In the south of Gotland and in a small stripe near Klinte, sandstone is exposed (fig. 1). The sandstone was deposited under shallow marine conditions and contains well-sorted terrestrial material cemented by calcite (Samtleben et al. 2000, p. 18).

Up to now, no detailed facies map of the island has been published. Rocks that have formed in distal and proximal shelf environments as well as reef rocks are unsuitable for the picture stone production because they do not deliver hard and stable limestone slabs in the required thickness. The most widely used raw materials for picture stones are reef debris limestones which can be found surrounding the reefs. Such rocks exist along the northwestern coast of Gotland including the island of Fårö, in the central part of the island from Fröjel towards Ljugarn and Gothem, and on the southern end of the Gotlandic main island called Storsudret. Between these areas, mainly marls and limestone-marl alternations are exposed which contain limestone with a bad quality for producing picture stones. Some limestones on the platforms are thickly bedded but show cross bedding patterns which renders them unsuitable for producing picture stones because of breaking along their diagonal bedding planes.



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storm wave base
reef
biostrome
fine-grained, well-sorted limestones

Fig. 1. a) Simplified facies map of Gotland based on Samtleben et al. (1996, pp. 278–292) and Samtleben et al. (2000, pp. 1–38) with the position of Gotland within Sweden. The find places of the analysed picture stones are plotted. b) Simplified section from northeast to southwest on Gotland during the Silurian showing different sediment rock types. Graphics: Patrick Hänsel, GeoZentrum Nordbayern.

The picture stones of Gotland

The picture stones of Gotland are unique monuments from the late Scandinavian Iron Age. They date from ca 400 to 1100 AD (Lindqvist 1941, p. 9; Nylén & Lamm 1988, pp. 171–172) (fig. 2–3). An earlier beginning of the picture stone tradition ca 100 AD (Andrén 2012, p. 50; Oehrl 2019, p. 22) with a later ending ca 1150 AD (Gustavson 2012, p. 112; Oehrl 2019, p. 33) is in the focus of current archaeological research (Oehrl 2019, p. 35). Five hundred and seventy-two picture stones are known so far (Oehrl 2019, p. 13). Probably, most of the picture stones were originally placed on burial sites (Lindqvist, 1941, pp. 125–126; Oehrl 2019, p. 57). Five different types called A, B, C, D, and E and two special forms, cist stones and kerb stones, are distinguished by Sune Lindqvist in his still authoritative 1941/42 edition of the material, based on the shape and decoration of the monuments. This typology is still widely followed today (Lindqvist 1941, pp. 22–61; Nylén & Lamm 1988, pp. 171–172; Varenius 2012, pp. 42–43; Widerström 2012, pp. 10–12; Oehrl 2019, pp. 20–34). However, the C, D, and E types are mainly distinguishable by their decoration but hardly by their outer shape. If the surface of those picture stones is weathered, their exact type is hard, sometimes impossible to recognize. For that reason, they are called "blind" (Lindqvist 1941, p. 44; Lindqvist 1942, p. 35). The cist stones were used to erect sarcophagus-like monuments. For those monuments, four cist stones were placed together. The long, narrow kerb stones emerging only in group A are considered by Lindqvist (1941, p. 32) as frame constructions for burial mounds.

The picture stones have identity numbers which are composed of the abbreviation GP for Gotlandic picture stone and a number. These GP numbers will be used for a new digital edition for the picture stones called "Gotlandic Picture Stones. The Online Edition". This edition will be available at the website of the project "Ancient Images 2.0. A digital edition of the Gotlandic picture stones". It will offer data of every known picture stone ranging from the iconography to the raw material and medieval reuse (Oehrl & Fergusson 2022, p. 215). The GP numbers of the picture stones are already used in our study.

The picture stones which were analysed visually in our study were produced of thickly bedded limestones. Only a few limestone lithologies on Gotland can be visually assigned to a specific outcrop area, and the exact locality of the raw material source is uncertain. Especially the reef debris limestones formed during different reef episodes are almost indistinguishable from each other. This is even more difficult for picture stones as they are usually characterized by weathered surfaces, and sometimes completely overgrown by lichens.

Despite this, it is possible to determine the geological origin of the picture stone raw material by analysing the carbon isotope ($\delta^{13}C$) signature: An isotope study on 95 picture stones at Gotlands Museum in Visby, Sweden, was undertaken for determining the geological origin of the picture stone raw material (Hänsel et al. 2023, pp. 222–228). By comparing the $\delta^{13}C$ signatures from field samples with those from picture stones, it is concluded that whenever suitable rocks were available nearby, they have been preferentially used to produce picture stones (Hänsel et al. 2023, pp. 228–237).

Thin section analysis which is a standard method in carbonate petrography could technically help to determine the exact facies type but would cause huge damages and destructions of the archaeological monuments. Unfortunately, this method is inappropriate for archaeological objects because the archaeological information exists on the surface and must be protected from any kind of damage. The purpose of this study is to determine specific facies types of the limestones if they were preferred for producing picture stones, which importance had the fossil components of these carbonate rocks, and

Fig. 2. Examples of Gotlandic picture stones from the late Scandinavian Iron Age. a) Outer shapes of the picture stone types A, B, C, D, E and the cist stone. Graphic after Nylén & Lamm (1988, p. 172). b) A stone Hangvar Austers I (GP 173); Gotlands Museum, Visby, Sweden. c) B stone Ardre Petsarve II (GP 24); Gotlands Museum, Visby, Sweden. d) C stone Klinte Hunninge I (GP 209); Gotlands Museum, Visby, Sweden. Graphic: Patrick Hänsel, GeoZentrum Nordbayern. Photos: Patrick Hänsel, GeoZentrum Nordbayern.

Fig. 3. Examples of Gotlandic picture stones from the late Scandinavian Iron Age. a) D stone Klinte Hunninge III (GP 211); Gotlands Museum, Visby, Sweden. b) E stone Sjonhem kyrka II (GP 356); Gotlands Museum, Visby, Sweden. c) Blind C/D/E stone Garda kyrka 6 (GP 100); churchyard, Garda, Sweden. d) Cist stone Visby Sankt Hans kyrkoruin ID 545 (GP 545); Gotlands Museum, Visby, Sweden. Photos: Patrick Hänsel, GeoZentrum Nordbayern.

whether relationships exist between facies type and picture stone type.

Material and methods

One hundred and thirty-four rock samples of thickly bedded limestones were collected in the field during two field trips in September 2018 and September 2019 on Gotland, Sweden. The outcrops and rock samples were documented photographically in the field. Every piece of the rock sample was cut into two parts. One of the parts was grinded with an 800 SiC (silicon carbide) powder slice by a Minitech 300 SP1 grinding machine. The ground surfaces were photographed by a regular camera, and by a ZEISS AXIO Zoom.V16 microscope with an Axiscan 506 Color camera.

Ninety-seven picture stones were documented photographically during two museum trips in May and September 2019 at Gotlands Museum in Visby, Sweden, and seven picture stones in August 2022 outside in the field on Gotland, Sweden. The structure of their raw material was photographed in a closer view on the surface, especially on the smoothed front side of the monument. On the fragments, the fracture edges were in the focus of the documentation process. All visual observations were documented.

The facies and the fossil content of the sampled limestones and of the picture stone raw materials were analysed visually. We defined different raw material types based on visual observations of the picture stone raw material. The definition of those raw material types is based on a significant appearance or absence of fossils from reef-building organisms, on the abundance of what kind of fossil, and on the distinction between coarse and fine by defining 1 cm as the maximum size for components in fine material. Finally, a comparison between the polished field sample pieces and the picture stones' surfaces was undertaken via the photos.

Investigating the picture stones is hampered by the following five points: (1) For cultural heritage protection, it is strictly forbidden to break up a picture stone for getting pieces for grinding or for producing thin sections. (2) Not every picture stone was discovered in fragments with the consequence that fracture edges enabling exact observations are rare. (3) The picture stones stood, and some of them still stand, in the field, and their surface is often strongly weathered. (4) Many picture stones were overgrown by lichens which caused small pits as damages on the surface. Finally, (5) some picture stones were reused later, especially in the floors of some churches as *spolia*, resulting in strong abrasion by the church goers destroying the ornamentation. These five critical points had to be kept in mind when comparing the rock samples with the picture stone raw materials.

Results

The limestones in the field on Gotland

Thickly bedded limestones are often dominated by reef debris. This reef debris is deposited on the seafloor surrounding the reefs. Coarse reef debris is located closer to the reef and gets finer with an increasing distance from the reef. Crinoids are common components in the reef debris. Their abundance increases with a increased distance from the reef because the very light crinoid ossicles can be transported farther from the reef than the remains of reef-building organisms whose amount decreases with increasing distance from the reef core.

The limestones on Gotland show different patterns of layering and bedding. Whereas the reef limestone is massive and characterized by missing internal layering structures, the reef debris limestones are disintegrating into thicker beds, and the crinoidal limestone often disintegrates into thinner beds. In limestone-marl alternations, the limestone usually has a thickness of up to at most 10 cm, and is either nodular or shows a wavy, uneven bedding. Fine limestones with components smaller than 1 cm often show cross bedding.

In general, limestone beds are separated by bedding planes or by thin layers of softer sediment like marl or clay. Large components are often truncated at the bedding surface, and the resulting limestone bed shows a smooth and planar surface.

The limestone types used for the picture stones
Six different types of thickly bedded limestones have been distinguished, with gradual transitions between the types (tab. 1). The definition of these types is based on the observation criteria which are described under material and methods. (1) Coarse reef debris limestone contains fragments of reef-building organisms which are larger than 1 cm (fig. 4a–b). (2) Fine reef debris limestone is also composed of fragments from reef-building organisms, but they have a size of up to 1 cm (fig. 4c–d). (3) Crinoidal limestone is mostly composed of crinoid ossicles (fig. 4e–f). These ossicles are mm- to cm-sized single elements, and each one is a single crystal. This single crystal characteristic causes a strong sparkling effect in the sun. (4) Another type is the coarse limestone which is composed of components being larger than 1 cm, but they are not reef-derived (fig. 5a–b). (5) This type, called fine limestone, is composed of small, not reef-derived components with a size of up to 1 cm (fig. 5c–d). Since types 4 and 5 do not contain significant amounts of reef debris they are called limestones with rare or absent reef debris. (6) The oncoidal limestone contains oncoids which are cyanobacterial crusts around fossils (fig. 5e–f).

The reef debris (type 1 and type 2) and crinoidal (type 3) limestones are deposited mostly on the outer platform areas in shallow, agitated waters and surrounding the reefs. Oncoidal (type 6) limestone is typical for inner platform and back reef environments. Type 4 and type 5 can form in different environments.

The 97 picture stones at the Gotlands Museum in Visby and the seven ones in the field on Gotland are all made of thickly bedded limestone (tab. 2). Most of the picture stones at Gotlands Museum were discovered in areas where suitable raw materials are exposed and can be collected (fig. 6). All analysed picture stones were produced of limestone slabs which were brought into the picture stone shape, and the front side was decorated with ornaments, pictorial motives, and runic inscriptions. The surface is often weathered which hampers an optical facies analysis. In contrast, picture stone fragments offer the possibility to study their facies on their fracture edges.

The fossil content
The coarse reef debris limestone contains mainly remains of reef-building organisms like stromatoporoids, rugose and tabulate corals, bryozoans, and calcareous algae (fig. 4a–b). In the fine reef debris, smaller fragments of these reef builders appear (fig. 4c–d). Remains of reef dwellers such as trilobites, crinoids, bivalves, gastropods, and brachiopods are also observed. Skeletal elements of crinoids, which are originally highly porous single crystals of calcite, build up the crinoidal limestone (fig. 4e–f). Shells of gastropods, bivalves, and brachiopods dominate the coarse limestone (fig. 5a–b) and the fine limestone (fig. 5c–d) with rare or absent reef debris. These components can be overgrown by calcareous microbial and algal crusts creating nodular oncoids (fig. 5e–f).

The raw material preferences of the picture stone types
Coarse and fine reef debris limestones and crinoidal limestone are the most widely used limestone types (tab. 2). Twenty-four A stones were visually analysed. Seven of them (29 %) were produced of coarse reef debris limestone, and eight of them (33 %) of fine reef debris limestone. Twelve of the 23 B stones (52 %) are produced of crinoidal limestone. Ten of the 23 C stones (43 %) are of coarse reef debris limestone, and eight of them (35 %) of fine reef debris limestone. Only one identifiable D stone was visually analysed and is produced of coarse reef debris limestone. The twelve visually analysed E stones show no significant preference of raw material type. Five of the 16 blind C, D or E stones (31 %) were produced of coarse reef debris limestone, and six of them (38 %) of fine reef debris limestone. Five cist stones were visually analysed. Three of them (60 %) are of coarse reef debris limestone.

Interpretation and discussion
Thickly bedded limestones as picture stone raw materials
Because mining in a quarry in the Iron Age was extremely labour-intensive, thick limestone beds in the field were used where the rock was exposed on or very close to the surface. Those

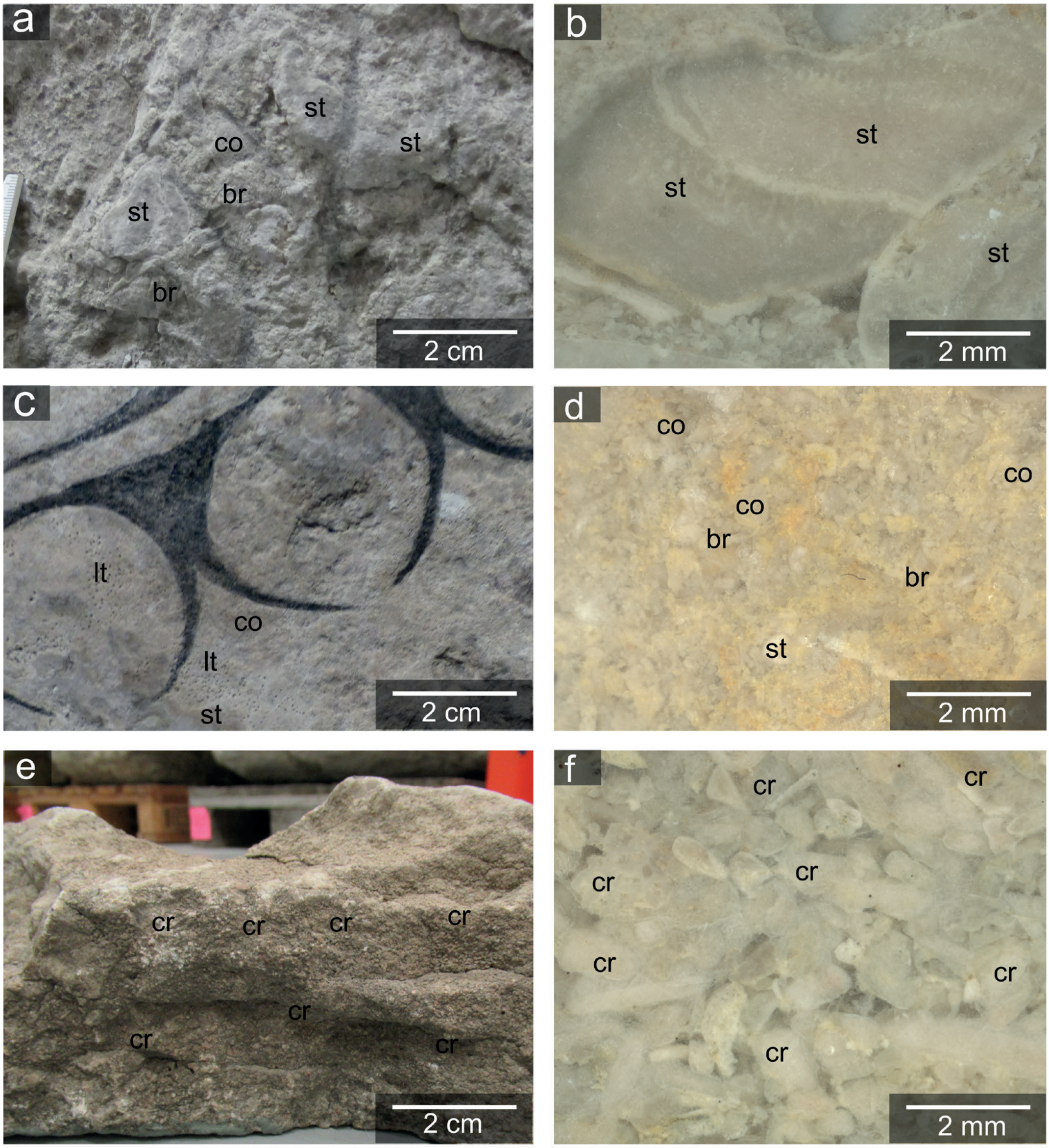

Fig. 4. Examples of thickly bedded limestone types which were used as raw materials for picture stones. Picture stone details showing characteristics of these limestone types (a, c & e). Polished samples of limestones as counterparts from outcrops on Gotland (b, d & f). a) Väte Gullarve (GP 561), C stone, produced of coarse reef debris limestone, detail from front side left down; Gotlands Museum, Visby, Sweden. b) Coarse reef debris limestone from Svarven, Gotland; Tofta Formation, Silurian. c) Väskinde kyrkogård 5 (GP 554), A stone, produced of fine reef debris limestone, detail from front side right underneath spiral whorl; Gotlands Museum, Visby, Sweden. d) Fine reef debris limestone from Hällarna, Gotland; Slite Group, Silurian. e) Kräklingbo Smiss IV (GP 215), B stone, produced of crinoidal limestone, detail from the fracture edge right; Gotlands Museum, Visby, Sweden. f) Crinoidal limestone from Gullstajnen, Gotland; Hamra-Sundre Formation, Silurian. st = stromatoporoid; co = coral; br = brachiopod; cr = crinoid; lt = lichen traces. Photos: Patrick Hänsel, GeoZentrum Nordbayern.

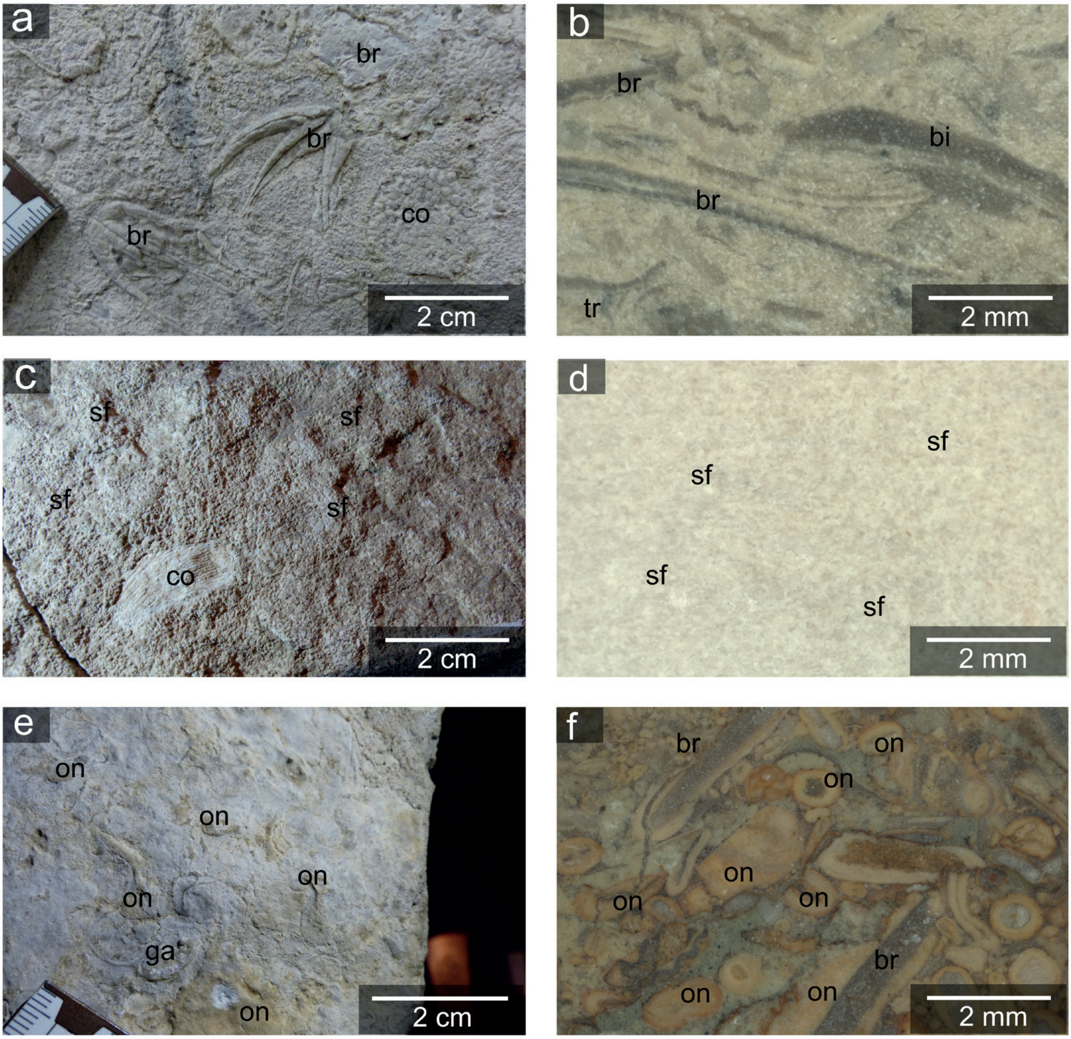

Fig. 5. Examples of thickly bedded limestone types which were used as raw materials for picture stones. Picture stone details showing characteristics of these limestone types (a, c & e). Polished samples of limestones as counterparts from outcrops on Gotland (b, d & f). a) Väte Mölner (GP 562), C stone, produced of coarse limestone with rare or absent reef debris, detail from the front side right middle; Gotlands Museum, Visby, Sweden. Note that the large components are shells belonging to the pentamerid brachiopod *Conchidium biloculare* which is an index fossil for the Klinteberg Formation on Gotland. b) Coarse limestone from Saxriv, Gotland; Tofta Formation, Silurian. c) Hellvi Ire I (GP 196), A stone, produced of fine limestone with rare or absent reef debris, detail from front side right up; Gotlands Museum, Visby, Sweden. d) Fine limestone from Bläse, Gotland; Högklint Formation, Silurian. e) Stenkyrka kyrkogård (GP 570), C stone (Lärbro Group), produced of oncoidal limestone, detail from fracture edge right up; Gotlands Museum, Visby, Sweden. f) Oncoidal limestone from Hoburgen, Gotland; Hamra-Sundre Formation, Silurian. on = oncoid; co = coral; ga = gastropod; tr = trilobite; br = brachiopod; sf = skeletal fragments. Photos: Patrick Hänsel, GeoZentrum Nordbayern.

places are either at the coast or in the inland where pure limestone is developed. Due to the soft marl layers which weather easily, the limestone-marl alternation areas show less outcrops with exposed rocks, but they are covered by thick soils.

Thickly bedded limestones with their flat bedding surface are an optimal material for producing picture stones. For the production process, only the outer shape of the picture stone had to be worked out and the ornamentation on the front side, in very rare cases also on the back side, had to be carved. At a first glance, it seems surprising that coarse reef debris limestones were used as the preferred material for the picture stones. It could be possible that large components would create a very uneven surface which would cause difficulties in processing. However, the formation of hard limestone beds can be traced back to diagenetic processes (Semper 1917, pp. 53–56) that can run through components and virtually cut them (Nohl & Munnecke 2019, p. 292). The diagenetic processes leading to the formation of such beds are, however, still debated (Munnecke et al. 2023, p. 16). The resulting beds often have a relatively even surface despite of their large components, which makes them easy to work on for the picture stones.

The influence of the fossil content for selecting the raw material

Reef debris limestones, which were mostly used, contain large amounts of reef-building and reef-dwelling organism remains, often with the size of several centimetres up to one decimetre in diameter. In most cases, the carved motives on the picture stones crosscut the fossil remains. The fossils usually have a significantly different colouring than the surrounding rock. This means that either this optical effect was not considered as important, or the front side of the picture stones were painted (Lindqvist 1941, p. 23; Nylén & Lamm 1988, p. 82; Simonsson 2012, p. 198; Oehrl 2019, p. 489). In that case, the colour differences were not important. However, there are examples of picture stones in which fossils were integrated as motif elements. Three significant examples are as follows: The A stone Hangvar Austers I (GP 173) showing two crinoid stems as the eyes of a worm- or snake-shaped creature (Oehrl 2019, p. 201), the A stone Sanda kyrka IV (GP 350) having a bivalve shell as the back stern of the ship (own observation), and the cist stone Alskog kyrka (GP 3) showing two crinoid stem pieces as rings on the anvil in the forge (Oehrl 2009, p. 545).

A special type of thickly bedded limestones is the crinoidal limestone. It is mostly composed of crinoid ossicles which are mm- to cm-sized calcitic single-crystals reflecting the sunlight in different angles in dependence on their position in the rock. This sparkling effect was probably a reason for the attraction of that limestone type giving the picture stones an aesthetic feature. However, the crinoidal limestone is too delicate for producing large picture stones because it disintegrates into thinner slices when being exposed to weathering for a longer time. Additionally, many crinoidal limestones show cross beddings. Therefore, picture stones which are produced of this limestone possess a small size.

The relation between the limestone type and the picture stone type

About two thirds of the picture stones were produced of coarse and fine reef debris limestones, 15 % of crinoidal limestone, 13 % of fine limestone with rare or absent reef debris, and the oncoidal limestone and the non-reef-related coarse limestone seem to be in minor use (tab. 2). With respect to the picture stone types, it seems that there is almost no preference for specific raw material types. Except for the B stones, different facies types were used, like coarse- and fine-grained facies types as well as reef-related and non-reef-related facies types. The findings of the picture stone provenance investigation based on their carbon isotope ($\delta^{13}C$) signature conclude that the most important factor for the raw material selection was the geographical distance to the nearest outcrop where thick limestone beds were available (Hänsel et al. 2023, pp. 228–237). Among the 95 picture stones which were analysed, 79 picture stones were produced of local material (Hänsel et al. 2023, p. 233), because the transport of a picture stone was quite laborious over land or by ship at that time (Hänsel et al.

2023, p. 237). Picture stones were only transported distances over 10 km if no suitable raw material was available, especially in marl areas, or probably for some personal reasons (Hänsel et al. 2023, pp. 234–235). It seems that the Iron Age crafters went directly to the next reef or shoal areas on Gotland where thickly bedded limestones, especially reef debris limestones, are exposed for getting suitable raw materials as perfect limestone slabs for producing picture stones. This can be observed by the distribution of used limestone types in dependence on the geological situation of the standing or find place (fig. 6). Surrounding and between the reefs, suitable limestones as picture stone raw materials are exposed and can be collected close to the surface. Additionally, it could be possible that the Iron Age crafters gained the knowledge about the geological situation of Gotland as a reef area delivering limestones for the picture stone production.

The B stones are the only significant exception in this respect. Only four out of 23 B stones were produced of coarse-grained rocks, and about half of the B stones are of crinoidal limestone (twelve of 23) (fig. 7). Their decoration shows sketch-like motives which are usually carved on both sides on the picture stone. The sparkling effect of the abundant crinoid remains was probably desired and led to a preference of crinoidal limestone during the period when the B stones were produced and erected. In this respect, it is interesting to note that the second most used rock type, fine reef debris, contains a lot of crinoid remains as well, i.e., they show an optical pattern similar to pure crinoidal limestone. Coarse reef debris limestone was rarely used (fig. 7) because the remains of the reef-building organisms being larger than 1 cm do not obtain the desired sparkling effect. It could be possible that the significant preference of crinoidal limestone stand in correlation with decoration patterns on fibulas which are known from the B stone period. Examples are large opulent relief brooch fibulas of gilded silver from Gotland (Lindqvist 1941, p. 110). Comparable relief brooch fibulas were discovered in the fortress Sandby borg on Öland (Alfsdotter et al. 2018, p. 424) which is in the immediate vicinity of Gotland. One disc fibula from Fröjel dating to the Vendel Period shows a filigree decoration with garnet (Fritz 1997, p. 11) which can also stand in correlation with the preference of crinoidal limestone for the B stones. The opulent and filigree ornamentation patterns of the fibulas can indicate a fashion trend which was characterized by a kind of popularity for sparkling effects in sunlight. Such a trend is a possible explanation for the preference of crinoidal limestone for producing B stones because of the popularity of sparkling effects at that time from the Migration Period to the Vendel Period.

B stones are usually less than 1 m tall (and are therefore called dwarf stones) because the crinoidal limestone beds disintegrate easily into thinner beds by their relatively fine-grained structure, whereas coarse-grained reef debris forms more massive beds which do not disintegrate easily. Crinoidal limestone can possess cross beddings hindering the production of large picture stones of this raw material. The low size of the B stones was seen as an indication for political or economic crises which happened in the middle of the 1st millennium AD (Lindqvist 1941, p. 128). However, our findings contradict that indication: The small size of the B stones is simply a result of the fact that their raw material was not suitable to produce large picture stones. B stones are dwarf stones because of technical and not of political or economic reasons.

For the D stones and cist stones, no preference for specific limestone types is discussed because of the very low number of analysed picture stone specimens belonging to these two picture stone types. The blind stones are not discussed either because their attribution to the C, D or E types is uncertain.

Conclusion

The Gotlandic picture stones which were analysed visually in our study were produced of thickly bedded limestones from the Silurian. These rocks are developed in the areas surrounding the reefs and on the carbonate platforms on Gotland. Close to the reef, coarse reef debris limestone is dominating, and the reef debris is getting finer with the increase of the distance from the reef, and finally it goes over into crinoi-

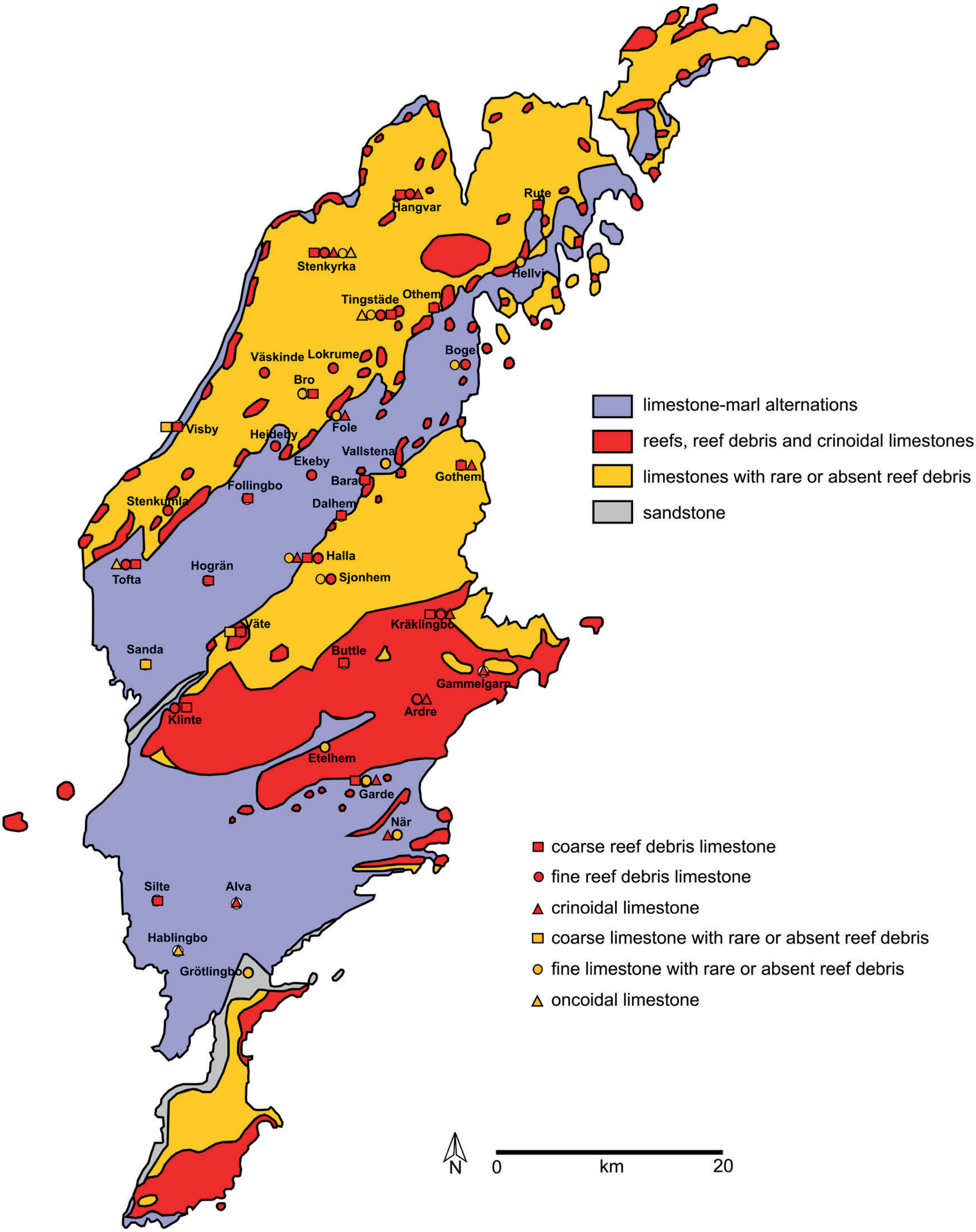

Fig. 6. Simplified facies map of Gotland based on Samtleben et al. (1996, pp. 278–292) and Samtleben et al. (2000, pp. 1–38). The thickly bedded limestone types which were used for producing the analysed picture stones are plotted. Each find place on the map shows which limestones were used for the picture stones discovered there. Graphic: Patrick Hänsel, GeoZentrum Nordbayern.

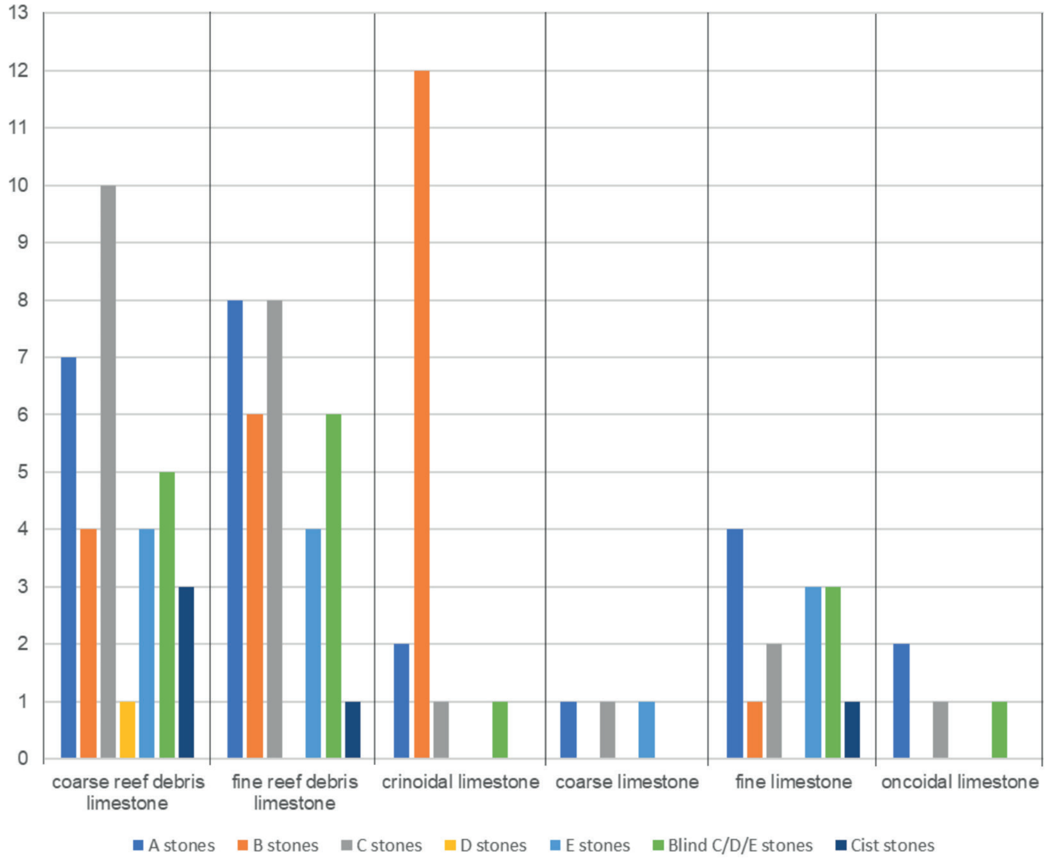

Fig. 7. Raw material usage by limestone types of the analysed picture stones. Note that a significant preference is visible for coarse and fine reef debris limestones in A, C, E, and the blind C/D/E stones, and for crinoidal limestone in B stones. The Y axis stands for the number of analysed picture stones. Graphic: Patrick Hänsel, GeoZentrum Nordbayern.

dal limestone. Coarse and fine limestones with rare or absent reef debris dominate between the reefs and in the shoal areas. Behind the reefs, oncoidal limestone was deposited. It was also used for producing picture stones.

Most of the picture stones were produced of coarse and fine reef debris limestones because both are the most weathering-resistant thickly bedded limestone types on Gotland. Coarse and fine limestones with rare or absent reef debris were also used. The usage of oncoidal limestone appears in very rare cases. Only the B stones are different: They demonstrate a clear preference for the crinoidal limestone which is more fine-grained. The sparkling effect of this limestone in sunlight was a desired preference at the time when the B stones were produced. Because of the delicate structure of the crinoidal limestone, it was more convenient to produce a small picture stone than a big picture stone, which is the reason why B stones are dwarf stones.

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Tab. 1. Data for the collected field samples from Gotland, which are comparable to the limestones being used for producing picture stones. The limestone types were determined visually by ground pieces.

Sample number	Outcrop	Coordinates GPS North	Coordinates GPS East	Geological unit
		coarse reef debris limestone		
Lok1_1_PH	Lokality 1 S from Ireviken	57.825695 N	18.578125 E	Högklint Formation
Lok1_2_PH	Lokality 1 S from Ireviken	57.825695 N	18.578125 E	Högklint Formation
Lok1_3_PH	Lokality 1 S from Ireviken	57.825695 N	18.578125 E	Högklint Formation
Sn_4_PH	Snipan	57.845261 N	18.564643 E	Högklint Formation
Gv_4_PH	Gutevägen	57.629505 N	18.280608 E	Högklint Formation
NBl_1_PH	Nors Blålagunen	57.917623 N	18.923034 E	Högklint Formation
Sa_1_PH	Saxriv	57.927806 N	18.888746 E	Tofta Formation
Sv_3_PH	Svarven	57.919911 N	18.845954 E	Tofta Formation
Ny_2_PH	Nymånetorp	57.849671 N	18.754980 E	Hangvar Formation
Hn_2_PH	Haganäs	57.923764 N	19.154125 E	Slite Group
Hn_3_PH	Haganäs	57.923764 N	19.154125 E	Slite Group
Hn_5_PH	Haganäs	57.923764 N	19.154125 E	Slite Group
Hl_2_PH	Hällarna	57.631974 N	18.380714 E	Slite Group
Hl_5_PH	Hällarna	57.631974 N	18.380714 E	Slite Group
Tj_1_PH	Tjautet	57.639661 N	18.380660 E	Slite Group
Tj_2_PH	Tjautet	57.639661 N	18.380660 E	Slite Group
Tj_6_PH	Tjautet	57.639661 N	18.380660 E	Slite Group
Hu_1_PH	Hunninge	57.381494 N	18.260307 E	Klinteberg Formation
Hu_3_PH	Hunninge	57.381494 N	18.260307 E	Klinteberg Formation
Bf2_1_PH	Bofride 2	57.335206 N	18.260158 E	Klinteberg Formation
St_1_PH	Stenstugårds	57.460586 N	18.433740 E	Klinteberg Formation
St_3_PH	Stenstugårds	57.460586 N	18.433740 E	Klinteberg Formation
Ra_1_PH	Rangsarve	57.282636 N	18.404316 E	Hemse Group
Ra_2_PH	Rangsarve	57.282636 N	18.404316 E	Hemse Group
Ra_3_PH	Rangsarve	57.282636 N	18.404316 E	Hemse Group
Ku1_1_PH	Kuppen 1	57.424387 N	18.925012 E	Hemse Group

Sample number	Outcrop	Coordinates		Geological unit
		GPS North	GPS East	
Ku2_1_PH	Kuppen 2	57.424077 N	18.926262 E	Hemse Group
Gr_1_PH	Grogarnshuvud	57.442504 N	18.892878 E	Hemse Group
SK_1_PH	Sandarve Kulle	57.274332 N	18.342579 E	Hemse Group
		fine reef debris limestone		
Sn_2_PH	Snipan	57.845261 N	18.564643 E	Högklint Formation
Sn_3_PH	Snipan	57.845261 N	18.564643 E	Högklint Formation
SnO_1_PH	Snipan E	57.845007 N	18.565378 E	Högklint Formation
SnO_2_PH	Snipan E	57.845007 N	18.565378 E	Högklint Formation
Gv_1_PH	Gutevägen	57.629505 N	18.280608 E	Högklint Formation
Gv_2_PH	Gutevägen	57.629505 N	18.280608 E	Högklint Formation
Gv_3_PH	Gutevägen	57.629505 N	18.280608 E	Högklint Formation
Hd_1_PH	Hälludden	57.924579 N	18.929032 E	Högklint Formation
Hd_2_PH	Hälludden	57.924579 N	18.929032 E	Högklint Formation
Hd_3_PH	Hälludden	57.924579 N	18.929032 E	Högklint Formation
Si_1_PH	Sigsarve	57.855520 N	18.616756 E	Högklint Formation
Bl_3_PH	Bläse	57.906656 N	18.860123 E	Högklint Formation
Hh_1_PH	Hallshuk	57.918439 N	18.755906 E	Högklint Formation
Hh_2_PH	Hallshuk	57.918439 N	18.755906 E	Högklint Formation
Hh_3_PH	Hallshuk	57.918439 N	18.755906 E	Högklint Formation
Sa_3_PH	Saxriv	57.927806 N	18.888746 E	Tofta Formation
Sv_2_PH	Svarven	57.919911 N	18.845954 E	Tofta Formation
Ha_1_PH	Hall	57.902423 N	18.761015 E	Tofta Formation
Ha_3_PH	Hall	57.902423 N	18.761015 E	Tofta Formation
Ny_1_PH	Nymånetorp	57.849671 N	18.754980 E	Hangvar Formation
Ny_3_PH	Nymånetorp	57.849671 N	18.754980 E	Hangvar Formation
Ny_6_PH	Nymånetorp	57.849671 N	18.754980 E	Hangvar Formation
Hg_1_PH	Hällagrund	57.926070 N	19.048851 E	Hangvar Formation
Hg_2_PH	Hällagrund	57.926070 N	19.048851 E	Hangvar Formation
Ab_1_PH	Ar brottet	57.912581 N	18.950925 E	Hangvar Formation
Ab_2_PH	Ar brottet	57.912581 N	18.950925 E	Hangvar Formation
Hn_4_PH	Haganäs	57.923764 N	19.154125 E	Slite Group
Hl_4_PH	Hällarna	57.631974 N	18.380714 E	Slite Group
Hl_6_PH	Hällarna	57.631974 N	18.380714 E	Slite Group
Tj_3_PH	Tjautet	57.639661 N	18.380660 E	Slite Group
Da_1_PH	Dacker	57.660408 N	18.453205 E	Slite Group
Da_2_PH	Dacker	57.660408 N	18.453205 E	Slite Group
Fu_1_PH	Furilden	57.772853 N	19.015161 E	Slite Group
Fu_2_PH	Furilden	57.772853 N	19.015161 E	Slite Group
Fu_3_PH	Furilden	57.772853 N	19.015161 E	Slite Group
Vv_3_PH	Valleviken	57.793782 N	18.939876 E	Slite Group
AM119	Båta 1	57.939202 N	19.185990 E	Slite Group
Hu_2_PH	Hunninge	57.381494 N	18.260307 E	Klinteberg Formation
Bf1_1_PH	Bofride 1	57.336391 N	18.259471 E	Klinteberg Formation

Sample number	Outcrop	Coordinates		Geological unit
		GPS North	GPS East	
St_2_PH	Stenstugårds	57.460586 N	18.433740 E	Klinteberg Formation
Ga_2_PH	Gannes	57.422722 N	18.846035 E	Hemse Group
Ga_3_PH	Gannes	57.422722 N	18.846035 E	Hemse Group
Gr_2_PH	Grogarnshuvud	57.442504 N	18.892878 E	Hemse Group
Bt2_1_PH	Bote 2 (1 not)	57.257992 N	18.711071 E	Eke Formation
		crinoidal limestone		
Sn_1_PH	Snipan	57.845261 N	18.564643 E	Högklint Formation
Sn_5_PH	Snipan	57.845261 N	18.564643 E	Högklint Formation
Si_2_PH	Sigsarve	57.855520 N	18.616756 E	Högklint Formation
Gs_1_PH	Gullstajnen	56.937367 N	18.157195 E	Hamra-Sundre Formation
Gs_2_PH	Gullstajnen	56.937367 N	18.157195 E	Hamra-Sundre Formation
Ho_1_PH	Hoburgen	56.922014 N	18.128750 E	Hamra-Sundre Formation
Ho_2_PH	Hoburgen	56.922014 N	18.128750 E	Hamra-Sundre Formation
Ho_3_PH	Hoburgen	56.922014 N	18.128750 E	Hamra-Sundre Formation
Ho_4_PH	Hoburgen	56.922014 N	18.128750 E	Hamra-Sundre Formation
		coarse limestone with rare or absent reef debris		
Sa_2_PH	Saxriv	57.927806 N	18.888746 E	Tofta Formation
Sa_4_PH	Saxriv	57.927806 N	18.888746 E	Tofta Formation
		fine limestone with rare or absent reef debris		
Ir_1_PH	Ireviken	57.843606 N	18.572216 E	Högklint Formation
Ir_2_PH	Ireviken	57.843606 N	18.572216 E	Högklint Formation
Ir_3_PH	Ireviken	57.843606 N	18.572216 E	Högklint Formation
Ir_4_PH	Ireviken	57.843606 N	18.572216 E	Högklint Formation
Ir_5_PH	Ireviken	57.843606 N	18.572216 E	Högklint Formation
NBl_2_PH	Nors Blålagunen	57.917623 N	18.923034 E	Högklint Formation
NBl_3_PH	Nors Blålagunen	57.917623 N	18.923034 E	Högklint Formation
Bl_1_PH	Bläse	57.906656 N	18.860123 E	Högklint Formation
Bl_2_PH	Bläse	57.906656 N	18.860123 E	Högklint Formation
GbT_1_PH	Galgberget	57.650924 N	18.312369 E	Tofta Formation
GbT_2_PH	Galgberget	57.650924 N	18.312369 E	Tofta Formation
GbT_3_PH	Galgberget	57.650924 N	18.312369 E	Tofta Formation
Sv_1_PH	Svarven	57.919911 N	18.845954 E	Tofta Formation
TS_1_PH	Tofta S	57.478375 N	18.125004 E	Tofta Formation
TS_2_PH	Tofta S	57.478375 N	18.125004 E	Tofta Formation
EA_1_PH	Elinghem Austers	57.814111 N	18.634864 E	Tofta Formation
Ha_2_PH	Hall	57.902423 N	18.761015 E	Tofta Formation
Ny_4_PH	Nymånetorp	57.849671 N	18.754980 E	Hangvar Formation
Ny_5_PH	Nymånetorp	57.849671 N	18.754980 E	Hangvar Formation
TSH_1_PH	Tofta S (Hangvar Fm.)	57.463356 N	18.122591 E	Hangvar Formation
Hn_1_PH	Haganäs	57.923764 N	19.154125 E	Slite Group
Hl_1_PH	Hällarna	57.631974 N	18.380714 E	Slite Group

Sample number	Outcrop	Coordinates		Geological unit
		GPS North	GPS East	
Hl_3_PH	Hällarna	57.631974 N	18.380714 E	Slite Group
Tj_4_PH	Tjautet	57.639661 N	18.380660 E	Slite Group
Tj_5_PH	Tjautet	57.639661 N	18.380660 E	Slite Group
Vv_1_PH	Valleviken	57.793782 N	18.939876 E	Slite Group
Vv_2_PH	Valleviken	57.793782 N	18.939876 E	Slite Group
Vt_1_PH	Väte	57.453563 N	18.375191 E	Halla Formation
DB_1_PH	Djupvik-Blåhäll	57.305947 N	18.144164 E	Halla Formation
DB_2_PH	Djupvik-Blåhäll	57.305947 N	18.144164 E	Halla Formation
DB_3_PH	Djupvik-Blåhäll	57.305947 N	18.144164 E	Halla Formation
Gh_2_PH	Gothemhammar	57.606384 N	18.803894 E	Klinteberg Formation
Ta1_1_PH	Tass 1	57.408670 N	18.358113 E	Klinteberg Formation
Ta2_1_PH	Tass 2	57.410663 N	18.363269 E	Klinteberg Formation
Ga_1_PH	Gannes	57.422722 N	18.846035 E	Hemse Group
Hb_1_PH	Hummelbosholm	57.205528 N	18.520178 E	Hemse Group
Hb_2_PH	Hummelbosholm	57.205528 N	18.520178 E	Hemse Group
Dj1_1_PH	Djaupviksudden 1	57.464347 N	18.797149 E	Hemse Group
Dj1_2_PH	Djaupviksudden 1	57.464347 N	18.797149 E	Hemse Group
Dj2_1_PH	Djaupviksudden 2	57.464961 N	18.798214 E	Hemse Group
Dj3_1_PH	Djaupviksudden 3	57.469478 N	18.799801 E	Hemse Group
Bo_1_PH	Bodudd	57.069900 N	18.189415 E	Hemse Group
Bo_2_PH	Bodudd	57.069900 N	18.189415 E	Hemse Group
Ho_5_PH	Hoburgen	56.922014 N	18.128750 E	Hamra-Sundre Formation
Ho_6_PH	Hoburgen	56.922014 N	18.128750 E	Hamra-Sundre Formation
		oncoidal limestone		
Gh_1_PH	Gothemhammar	57.606384 N	18.803894 E	Halla Formation
Kl_1_PH	Kullunde	57.163616 N	18.417531 E	Eke Formation
Ho_7_PH	Hoburgen	56.922014 N	18.128750 E	Hamra-Sundre Formation
Ho_8_PH	Hoburgen	56.922014 N	18.128750 E	Hamra-Sundre Formation
Ho_9_PH	Hoburgen	56.922014 N	18.128750 E	Hamra-Sundre Formation

Tab. 2. Data for the analysed picture stones sorted by their raw material. The limestone types were determined visually in comparison with the ground field sample pieces.

Picture stone ID	Inventary number	Picture stone name	Find place	Coordinates		Picture stone type
				GPS North	GPS East	
			coarse reef debris limestone			
GP 402	C10982	Stenkyrka kyrka 13	Stenkyrka	57.793234 N	18.531333 E	A
GP 406	C10986	Stenkyrka kyrka 17	Stenkyrka	57.793234 N	18.531333 E	A
GP 408	C10988	Stenkyrka kyrka 19	Stenkyrka	57.793234 N	18.531333 E	A
GP 425	C11010	Stenkyrka kyrka 35	Stenkyrka	57.793234 N	18.531333 E	A
GP 516	C4650	Tingstäde ID 516	Tingstäde	57.736341 N	18.614862 E	A

Picture stone ID	Inventary number	Picture stone name	Find place	Coordinates		Picture stone type
				GPS North	GPS East	
GP 515	C4649	Tingstäde ID 515	Tingstäde	57.736341 N	18.614862 E	A
GP 511	C4645	Tingstäde ID 511	Tingstäde	57.736341 N	18.614862 E	A
GP 106	C2700	Gothem Bentebingels	Gothem	57.576572 N	18.731453 E	B
GP 147	C2433	Halla Broa X	Halla	57.510875 N	18.496946 E	B
GP 146	C1677	Halla Broa VIII	Halla	57.510875 N	18.496946 E	B
GP 68	C1398	Dalhem Hallfoser	Dalhem	57.552411 N	18.533893 E	B
GP 525	C10145	Tofta Dyple	Tofta	57.521515 N	18.168592 E	C
GP 489 + GP 490	C2639 (311)	Tingstäde kyrka XV-XVI	Tingstäde	57.736341 N	18.614862 E	C
GP 336	C9200	Rute Fardume	Rute	57.833761 N	18.923206 E	C
GP 339	C9212:20	Rute ID 339	Rute	57.833761 N	18.923206 E	C
GP 41	C21905	Bro Ekes 1:5	Bro	57.669964 N	18.475521 E	C
GP 561	C1668	Väte Gullarve	Väte	57.449098 N	18.363680 E	C
GP 352	/ (463)	Silte stenbro	Silte	57.220739 N	18.216280 E	C
GP 210	/ (154)	Klinte Hunninge II	Klinte	57.385280 N	18.251482 E	C
GP 61	/ (43)	Buttle Änge I	Buttle	57.394467 N	18.500358 E	C
GP 62	/ (44)	Buttle Änge II	Buttle	57.394467 N	18.500358 E	C
GP 211	C7116	Klinte Hunninge III	Klinte	57.385280 N	18.251482 E	D
GP 174	C183	Hangvar kyrka I	Hangvar	57.839269 N	18.688311 E	E
GP 87	C8161	Follingbo Hallfreda	Follingbo	57.582310 N	18.383005 E	E
GP 208	B1063	Hogrän kyrka I	Hogrän	57.504609 N	18.307588 E	E
GP 217	C3991	Kräklingbo Smiss III	Kräklingbo	57.445242 N	18.711105 E	E
GP 411	C10991	Stenkyrka kyrka 22	Stenkyrka	57.793234 N	18.531333 E	blind C/D/E
GP 404	C10984	Stenkyrka kyrka 15	Stenkyrka	57.793234 N	18.531333 E	blind C/D/E
GP 327	C11043	Othem Othemars 1:9	Othem	57.747940 N	18.738556 E	blind C/D/E
GP 100	/ (65)	Garda kyrka 6	Garda	57.317146 N	18.581959 E	blind C/D/E
GP 218	/ (415)	Kräklingbo kyrka	Kräklingbo	57.445242 N	18.711105 E	blind C/D/E
GP 521	C4655	Tingstäde kyrka ID 521	Tingstäde	57.736341 N	18.614862 E	cist
GP 28	C4640	Bara Nederbjärs II	Bara	57.584633 N	18.611063 E	cist
GP 545	C10860	Visby Sankt Hans kyrkoruin ID 545	Visby	57.638040 N	18.292474 E	cist
		fine reef debris limestone				
GP 429	C2482	Stenkyrka Lillbjärs XVI	Stenkyrka	57.793234 N	18.531333 E	A
GP 420	C11002	Stenkyrka kyrka 30	Stenkyrka	57.793234 N	18.531333 E	A
GP 412	C10992	Stenkyrka kyrka 23	Stenkyrka	57.793234 N	18.531333 E	A
GP 519	C4653	Tingstäde ID 519	Tingstäde	57.736341 N	18.614862 E	A
GP 496	C2639 (314)	Tingstäde kyrka XIX	Tingstäde	57.736341 N	18.614862 E	A
GP 528	C10238	Tofta kyrka 2	Tofta	57.521515 N	18.168592 E	A
GP 159	C1402	Halla kyrka	Halla	57.510875 N	18.496946 E	A

Picture stone ID	Inventary number	Picture stone name	Find place	Coordinates		Picture stone type
				GPS North	GPS East	
GP 554	C10397:1	Väskinde kyrkogård 5	Väskinde	57.690576 N	18.422842 E	A
GP 366	C1671	Stenkyrka kyrka VI	Stenkyrka	57.793234 N	18.531333 E	B
GP 449	C11026	Stenkyrka kyrka ID 449	Stenkyrka	57.793234 N	18.531333 E	B
GP 238	C1401	Lokrume Lauks	Lokrume	57.687827 N	18.541124 E	B
GP 181	C1058	Hejdeby Råby	Hejdeby	57.630436 N	18.442575 E	B
GP 152	C10980	Halla Hallegårda	Halla	57.510875 N	18.496946 E	B
GP 354	C8540	Sjonhem Lilla Sojvide	Sjonhem	57.485563 N	18.520517 E	B
GP 397	C3428	Stenkyrka Smiss I	Stenkyrka	57.793234 N	18.531333 E	C
GP 209	C9286	Klinte Hunninge I	Klinte	57.385280 N	18.251482 E	C
GP 491	C2639 (313)	Tingstäde kyrka XVIII	Tingstäde	57.736341 N	18.614862 E	C
GP 34	C10188:14	Boge Laxarve 2	Boge	57.687185 N	18.763950 E	C
GP 160	A2088	Halla Broa II	Halla	57.510875 N	18.496946 E	C
GP 161	C2089	Halla Broa III	Halla	57.510875 N	18.496946 E	C
GP 551	C5179	Väskinde Butter	Väskinde	57.690576 N	18.422842 E	C
GP 216	C1876	Kräklingbo Smiss I	Kräklingbo	57.445242 N	18.711105 E	C
GP 70	609	Ekeby annexhemmanet	Ekeby	57.595130 N	18.514419 E	E
GP 32	C1064	Boge kyrka	Boge	57.687185 N	18.763950 E	E
GP 362	/ /226)	Stenkumla kyrka II	Stenkumla	57.547700 N	18.268328 E	E
GP 361	/ (225)	Stenkumla kyrka I	Stenkumla	57.547700 N	18.268328 E	E
GP 479	C11025	Stenkyrka ID 479	Stenkyrka	57.793234 N	18.531333 E	blind C/D/E
GP 405	C10985	Stenkyrka kyrka 16	Stenkyrka	57.793234 N	18.531333 E	blind C/D/E
GP 426	C11012	Stenkyrka kyrka 36	Stenkyrka	57.793234 N	18.531333 E	blind C/D/E
GP 386 + GP 387	C11028	Stenkyrka kyrka 41	Stenkyrka	57.793234 N	18.531333 E	blind C/D/E
GP 403	C10983	Stenkyrka kyrka 14	Stenkyrka	57.793234 N	18.531333 E	blind C/D/E
GP 172	C11027	Hangvar Austers II	Hangvar	57.839269 N	18.688311 E	blind C/D/E
GP 19	C1877	Ardre Petsarve I	Ardre	57.379492 N	18.696690 E	cist
		crinoidal limestone				
GP 173	C1033	Hangvar Austers I	Hangvar	57.839269 N	18.688311 E	A
GP 99	C1456	Garda kyrkogård	Garda	57.317146 N	18.581959 E	A
GP 365	C1670	Stenkyrka kyrka IV	Stenkyrka	57.793234 N	18.531333 E	B
GP 107	C2925	Gothem Västerbjärs	Gothem	57.576572 N	18.731453 E	B
GP 84	C9018	Fole Stora Tollby	Fole	57.650518 N	18.544592 E	B
GP 166	C7888	Halla Broa XVIII	Halla	57.510875 N	18.496946 E	B
GP 142	C1676	Halla Broa VII	Halla	57.510875 N	18.496946 E	B
GP 143	2087	Halla Broa I	Halla	57.510875 N	18.496946 E	B
GP 215	C7445	Kräklingbo Smiss IV	Kräklingbo	57.445242 N	18.711105 E	B
GP 281	C10261	När Smiss 3	När	57.257437 N	18.634786 E	B
GP 93	C8075	Gammelgarn Högstens	Gammelgarn	57.404554 N	18.804186 E	B

Picture stone ID	Inventary number	Picture stone name	Find place	Coordinates GPS North	Coordinates GPS East	Picture stone type
GP 24	C1878	Ardre Petsarve II	Ardre	57.379492 N	18.696690 E	B
GP 96	C1984	Garda Smiss I	Garda	57.317146 N	18.581959 E	B
GP 10 + GP 11	C9427	Alva Stora Ringome	Alva	57.207463 N	18.361203 E	B
GP 13	C10126	Alva Bopparve	Alva	57.207463 N	18.361203 E	C
GP 394	C1672	Stenkyrka Lillbjärs XV	Stenkyrka	57.793234 N	18.531333 E	blind C/D/E
		coarse limestone with rare or absent reef debris				
GP 350	C10121:1	Sanda kyrka IV	Sanda	57.429273 N	18.222886 E	A
GP 562	C10976	Väte Mölner	Väte	57.449098 N	18.363680 E	C
GP 543	/ (436)	Visby Sankt Hans kyrko-ruin 3	Visby	57.638040 N	18.292474 E	E
		fine limestone with rare or absent reef debris				
GP 520	C4654	Tingstäde ID 520	Tingstäde	57.736341 N	18.614862 E	A
GP 522	C4656	Tingstäde ID 522	Tingstäde	57.736341 N	18.614862 E	A
GP 196	C8563:136	Hellvi Ire I	Hellvi	57.774375 N	18.894462 E	A
GP 538	C10039	Vallstena Vallstenarum 2	Vallstena	57.608394 N	18.637507 E	A
GP 277	C160151	När Rikvide	När	57.257437 N	18.634786 E	B
GP 79	C2264	Etelhem järnvägen	Etelhem	57.336814 N	18.495948 E	C
GP 83	C4366	Fole Tollby	Fole	57.650518 N	18.544592 E	C
GP 356	B1062	Sjonhem kyrka II	Sjonhem	57.485563 N	18.520517 E	E
GP 30	C10038:130	Boge Laxarve 3	Boge	57.687185 N	18.763950 E	E
GP 579	C11144	Bro kyrka 7	Bro	57.669964 N	18.475521 E	E
GP 437	C11029	Stenkyrka kyrka 42	Stenkyrka	57.793234 N	18.531333 E	blind C/D/E
GP 154	C11606	Halla Broa 21	Halla	57.510875 N	18.496946 E	blind C/D/E
GP 121	C10977	Grötlingbo Barshalder-shed Uddvide S	Grötlingbo	57.133497 N	18.346282 E	blind C/D/E
GP 103	C3644	Garda Smiss II	Garda	57.317146 N	18.581959 E	cist
		oncoidal limestone				
GP 527	C10237	Tofta kyrka 1	Tofta	57.521515 N	18.168592 E	A
GP 133	C10398	Hablingbo Havor II	Hablingbo	57.187311 N	18.262456 E	A
GP 570	/ (570)	Stenkyrka kyrkogård	Stenkyrka	57.793234 N	18.531333 E	C
GP 523	C4657	Tingstäde kyrka ID 523	Tingstäde	57.736341 N	18.614862 E	blind C/D/E