

## A Viking Age weight from Cleat, Westray, Orkney

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### ABSTRACT

*A Viking-period barrel-shaped weight, found at Cleat, on Westray, is discussed in the context of other weights and contemporary Islamic and Scandinavian/Islamic weight systems.*

### BACKGROUND

In 1979 an excavation was conducted at a site threatened by coastal erosion at the Bay of Cleat (NGR: HY 4670 4663) on Westray, Orkney. The site comprised midden deposits and associated stone structures. The small size of the excavation and the poor state of preservation has made it hard to interpret the structures; however, two stone walls and possible stone flagstones may represent the partial remains of a building which was abandoned and covered by a midden of domestic refuse (Colley & Barrett 2000). The site was revisited in 1997 by Dr James Barrett (Barrett et al 1997) and a small trench was opened along the eroding section. No trace of the area excavated in 1979 remained, and while it is possible to compare the stratigraphy and content of the midden deposits recovered, the structural phase was no longer evident in the 1997 excavation. The midden deposits were rich in marine shell and fish bone. The 1979 excavation recovered a truncated conical steatite spindle whorl of probable Viking Age date; and the 1997 excavation recovered a spherical weight with flat poles and several fragments of steatite vessels. The Viking Age spherical weight with flat poles is described and discussed in this paper.

### DESCRIPTION

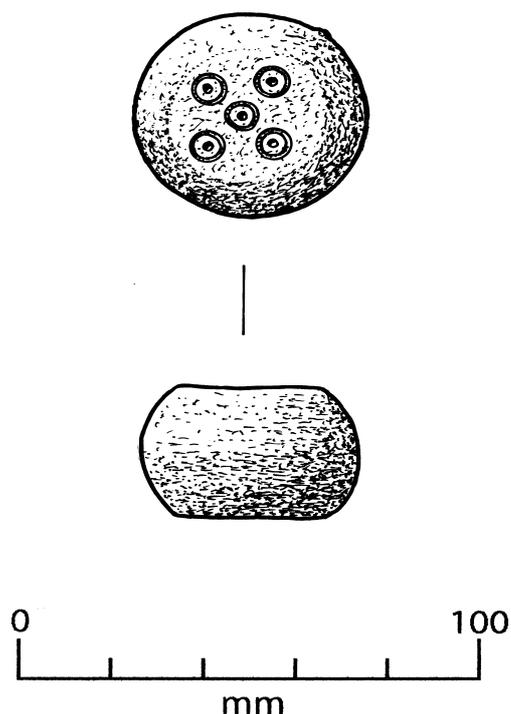
The Cleat weight (illus 1) has been manufactured from copper-alloy. The weight is 9mm high, has a diameter at its 'equator' of 12mm and a diameter across its poles of 8mm. The decoration on each of its flat poles consists of five small punched circles, each circle having a small hole at its centre (which is at least twice as deep as the outer ring). The weight's excellent condition allows us to establish its place within the different weight systems of the time. It weighed 7.1g pre-conservation and remained 7.1g post-conservation (Clydesdale 1999).

The condition of the weight indicates that the core is sound; the surface is corroded only to an estimated depth of 0.25mm. Before conservation, the decorative circles and holes were filled with a mixture of soil and corrosion products.

### TECHNOLOGY & MANUFACTURE

Weights of this type were made using moulds, and evidence of this process has been recovered from excavations at the harbour area of Birka, Sweden. At least four fragments of the same mould were recovered, enough to show the shape of a spherical object with flat poles, and roughly the same size as a bronze spherical

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ILLUS 1 Sub-spherical copper alloy weight with flat poles from Cleat, Orkney (Copyright Christina Unwin)

weight also found during that excavation (Gustin 1997, 171). This is the earliest evidence of weight manufacture that has been found in Sweden, dating from the second half of the eighth century AD to the end of the ninth century (ibid). However, the Cleat type of bronze/copper-alloy weight is generally dated to the late Viking period (Sperber 1996, 93). The vast majority of Viking Age weights, which are very common in the Baltic region, have an iron core with a thin bronze coating.

The excavation of the town rampart at Birka recovered fragments of a crucible used in the manufacture of iron-core spherical weights. This type of crucible has been named 'Schmelzkugeln' (Söderberg 1996, 7; Gustin 1997, 171). A small number of the crucible fragments were shaped (on their inner side) to suit a small spherical object with flat poles. There were also traces of a cloth bag which had enclosed the spherical objects. Söderberg

has described the process as one in which the crucible was used as a mould where copper filings (wrapped around the iron core of the weight and kept in place by the cloth bag) were melted to enclose the core. Such *Schmelzkugeln* have also been found at other sites in Birka (the Black Earth), Hedeby and Sigtuna. In contrast, fragments of *Schmelzkugeln* have not yet been recovered from any Viking Age site that has no, or only occasional, evidence of the use of spherical weights, such as Helgö, Ribe and Kaupang (Gustin 1997).

Whether wholly copper-alloy or having an iron core, these weights were smoothed and polished prior to the decoration of the surface of the flat poles using a punch. Whatever decoration was chosen, the regularity of the designs would seem to suggest that they functioned as recognized weight markings.

#### WEIGHT SYSTEMS & MARKINGS

In the Baltic region, but mostly in the Scandinavian areas, the most common weights are either spherical with flat poles or polyhedral (or 'cubo-octahedral') in shape. Both types probably had Islamic prototypes (Sperber 1996, 61). These small spherical and polyhedral weights were probably used for weighing precious metals on small portable scales. Most were simply decorated, with weight markings in the form of dots or circles. The circles often had a small central hole (as on the Cleat weight or Birka, Sweden, SHM 5208/ 217; Sperber 1996) and were sometimes grouped in pairs (eg Klentz, Kr Güstrow, Germany ALM 1994/ 991/2-3; Lüth & Schoknecht 1995, 327). The central decoration of the poles was also sometimes linked by curved lines (Hemling, Sweden). Some weights were decorated with a dotted stamp all around the edges of the poles, creating a form of single (and sometimes double) linear decoration around the circumference of the pole. Occasionally, some spherical weights also had an S-shaped decoration punched into the surface of the pole (eg Cieple

St.6 woj. Pomorskie, Poland: Żak 1957, 166; Kara 1998, 509). The most elaborate decorations on the spherical weights are pseudo-Islamic ornamentations (eg Nysättra, Uppland, UMF 3442; Kopparsvik, Gotland, F7 & F8; Sperber 1996, 98).

The actual individual weight of these objects varies. The lightest weighs 0.442g and was recovered from Birka, Sweden (Sperber 1996, 81, no 135/1); and the heaviest weighs 162.8g and was recovered from Bandlunde, Gotland (Sperber 1996, 68, no 108).

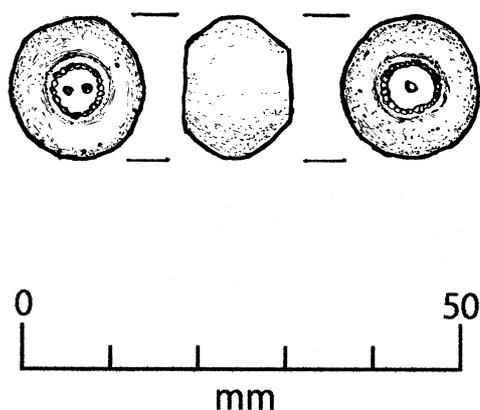
Both polyhedral and spherical weights with flat poles appear to have been used across a large geographical area. They have been found at Viking Age trading sites and in graves throughout the Baltic area and in Russia (for examples see Jansson 1987; Steuer 1987; 1997; Gustin 1997; Łosinski 1997). The largest number of weights has been found in Sweden. Sperber examined the majority of the Swedish weights and concluded that there were two main Viking Age weight systems in use on the Swedish mainland and Gotland (Sperber 1996). The two systems were based on the Islamic weight unit for gold, the *mitqal*, a coin weight established to be 4.233g (Hinz 1970). The Islamic system was defined by the Caliph Abd al-Malik in the year AD 696–7. It was a dual system intended to be used for both silver and gold without elaborate conversion of the weight figures, provided that gold was exactly 14 times more expensive than silver. Its sub-unit, the *dirham*, was set at 0.7 *mitqals*. Unfortunately, however, the gold and silver prices changed and so did their relative value. The factor 0.7 became irrelevant and the simpler factor of two-thirds replaced it. The standard *mitqal* remained unchanged, but the *dirham* fluctuated by as much as 5% from 2.96g to 2.82g (Sperber 1996, 54).

The two main weight systems in use in Viking Age Scandinavia can be summarized as follows: the Islamic trade system, based on the market *dirham* (two-thirds of a *mitqal* = 2.822g); and the Swedish/Islamic system,

based on the three *mitqal* unit (12.7g). The original legal *dirham* defined by Abd al-Malik (0.7 of a *mitqal*) does not appear to have been in use. The actual weight sets used by merchants and traders were fractions based on these systems. The Islamic trade system divided the 12.7g unit weight into three *mitqals*, with each *mitqal* being 1.5 *dirhams*. The *dirham* was then divided into quarters and eighths. The Swedish/Islamic system divided the 12.7g or three *mitqal* unit weight by two, four, eight or 16 to obtain smaller weights. The 16th-part weight (0.8g) may have been a kind of standard weight, for its multiples of two (1.6g) and three (2.4g) are common sizes in the Swedish material (Sperber 1996, 54).

The weight from Cleat corresponds with the Islamic trade system. Its weight, 7.1g, can be divided by the five marks on one side to reach 1.42g and be divided by the total of 10 marks (both sides) to reach 0.71g. The Islamic trade system uses the market-*dirham* (two thirds of a *mitqal*), dividing the basic unit of 12.7g by 4.5 to obtain a *dirham* of 2.822g. The *dirham* is further divided by two (1.41g) or by four (0.705g). The Cleat weight is sufficiently close to these definitive fractions that it can be described as a weight that belongs to the Islamic trade system.

Kyhlberg (1980) states that the decorations on the weights usually mark the number of the weights in a particular set and identify that set, rather than mark their absolute value within the system (Sperber 1996, 66). However, the example from Cleat adds weight to the argument that the markings on the spherical weights correspond to their actual weight – and their positions within the system. A further example of a spherical weight whose markings correspond to its actual weight is one from Wrzeźnica, Poland (Maleszka 1998, 180); this bronze-covered iron weight weighed 12.69g after conservation and had two dots on one pole and a single dot on the reverse, corresponding to the division of the unit weight of 12.7g into three *mitqals* (illus 2).



ILLUS 2 Sub-spherical weight with flat poles made of iron with a copper alloy coating and with a decoration of two dots on one pole and a single dot on the reverse (weight: 12.69g), from Wrześnica, Poland.

#### TYOLOGY, DISTRIBUTION & CHRONOLOGY

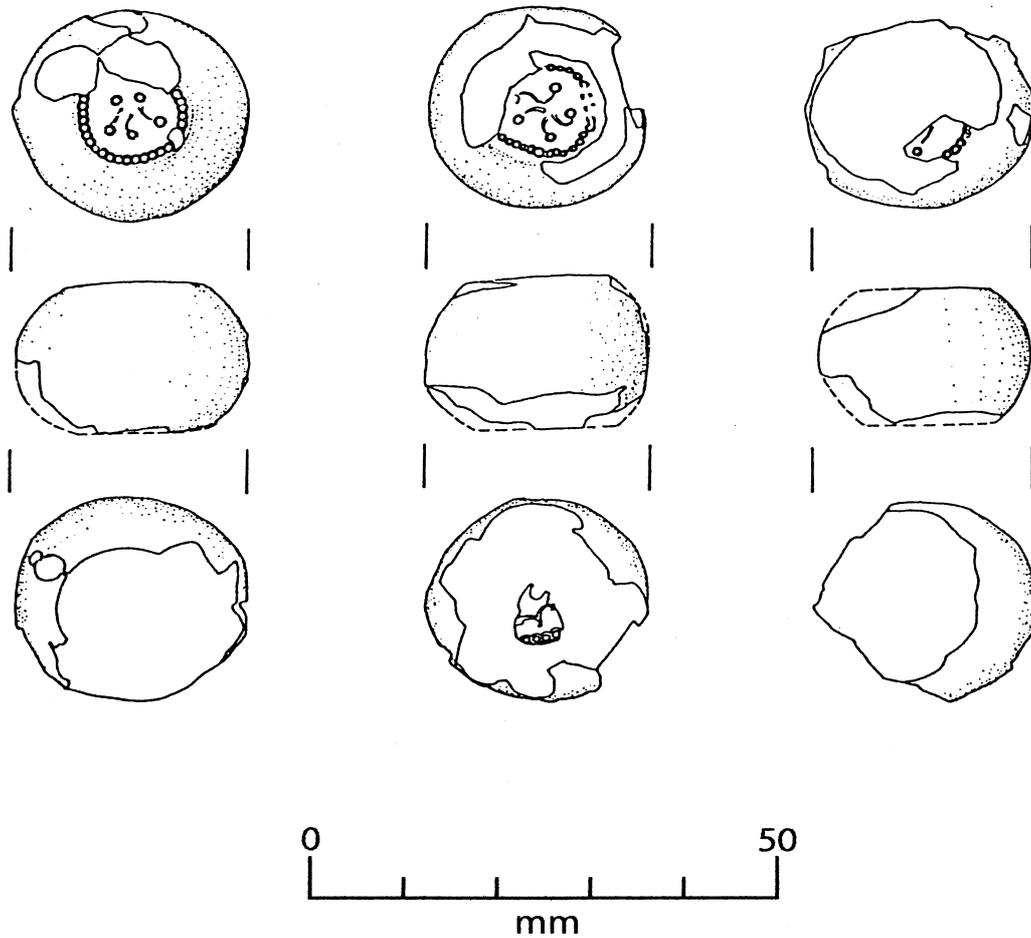
Weights of the Viking world range widely in shape, form and weight. On the southern coasts of the Baltic Sea, in the Western Slavonic homelands, different types of weights co-existed in the same regions at the same time. The excavation of a 10th- or 11th-century merchant's grave from Sowinki gm. Mosina, woj. Wielkopolskie, Poland (grave no 70) revealed an assemblage of several different varieties of weight in one set (complete with a portable scale). Of the 19 weights recovered, six were spherical weights of iron with bronze coating (eg *illus 3*), 12 were of lead in a variety of shapes (spherical, disc-shaped, cone-shaped, globular, die-shaped and brick-shaped) (eg *illus 3*) and one was a stone of a particular weight – perhaps a replacement (Krzyszowski 1997, 645).

The north-west of the expanded Viking world also commonly used many different shapes and types of weight. One of the most interesting assemblages of lead weight shapes comes from Dublin. Discs, bowls, hemispheres and cones of both plain and perforated varieties, as well as rings, hammer-finished lumps and lead-filled copper-alloy containers, were

recovered. The basic unit of the majority of these weights from Dublin (26.6g) was close to the Roman and Carolingian ounces of 26.8g and 25.6g respectively. The surviving specimens were multiples or fractions of this unit, no matter what their shape (Wallace 1987, 212). There were also several spherical iron weights with a copper-alloy coating which, on the basis of their individual weight (about 24g) and the technology of their manufacture, were probably imported (Wallace 1987, 212). There is, however, an absence of polyhedral weights from the assemblage. The Dublin excavations probably emphasize and underline Dublin's trade links with the ports of western England and the north-west Continent. There is a relative degree of economic independence from the Scandinavian world of the North Atlantic even in the mid-10th century (Wallace 1987, 213).

Even in the Viking homelands there were many forms of weight. At the early Viking market place in Ribe, Denmark, a large number of cylindrical weights have been recovered through excavation around a bronze workshop. Some of them are very small (weighing around 1g) and none are much heavier than the equivalent of about one Scandinavian öre (24.4g). It has been suggested that these small and simple weights from Ribe may have been used not only for weighing small quantities of precious metals (in trade) but also for weighing out base metals in the workshop (Owen 1999, 124–5).

Only three other Viking Age weights have been recovered from Orkney. One was found during excavations at Buckquoy, Birsay (at the centre of the Norse Earldom) and is a lead disc-shaped weight of about 9.9g (Ritchie 1977, cat no 96). The other two were discovered in the vicinity of the boat burial at Scar, Sanday. They were also made of lead and were both cylindrical with the same weight of 26.65g. Both of them are decorated with what are probably weight markings (Owen 1999, 124). No weights are so far known from Shetland or Caithness. The remains of pairs of



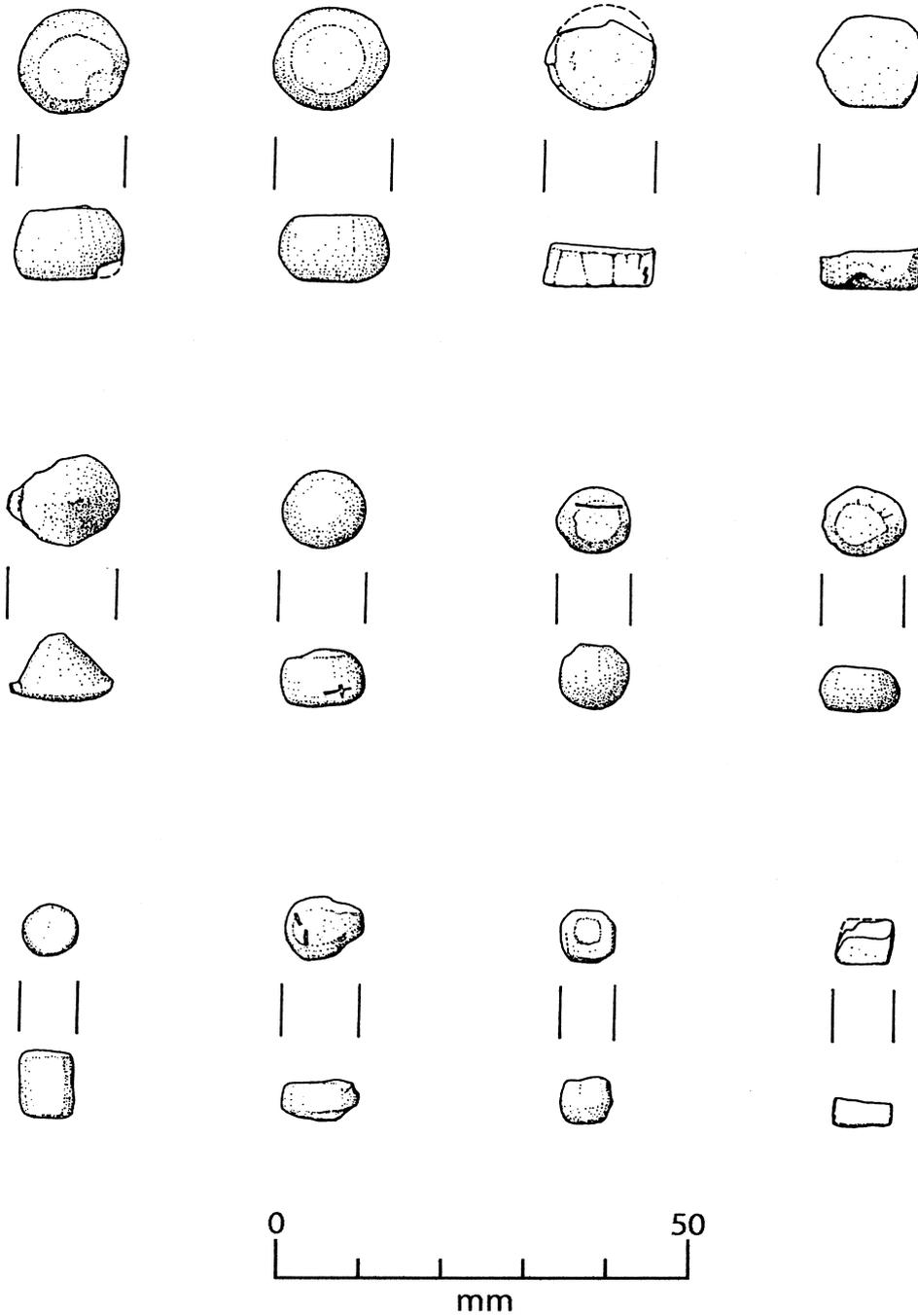
ILLUS 3 Sub-spherical weights with flat poles made of iron with a bronze coating from Sowinki, Poland (after Krzyszkowski 1997: copyright Archaeological Museum in Poznań)

scales are also scarce in this region, although part of a balance was found at Gurness, Orkney and half of a bronze box probably once used for containing scales was found on Unst, Shetland. Given the plentiful evidence for the use of 'ring money' and hack-silver – and of 'nicking' (repeated testing of the quality of silver objects), signifying repeated silver exchanges – it is interesting to speculate on the reason for this general lack of weights and scales from the north of Scotland (Owen 1999, 125).

No spherical weights with flat poles have yet been found in England. However, weights

with a basic unit of 0.71g – corresponding to the Islamic trade system – have been recovered from some Viking Age sites in England. The excavation of 16–22 Coppergate, York recovered at least two weights that correspond to the Islamic trade system: both are lead discs weighing 5.81g (approximately 2 *dirhams*, or 1 and  $\frac{1}{3}$  of a *mitqal*) and 8.49g (approximately 3 *dirhams*, or 2 *mitqals*) respectively (Kruse 1992, 87).

Solid bronze/copper-alloy spherical weights such as the Cleat weight are very rare. Only 20 such weights have been recovered from the Swedish mainland and Gotland,



ILLUS 4 Spherical, disc, cone, globular, die and brick-shaped lead weights from Sowinki, Poland (after Krzyszowski 1997: copyright Archaeological Museum in Poznań)

while the number of other weights that has been recovered is very large. Only two of these spherical solid bronze weights can be compared with the Cleat weight: one from Bandlunde (7.36g) and one from Fresta (7.49g) (Sperber 1996, 93). However, some weights of this unit (7.1g) but of different manufacture have been recovered from Gotland, such as the spherical bronze-covered iron weight from Buters (7.17g) (Żurek 1949). Similar units have also been found in the Slavonic regions; one spherical bronze-covered iron weight from Gniezno, Poland, weighs 7.14g (Żurek 1939), while two weights from Kruszwica, Poland weigh exactly 7.1g each, one being a spherical weight made entirely of iron and the other being a lead disc (Sawicki 1986).

## DISCUSSION

Gustin, using work by Heiko Steuer (1987), has identified three phases of economic activity in the distribution areas of the different types of weight in northern and eastern Europe in the Viking Age (Gustin 1997, 169). The first phase began around AD 870–80 when a standardized weight system was introduced in many areas. In north-eastern Carolingian Europe a coin-based system of exchange was operating, but in the areas of Viking influence the standardized weight system developed into two main zones of exchange. The North Sea area is characterized by large number of different types of lead weights. The Baltic, in contrast, has standardized weight sets with spherical weights with flat poles and polyhedral weights.

The second phase begins around AD 970–1000. The influx of Arabic silver ceases and weights and balances begin to show new formal elements. The North Sea zone now uses many coins from north-west Europe, although still predominantly as hack-silver. Trade and exchange between the two areas was probably much more common. The Baltic area now includes all the areas round the eastern and south coast of the Baltic Sea, along with parts of the interior Slavonic areas and northern

Norway. Gotland appears to be the core area in the distribution of weights and balances.

The third phase begins around AD 1050–75 and once again brings new formal elements in the design of weights and balances. In the North Sea area the varied weight-based economy has given way to a coin-based economy. In the eastern area certain economic regions are clearly distinguishable, such as Sweden, the Baltic region and the Slavonic area, which has been extended to the south. Gotland is still the core area for spherical weights.

The spherical weight was introduced no earlier than AD 870–80. In the Viking homelands a small number of solid copper-alloy spherical weights has been found and most of these, although not all, are of a later date than the end of the ninth century (Sperber 1996, 93). The solid copper-alloy spherical weights from Birka, Sweden and probably also from Bandlunde, Gotland, are, however, earlier than c AD 970. Those from Södra Byrummet, Visby (Gotland) are later. Generally, the solid weights occurred both before and after the second half of the 10th century, during the decades when the supply of Islamic silver coins to Sweden began to wane (Sperber 1996, 93). At Sigtuna, the main concentrations of the *Schmelzkugeln* type of crucible have been found in the quarters of Urmakaren 1 and Humlegården and have been dated to the start of the 11th century (Gustin 1997, 171). The two quarters are located near what was probably the royal demesne. The impression of a die for a coin of Olaf Skötkonung was also recovered from these quarters. Söderberg (1996, 34) established that the total weight of all the *Schmelzkugeln* crucible fragments recovered amounted to about 7.467kg. This would in turn indicate that over 250 whole crucibles were represented in the assemblage of fragments. The large quantity of fragments indicates that there was extensive production of bronze-covered iron spherical weights at Sigtuna – and in the same place where the first Scandinavian coins were minted (Gustin 1997, 172).

Sperber has suggested that a manufacturing site producing spherical weights of solid bronze/copper-alloy started in the ninth century and continued to manufacture weights for some time after the overall production of the later more numerous bronze-coated iron spherical weights had dwindled in the late 10th century (Sperber 1996, 93). The Cleat weight may be a product of such a workshop.

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