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The Danish island of Bornholm is situated in the middle of the Baltic Sea between the shores of Northern Poland and Southern Sweden. Thanks to systematic detector surveys and archaeological excavation campaigns, the number of known hoards on Bornholm has doubled within a few years and the island has by far the largest concentration of Viking Age and Early Medieval treasures in Denmark. The hoards are composed of objects produced in many different areas and are an important source for our understanding of the economic and political network in the Baltic Sea region. New research on the largest Viking Age silver hoard on the island, the Nørremølle hoard, calls into question whether Bornholm was part of the Danish kingdom in the late Viking Age and whether large scale trade was carried out on the island (Ingvardson 2012, 2013a). In this paper, the archaeological evidence of the silver hoards is compared with the evidence of weights and Baltic Sea ware on the island.

The Nørremølle Hoard
A hoard of almost two kilograms of silver was deposited at a settlement on the east coast of the island of Bornholm, probably in the years 1024-1040. The hoard is composed of a heterogeneous group of minted and unminted silver objects. The majority

Fig. 1. The Nørremølle hoard is the largest Viking Age hoard on Bornholm. It was located by the amateur archaeologist Finn Jensen in August 2006. Photo J. Lee, the National Museum of Denmark.
of the 1194 coins are German, but there is also a large number of English coins and smaller groups of Kufic, Scandinavian, and Bohemian coins. The hacksilber consists of 87 objects such as ingots, rods and melts/lumps, and 170 pieces of jewellery mainly produced in the Slavic territory (fig. 1). Archaeological investigations show that the hoard was situated only a few metres from the remains of a burnt-down house dated to the late Viking Age (Ingvardson 2013).

Western Contacts

With regard to both number and weight, the German coins, with 846 coins (951.54 g), constitute by far the largest group of objects in the Nørremølle hoard. 711 German coins can be attributed to one of the 25 German mints represented in the hoard. Coins minted in Northern Germany dominate. More than 40% (301 coins) of the German group which are attributed to a mint are the so-called Otto-Adelheid pennies (983/991-1040), probably minted in Goslar. The presence of many German coins can be explained by the discovery of large silver mines in Harzen in the second half of the 10th century. The plentiful supply of silver resulted in large scale coin production in the following decades. Throughout the late Viking Age, the dominating role of Otto-Adelheid pennies is a common feature in hoards deposited in present day Denmark and Scania, whereas the Otto-Adelheid pennies were succeeded by the younger Saxon pennies (Randpfennig) as the dominant coin type around 1020 in present day eastern Germany and Poland (Kilger 2000: 127; Kluge 2001: 419, 424). This suggests a very intense trade between northern Germany and southern Scandinavia (Ingvardson 2013: 292-293).

The second largest coin group originates from England. 144 English coins can be attributed to 27 mints. Even though coins from the London mint represent a large percentage of the coins, the distribution among the English mints is more varied than the German issues. Contrary to Germany, the English coinage was a unified national coinage, and coins from various mints mingled freely in circulation within the country. In the light of other hoards, especially Tyskegård but also Store Frigård, both from Bornholm, the presence of some of the English coins in the Danish Viking Age deposits has been interpreted as the result of Danegeld (Moesgaard 2006: 405-419). The Tyskegård hoard is composed of 81 coins all of the same type, Ethelred II’s long cross minted c. 997-1003, and none of the coins bear test marks. This is not the case in the Nørremølle hoard, which is composed of many different English coin types (Ingvardson 2013: fig. 24). Furthermore 98 % of the English coins in the Nørremølle hoard have been tested either by test marks and/or by bending, which indicates that the coins have been in circulation for some time outside the British Isles. It is unknown how they left England, but in the last instance the English coins in the Nørremølle hoard are therefore probably the result of trade rather than raid (Ingvardson 2013: 293-294).

Eastern Contacts

The Kufic dirhems constitute a heterogeneous group of 72 coins produced in many different places, such as present day Iran, Russia, Syria and Iraq. The Kufic coins are without doubt the oldest group of coins in the hoard. It is very interesting that they show two waves of influx, one at the turn of the 9th century and one from the end of the 9th century to the middle of the 10th century. Very few Kufic coins in the Nørremølle hoard are struck later than 970. These waves correspond to the general influx of Kufic coins in the Baltic Sea area (Leimus 2009: 8-10). The chronological frame for most of the English and German coins and all of the Scandinavian coins is 990-1025, which is close to the deposition time (fig. 2). The Kufic coins must therefore have been in circulation for some time before they were hoarded in the Nørremølle treasure (Ingvardson 2013: 287-289).

The hack silver shows a strong contact with the Slavic territory. 126 objects such as beads, pendants, and temple rings have been produced in the Slavic territory (fig. 3). The presence of many melts/lumps of silver is also a common feature in the Polish Viking Age hoards (Ingvardson 2013: 288-294).

1 I am grateful to René Laursen for the identification of the Kufic coins.
kinds of test marks have been recorded on the silver objects of the Nørremølle hoard: nicks, notches and pecks. Nicks are defined as small scratches made with a knife on the surface towards the edge of the object (Malmer & Lagerqvist 1987: XVIII). Notches are defined as small cuts made with a knife in the edge of the object (Rispling 2004: 4f type C). Pecks are defined as small impacts of a knife in the surface of the coin (Malmer & Lagerqvist 1987: XVIII;
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On Bornholm, perhaps indicating a low degree of circulation of coins on Bornholm and that many of the coins were hoarded soon after their arrival on the island (Ingvarsdson 2013: 294-296, 300-302).

Weight analysis of the hack silver hoards in Scandinavia and in the Baltic region demonstrates that weight standards must have functioned in various regions (Hårdh 1996: 94-130). The results of the weight analysis of the Nørremølle hoard correspond to the survey made by Hårdh, which shows that Scania, Blekinge, Bornholm and the Slavic area constitute a homogeneous economic area where the fragmentation in hoards culminates in the decades around 1000, whereas the size of fragments in hoards deposited after 1020 increases slightly, corresponding to the fragmentation in the Nørremølle hoard (Hårdh 1996: 104-111; Ingvarsdson 2013: 296-299).

The analysis of the Nørremølle hoard shows a unique combination of objects. The composition of the coins resembles silver hoards of south Scandinavia. In this area, hoards are dominated by Otto-Adelheid pennies and there is a relatively high proportion of English and Scandinavian coins. In the Slavic area, the Otto-Adelheid penny is succeeded by the Saxon penny (Randpfennig) as the dominant coin type around 1020 and there are very few English and Scandinavian coins in the Polish hoards (von Heijne 2004: 23; Kilger 2000: 127; Kluge 1981: 257-327). On the contrary, the hack silver shows a strong contact with the Slavic territory, where the majority of the jewellery is produced. The many melts/lumps of silver are also a characteristic for the hoards from Poland, Bornholm and Eastern Sweden (Hårdh 2011: 289). In Scandinavia and the Baltic countries, so-called mixed hoards with both minted and unminted silver were a common

Kilger 2003: 3-12, 2006: 449-465). Around 90% of the Western objects, which are almost exclusively coins, are tested with pecks and around 20% are tested with notches (fig. 5). The very uniform picture implies that the coins have probably been in circulation in the same areas. The Kufic coins, on the other hand, show a different pattern, as 43% of them have been tested with pecks and 69% with notches. As mentioned, the Kufic coins probably reached Bornholm in two waves, the first one at the turn of the 9th century and the second one from the end of the 9th century to the middle of the 10th century. It is therefore possible that the Kufic coins have been in circulation for a long time on Bornholm. As there are very distinct differences between the West European coins and the Kufic ones, it seems likely that the main part of the test marks on the German, English and Scandinavian coins were made before they reached Bornholm, otherwise the dirhems would have had a similar pattern of test marks. Another possible interpretation is that the Kufic coins were a more trusted currency on Bornholm and therefore not pecked to the same degree as the West European coins. We must however bear in mind that the Kufic coins were tested with notches, in the Eastern territories, prior to their arrival in Bornholm, which probably indicates mistrust. Therefore, an explanation of these different patterns of testing can be that the coins were rarely tested on Bornholm, perhaps indicating a low degree of circulation of coins on Bornholm and that many of the coins were hoarded soon after their arrival on the island (Ingvarsdson 2013: 294-296, 300-302).

The Unique Treasures of Bornholm

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The central power had a very strong influence on the monetary development in the Late Viking Age in Denmark and the unique composition of the hoards of Bornholm suggests that the island was not a part of the Danish kingdom in the late Viking Age, but constituted an independent economic and therefore also political unit (Ingvarsson 2012, 2013a). 

The organization of trade on Bornholm in the late Viking Age is an open question. The Sorte Muld complex functioned as an important power and trading centre during the Iron Age but gradually declined during the Viking Age. In the late 10th and the early 11th century, Sorte Muld was reduced to a few individual farmsteads (Aarsleff 2009: 119; Watt 2008: 26-27). Furthermore, the elite burials that have been found on the extensive cemeteries at Nørre Sandegård Vest, Lousgård, Bækkegård, Glasergård and Kobbeå diminish during the 9th and 10th century (Jørgensen 1990; Jørgensen & Jørgensen 1997; Nørgård Jørgensen 1991). No new trading centre from the late Viking Age has yet been located in the archaeological record. However, this does not mean that trade related finds are absent in the Late Viking Age on Bornholm. From the end of the 10th century, a new settlement structure of individual farmsteads appears. Both the weight analysis and the examination of test marks of the Nørremølle hoard suggest that there are different patterns on the two islands. Furthermore, the Gotlandic hoards contain an element of locally produced jewellery and bronze objects, which are not found in the hoards on Bornholm. It is only with regard to the content of unminted silver in the hoards that the two islands have a comparable development.

Finally, the weight analysis shows that Bornholm, Southern Sweden and the Slavic area constituted an economic unit, as the fragmentation of the hoards in these areas fall into similar weight categories.

The unique structure of the Nørremølle hoard indicates that the economic system on Bornholm differed greatly from the development in the rest of the Danish Kingdom. The central power had a very strong influence on the monetary development in the Late Viking Age in Denmark and the unique composition of the hoards of Bornholm suggests that the island was not a part of the Danish kingdom in the late Viking Age, but constituted an independent economic and therefore also political unit (Ingvarsson 2012, 2013a).

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**System of Trade and Power**

The organization of trade on Bornholm in the Late Viking Age is an open question. The Sorte Muld complex functioned as an important power and trading centre during the Iron Age but gradually declined during the Viking Age. In the late 10th and the early 11th century, Sorte Muld was reduced to a few individual farmsteads (Aarsleff 2009: 119; Watt 2008: 26-27). Furthermore, the elite burials that have been found on the extensive cemeteries at Nørre Sandegård Vest, Lousgård, Bækkegård, Glasergård and Kobbå diminish during the 9th and 10th century (Jørgensen 1990; Jørgensen & Jørgensen 1997; Nørgård Jørgensen 1991). No new trading centre from the late Viking Age has yet been located in the archaeological record. However, this does not mean that trade related finds are absent in the late Viking Age on Bornholm.

From the end of the 10th century, a new settlement structure of individual farmsteads appears. The farmsteads are primarily recorded through reconnaissance and metal detector surveys and are characterized by finds of Baltic Sea ware, fragments of imported millstones from Central Europe, whetstone from South Norway, weights and coins (Aarsleff 2008: 21-22; Nielsen 1994: 125-129).
The presence of imports, weights and coins can be seen as strong markers for trade and it is therefore likely that these new settlements played an important role in the organisation of trade on Bornholm in the late Viking Age.

In the following, I will give an overview of these sites, focussing on sites with finds of Baltic Sea ware and weights. My survey is based on finds recorded by the Museum of Bornholm in the National databases Fund og Fortidsminder and Regin. The results must therefore be regarded as preliminary guidelines and focus is laid on tendencies rather than detailed site studies.

Settlements with Baltic Sea Ware

The Museum of Bornholm has recorded approximately 200 sites with Baltic Sea ware 2 (fig. 6). A further classification of the Baltic Sea ware into early, middle and late types is unfortunately not possible within the scope of the present paper, but earlier surveys have connected the many finds of Baltic Sea ware with the new settlement structure appearing towards the end of the 10th century. In the future, it would be interesting with a more detailed study of finds of Baltic Sea ware on Bornholm, but at present I will rely on earlier studies and conclude that the main part of sites with Baltic Sea ware are probably from the late Viking Age. The map shows that late Viking Age sites are widely distributed throughout the island. The central part of Bornholm is forested and the lack of finds in this area is probably caused by the lack of detector surveys.

Weights

H. Steuer’s analysis of the finds of weights in comparison with the monetary development is of great interest to this analysis. Steuer concludes that a system of very accurate and fine weights is found in societies with a weight economy, whereas weights have a more unsystematic character when they are found in coin-using societies and in societies where different currencies were in circulation and weights were used in comparison between different coin types (Steuer 1987: 407-409).

During the late 9th century, a very accurate folding balance (Steuer’s type 3) was introduced to the Baltic Sea region. The balance appears together with two standardised weight types, the spherical weights with flattened poles and the polyhedral weights. Both the spherical weights and the balance probably originate from the Islamic area and were introduced in the Baltic region at the same time as the second wave of Kufic dirhems (Steuer 1987: 462; Gustin 2004: 99). The spherical weights with flattened poles and the polyhedral weights functioned in a system where the polyhedral weights followed the light standards, whereas the spherical weights with flattened poles followed the heavier standards. Steuer has made a chronological division of the types of these weights on the basis of shape and

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2 I am grateful to the Museum of Bornholm which has willingly let me use their archaeological data and especially to Finn Ole Nielsen and René Laursen, who was a great help when I visited the museum.
There are, however, chronological problems. Spherical/polyhedral weights can clearly be dated to the later part of the Viking Age, whereas other weights were in use throughout both the Iron Age and the Viking Age. This should be held in mind when drawing conclusions from the recorded data. The survey is primarily based on finds from the topsoil and the chronological sequences of the sites are therefore based on the combination of finds. In this paper, only finds of Baltic Sea ware, coin hoards and weights are included. It would be relevant to include finds of fibulae types and single coin finds, but this is unfortunately beyond the scope of the present study.

There is a widespread distribution of weights throughout the island of Bornholm, though finds in the northern part of the island are less common (fig. 8). If we compare it with the distribution of Baltic Sea ware, (fig. 6) it is clear that the distribution pattern is not influenced by lack of Viking Age activity on North Bornholm. Even though spherical/polyhedral weights and other weights are found in all areas of the island, there is a clear difference in the decoration (fig. 7). As mentioned above, the identification of weights is made on the basis of pictures and/or descriptions in Regin; the limitation in this identification method unfortunately does not allow me to include Steuer’s chronological sequence in this paper. I. Gustin has pointed out that not all of the Viking Age weights should be seen in connection with a weight economy. At the Posthuset (ASR 9) excavation in Ribe, there is a clear connection between lead weights and fragments of moulds, which shows that the lead weights were used in the process of metal working (Feveile 2006: 143-144; Gustin 2004: 108-109). Gustin has compared the frequency of polyhedral, spherical with flattened poles and other weight types in four craft and trading sites: Paviken and Bandlunde on the island of Gotland in the Baltic Sea, Uppåkra 5 km south of Lund in Scania and Birka on the east coast of Sweden. There is a very distinct difference in the distribution of weight types between the sites and in some cases also within different areas of the sites. In areas with many finds of coins and hacksilber, the dominating weight types are polyhedral and spherical whereas other weight types dominate in areas with craft activity (Gustin 2004: 89-108).

As discussed above, the distribution pattern of weights can be influenced both by chronological and functional aspects. I have recorded 970 Iron Age and Viking Age weights from Bornholm in the following categories: spherical with flattened poles, polyhedral, spherical, cylindrical, segment shaped, quadrilateral and conical/biconical weights (for further discussion on classification of weights, see Gustin 2004: 89). With reference to the works of Steuer and Gustin, the following analysis will concentrate on the distribution of spherical weights with flattened poles and polyhedral weights (hereafter spherical/polyhedral weights) in comparison to the group of other types of weights including spherical, cylindrical, segment shaped, quadrilateral and conical/biconical (hereafter other weights). There are, however, chronological problems. Spherical/polyhedral weights can clearly be dated to the later part of the Viking Age, whereas other weights were in use throughout both the Iron Age and the Viking Age. This should be held in mind when drawing conclusions from the recorded data. The survey is primarily based on finds from the topsoil and the chronological sequences of the sites are therefore based on the combination of finds. In this paper, only finds of Baltic Sea ware, coin hoards and weights are included. It would be relevant to include finds of fibulae types and single coin finds, but this is unfortunately beyond the scope of the present study.

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3 Another 121 weights could not be identified on the basis of pictures and/or descriptions in Regin, and are therefore excluded from the analysis.
distribution pattern of the two groups. The overall picture is that spherical/polyhedral weights are distributed on many sites with a few weights per site. A large proportion of other weights are also scattered on many sites with a few weights, but a large percentage of them are found on a few sites with many weights per site (figs. 9a and 9b). There are 16 sites with more than ten weights (fig. 10). Among these sites, there is a clear dominance of the so-called Iron Age productive sites, which includes the Sorte Muld complex on the Eastern side of Bornholm.

Ten of the sites are included in M. Watt’s extensive sampling programme from 1997 and 1999 (Watt 2006: 140). One could therefore argue that the high density of weights on these sites is due to these extensive surveys. On the other hand, most of the weights (79%) have been found with metal detectors and the multiplication of coin finds within the last decades testifies to an extensive survey on sites with Baltic Sea ware as well. With some caution, I will conclude that sites with many weights are an Iron Age phenomenon on Bornholm, whereas Viking Age sites have produced only a few weights per site. Analysis made by Gustin and Steuer mainly connects the spherical/polyhedral weights to trading activity. The very scattered distribution without clear clustering does not therefore point towards the presence of a new trading centre on Bornholm in the Viking Age.

Silver Hoards

Today we know 37 sites with one or more Viking Age and Early Middle Age silver hoards on Bornholm. Extensive metal detector surveys by the skilled amateur archaeologist on the island constantly bring forth new finds. On 35 sites, the amount of coins and hackesilber makes it likely that
further surveys on these sites will produce one or more hoards (fig. 11).

The composition of coins in the known hoards fall into three general phases (fig. 12). In the first phase, the hoards are dominated by Kufic coins. The second phase begins towards the turn of the

11th century. The hoards in the second phase are generally large, are dominated by especially German and to some degree English coins and there is often a small influx of Scandinavian and Kufic coins. In the third phase from the middle of the 11th century, the hoards are generally small. They are dominated by German and English coins and some Scandinavian coins. The Kufic coins have vanished almost completely.

There is no clear connection between other weights and sites with hoards. In contrast, the spherical/polyhedral weights are often found on sites with one or more hoards (figs. 13a and 13b). Even though Gustin and Steuer connect the spherical/polyhedral weights with the second wave of Kufic coins, there is at present no clear connection between the two find groups on Bornholm. On the contrary, spherical/polyhedral weights can be connected to sites with hoards from the 11th and the beginning of the 12th century (phase two and three). This indicates that the widespread distribution of spherical/polyhedral
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is rare in the Viking Age hoards on Bornholm. Due to the find history, it is unclear whether these items come from one or two hoards. The large house, the gilded pendant, the glass and the gold piece in the hoard indicate that the Store Gadegård site should be interpreted as a high status settlement, but the main part of the Viking Age hoards found on Bornholm is apparently found in ordinary settlements lacking other high status features. It must however be underlined that the excavated areas are limited and it is difficult to give an exact interpretation of the sites (Ingvardson 2013: 304-309).

weights on Bornholm is a later phenomenon, which should be seen in connection with the distribution of the many silver hoards from the 11th century on the island. This corresponds to Gustin’s analysis that shows a connection between spherical/polychedral weights and finds of hacksilver and coins.

At present, the Museum of Bornholm has undertaken small archaeological excavation campaigns on the find spots of 29 Viking Age hoards. Among these sites, Store Gadegård is the only site that can be categorised as a high status settlement (Ingvardson 2013: 305-309, Wagnkilde 1978). Here the excavation revealed a house of 33 metres and the find material contained Baltic Sea ware, iron knives, arrows and needles, animal bones from domesticated animals and fish, glass fragments and a coin imitation pendant of gilded bronze with a king’s portrait, probably produced in the second half of the 11th century. The hoard itself consists of 68 complete coins, 44 fragmented coins, 33 pieces of unminted silver and a piece of hack gold, which

The Organization of Trade and Power

The analysis of weights, hoards and Baltic Sea ware demonstrate a clear change in the organisation of settlement and trade on Bornholm at the turn of the 11th century. The widespread distribution of Baltic Sea ware shows that the new settlement structure with individual farmsteads is present throughout

Fig. 12. The composition of coin provenance in Viking Age hoards on Bornholm. Data is based on von Heijne 2004 and updated with new finds recovered before 2011 by H. Horsnæs, who has generously allowed me to use the data. The numbers refer to the catalogue of von Heijne 2004.
the island. Simultaneously, we see a sharp rise in the amount of deposited hoards and a marked structural change in the hoards, as the dominant role of the Kufic coins is replaced by West European coins. The distribution pattern of weights shows that no new trading centre was established in the late Viking Age after the fall of the Sorte Muld complex, and the connection between 11th century hoards and spherical/polyhedral weights indicates that the widespread distribution of spherical/polyhedral weights should be seen as an important element in the organisation of trade on the island.

The structure of the Nørremølle hoard as regard to the objects, production place, chronology and secondary treatment implies that the hoard was gathered by trade and not by tribute or raid, and that the coins were hoarded soon after their arrival to the island, thus indicating a low degree of circulation in the 11th century on Bornholm. The analysis of the fragmentation shows that Bornholm constituted an economic unit with Scania and the Slavic area. The composition of the coins and jewellery and the relation between minted and unminted silver in the hoards of Bornholm is unique in comparison with the countries surrounding the Baltic Sea, and this suggests that Bornholm was not under the strict control of a powerful external ruler. It was an economically independent unit.

The absence of a new powerful trading centre implies that trade on Bornholm was not controlled by one strong ruler who organized and guaranteed safe trading conditions in one dominating trading centre. On the contrary, many of the 11th century hoards are deposited on what appear to be more or less ordinary settlement sites. Together with the distribution pattern of the spherical/polyhedral weights found on sites with late Viking Age hoards, this implies that trade was instead carried out on a smaller scale, perhaps on several manor sites distributed throughout the island. The analysis of test marks on the coins in the Nørremølle hoard implies a low

![Diagram](image_url)

**Fig. 13 a.** The distribution of hoards and sites with primarily other weights. **b.** The distribution of hoards and (red dots) sites with primarily polyhedral/spherical weights, and (green dots) sites with a mix of spherical/polyhedral weights and other weights. (Primarily is defined as at least twice as many). Map J. S. Andersen.
degree of circulation which confirms this interpretation. No doubt the inhabitants of Bornholm used the central geographical position of the island to gather these significant fortunes that are represented in the silver hoards, but the find picture gives evidence that the silver was mainly gathered through trade outside the island. With reference to S. Bolin's classic thesis (1962: 45-64), the non-recovery of the many 11th century hoards can be seen as the result of war and unrest. This supports the idea that Bornholm was not under the protection of a strong ruler, but functioned as an independent economic and political unit in the late Viking Age.

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