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The Perm´/Glazov rings

Contacts and Economy in the Viking Age between Russia and the Baltic Region

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Contents

9 Strange birds in Scandinavian Viking Age?

13 The Baltic/Scandinavian record

19 The Russian record

33 Comparison of rings from east and west

34 Long-distance trading networks

35 The Kama and Čepca regions

39 Graffiti on rings and coins

45 "Permian" rings and Duesminde rings

49 Weight systems in east and west

53 The weight of complete rings

57 Silver analyses

58 Weight-adjusted ingots in east and west

61 Gotlandic bangles and "money" spirals

63 Relation between Perm'/Glazov rings, Duesminde rings, weight-standardized ingots and spiral rings

63 Concluding discussion

67 Abbreviations

67 References

Preface

This text has been on its way for quite a long time. Back in the 1970s, when working on the Viking Age silver hoards from Southern Sweden, I was fascinated by a group of small striated clipped rods. They derived from so-called Permian rings, which supposedly have their origin in the distant Perm' district close to the Ural Mountains. In search of information on these rings I have visited a number of museums in Russia, the Baltic region and Scandinavia and have had the privilege to study the collected material.

First of all I would like to thank Nikolaj Andrevich Makarov. Without your support and encouragement through years this book would never have been realized. To Johan Callmer for your scrupulous reading of my manuscript and important comments which fundamentally improved the text and also rescued med from some traps. To Christoph Kilger, also for reading my manuscript and for valuable comments.

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Lund, October 2016

Birgitta Hårdh

The Perm'/Glazov rings

Contacts and Economy in the Viking Age between Russia and the Baltic Region

Strange birds in Scandinavian Viking Age?

Among the record from the Scandinavian Viking Age there is a group of artefacts which stands out strikingly. It is a group of rings, usually bent into spiral shape. Although they were obviously neck-rings, Mårten Stenberger let the spiral bend settle his designation of them, "Spiralringe" (Stenberger 1958: 123). Their characteristic is that the ring body is neatly decorated with spirally striated sections. Usually striated sections are placed at the end parts of the ring with a smooth middle section. Some rings are also stamp-decorated. The clasp consists of a hook and a multifaceted knob; in a few cases both ends have such a knob (e.g. Fig. 1). There are some rings which have both ends shaped like hooks. The striation is usually very accurate with regular grooves and sharp ridges in between, but there is also a coarser variety where the ridges are broad and flat. The stamp decoration is usually made out of small triangular stamps, often with one or three raised dots. Small circles also occur. The knobs might be broad and flat or high with sloping sides. The sides of the broad knobs are c. 1 cm., those of the high knobs shorter, generally c. 0.5 cm.

The spiral striation has no parallels in Scandinavian silver craft. It consists of narrow grooves which run in a spiral along the ring rod. There has been some discussion about how the rings were made. M. V. Fechner maintains that the rings are made of a massive rod decorated with oblique grooves. These were made by winding the rod; the harder the winding, the tighter the grooves. Then the rings were bent with help of a block to create the ring shape. At the middle and the ends the ring was ground, so that the groves were destroyed (Фехнер/Fechner 1967: 56).

To clarify the process of manufacture, analyses were carried out in 2016 of fragments from two rings from Alvara Böda, Öland, SHM 15890:25 and 15890:27, at the Geoarchaeological Laboratory (GAL), The Archaeologists, National Historical Museums. The analyses were undertaken particularly to find out how the spiral decoration was made. The analyses were performed by microscope and chemical analyses of cross- and length-sections, which made it possible to interpret several steps concerning the manufacture, treatment and use of the rings. Both rings are of pure silver with low concentrations of copper and gold. They have a core with a homogenous texture with no indications of either turning or casting. At the outermost part of the rods, on the

Fig. 1. Three "Permian" rings from Hellvi, Gotland. Photo: Swedish History Museum, Stockholm. c. 75, 78 and 86 mm.

other hand, there are signs of mechanical cold-working. Potentially this is consistent with creating the striation by rolling the rod on a striated surface. The rings were probably bent in cold condition after the spiral decoration was created, as there are fractures in the pattern and the spaces in the pattern are wider on the outside than the inside. The rings show signs of use. The ridges are worn and one side is generally more worn than the other. According to the analyses this was the most likely manner of production, although alternatives cannot completely be ruled out (Hjärthner-Holdar & Grandin 2016). It is also important to remember that the analyses concern two items but as this type of rings is rather stereotyped it is probable that they are relevant for other rings as well.

The knob was probably cast separately and soldered to the ring. A distinctive feature of these rings is that they seem to have been made according to defined weight groups, which probably indicates that they were made to be used as a means of payment or a standard of value. In Scandinavia these rings are known from a number of silver hoards. Complete rings occur on the islands of Gotland and Öland, Sweden, and from eastern Jutland, Denmark. Roar Skovmand, in his survey of the Danish Viking Age hoards, assigns them to his "ældste gruppe", that is, to early Viking Age before the 10th century (Skovmand 1942). Generally, these rings seem to belong to the earliest part of the Viking Age, a period when domestic silver craft was not much developed in Scandinavia.

Traditionally the rings have been referred to as "rings of Permian type". The term was coined by M. A. Hachmann in 1910 and was also used by Ture J. Arne, who states that they have a pronounced presence in the region around the rivers Vyatka and Kama west of

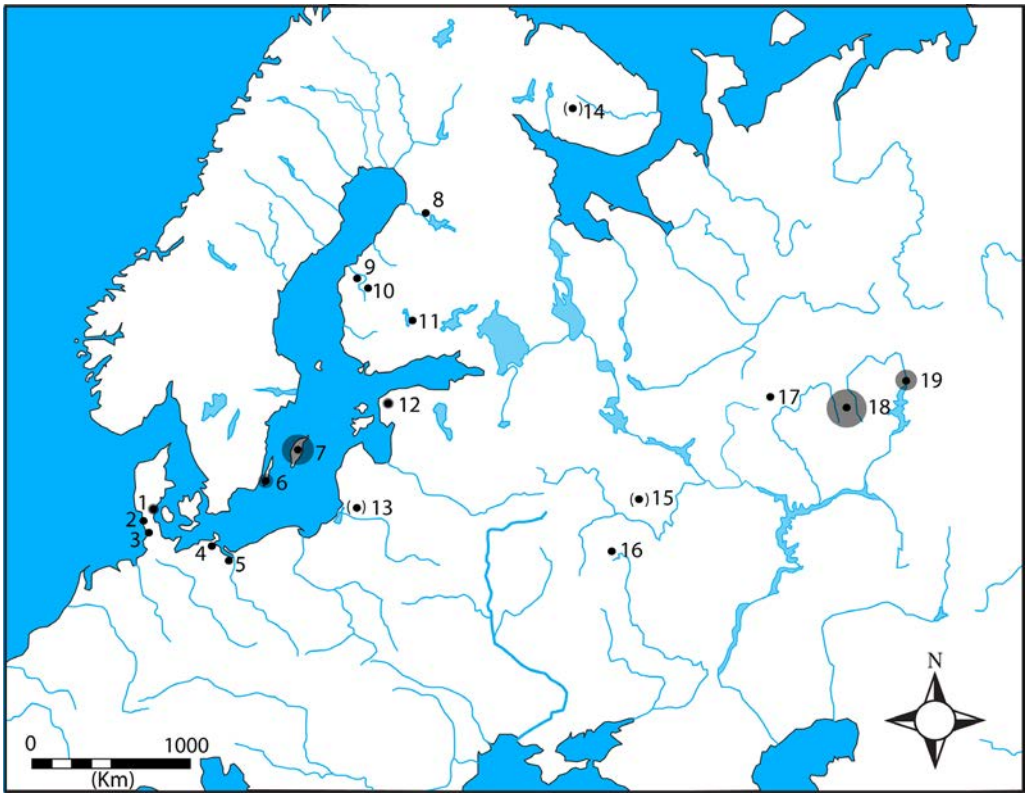

Fig. 2. Distribution of the complete Perm'/Glazov rings in the article. 1 Erridsø (4 items), 2 Fole, 3 Sylt, 4 Ralswiek, 5 Anklam, 6 Öland (9 items), 7 Gotland (c. 40 items), 8 Utajärvi, 9 Lilkyro, 10 Storkyro, 11 Pälkäne, 12 Hapsal, 13 Lithuania, 14 Kola peninsula, 15 Vladimir, 16 Tula, 17 Kirov obl. (7 items), 18 Udmurtija rep. with Glazov region (c. 50 items), 19 Perm' oblast (27 items). Points in brackets show uncertain location. Drawing: Johannes Edvardsson.

the Urals. From the Čepca basin east of the river Vyatka he knows a hundred of them and from the Kama basin, Perm' region, a dozen (Arne 1914: 167). The strange geographical distribution (Fig. 2) together with the pronounced weight distribution triggered my interest in them a long time ago.

There are thus many puzzling questions about these rings. A central question is of course what relations there are between the Scandinavian and the Russian rings.

I would like to discuss the following questions:

- Why this apparently discontinuous distribution? What relations are there between rings in the east and the west?
- What is the origin of the rings? Where were they made? Were they made in one region or were they made locally at many sites? Are they contemporaneous in Scandinavia and Russia?
- What does the weight nomination mean? What weight system/systems can lie behind their manufacture?
- How were the rings used? Was the use similar in the east and in the west?

Fig. 3. Three rings from Hoffmanslyst, North Jutland, Denmark. Photo: National Museum, Copenhagen.

In the Scandinavian material there is also a related type of rings, also uniform in shape, decoration and weight grouping. These rings are made of a thinner rod and closed with two hooks. Like the so-called Permian rings, the ring body is spirally striated but here the striated parts alternate with stamp decoration. Apart from a few rings which are only striated or striated with smooth end sections, they are decorated with striation and stamps according to a strict scheme. The decoration is divided into three or five sections and always with a striated section in the middle. The stamps are likewise stereotyped, triangles placed to create hourglass figures (Munksgaard 1963: 98 f.). Rings found later agree in shape and decoration with those found earlier (Munksgaard 1970: 56). In hoards these rings are also usually bent into spirals. Elisabeth Munksgaard distinguishes between Permian rings and spiral rings and assigns rings with the facetted knob to the Permian group (Munksgaard 1963: 97). The two types are closely related in decoration as well as in weight grouping. They are, as Munksgaard writes, rings for payment made according to precise weight relations: big "Permian" rings, c. 200 grams in weight, and small "Permian" rings of c. 100 grams and big spiral rings of c. 100 grams and small spiral rings of c. 50 grams. As for their distribution, the two main types differ, as spiral rings with hook ends occur in Denmark and on Gotland, in Denmark mainly in the southern and eastern parts of the country. Rings with facetted knobs have a much wider distribution, from Russia via Finland and the Baltic lands to Gotland, Öland and Denmark (Munksgaard 1963: 103 f.).

In a later article Munksgaard maintains that the grouping is impractical, as it can only be applied to complete rings. She suggests that all rings should be called Permian rings (Munksgaard 1970, 57–58). In my opinion this leads one's thoughts in the wrong direction. Among the manifold rings in the Perm' and Čepca regions, stamped items and rings with two hooks are obviously not typical. It is appropriate that the term Permian ring is restricted to rings with a facetted knob. Usually they are also made of thicker rods. In Russian literature these rings are referred to as rings of Glazov type, which obviously is a better term than the one current in Scandinavian literature. It is important, however, that the description of Glazov rings and Permian rings in Russian and Scandinavian literature is in concordance. Here I will use the term "rings of Perm'/Glazov type".

For the rings with stamped decoration and two hooks I have suggested the term "rings of Duesminde type" after the Danish site where the largest amount of them has been found. The distinction between the two groups was suggested to be based on the thickness of the rod, to enable the include of fragments as well (Hårdh 2008: 108–113). The rings from Duesminde presented by Munksgaard have a rod thickness of 3–5 mm, occasionally 5 mm (Munksgaard 1963, 1965). Fragments with a rod thickness over 5 mm probably derive from rings of Perm'/Glazov type. The relation between the two ring types will be treated below.

The Baltic/Scandinavian region

In Scandinavia complete rings of Perm'/Glazov type occur in present-day Denmark and on the Swedish islands of Öland and Gotland. Larger fragments are known from Norway and Schleswig-Holstein in Germany. Small fragments, rods of one to a few centimetres length, are not unusual in South Scandinavian silver hoards from late 10th and the beginning of the 11th century. The thickness of these rods indicates that they derive from rings of Perm'/Glazov type.

Those rings are also known from the eastern and southern coastal areas of the Baltic, although not abundant. From Finland I know four rings of silver. Besides this there are similar rings of bronze known from graves. From Estonia one hoard with four rings is registered as well as one single ring from Lithuania.

Sweden

Two finds from Öland contain striated spiral rings with facetted end knobs. Church, Sandby, Öland (Statens Historiska Museum, SHM 936), is a hoard containing four rings all wound into spirals. They have two striated sections and a smooth middle section which is thinner. They have flat, facetted knobs. Three rings have almost triangular loops, the fourth a rounded one. Weigh: 97.9, 102.4, 198.9 and 308.9, grams. They were found with two neck-rings made of twisted rods, one weighing 204.37 and the other 100.68 grams. This hoard also contains over 2,000 Arab coins with tpq. 894– (Kilger 2008a: 284, here called Skarpa Alby). It is important here to point out that the two neck-rings manufactured according to the prevalent Scandinavian shape seem to be weight-standardized in the same way as the spiral rings. The same has previously been observed for a few twisted neck-rings from two early Viking Age hoards, one from Poland and one from Denmark (Hårdh 1996: 60 ff.).

Alvara, Böda, Öland (SHM 15890) contains five complete Perm'/Glazov rings, all wound into spirals. Two have stamped decoration alternating with striated sections, and one has small stamped circles at the knob. Three are striated with smooth middle sections. The knobs are facetted. Weights: 94.68, 99.81, 100.71, 101.07 and 202.6 grams. Two fragments were analysed with archaeometallurgical methods as described above. A rod with rhombic cross-section, bent into a spiral, weighs 97.59 grams. The hoard contains further bangles and rods.

In the Baltic region Gotland has the largest share of Perm'/Glazov rings. An outstanding hoard is the one from Asarve, Hemse

(SHM 11930), a huge assemblage weighing over 7 kg of silver with 18 complete rings of Perm'/Glazov type. All are wound into spirals, usually into 2½ windings. Each has two striated sections and a smooth middle section. One ring is also stamped with small triangles with three dots in each. One has stamped small rings on the knob. The knobs are of high or semi-high type. One ring has a knob at each end. The rest have knob and loop. On one ring there are incised lines at the knob. Weights of the complete rings: 98.42, 98.89, 99.42, 99.76, 99.92, 100.88, 101.0, 101.45, 101.84, 101.87, 102.35, 102.54, 102.59, 102.7, 200.65, 200.79, 201.57 and 204.17 grams. The ring weighing 204.17 has an Arab coin folded around it. There are a further seven fragments, among them three rather big ones, from similar rings in the hoard. One large fragment has a rod wound around it. Their total weight is 204.82 grams. Besides the spiral rings there are bangles of Gotlandic types, spirals of rods with square cross-section and staff-shaped ingots. There are 1+1 Arab coins, Abbasids. The majority of the 10 silver spirals with square cross-section, the 13 cast ingots and also some of the arm rings may with good reason also be seen as weight-standardized according to the same groupings as the spirally striated rings (Stenberger 1947: 119 ff., Abb. 1–7).

In 1999 a find was made that has been called the largest Viking Age silver hoard in the world in Spillings, Othem parish, Gotland. Actually they are two depots, weighing together c. 67 kilo, here referred to as Spillings I (SHM 33758) and II (SHM 33759). The two depots have the same composition on average. They consist of ingots, spirally striated rings and other types of rings, such as finger rings, arm rings and bangles. Moreover there are 14,300 coins, almost entirely Arab. The coins indicate a deposition after AD 870–71. Obviously the silver makes up an unusually large stock of raw material and means of payment, which for some reason was never used.

Lena Thunmark-Nylén states that in the two Spilling hoards there are several examples of rings of Stenberger's type Sa 1 and Sa 2 (here Perm'/Glazov and Duesminde rings). Most of them have been bent into spirals, a trait well known from other Gotlandic finds (Thunmark-Nylén 2006: 701 ff.; Rispling 2004). Majvor Östergren states that a large share of the objects were joined into bundles with regular weight units based on the Viking Age weight system (Östergren 2008: 16–24 and below).

In the two hoards there are eight complete rings. Weights: 205, 166, 103, 98, 96 grams. The rest could not be weighed as they are linked to other items. Some rings are very worn and/or corroded. The rings have the usual striation in two sections with a smooth middle section. However, two complete rings and some fragments have a coarse type of striation where the ridges are broad and flat instead of the usual striation with sharp ridges. Six knobs are of the flat type, two are semi-high. Two knobs have incised lines. Beside the complete rings there are several fragments. One of the rings is part of a large bundle of a variety of rings. One complete ring is of the type, which here is called ring of Duesminde type. Fragments which possibly derive from similar rings are also known from the hoard. Moreover there are fragments of spirally striated rings of

Baltic types, among them fragment of a ring with the typical saddle knob.

Beside these hoards there are nine rings in seven finds. Five finds moreover contain fragments of such rings.

The hoard from Hellvi (SHM 1124, Fig. 1) contains three Perm'/Glazov rings, weighing 194.6, 199.9 and 208.4 grams. They were found together with 1154+8 Arab coins, 739–921 AD. The three rings show great similarities. The facetted knobs are rather flat. Each ring has two striated sections, the middle section and the end parts close to knob and hook being smooth. The smooth middle section and the smooth end parts are slightly thinner than the striated parts. The three rings are so similar to one another that they must have been made in close connection to one another. Two of them have graffiti, scratched lines, on the knobs (Stenberger 1947: 111 f., Abb. 17).

The hoard from Broungs, Bunge (SHM 6105), consists of two spiral rings. One is a typical ring of Perm'/Glazov type with a high facetted knob and hook, two striated sections and a smooth middle section. Its weight is 97.22 grams. The other ring is bent into a spiral but is made of a rod with square cross-section. It is stamped with small triangles on two sides. Both ends have high facetted knobs. Weight 100.35 grams, Fig. 13. (Stenberger 1947: 32, Abb. 12).

From Ockes, Öja (SHM 3229), a ring in two fragments is known. It has a flat, facetted knob and hook. The two fragments fit together and thus the ring can be considered complete. Weight 207 grams. It was found together with one bangle and 217+43 Arab coins, 744–911 AD. (Stenberger 1958: 249, Abb. 16).

From Söderkvie, Grötlingbo (SHM 2483), comes a neck-ring with high facetted knob and hook. The rod has an octagonal cross-section at the ends and at the middle section. These parts are stamp-decorated with hourglass-shaped imprints. Weight 101.6 grams. (Stenberger 1958: 81).

The hoard from Hemmor, När (SHM 1585), contains a striated spiral ring with a high facetted knob in two fragments, one bangle and 150+151 Arab coins, 743–868. The spiral ring is not complete (Stenberger 1958: 154, Abb. 9).

From Asa, Lojsta (SHM 6949, 16519, 16979), come three fragments from an incomplete Perm'/Glazov ring. It has a high facetted end knob and spirally striated sections interchanged with eight-edged parts at the ends and at the middle of the ring. These parts are stamped with triangles. Together with the ring fragments a spiral bent rod with square cross-section was found and 16+1 Arab coins 895–932 (Stenberger 1958: 137, Abb. 8).

Norrgårda, Björke (SHM 12328), is a large hoard. It contains a folded Perm'/Glazov ring with two striated sections and stamps at the ends; hook and semi-high knob. Weight 100.4 grams. Three rods with square cross-section, weight 98.9, 99.8 and 101.6 grams. These were possible spiral rings; they are compressed in the same way as the Perm'/Glazov ring. Beside these the hoard contains bangles, rods, ingots and some glass beads. There were also some fragments of Sasanian and Arab coins, tpq. 833– (Stenberger 1947: 25, Abb: 32:1; Kilger 2008a: 248).

Finland

Utajärvi, Koverokoski, Österbotten (National Museum of Finland, NM 150). Spirally striated ring in two sections with a smooth middle section and facetted knob and hook. According to a note in the catalogue at NM, the ring was obviously bent to a spiral to be used as an arm-ring but later drawn out, perhaps at the finding. The ring was found in 1825 during digging of a canal through a tongue of land at the Kovero rapids, one of the uppermost falls of the Uleå river (information by e-mail from Leena Ruonavaara, NM, 1 September 2014).

Lilkyro, Kotsalonmäki, Ostrobothnia (National Museum of Finland 1912). Ring bent irregularly into 1½ windings. Striated in two sections with smooth middle sections and ends. Loop and semi-high facetted knob. Found together with several other objects half a verst south of the church of Lillkyrå (information by e-mail from Leena Ruonavaara, NM, 1 September 2014). Weight: 192.88 grams.

Storkyro, Napo, Ostrobothnia (National Museum of Finland 276). Ring bent into a spiral. Striated, facetted semi-high? knob and hook. Weight: 97.15 grams.

Palkäne, Värilä Tavastland (Swedish History Museum, SHM 93). Ring bent in three windings with two striated sections and smooth middle section. The ends are facetted and stamped with small triangles and squares. Loop and facetted flat knob. Weight: 191.7 grams. Found with west European and Arab coins, deposited c. 1060 (Stenberger 1958: 124, 128, Abb. 17).

The distribution in Finland is strange, with two inland finds and two in the Vasa coastal region. This is in sharp contrast to finds of Oriental coins, which are concentrated on the island of Åland. A find from Västergeta, Geta, Åland (NM 1133), contains some fragments of spirally striated rings.

Estonia

Hapsal (SHM 17091). Five rings one of which is a saddle ring, which is a characteristic type from the Baltic and East European regions, the rest are Perm'/Glazov rings. 1. Ring with two striated sections, smooth slightly thinner middle section. High facetted knob. The hook is shaped as an animal head with open mouth and a round eye, which is a unique shape for this type of rings. Stamp decorated with small band-shaped imprints with raised dots. Weight: 248.8 grams. 2. Ring with two striated sections. Mid and end sections have square cross-section. Stamped with triangles with three dots. Loop and high facetted knob. Weight: 198.8 grams. 3. Ring bent in 2½ windings. Two striated sections, smooth end and mid sections. Hook bent into a swan neck shape and flat facetted knob, stamped with short lines making up a square with a small circle within. Weight: 108.1 grams. 4. Ring bent in 2½ windings. Two striated sections, smooth middle and end sections. Loop and flat facetted knob, stamped with short lines making a square. Small circles placed three by three make up triangles outside the square. Weight: 98.7 grams (Stenberger 1958: 93, 125, Abb. 15–16.

Lithuania

Lithuania, unknown find spot (Museum Warszawa, PMA/V/10345-1). Ring with two

Fig. 4. Erridsø, Elbo, Jutland, Denmark. Photo: National Museum, Copenhagen.

striated sections and thinner mid section. Hook and semi-high facetted knob. Rod of 5.5 mm thickness. Weight: 100.8 grams.

Vorpommern

Ralswiek, Rügen, Mecklenburg-Vorpommen (Archäologisches Landesmuseum, Schloß Gottorf, Schleswig, M-V ALM 73/00001). Found during excavation of a house together with 2211 Arab coins, tpq 842–. The ring is described as "zerhackten Armspirale vom Permer Typ" (Herrmann 2006: 14–15). It is wound into 1½ windings, cut with a hook at the preserved end. It is striated and the section close to the hook is stamped with small triangles placed to create a rhombic pattern between them. The large dirham hoard from Ralswiek is most important, not least for dating. This ring is usually referred to as a Permian ring. However, as it is made of a thin rod, 4–5 mm, it should rather, according to classification in this article, be labelled as a ring of Duesminde type although one end of the ring is missing. Then this hoard would give a reliable coin dating for the Duesminde type of rings.

Anklam, Mecklenburg-Vorpommern (ALM 2009/641). Ring, bent into 2½ windings. Hook at one end, cut at the other. Two striated sections, the striation is fine and regular. The mid section and the ends are smooth with regular octagonal cross-section. The ring was found together with

ingots and Persian and Arab coins. Rod thickness 5–6 mm. It is the thickness of the rods that probably refers the Ralswiek ring to the Duesminde group and the Anklam ring to the Perm'/Glazov type (Williams et al. 2013: 268).

Schwerinsburg, Kr. Anklam. The ring has a hook and facetted knob. The knob has an incised cross. Striated ring body, according to picture, possibly two sections of striation. The ends are stamp decorated with triangles placed opposite to one another, thus making a rhombic pattern, similar to that on Duesminde rings. The ring is bent to a spiral in three windings. The ring was stolen from the museum in Stralsund in the 1980s (Herrmann 1985: 141, Fig. 57).

Denmark and Schleswig-Holstein

Within the borders of present-day Denmark two finds of complete Perm'/Glazov rings have been made.

Erridsø, Elbo, Jutland (National Museum of Denmark C. 5329-34) contains three complete Perm'/Glazov rings and two fragments. Three rings each have two striated sections and a smooth middle section. The fourth ring is stamped all over. Semi-high knobs and loops. The weights of the complete rings are: 197.71, 199.61 and 200.68 g The two fragments, seen as one ring by Munksgaard, weigh together 198.41 g. The hoard also contains five ingots, which are weight-standardized, obviously to the same weight system as the weight around 100 grams or 200 grams (Skovmand 1942: 30 f.; Hårdh 1996: 139). Fig. 4.

Fole, Frøs, Sønderjylland (MMXCVI-II). Ring, spirally striated, facetted knob and loop. The weight is 161 g according to Munksgaard (1963: 103).

From Schleswig-Holstein two finds of Perm'/Glazov rings are known:

Witzwort, Kr. Nordfriesland (Archäologisches Landesmuseum, Schloß Gottorf, Schleswig, ALM, K.S. 7007). This hoard is interesting because of its composition. It contains, besides a fragment of a Perm'/Glazov ring with knob, a spirally striated ring with two hooks and four fragments of spirally striated rings. The hoard further contains a collection of ingots, cast but not hammered, staff-shaped with rounded ends. These also seem to be weight-standardized (Wiechmann 1996: 527, Taf. 45, 70,4). Ingots and their weights will be treated below.

Sylt, Kr. Nordfriesland (Mus. Flensburg, P.V.149), is cut at one end, while the other has a facetted knob. On the ring body striated, smooth and stamp decorated sections alternate. In its fragmented state it weighs 92.2 grams (Wiechmann 1996: 443, Taf. 19).

The Baltic/Scandinavian record – summary

It is evident that the weights of the so-called Perm'/Glazov rings were not random; units of c. 100 or 200 grams are current. It is obvious that the rings, especially on Gotland, were found together with other types of objects which seem to have been adjusted to the same weight system, spiral rings with hook ends, spiral rings of rods with square cross-section or cast ingots. This grouping around certain weight units is special for early silver hoards from the Baltic region, whereas hoards from the mid 10th century or later do not show this trait.

Particularly interesting in this connection are the striated spiral rings with hooks at both ends, here called rings of Duesminde type. They show clear similarities to the Perm'/Glazov rings and there are different opinions as to whether they were imported from the east together with the Perm'/Glazov rings or made in Denmark or Gotland as simpler and smaller copies of the Perm'/Glazov rings. They will be treated below as the other categories of apparently weight-standardized objects.

The Baltic region is characterized by a large variation of rings. The so-called saddle rings are related through their striation to the rings of Perm'/Glazov type. The hoard from Hapsal, Estonia, consists, as mentioned, of four Perm'/Glazov rings and one saddle ring. Moreover one of the rings in the Hapsal hoard is unique as the hook is shaped into an animal head whereas the knob is of the usual facetted type. The majority of rings from the Baltic region are stamp-decorated, often with rather complex combination of stamps.

As we have seen, some rings are found in hoards together with Oriental coins: När, Hemmor, Gotland 150+151 coins, tpq 868–, Spillings, Gotland 14300 coins, tpq 870/71–, Asarve, Hemse, Gotland, 1+1 Abbasid dirham, Norrgårda, Björke, 62 dirhams, tpq 833–, Sandby, Skarpa Alby, Öland 1122+900 Arab coins, tpq 922–, Anklam Mecklenburg-Vorpommern, Persian and Arab coins, Ralswiek, Rügen, 2211 Arab coins, tpq 842– (Stenberger 1947; Herrmann 2006; Kilger 2008a).

Most important is the hoard from Ralswiek, although in my opinion this ring belongs to the group of Duesminde rings, which gives a solid dating to this type. The ring from Pälkäne, Värilä, Finland, comes from a hoard with a very late dating. It was found with about 100 West European and seven Arab coins. The hoard is dated to c. 1060 (Stenberger 1958: 128). A large hoard from Kuusamo, Lämsä (NM 13350), contains several spirally striated fragments, one of which is identified as a saddle ring or other East Baltic types. This hoard has a very late dating, the so-called crusade period, i.e. 1000–1100 according to Ella Kivikoski (1973: 12).

There are a few fragments of rings of striated rods which have an early coin dating:

Sønder Kirkeby, Falster, probably fragment of a Duesminde ring, 97 coins, tpq. 846/47–. Hässleby, Gotland, two striated rods, 3 coins 796/7– (Skovmand 1942 :35; Kilger 2008a: 225). Together with the hoards above, these show that the dating of rings from Scandinavia are clearly concentrated in the 9th century.

The Russian record

T. J. Arne wrote in 1914 that the majority of what he calls Permian rings were not found in the Government of Perm' but in the Vyatka region, from where he knows a hundred, the majority of them from the region around the town of Glazov. From Perm' he knows a dozen rings and one from Kostroma. These are all of silver. Arne also maintains that he has seen similar rings of bronze, six from an inhumation cemetery in the Vyatka region, the same number from Vladimir, two from Tambov and some from the region south-east of Ladoga. Their dating, according to Arne, should be the 9th century

Fig. 5. One ring from the Redikar hoard, Perm'. Photo: State Historical Museum, Moscow, GIM. c. 210 mm.

and first part of the 10th (Arne 1914: 167). The regions that Arne refers to are situated west of the Urals. The Perm' region is the easternmost, centred in the Kama basin. The region with the town of Glazov is now known as the Udmurtija Republic, between the rivers Kama and Vyatka.

In a more modern survey A. G. Ivanov accounts for known rings from various parts of Russia. By far the largest concentration is to be found near the town of Glazov on the Čepca river – 176 rings from 51 sites. On the upper Kama c. 130 rings are known from 29 sites, in the region between the rivers Vyatka and Vetlyuga over 40 rings from 15 sites. Moreover 91 similar rings are known from the Mordvinian region. Other regions have a smaller number of rings. So 22 items were registered in the south–eastern Ladoga region in the 1950s and in 1950 13 rings of

Fig. 6. Rings from Pankov, Perm'. State Hermitage Museum, St Petersburg, GE. Photo: author.

this type were known from Finland (Иванов/Ivanov 1998: 74 and works cited there). Here it is important to notice that Ivanov's record includes silver rings as well as those of bronze.

The following survey is based on the rings I have studied in the State Historical Museum, Moscow, GIM, and the State Hermitage Museum, St Petersburg, GE, together with information from literature. These rings, like the Russian rings in general, also show two pronounced concentrations, in Perm' oblast on the Kama, especially north of the town of Perm', and around the town of Glazov, especially around the Čepca river.

A most splendid hoard from Редикор, no. 1, Чердын, обл. Пермская/Redikar, no. 1 (Redikor), raj. Čerdyn, obl. Perm' (State Historical Museum, Moscow/GIM 16726/1134) is reported to have originally consisted of 34 rings. Ten of them remain (Fig. 5). The find was made in 1883 and the rings lay in a large silver cauldron, c. 25 cm high. Of the ten rings nine are complete. All rings have a semi-high, facetted knob and the complete ones have a hook at the other end. All rings have two striated sections and a smooth middle part. On six rings there are incised figures at the knobs (Hårdh 2001 and below). The weights of the complete rings are: 417.4, 212.0, 210.3, 210.2, 212.0, 210.0, 209.25, 208.2 and 207.6 grams. The fragmented ring was once heavy, the remaining part weighing 279.95 grams, and probably around 300 grams when complete. The rings are very similar, very well made with regular striation and neat knobs and were obviously

Fig. 7. Two rings from Shestinskaja, Glazov, Udmurtija. Photo: State Historical Museum, Moscow, GIM.

made in close connection to one another. It should also be pointed out that these rings are somewhat overweight in relation to other rings of the type. The cauldron, according to V. P. Darkevič, was from Eastern Central Asia and dated to the second half of the 9th century or the first half of the 10th (Даркевич/Darkevič 1976: 23).

Чердын, обл. Пермская/Čerdyn, raj., Čerdyn, obl. Perm' (State Hermitage Museum, St Petersburg/GE 535/1–2) is two complete rings, found in a large hoard together with bronze and silver jewellery. The hoard also contained an Arab coin dated 679–722, transformed into a pendant. One ring has two striated sections and a smooth middle

section. Flat knob with graffiti at one end and loop at the other. The striation is neat. Weight: 203.71 grams. The second ring also has two striated sections. Some parts seem to be twisted harder, the mid and the end sections are smooth. Loop and flat, facetted knob. Weight: 205.20 grams. Talickaja writes that GE 535 belongs to the Redikar 1 hoard, but according to notes in the GE these rings rather belong to the second hoard from Redikar (Талицкая/Talickaja 1952: 159).

Also from Чердын, обл. Пермская/Čerdyn raj., obl. Perm' (GE 533/1) comes a ring found on its own. This is of an unusual type. The middle section is thin and consists of one single rod whereas the end sections are

twisted from two rods with twisted wires in between. Both ends have high facetted knobs stamped with dots and small circles. Weight: 453.72 grams. Several finds of, among other things, neck-rings of silver are known from the region around Čerdyn (Талицкая/Talickaja 1952: 162).

In Панковка, обл. Пермская/Pan'kovka, raj. Jus'va, Komi-Permjackij NO (Nacional'nyj Okrug), obl. Perm' (GE 546 5–6) a large collection of 108 objects of silver, bronze and glass was found in 1844. Find circumstances are unknown. Among the objects were two complete rings and some fragments. One is bent in 2½ windings. Neat, regular striation in two sections. Loop and facetted semi-high knob with incised and carved lines. Weight: 210.73 grams. The second ring is wound in three windings. It has two striated sections and smooth middle section. The striation is regular and neat. Round loop and semi-high knob with incised and carved lines. Weight: 205.35 grams (Fig. 6).

Обл. Пермская/obl. Perm' (GE 546 1–4, 7–17). A large collection of objects with unknown find sites. Among the objects are twelve complete rings and some fragments. Nine of the complete rings are shaped as neck-rings; three are bent into 1½ windings. Striated in two sections and smooth middle section. Most rings have a fine and regular striation, two somewhat coarser. Two have a flat, facetted knob, the rest a semi-high knob. One fragment has a fine striation and a semi-high knob and two fragments have coarse striation. Six rings have graffiti on the knob. Weights of complete rings: 95.91, 107.32, 202.90, 204.87, 207.20, 207.39, 207.40, 207.79, 208.00, 208.30, 209.80 and 212.02. Talickaja reports 15 neck-rings of Glazov type found at Pan'kovka in 1844 and kept at the GE with no. 546 (Талицкая/Talickaja 1952: 139).

Bielowodsk, obl. Perm'. Ring with two facetted knobs. The ring body has two striated sections, partly facetted middle section and facetted end parts. The facetted parts and the knobs are stamped with small rings (British Museum, London, Williams et al. 2013: 61, Fig. 54). This ring has a close parallel in a hoard from Volgina (Roždestvenskoe), raj. Karagaj, obl. Perm' (Белавин & Крыласова/Belavin & Krylacova 2008: 496).

From the Glazov region come 50 rings together with fragments from 20 finds. From the rest of the Udmurt Republic and Kirov oblast come 14 rings as well as fragments.

Шестинская, рай. Глазов, республика Удмуртия/Shestinskaja, raj. Glazov, respublika Udmurtija (GIM 43461/op.1127/1–2). The hoard consists of two rings, both wound into slightly more than 2 windings. The mid sections and the ends are facetted with an octagonal cross-section. The rest of the ring has two striated sections. The other ring has a striated mid section and smooth ends. One ring has a facetted semi-high knob and the other a flat facetted knob. Both have loops. The total weight of both rings is reported as 616.30 grams. Found in 1890 on the bank of the Čepca river. Later a fragmentary ring and a bronze ring were found at the same spot (Иванов/Ivanov et al. 2004: 186). (Fig. 7).

Большой Лудошур, рай. Глазов, республика Удмуртия/Bol'šoj Ludošur, raj. Glazov, respublika Udmurtija (GIM 23499, op.1123/1, 24015, op./1123/4, 24017/op. 1123/3, 5–8). Eight rings, all striated with smooth middle section and facetted knob

and loop. On one ring the rod closest to the knob is facetted. Two rings have a coarse striation with flat ridges. One of the rings has incised figures on the end knob. Weight: 171.75, 199.40, 199.50, 199.65, 202.90, 204.2, 206.9 and 207.50 grams.

Talickaja reports 18 or 19 silver rings, 16 of them complete, found successively between 1888 and 1899. Ivanov et al. report more than 20 silver rings of Glazov type here. The rings derive from different locations and were distributed to several museums. Two rings GE 515, reported as single finds, may also belong here (Талицкая/Talickaja 1952: 41; Иванов/Ivanov et al. 2004: 187).

Лудошур, рай. Глазов, республика Удмуртия/Ludošur, raj. Glazov, respublika Udmurtija GE 515-1. Ring with overlapping ends. Regular striation. Round loop and smooth, facetted semi-high knob. Weight: 197.33 grams.

GE 515-2. Ring with two striated sections, smooth middle section. Regular striation. Round loop and semi-high facetted knob. Weight: 198.9 grams.

Дондинская дер., Укан дер., Больше-Палкинская, рай. Глазовский уезд, республика Удмуртия/Dondinskaja, Ukan and Bol'še-Palkinskaja, raj. Glazov, respublika Udmurtija (GIM 24014, op.1131/2, 24014, op.1131/3, 24018, op. 1131/1). Two complete rings and two fragments. Found at different locations.

1. Striated sections and smooth middle section. Ends with facetted cross-section, stamp-decorated. Facetted knob and loop. Weight: 195.9 grams. 2. Striated and smooth middle section. Facetted knob and loop. Weight: 98.8 grams. 3. Two fragments of a ring with loose striation, rather a twisted rod. Square knob and loop. Weight: 57.70 and 81.10 grams.

Симпаловская, рай. Глазов, республика Удмуртия/Simpalovskaja raj. Glazov, respublika Udmurtija (GIM 44568, op.1131/11).

Ring with large knob and striation with thin, pointed ridges. Weight 208.8 grams.

Коршуновская рай. Глазов, республика Удмуртия/Koršunovskaja, raj. Glazov, respublika Udmurtija (GIM 44568, op. 1131/9–10).

Two rings. Both striated with smooth middle section and facetted knob and hook. One with large knob and the typical striation with thin, pointed ridges. The other has a smaller knob and a striation with broad, flat ridges. Weight 208.60 and 175.40 grams.

Коршуновская, рай. Глазов, республика Удмуртия/Koršunovskaja, raj. Glazov, respublika Udmurtija (GIM 44568, op.1130/1). One ring in two fragments. The ring is striated with smooth mid section, facetted knob and loop. The collected weight of the fragments is 208.1 grams. Found in 1903. Ivanovo et al. report more rings from the same site (Иванов/Ivanov et al. 2004: 192).

Ягошурская, рай. Балезино, республика Удмуртия/Jagošur raj. Balezino, respublika Udmurtija (GIM 45808/1132). Four rings and one rod. The first ring is a large item, spirally striated with smooth middle section, facetted knob and loop. Incised lines on the knob. The ring weighs 412.20 grams. The other three rings have striation with broad, flat ridges, one ends with two facetted knobs, and the others with hook and loop. Two weigh 182.20 and 177.6 grams, while the weight of the third is unknown. The rod has a square cross-section, one end is pointed and the other hammered into a square knob,

semi-manufactured product for a neck-ring? Found in 1906 at a tributary of the Čepca (Иванов/Ivanov et al. 2004: 133).

Кыпка, рай. Глазов, республика Удмуртия/Kypka raj. Glazov, respublika Udmurtija (GIM 37900/1124,). Two fragments with striated and smooth parts. One fragment has a facetted knob. The weight, 181.5 grams, probably refers to both fragments (Талицкая/Talickaja 1952: 36–37 Иванов/Ivanov et al. 2004: 193)

Мало-Ключевская рай. Глазов, республика Удмуртия/Malye Ključi, raj Glazov, rep. Udmurtija (GIM 37901/1120). One complete ring with two striated sections and one smooth middle section, facetted knob and loop. Found in 1898. Weight: 198.0 grams (Талицкая/Talickaja 1952: 37; Иванов/Ivanov et al. 2004: 193).

Починок Аверинский, рай. Балезино, республика Удмуртия/Averinskij počinok, raj. Balezino, respublika Udmurtija (GIM 36221, op. 1131/4–6). Two complete rings, seven fragments of at least two more rings and a lunula-shaped pendant. The two complete rings are both striated with a smooth middle section, facetted knob and loop. Weight: 100.2 and 98.2 grams. Among the fragments there is a part of a ring with a facetted knob with incised figures and a small ring with facetted knob. The total weight of the fragments is 291.4 grams. The hoard was found in 1896 close to a tributary of the Čepca (Иванов/Ivanov et al. 2004: 129)

Макаровская, рай. Глазов, республика Удмуртия/Makarovskaja raj. Glazov, respublika Udmurtija (GIM 32841–42/1121). Find of two rings, all striated with smooth mid sections, facetted loop and knob, both with incised figures on the facetted knobs. Weight: 209.76 and 422 grams.

Седьяр дер., рай. Глазов, республика Удмуртия/Sedjar village, raj. Glazov, respublika Udmurtija (GIM 45841, op.1119/1). Ring with two striated and one smooth section. Loop and facetted knob. Found 1906. Weight: 91.8 grams.

Жабинская дер., рай. Глазов, республика Удмуртия/Jabinskaja village, Glazov, respublika Udmurtija (GIM 45807, op. 1121/1–2). Two rings, striated with smooth mid section. Facetted knobs and loops. Found in 1906. Weight: 200.21 and 204.71 grams.

Омутница, рай. Глазов, республика Удмуртия/Omutnica, raj. Glazov, respublika Udmurtija (GE 514). 514-1. Complete ring in three pieces. Regular striation, two striated sections and a smooth middle section. Round loop and semi-high facetted knob. Weight: 210.36 grams. Found in 1883. Close to the same village two dirhams, 803 and 880, were found in 1903 and two more in 1913. According to Talickaja three rings were found here, one of which is kept in GE (Талицкая/Talickaja 1952: 42; Иванов/Ivanov et al. 2004: 194).

Усть-Озегвайская (Тотош), рай. Глазов, республика Удмуртия/Ust'-Ozegvajskaja (Totoš), raj. Glazov, respublika Udmurtija (GE 513-1). Ring in four pieces, probably complete. Coarse striation, hook and smooth, facetted knob.

According to Ivanov et al. six rings were found at this site (Иванов/Ivanov et al. 2004: 1987).

Клучевская вол., Макшур дер, республика Удмуртия/Klučevskaja vol., Makšur, respublika Udmurtija (GE 518-1).

Large ring with coarse striation in two

striated sections with a smooth section in between. Hook, almost round, flat knob with facetted upper side. Incised lines on the knob, pecks on the ring. Found in 1891. Weight: 192.42 grams.

Лудошурская, вол., Качкашур дер., республика Удмуртия/Ludošur, Kačkašur, respublika Udmurtija (GE 518-2). Well-made ring with utterly regular striation in two sections and smooth middle section. Loop and semi-high facetted knob. Found in 1891. Weight: 210.16 grams.

Седиваново, рай. Балезино, республика Удмуртия/Sedivanovo, raj. Balezino, respublika Udmurtija (GE 522).

522-1. Ring with striation in two sections. Loop and semi-high facetted knob. Weight: 183.97 grams.

522-2. Ring with regular but coarse striation. Two striated sections. Hook and thin knob with dome-shaped upper side. Weight: 97.56 grams.

522-3. Ring with irregular striation. Hook and small, flat knob with cut-off corners. Weight: 95.02 grams.

522-4. Ring with somewhat irregular striation in two sections. Loop and flat knob with almost round outline and facetted upper side. Weight: 203.42 grams.

522-5. Ring in two fragments. The fragments fit so the ring can be considered complete. Hook and semi-high facetted knob with incised lines. Weight: 205.2 grams.

522-6. Ring with regular striation. Loop and flat, facetted knob. The knob has incised lines and stamped points. Weight: 200.18 grams.

522-7. Ring with regular striation, worn. Loop and high, small knob. Weight: 99.8 grams.

522-8. Ring with rather regular striation in two sections. Loop and facetted knob Weight: 192.12 grams.

522-9. Ring with coarse striation in two sections. Hook and flat, facetted knob.

Weight: 72.46 grams.

The nine rings were found in 1876 close to a tributary of the Čepca (Иванов/Ivanov et al. 2004: 132).

Дондыкар, рай. Глазов, республика Удмуртия/Dondykar, raj. Glazov, respublika Udmurtija (GE 520). Fragment. Very well made, regular striation. Loop. Weight: 103.50 grams. Ivanov et al. report that in 1873 five complete and some fragmentary silver rings of Glazov type were found together with four silver ingots and four Kufic coins (Иванов/Ivanov et al. 2004: 189).

Дондыкар, рай. Глазов, республика Удмуртия/Dondykar, raj. Glazov, respublika Udmurtija (GE 519). Ring with overlapping ends. Regular striation in two sections. Loop and semi-high, facetted hook. Rod thickness 6.8 mm. Weight: 206.19 grams. Together with the ring some other ornaments, beads, a bronze pendant etc. were found (Иванов/Ivanov et al. 2004: 189).

Габовская, рай. Глазов, республика Удмуртия/Gabovskaja, raj. Glazov, respublika Udmurtija (GIM 44569, op.1974/1–8). Three rings and five fragments. The three rings are similar, striated with smooth middle section, high and broad, facetted knobs and loops. One ring has cut marks at the ends. Weight: 198.70, 202.70 and 204.10. The fragments derive from one or more thinner striated rings. One fragment has a facetted knob and one fragment a loop.

Дураковская, рай. Глазов, республика Удмуртия/Durakovskaja, raj. Glazov, respub-

Fig. 8. Fragmentary ring from Glazov with coarse striation. Glazov, Udmurtija. State Hermitage Museum, GE. Photo: author.

lika Udmurtija (GIM 41861, op.1126/1–6). The hoard consists of six rings and one fragment. Five rings are similar with striation with somewhat flattened ridges, rather flat knobs and loops. One ring has striation with sharp ridges and is slightly worn. Two rings have testing marks and two have engravings on the knobs. Weight: 195.10, 198.0, 198.7, 199.7 and 202.7. The sixth ring is broken and the fragment may belong to it. Their assembled weight is 202.00 grams (Иванов/Ivanov et al. 2004: 190).

Малый Лудошур, рай. Глазов, республика Удмуртия/Malyj Ludošur, respublika Udmurtija (GIM 34340/993 1–15). Three rings and several fragments of rings. All three rings are shaped as neck-rings, striated with smooth middle section and facetted knob and loop. Two rings have test marks. Weight: 88.50, 179.80 and 204.30. The heaviest ring is worn. The ring weighing 179.80 has the broad/flat striation. The find also contained 12 fragments of similar rings. Found on a tributary of the Čepca (Иванов/Ivanov et al. 2004: 193).

Тугбулатовское, рай. Глазов, республика Удмуртия/Tugbulatovskoe, raj. Glazov, respublika Udmurtija (GIM 39942/995). Ten fragments of two striated rings, Coarse striation. Two swan-neck-shaped bent hooks, two loops. Found in 1900 (Талицкая/Talickaja 1952: 37; Иванов/Ivanov et al. 2004: 196–7).

Ершовская дер., рай. Глазов, республика Удмуртия/Eršovskaja village, raj. Glazov, respublika Udmurtija (GIM 39943/994). 2 pieces of a ring with the broad, flat striation and facetted knob, together less than half a ring. Weight 59.8 grams.

Кортышевская, рай. Глазов, республика Удмуртия/Kortyševo, raj. Glazov, respublika Udmurtija (GIM 44566/857). Large neck-

ring, striated with smooth middle section. Facetted knob and loop. The ring is worn. Unfortunately no reliable information about weight.

Республика Удмуртия/respublika Udmurtija. Unknown find place (GIM 25608, 25749, dpt. no. 1133). Two rings, striated with smooth middle section, facetted knob and loop. Weight: 189.9 and 208.2 grams.

Республика Удмуртия. respublika Udmurtija. Unknown find place (GIM, dpt. no. 1129). Two large rings, both in two fragments, striated with facetted knob and loop. The collected weight of the fragments is reported to be 397.10. As the rings are of equal size their individual weight should be around c. 200 grams or slightly below.

Малмыжский уезд, обл. Киров/Malmyž raj. Malmyž, obl. Kirov (GIM 24016). Three rings: 1. Striated ring with smooth middle section. Two facetted knobs. Very worn. Weight: 294.10 grams. 2. Striated ring with smooth middle section. Two facetted knobs Weight: 268.80 grams. 3. Striated ring with smooth middle section. High facetted knob and loop. Weight: 178.90 grams.

Малмыжский уезд, обл. Киров/Malmyž raj. Malmyž, obl. Kirov (GE 517). 517-1. Ring with regular striation, two striated sections and a smooth middle section. Loop and high facetted knob. The ring was made of a thick rod, 6.5 mm thickness. It is partly carved as if some silver has been hacked away. Weight: 199.53 grams.

517-2. Ring with regular striation, two striated sections with smooth middle section. Thick 6.5 mm rod. Round loop and high facetted knob with extra facets. Weight: 199.22 grams.

These two rings are a good example of similar rings found together

Городище, рай. Зуевка, обл. Киров/Gorodišče, raj. Zuevka, obl. Kirov (GE 521). 521-1. Ring with overlapping ends. Regular striation. Loop and semi-high facetted knob. Weight: 203.17 grams.

521-2. Ring bent into a spiral. Regular striation in two sections. Loop and semi-high facetted knob. Well made. Weight: 199.29 grams.

521-3. Fragment. Regular striation. Semi-high facetted knob with an incised cross. Well made. Weight: 162.70 grams.

512-4. Large ring. Overlapping ends, regular striation in two sections. Loop and semi-high knob. Weight: 412.22 grams.

Яранск, рай. Яранск, обл. Киров/Jaransk, raj. Jaransk, obl. Kirov (GE 516-1).

Ring with regular striation, two striated sections and a smooth section in the middle. The ring is worn. Hook and high faceted knob. Weight: 97.30 grams.

The rest of the rings of Glazov type which I was able to see come from widely separated regions such as the Vladimir region east of Moscow, Tula, south of Moscow and the Kola Peninsula.

In the vicinity of Vladimir, raj. Vladimir, obl. Vladimir (GE without no.). Ring with fine, regular striation in two sections. Hook and facetted semi-high knob. Weight: 208.0 grams.

Супруты, Щекиного р., Тульсой обл./Supruty, raj. Ščekino, obl. Tula (GIM). Small ring, spiral wound in three windings. Somewhat unevenly striated, high, facetted knob and loop. Weight: 60 grams (Изюмова/Izyumova 1989).

Kola Peninsula, obl. Murmansk (GE,

without no.). Irregular but fine striation in two sections. Flat, facetted knob and loop. Weight: 179.00 grams.

The Russian record – summary

Fifty-six complete rings were registered in the State Historical Museum in Moscow and 42 in the State Hermitage Museum in St Petersburg. To these are added some fragments. The rings show a geographical distribution with clear concentrations. Twenty-five rings come from Perm' oblast, 13 of those from Čerdyn. Twelve rings belong to a collection in the Hermitage originating in Perm' with different find places. No fewer than 64 rings in the two museums come from the Udmurtija Republic, 52 of them from the Glazov region. Only a few rings come from places outside these regions, from Vladimir, Tula and the Kola Peninsula.

Most striking is the concentration in the Glazov region, primarily on the river Чепца/Čepca. The majority of the rings from Perm' come from the upper reaches of the Kama, north of the town of Perm', at Čerdyn. Thus the rings seem to have a concentrated distribution in the west Ural region.

With few exceptions the rings give a most uniform impression. The ring body is striated, usually with two striated sections and a smooth section in between at the middle of the ring body. Through the striation the rings may be divided into two groups, one with regular, often sharp, pointed ridges (Figs. 5, 6, 7) and one with irregular striation and broad and flat ridges (Fig. 8). Also the knobs vary between higher/narrower and a flatter/broader shape. Unfortunately I have not been able to weigh the rings myself. The rings were usually fixed on boards in the exhibition. The weight information comes from registration in the museums. Occasionally I had the opportunity to check the weights, and the results were all in good agreement with those stated on the catalogue cards. The rings seem to have relation to a definite weight system like those rings found in Scandinavia. Rings around 200 grams are in a clear majority. Light rings, around 100 grams, are scarce, and no rings of c. 50 grams are present in the material. The six rings weighing over 400 grams are unique. Such heavy rings are not known outside Russia.

There are also a few rings which clearly deviate from the rigid weight scheme. They might be adapted to fractions of the pound weight but it is also possible that they were adapted to some other weight system or that weight here is of no relevance. It is worth noticing that several of these rings have a different striation from the others, with flat, broad ridges. In some cases test marks have been noticed, which is to be expected with the accurate weight standardization.

Stamp decoration is rather abundant on Scandinavian rings. It is also characteristic of the simpler, small rings with hooks in Danish and Gotlandic hoards. A couple of Russian rings have stamped small rings on the knobs and in one case also on the ring body. However, the stamp decoration of triangles, so common in the Scandinavian/Baltic region, has not been noticed on the Russian rings that I have seen.

The Russian rings are usually shaped as neck-rings. Rings found in Scandinavia are usually bent to spirals, which made Stenberger label them as "Spiralringe". The spiral shape is obviously secondary and was per-

haps a practical way to transport and hoard the rings. However, there are also spiral bent rings from Russia. The ten Redikor rings, for example, were bent into spirals; they lay in a cauldron and maybe this was the reason they were bent.

An observation, also valid for some Scandinavian hoards, is that rings from one hoard often are very similar to one another. This is relevant for the shape of the knob, if it is high or flat, how the loop was shaped and what the striation is like. A good example here is the ten rings from Redikor, Perm'. They are strikingly alike, with a well-executed and regular striation and flat, facetted knobs. They are also overweight in relation to a fixed standard of c. 100 or 200 grams, what is also a trait that unites them.

It was not easy to get a general over view of the Russian material. On my visit to Moscow in 1997 the museum was closed and the exhibition packed up. I was able to study the rings but my knowledge of the rest of the silver is unclear. From literature it is obvious, as mentioned, that there are many more rings found in Russia. Several of these are kept in other museums, for instance in Perm' and Izevsk. I have not been able to see these and several rings are obviously also lost.

Darkevič reports in his account of finds of Oriental vessels that in many cases they were found together with rings of Glazov type. Besides the rings described here he mentions an indefinite number from Udmurtija and at least some 50 from Perm' oblast (Даркевич/Darkevič 1976: 8–36). 20). V. V. Sedov reports numerous finds of Glazov rings from the region around the Čepca river in settlements, as well as in graves, for example, from Мыдланьшай/Adam II, Mydlan Šaj, raj. Glazov, rep. Udmurtija and Варни/Varni, raj. Debesy, rep. Udmurtija. A hoard with 19 rings of this type was found in the goridische Гурьякар/Gurjakar (Седов/Sedov 1987: 143). The catalogue of Ivanov et al. (2004) has already been mentioned. Thus, rings are found in hoards, sometimes with Oriental silver vessels; they are also known from graves and occasionally from settlements.

A find from Тугбулатовское, Глазов/Tukbulatovo, Glazov, GIM, inv. no. 39942-1-2/995, contains, together with several fragments of striated rods, two fragments of striated rods with hooks bent into swan neck shapes. The hooks are in agreement with what is typical for rings in Scandinavia, for example Norregård, Björke, Gotland. However, these fragments from the Glazov region have a striation of the type with broad, flat ridges which has been observed in the Scandinavian record only in the Spillings hoard from Gotland. In Scandinavia, on the other hand, this type of clasps with hooks is common.

In Воролиа/Vorolia, Glazov, a band-shaped rod with a rectangular cross-section and some test marks was found. It seems to be weight-adjusted, like Scandinavian counterparts, weighing 101.15 grams.

I have also noticed some differences between rings from Perm' and Udmurtija. The rings from Perm' are fewer in number than the rings from Udmurtija. Except for one single fragment, I have not seen the striation with broad, flat ridges on rings from Perm'. The facetted knobs on the Perm' rings are, with no exceptions, of the flat or semi-high, broad type. Graffiti on the knobs is, on the other hand, more common in Perm' than in Udmurtija. Thus the rings from Udmurtija are considerably more abundant and also

show greater variation. It is here that striation with broad, flat ridges occurs on 11 items. Also the knobs show variations in Udmurtija; the high knob is rather abundant, but not registered from Perm'. This region is also characterized by a considerably larger number of fragments of rings. Moreover most of the hoards from the Udmurtija region probably consisted of only one ring (Callmer 2015: 17).

One ring from Čerdyn is twisted of two rods with thin threads in between and each end has a facetted knob. This ring has a close parallel in the Roždestvensk hoard from Perm'. The hoard has a late dating, possibly to the 12th–13th century (Белавин & Крыласова/Belavin & Krylasova 2008: 493 ff., Fig. 215) but the ring is probably older than the rest of the inventory.

Rings of Glazov/Perm' type are known from hoards, settlements, fortified settlements and graves. Darkevič reports find spots for several finds and constantly writes that the find was made on the shore of one or another watercourse. Ivanov et al. report find circumstances in their catalogue. Whenever known, the find spots seem to be close to rivers or smaller watercourses. Obviously this is where settlements usually were located (Даркевич/Darkevič 1976; Иванов/Ivanov et al. 2004).

Dating of the Russian material is not easy and authors generally give a date within broad margins. Several of the silver vessels which Darkevič reports have been found together with Glazov rings were obviously old when deposited. He often gives dates from the 5th and 6th centuries, but older as well as younger datings occur (Даркевич/Darkevič 1976: 8–36). Fechner mentions that six rings of this type were found in hoards from the 9th to the 10th century. Bronze rings were found in graves together with oval brooches of Scandinavian types, types J 51b, J 51 c and J 55 (Фехнер/Fechner 1967: 56–57). Sedov maintains that rings of Glazov type occur in graves from the 9th and 10th centuries and Ivanov also gives a general dating to the 9th–11th centuries but keeps it open when they started to be made (Седов/Sedov 1987; Иванов/Ivanov 1998: 100).

There are only a few of the rings which are reported to be found in contexts with coins or other datable objects: the Redikor, Čerdynsk, rings were found in a silver vessel from Middle Asia, dated by Darkevič to the second half of the 9th or beginning of the 10th century (Darkevič); a hoard from Čerdynsk, Perm, contains one Arab coin transformed into a pendant 679–722 (Талицкая/Talickaja 1952: 159); the ring from Supruty, Tula, was found with 19 Arab coins dated to 760–860 (Изюмова/Izjumova 1989); and the ring from Dobrino at Vorchita, a variety of a Perm'/Glazov ring, was found together with 500 coins with tpq 841/42 (Callmer 2013: 62).

Callmer reports that a substantial number of rings of Perm'/Glazov type are known in Russia from graves as well as from hoards. The rings are made of silver or bronze. Although the massive introduction of neck-rings of Perm'/Glazov type began around 800 there are finds dating back to the middle of the 8th century. Early finds with neck-rings of this type are known from all excavated major cemeteries of the Perm' Finns. The majority of the rings in graves are of bronze whereas rings from hoards are mainly of silver. He maintains that it seems likely that the classical form of the rings was introduced

between 750 and 800 and that the Perm' region is where the earliest rings were produced (Callmer 2015: 17).

Comparison of rings from east and west

Generally the rings show two main concentrations, one in the east, west of the Urals, and one in the west, in the Baltic region. Outside these there are only a few and scattered items.

On the whole the rings of Perm'/Glazov type from the vast area of their distribution show a uniform picture. Typical are the facetted knobs and the decoration with striation, usually in sections interchanging with smooth sections. Their weights seem to group around c. 100 or 200 grams, occasionally around 300 or 400 grams. This must be crucial for the understanding of how they were used.

However, as the previous chapters show, there are also some regional variations. There are, as mentioned above, two types of striation: besides the usual type with sharp ridges there is another type with broad and flat ridges. This type of striation seems moreover to be restricted mainly to Udmurtija, with one example from Perm' and some items from Gotland in the Spilling hoard.

The facetted knobs also show a variation. The relation between the width and height varies between broader–flatter and narrower and relatively higher knobs. It has not been possible for me to make a more detailed investigation of the shape of the knobs. In spite of this some general observations can be stated. If we compare three Gotlandic hoards there are the three rings from Hellvi, which all have the flat knob, and the rings as a whole show great similarities to one another. It is quite possible that they were made in close connection to one another. The rings from the Hellvi hoard show moreover such great similarities to the rings in the hoard from Pan'kovka, Perm', that they could derive from the same or related workshops. The hoard from Hemse, Gotland, contains over 20 rings, together with many other object types, and many items are fragmented. The rings of Perm'/Glazov type from this hoard are heterogeneous. Thirteen rings have the narrow/high knob and eight the flat one. The hoards from Spillings I and II, Gotland, has the same mixed character as Hemse but here the majority of knobs are of the flat type.

The hoard from Redikor, Perm', has 10 preserved rings, all very similar in execution with flat knobs and were, like the Hellvi rings, probably made in close connection to one another. Twelve rings from Perm' also have the flat type of knob. It is uncertain whether all these rings (GE no. 546) come from the same find but the rings are closely related. A hoard from Averinskij, Pocinok, Udmurtija, contains three rings, again very similar to one another, also with the flat knob. Generally the flat knob seems to be more abundant in Russian finds whereas the narrow and high knobs are considerably more common in the Baltic region, although they also occur in the Udmurtija Republic. Thus it might be stated that a hoard like Hellvi is in close agreement with finds from Perm' and the rings might also derive from there.

The basis for coin dating of the Russian rings is, as we have seen, not very solid. Those hoards which contain a reliable number of dated coins have mainly been recorded from the Baltic region. The coin-dated hoards indicate the 9th century, with some con-

centration in the 840s. The coins are mainly Abbasids. Information from literature about the Russian rings does not contradict the coin datings but generally gives a date within broader limits (e.g. Иванов/Ivanov 1998: 100). As mentioned above, the record mainly from graves indicates that the ring type was developed in the middle of the 8th century (Callmer 2013: 62; Callmer 2015).

The few coin-dated hoards from Gotland, Rügen and Schleswig-Holstein indicate a dating to the 9th century or first part of the 10th. A very late Finnish dating is isolated.

There are a couple of very early datings, from Čerdyn, Perm', 679–722, and Hässleby, Gotland, 796/7. These datings are based on three coins each. Thus they are less reliable and might have been deposited later. Ella Kivikoski discusses the dating of a bronze ring of Perm/Glazov type from a grave at Kvarnbacken. The ring lay in a grave dated to the second half of the 8th century, and Kivikoski refers rings of this type to the Merovingian period but maintains that silver rings of this type belong to the Viking Age (Kivikoski 1963: 83, 125).

Thus the datings of rings of Perm'/Glazov type from the Baltic region, Scandinavia and Russia are in concordance with one another and with a concentration in the 9th century although there are indications that some rings from Russia are slightly older.

Long-distance trading networks

The period from the 8th to the 11th centuries is referred to by the French historian Maurice Lombard as "The Golden Age of Islam". He describes how the Islamic world during these centuries was criss-crossed by routes which connected remote parts of the Old World into a complex network. An important result of the Arab expansion was that trading regions which were previously isolated from one another now became interlinked into an immense network including China, India, the Sudan-Sahara region and the vast forest regions around the large Russian rivers (Lombard 1992: 19 ff. and 27 ff.).

Central agents in this period were first and foremost the Abbasid caliphate with its centre at Baghdad, founded in the middle of the 8th century, and the Khazar khaganate on the Caspian Sea and in the Caucasus. From the 8th century the Khazars expanded their interests to the Dnepr and beyond the Volga, making the region more stable, which promoted trade. The occurrence of Arab items, beads and dirhams, in the north-western forest region shows an extension of an old trading system, which linked Perm' and the Volga-Finns via the steppe to Caucasus and Chorezm (Callmer 2000: 62; 2015: 17). An important object group showing contacts to the south are the abundant Oriental silver vessels from the 5th to the 12th century, found in the regions west of the Urals. Simon Franklin and Jonathan Shephard emphasize the Persian and Byzantine silverware found in the basins of the rivers Kama and Vyatka as evidence of long-distance trade. The silver was probably exchanged for furs and brought to the north by Persian and other Oriental traders (Franklin & Shepard 1996: 7).

Thomas S. Noonan describes a most active fur trade which linked the Volga-Bulgarians to Chorezem in the 10th century, when these furs become a most advantageous export for the traders of Central Asia. This fur road was in its way as well organized as the Silk Road

(Noonan 2000: 289 f.). The large concentration of Central Asian silver vessels in the Kama-Ural region clearly indicates a "targeted marked". This indicates, in other words, that there was a steady export of Central Asian silver to Kama–Ural through the 8th and 9th centuries (Noonan 2000: 291f.).

Roman Kovalev means that the Aral basin was favourable for contacts with the Middle Volga basin, with its easy access to the fur-rich regions in Perm' via the river Kama. He also points out numerous finds which show the trade relations between Perm' and southern Eurasia in the 6th and 7th centuries. A further proof of these connections is finds of camel bones close to the confluence of the Kama and the Volga (Kovalev 2005a: 60 ff.). This might show that the trade relations, described by Ibn Fadlan and al-Muqaddsi as a well-developed road with a sophisticated infrastructure, can hardly have arisen around 900, but with great probability go back to the 6th century if not even earlier (Noonan 2000: 291f.; Kovalev 2005a: 72; 2005b: 222). The coins in the Spillings hoards give a manifest illustration of the long-distance connections in the period considered here. They consist of a mixture mainly of Sasanian and Arab coins together with imitations coined in North Africa and by the Khazars. Among the Khazarian coins there is a Moses dirham, i.e. an imitation of a dirham but with a Mosaic inscription (Rispling 2004).

The Kama and Čepca regions

The vast area from north Scandinavia to the Urals, a mainly forested region transversed by numerous watercourses, large rivers and their tributaries, was settled by a number of different Finno-Ugrian groups. Johan Callmer describes how Finno-Ugrian groups, among them Permian together with Volga-Bulgarian tribes, formed a closely interrelated complex with similar spiritual and material cultural pattern from the confluence of the Volga-Kliazma rivers and eastwards to the Urals. Social hierarchies were not especially well developed, although the society cannot be described as egalitarian. Cultural contacts were primarily directed towards the south, to the steppe cultures. Although regular trading networks to the south were most important, traditional exchange links between Finno-Ugrian groups also cut across the taiga zone from east to west (Callmer 2000: 54, cf. Franklin & Shephard 1998: 7; Иванов/Ivanov 1998: 94).

Ingrid Gustin maintains that the distribution of the rings of Perm'/Glazov type in Russia is in agreement with the older Finno-Ugrian regions, among others the Vepsians and Carelians, the area south-east of Ladoga, the Merian region between the Volga and Oka and the region around Glazov on the Чепца/Čepca, a tributary of the Vyatka between Perm' and Vyatka (Gustin 2004: 292 f. and works cited there). The culture around the upper Kama is known as the Lomovatov/Rodanivo culture and the one around Čepca as the Polom/Čepca culture.

A phenomenon that has drawn great attention is the already mentioned vast quantity of Oriental silver vessels found west of the Urals, vessels of Sasanian, Post-Sasanian, Central Asian or Early Byzantine origin (Даркевич/Darkevič 1976). The largest group comes from the upper Kama basin and around its tributaries; a smaller group is known from the Čepca basin. Generally the 104 hoards

with vessels which V. Yu. Leščenko analyses were found along the major rivers. He dates them to the period 7th to 12th century, the majority of the vessels belonging to the period 9th–10th centuries (Лещенко/Leščenko 1971: 8, 19). The vessels show a marked concentration in the eastern regions, around the upper Kama, which is natural as many vessels came along caravan routes over the steppes from Chorezem in present-day northern Uzbekistan. Oriental silver vessels are also known from the Čepca region, albeit in smaller numbers. They were probably brought to the north by Persian or other Oriental traders to exchange for fur in such a quantity that they became integrated into Finno-Ugrian cult rituals (Лещенко/Leščenko 1971; Callmer 2000: 62. map p. 64; cf. Callmer 2015: 27). On several vessels there are secondary engravings, which Leščenko labels as shamanistic. They show anthropomorphic figures, often with weapons like sabres in their hands and animals like elk, fish and birds. The depictions are schematic. Such engravings occur only on vessels from the Kama region and southern Ural. The engravings, together with holes which might have served for suspension, indicate that the Oriental vessels partly were used for cultic purposes (Лещенко/Leščenko 1971: 12–14).

The finds of Oriental silver vessels show a considerable increase of silver imports to the Kama and Ural regions in the 9th century compared to previous centuries. The start of increased trade with the Urals coincidences with the beginning of Abbasid rule. In the 8th century the demand for sable, marten, ermine, beaver and squirrel furs was very large on the world market, especially whole sable skins and black fox (Лещенко/Leščenko 1971: 12; Даркевич/Darkevič 1976: 148). Possibly the sable hunt was restricted to the Kama region and eastwards to Severnaya Dvina (Makarov & Zakharov 2009: 223). This could be connected to large silver imports into this region.

Based first and foremost on works by Noonan, Sebastian Brather and Christoph Kilger have compiled maps of the distribution of Arab coins found in hoards from North and East Europe. Kilger's map of dirham hoards from Eastern Europe dated c. 825–860 shows a concentration in the Caucasus and further a distribution of hoards from the Urals via the upper Volga, the upper Dnepr to the Baltic including Gotland, the south Baltic region and Scandinavia. From the late 8th to the 10th century some hoards are known from the Udmurt and Perm' regions. The datings are from the early 8th to the beginning of the 10th century. One find from Glazov with 3+x coins has an uncertain dating to 784(?). A hoard from obl. Kirov consists of 6 coins, tpq. 835, one hoard from Lesagurt, raj. Debesy, rep. Udmurtija close by the Čepca of 137 coins, tpq. 841–842 and one hoard from Jagošur, Vyatka, 1500 coins, tpq. 843–844. From 900–970 there is one find from Čerdyn, Perm', 908/9 and one from the Udmurt republic, 919/20 (Brather 1997, Abb. 4, 7; Kilger 8a, Figs 7.16, 7.17, p. 251). It is interesting that a hoard with five rings, four of which of the typical glazov type, and a rod, which might be an unfinished ring, was also found in Jagošur, on a tributary of the Čepca (Иванов/Ivanov 1998; Иванов/Ivanov et al. 2004: 133).

This is not a large amount of finds but they show a small but distinct concentration chiefly in the Čepca region in the 9th cen-

tury. The finds of dirhams coincide in time with the dating of the Perm'/Glazov rings and show, together with the Oriental silver vessels, contacts between the Vyatka-Kama region and the Oriental realms. The rings of Glazov type should be seen in this connection. If they were made regionally, silver vessels and dirhams might have been raw material for them. If the weight-adjusted rings are seen as money in large units they must have played a central part in trade with fur, slaves etc.

Thus, the region around the rivers Kama and Čepca show a concentration of silver, coins, vessels and rings. The combination of coins in the hoards generally indicates, according to Brather, that the local population owned them. Hoards accumulated in agrarian settings show a silver surplus not used. A larger concentration of silver hoards probably indicates a region with a less developed economy, where silver was not generally employed in exchange. The silver was hoarded, used as accumulation of wealth. Perhaps a part of the silver was sacrificed (Bálint 1981: 112; Brather 1995: 115–118, 123; cf. Hårdh 1996).

M. G. Ivanova and A. G. Ivanov et al. describe the culture on the Čepca and its tributaries. The economy was based on agriculture, cattle breeding, hunting and fishing. Hunting to obtain fur played an important role. Handicraft, not least metal handicraft, was well developed. Finds of crucibles, bronze clip, metal rods and cast drops etc. show a complex craft in Eastern European, Finno-Ugric tradition (Иванова/Ivanova 1998: 246; Иванов/Ivanov et al. 2004: 50 ff.). Massive imports to the Čepca region, beads, coins, silver vessels and more, show extensive and stable trading relations. Considerable collections of coins and silver vessels are possibly to be seen as manifestations of great fortune. They might also have been a symbolic manifestation in cultic connections. Imported silver was probably also melted down to create local ornaments. The most important export commodity, as in many forest regions, was fur, marten and "white skins". The local designation for these also became designations for fixed money values (Иванов/Ivanov et al. 2004: 62–63).

Ivanov et al. record a vast number of settlements, graves and find spots. There are also a number of fortified settlements, *gorodisha*. These show a highly varied character, from rather insignificant to large sites of c. 5000 m² or more and with more or less thick cultural layers. They were typically located on high ground close to watercourses with good communications. Several of them seem to have been established at the end of the 8th or in the first part of the 9th century and were functioning during the following centuries (Иванов/Ivanov et al. 2004: 47–53). An example of such a fortified settlement is Soldyr', Idnakar, raj. Glazov, rep. Udmurtija, situated centrally in the Čepca region. It seems to have started at the end of the 9th century and is regarded as a most important archaeological site. It has strong fortifications and is described as a craft centre with advanced agriculture. Metal handicraft is manifested in tools, raw material and ornament hoards. Abundant finds of anthropomorphic and zoomorphic plastic bone-carved figures are an indication that the site was also a religious centre. It seems to have been a kind of central place of high status. Manifold hoards in the region show

intense trade relations, but the remote situation far away from international trading routes did not promote active inclusion in the economic system of Eastern Europe, thus an independent identity was retained (Иванова/Ivanova 1998: 245–246).

During the 6th to the 9th century the Kama region showed a marked economic development and diversification. Agriculture was spread and economic growth led to larger settlements. Metal handicraft was developed with centres for mass production on the middle and upper Kama. Prestige could be attained though acquisition of exotic objects. Foreign silver could be used to legitimize the growing elite. The Lomovatovo culture is localized almost entirely within oblast Perm' (Голдина/Goldina 1985: 145–169; Noonan 2000: 297 ff.). According to Noonan, there is no evidence of a central market place comparable to Bolgar, which Ibn Fadlan visited, in the Kama-Ural region. However, the high price of a silver vessel indicates that there must have been certain sites where large collections of fur from various parts of Kama-Ural were assembled (Noonan 2000: 295).

In the Kama basin culture is likewise characterized by an economy based on agriculture, cattle raising, hunting and fishing. Handicraft, not least metal handicraft, developed rapidly to high specialization, manifested in abundant finds of slag, crucibles and the like at settlement sites. The increased production also created a basis for exchange, manifested in abundant import objects. Specialized hunting was developed, aimed mainly at fur bearing animals such as sable, marten, squirrel and beaver (Голдина/Goldina 1985: 158–159, 167). As in the Glazov region, here too there are centres like Roždestvenskoe with evidence of a broad variety of crafts and objects related to trade, which reveals the site as an important centre for crafts and trade. Hunting aimed at fur for trading played an important role. The Roždestvensk complex goes back to the transition from the 9th to the 10th century, but the main importance of this site came later (Белавин & Крыласова/Belavin & Krylasova 2008: 595–596).

A large number of grave fields and grave complexes have been investigated in the Kama region, making it an excellent source to elucidate the development of the region. Grave types and grave rites, together with ornaments, weapons, coins and tools, give a picture of several stages of development with changing geographical foci from the 5th to the 9th century. There seems to have been an economic rise, which led to the creation of the Lomatovo culture on the middle and upper Kama. At the end of the period, 8th–9th centuries, the region became a focus for trading relations (Schwerin von Krosigh 1999: 586).

Belavin and Krylasova pointed out that already from the middle of the 9th century trade relations between the lower Kama and the middle Volga are visible, connected to the development of trade connections, culture and craft in the region (Белавин/Belavin 2000: 83, 184; Белавин & Крыласова/Belavin & Krylasova 2008: 595).

Several excavations and finds confirm close connections between the Finno-Ugric NE Europe and the Baltic Sea region and Scandinavia in the 9th–10th centuries. Sites like Bol'šoe Temerevo (Timerovo), raj. Jaroslavl', obl. Jaroslavl', Petrovskoe, raj. Jaroslavl', obl. Jaroslavl', and Michajlovskoe, raj. Jaroslavl', obl. Jaroslavl', all have imports showing con-

nections to the Volga and the main trading routes to the east as well as the west (Callmer 2000: 81 f.; Gustin 2004: 79 ff.). Scandinavian combs and knives reached the regions around Čepca and Kostroma rivers in the 9th century and a steadily rising number of new sources demonstrate the diffusion of these categories of artefacts in a broad zone from Lake Peipus in the west to the Kama basin in the east (Callmer 2000: 72 f.). The Perm'/Glazov rings are undoubtedly also part in these connections. Ivanov maintains that these rings, which sometimes occur in hoards with Oriental coins and vessels, show that their main distribution is connected to the active trans-European trading route in the north of Eastern Europe. He further points out the so-called belts of Nevolino type, dated to the 7th–8th centuries, as the earliest and indisputable testimonies of connections between the Kama region and the west in the early Middle Age. What is important here is that the area of distribution of the Nevolino belts corresponds mainly to the location of early finds of rings of Glazov type (Иванов/Ivanov 1998: 99–101). Those belts occur in the Kama basin and in western Finland. They give a possibility for understanding the early Scandinavian contacts that existed with the east, probably in connection with the fur trade (Callmer 1980: 209; Callmer 1990: 24–25; Callmer 2015: 13; cf. Jansson 1989: 607 ff.).

Graffiti on rings and coins

On 36 rings I have noticed engravings, graffiti, on the facetted knobs. Fifteen of these rings come from Perm', 11 from the Glazov region, 2 from the Kirov region, six from Gotland, one from Mecklenburg-Vorpommern and one from Schleswig-Holstein.

Graffiti on silver objects is a well-known phenomenon. It occurs on coins, and seems to be especially abundant on Oriental coins, but is also seen on Byzantine, Anglo-Saxon and German coins. Inger Hammarberg and Gert Rispling have made a systematic survey of the roughly 34,000 Oriental coins kept in the Royal Coin Cabinet, Stockholm, supplemented with studies of western coins published in CNS (Hammarberg & Rispling 1985: 63 f.). Further G. Dobrovolskij et al. have investigated as many as 8000 Oriental coins from various hoards and around 20,000 without inventory number from the collection of the State Hermitage Museum, St Petersburg. They maintain that the largest number of graffiti on these coins was found in a hoard from Bol'šoe Temerevo, close to Jaroslavl. They state that graffiti on coins is a valuable source for reconstructing historical processes in connection with the development of economic contacts, trade and trading routes (Dobrovolskij et al. 1981: 218). As for the Oriental coins in the Royal Coin Cabinet it is stated that the frequency of graffiti is higher on coins from the 8th and 9th centuries than on those from the 10th century, which has also been confirmed by investigations of Russian material. Hammarberg and Rispling indicate a certain development of the graffiti. At the beginning of the 9th century Oriental, i.e. Arab and Georgian, inscriptions dominate together with Scandinavian runes (Hammarberg & Rispling 1985: 64–5; also Мельникова/Mel'nikova et al. 1983). Also Dobrovolskij et al. see a chronological development of graffiti on coins. Runes belong to the oldest signs and

Fig. 9. Examples of graffiti, both from Perm'. Left GE 535/1, right GE 546/9. State Hermitage Museum, St Petersburg. Photo: author.

occur mainly on coins minted in the 8th and 9th centuries, found in hoards from the 9th century (Dobrovolskij et al. 1981: 225).

It is important to remember that it is coin hoards which give the dating, and a single coin could be old when hoarded. Graffiti might have been applied to a coin much later than its coining. However the dating of graffiti on coins and other objects corresponds to the most likely dating of the Perm'/Glazov rings.

The most common engraving on the faceted knobs of the rings of Perm'/Glazov type is two crossing lines, usually extending from side to side on the square flat upper surface at the middle of the knob (10: 15–16, 19–20). Cross engravings have been noticed on 16 rings, six from Perm', five from the Udmurt region, on three from Gotland, one from Mecklenburg-Vorpommern and one from Schleswig-Holstein. Usually it is a simple engraving of two crossing lines but occasionally they are supplemented with more lines. Engravings with two crossing lines are common also on coins. The figure occurs, together with two other signs, on an Oriental

coin from Bol'šoe Timerovo, raj. Jaroslavl', obl. Jaroslavl' from the end of the 8th century or the beginning of the 9th. The engravings together make up the word "god". However, the cross sign might also be a rune from the older futhark. It is known as a magic symbol from the Rök stone, Östergötland from the 8th–9th century (Dobrovolskij et al. 1981: 222). Another possibility is of course that the crossing lines mean a cross. There are several cross figures on Oriental coins found in Scandinavia. Usually they are interpreted as guiding lines for dividing the coin into smaller pieces (Linder Welin 1956: 154). Hammarberg and Rispling, on the other hand think that they more likely depict crosses (Hammarberg & Rispling 1985: 74). Dobrovolskij shows that the Thor's hammer can occur together with a cross sign. Crosses engraved on Oriental coins may be of Greek or Latin type. Of course it is also possible that the cross marks had no magic meaning at all (Dobrovolskij et al. 1981: 230–231).

Six rings from the Redikor, Perm', hoard have signs, some of which look like runes, while the others might derive from some written language or are some kind of owner's mark. Several of these signs have also been noticed on Oriental coins. The arrow-shaped sign seen on one, perhaps two rings (Fig. 10:1–2) is a sign often occurring on coins, and has been interpreted as the T-rune. It has its name after the god Tyr and was seen as a rune with positive meaning, perhaps protecting the silver from theft (Dobovolskij et al. 1981: 222–224; Hammarberg & Rispling 1985: 66). Ulla Linder Welin gives an example of a T-rune on an Abbasid coin from the early 9th century, found on Gotland (Linder Welin 1956: 168). Hammarberg and Rispling give three examples of T-runes on Arab coins from the early 10th century. One sign on a Redikor ring resembles the S-rune (Fig. 10:3). The S-rune is said to be a symbol for the sun and according to Hammarberg and Rispling it was common in the 9th century. In the presentation by Hammarberg and Rispling it also occurs on two coins from the late 8th century. The signs on the rings from Perm' are made in a way that strongly resembles the signs, which have been interpreted as runes on the Arab coins. It is not unlikely that the same interpretation should

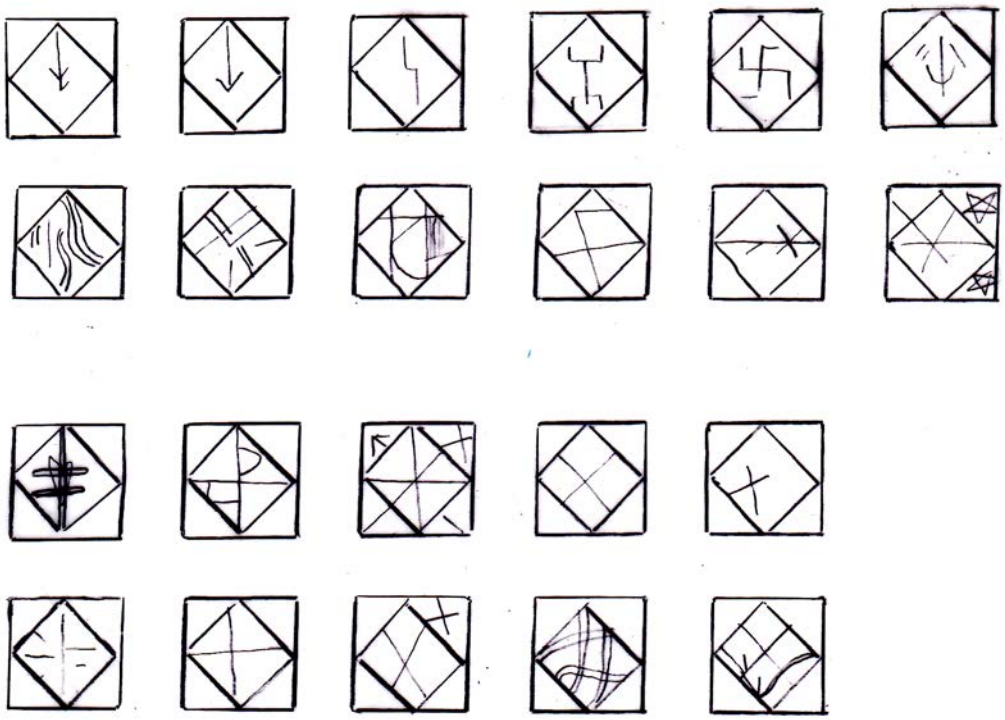

Fig. 10. Graffiti on Perm'/Glazov rings. 1–6 from Redikor, Perm'; 7–8 Pankov, Perm'; 9–12 Perm'; 13–15 Glazov, Udmurtija; 16 Malmyž, Kirov; 17 Kirov; 18 Spillings, Gotland; 19–20 Asarve, Gotland; 21–22 Hellvi, Gotland. Drawing author.

be valid also for these. Signs resembling the S-rune also occur on some Oriental coins from the Hermitage collection (Dobrovolskij et al. 1981: 224). It is more uncertain whether Fig. 10:6 can be interpreted as an M-rune. It is highly similar to a sign which Hammarberg and Rispling interpreted with hesitation as a bow with an arrow (1985: 70, fig. 2). On the ring from Redikor the figure has an additional three short strokes. One of the Redikor rings (Fig. 10:5) shows a swastika. This is a frequent figure engraved on Oriental coins. Linder Welin mentions an example from an Abbasid coin dated to 763/64 (1956: 168), and Hammarberg and Rispling give two examples, both engraved on Arab coins struck during the first half of the 10th century (1985: 74 ff.). The sixth figure in the Redikor hoard also has an obvious character as a symbol or owner's mark of some kind (Fig. 10:4).

There is only one ring, from Perm', with an unmistakably identifiable picture. Besides crossing lines on the middle field it has two five-pointed stars on two of the side fields of the knob (Fig. 9, 10:12).

Two rings in the hoard from Pan'kovka, Perm', have engravings of parallel lines; on one ring they are crossing and on the other they are parallel and partly curved. One of

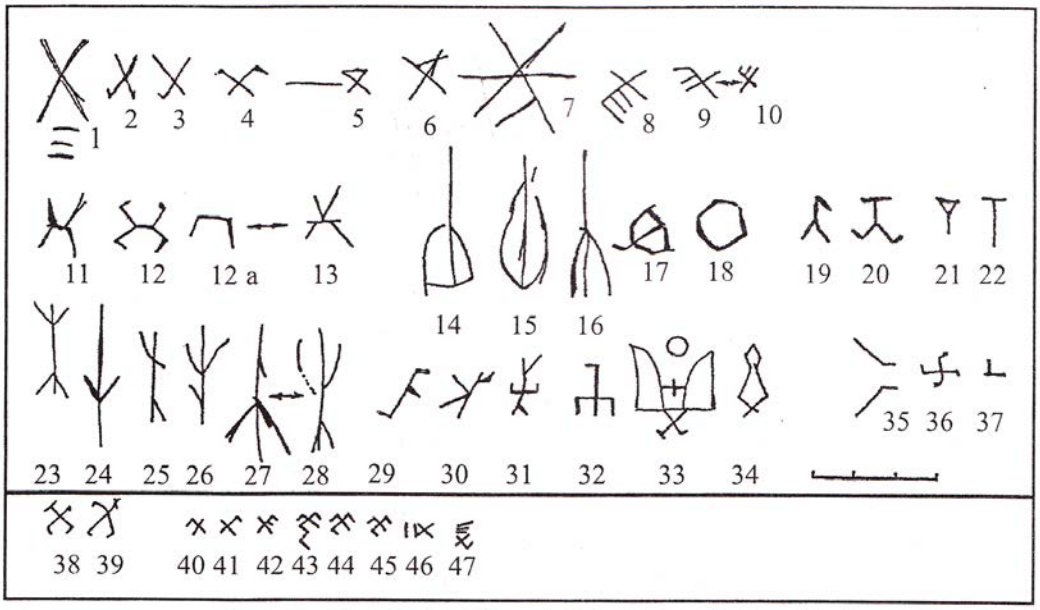

Fig. 11. Graffiti on bone objects. After Ivanova 1998, fig. 92.

the rings from Hellvi, Gotland, has a similar pattern: parallel, curved lines, which cross each other, making a chequer pattern (Fig. 10:7, 10:21).

One ring from Čerdyn, Perm', has a complex figure of straight lines, one curved and a cross-hatched field (Fig. 9, 10:9). One ring from Glazov has a curved line crossed by a number of straight strokes.

Another ring from Bol'šoj Ludošur, Glazov, has a complex figure, probably made in two stages. An engraving with thin lines makes up an extended triangle with a curved-in base and a crossing stroke. Over this there is a coarsely engraved line, crossed by two strokes (Fig. 10:13).

Where and by whom were these engravings made and what do they mean? I think that the whole complex of engravings on silver objects, rings, coins and silver vessels should be regarded together.

Coins, especially Oriental coins, found in Scandinavia and in Russia, often have graffiti, which, as mentioned, has been treated by a number of scholars. These signs are of various appearance and origin. There are, for example: runes, Oriental inscriptions, pictures of weapons, boats etc. or symbolic, possibly religious or magic (Dobrovolskij et al. 1981: 220). I think all of this, perhaps with the exception of Oriental signs, is possible interpretation also for the signs on the ring knobs.

In the regions west of the Urals, first and foremost in the Kama and Čepca basins, as mentioned, Oriental silver vessels have been found. They often have secondary engravings applied on them. They belong to a very long period, from roughly the 7th into the 13th century. Leščenko, as mentioned, calls them shamanistic engravings. They often show human beings with a crown on the head and

with sabres in their hands. Further there are, among other things, elk figures and fishes. According to Leščenko's interpretation they are hunting magic, which was deeply rooted among West Siberian peoples. Several of the vessels have holes, probably made for suspension. According to Leščenko, this strengthens the assumption that they were used for cultic/magic purposes (Лещенко/Leščenko 1976: 13 ff.).

The engravings on silver vessels and also on some coins are complex, depicting objects of various types. The engravings on the knobs of the rings are simpler, more like signs or emblems. It is interesting that some engravings on bone objects (Fig. 11) from the fortified site of Idnakar have the same character as those on the rings, including crosses and swastikas; besides the style of the engravings is similar (Иванова/Ivanova 1998 fig. 92).

The engraved knobs seem to be especially abundant in the Perm' region. Most interesting is that all types of signs observed on rings in Scandinavia and the Baltic region are also found in the Perm' region, but several signs on rings from the east have not been found on rings from the Baltic/Scandinavian region. Does this mean that the engravings were made in the east? The engravings could possibly have been made in a vast area. The simple cross engravings predominate on rings from the Baltic/Scandinavian area and, for example, on the rings from Schwerinburg, Mecklenburg-Vorpommern and Asarve, Gotland with stamped decoration, rings which probably were made locally (see below). This could speak in favour of cross signs also having been made there. Mel'nikova et al., proceeding from the early 9th century hoard from Peterhof, observe that the Arab coins, mainly struck in North Africa, have an accumulated collection of graffiti: Greek, Khazarian, Arab(?), together with Scandinavian runes. They indicate the route the coins took from the region of issue to the site of deposition (Мельникова/Mel'nikova et al. 1982). Graffiti on the rings is an extra indication of the close contacts between east and west according to the evidence of the Perm'/Glazov rings.

One observation is that the signs from the same hoards, for example from Redikor, Perm', or Hellvi, Gotland, often have engravings of similar appearance. This again strengthens the impression that the rings usually did not circulate to any great extent as soon as they had arrived in the region where they were found.

As for the function Ulla Linder Welin, in her article on graffiti on Oriental coins, suggests that they can be interpreted, for instance, as test marks for testing the metal quality, symbols for sharing booty, owner marks or religious/magical emblems (Linder Welin 1956). Owner's marks or symbols of some kind are likely interpretations of graffiti on the rings. As they appear on silver, owner's marks are quite probable. This interpretation has also been suggested by Mel'nikova for engravings on coins (Мельникова/Mel'nikova et al. 1982) and is also probable for the rings. Religious or symbolic meaning is also a possible interpretation. Comparison with silver vessels and engravings on bone objects strengthens the impression of a religious or magical meaning.

"Permian" rings and Duesminde rings

Duesminde on Lolland, Denmark, is a remarkable site. The island has a favourable position for contacts between east and west. In 2002 a spectacular find, a hoard consisting of 45 gilded silver mountings of Carolingian origin, was discovered here but the site was already well known in the archaeological world. From 1962 to 1966, on three occasions, no less than 23 items of spiral bent, striated and stamped rings were found in one single field at Duesminde. It is unclear whether they are from one or several depositions (Munksgaard 1970: 52). The rings from Duesminde have been considered as a group related to the Perm'/Glazov rings. They are similar in respect of the striation and obvious weight standardization. One similarity is also the obvious standardization in shape and decoration. The differences consist of the lock, made by two hooks, sometimes bent into a swan neck shape, and the extensive use of stamp decoration as well as a lower weight, generally c. 50 or c. 100 grams. These are the rings for which I suggest the term rings of Duesminde type.

These rings make up a characteristic trait in the oldest group ("ældste gruppe") of Skovmand, that is, Danish hoards from the 9th century, which puts them in the same period as the Perm'/Glazov rings (Skovmand 1942: 28 f.). Munksgaard reports 19 rings in the weight group around 50 grams from Denmark and four rings of the same type in the weight group around 100 grams (Munksgaard 1963: 101; 1970: 56).

Munksgaard states that this type of rings has a distribution restricted to Denmark and Gotland (1963: 104).

The other concentration of such rings is on Gotland. Here three complete rings have been discovered in two finds from Norrgårda, Björke (Fig. 12) each weighing around 100 grams. Their decoration is divided into three or five sections and has the same type of stamps as the Danish rings and the endings are hooks or swan neck hooks. Three rings from two other finds weigh between 49 and 55 grams, one of these with stamped decoration and striation and one with only spiral striation (Stenberger 1947; Munksgaard 1963: 101). Stenberger refers to them as spiral rings of type Sa2. As for his type Sa 1, i.e. Perm'/Glazow rings, the term spiral

Fig. 12. Rings of Duesminde type, Norrgårda, Björke, Gotland. Photo: Antikvarisk Topografiska Arkivet, Stockholm.

ring is, as mentioned above, less relevant. They are obviously neck-rings, which occur, mainly in Scandinavia and the Baltic region, as spirals. The smaller type, Sa2 or the Duesminde rings, generally appears as spirals, but one ring, from Rantrum, Nordfriesland, is shaped as a neck-ring (Wiechmann 1996, Taf, 13).

The ends shaped as hooks indicate that these rings too might have been made as neck-rings, even if the elegant swan neck hooks look more decorative as efficient neck-ring locks. Stenberger describes Sa2 as a ring that is closely related in shape and decoration to Sa1 but made of thinner rods (Stenberger 1958: 128).

Two important finds in this respect come from Nordfriesland: Rantrum I and Witzwort. One ring from Rantrum is, as mentioned, shaped as a neck-ring, and thus was not bent into a spiral. The main part of the ring is striated, the end parts have triangle stamps with dots and the ring is closed with hooks. The weight is 48.38 grams and the thickness of the rod is 3.8 mm. The hoard contains 13 Arab coins with tpq. 873–. In the hoard there is also an end fragment of a ring with similar stamped decoration (Wiechmann 1996: 423f., Taf. 13). The complete ring fulfils all the requirements to be classified as a ring of Duesminde type. The hoard from Witzwort contains a spiral bent ring with striated ring body and ends with triangle stamps creating hourglass figures and hooks. The weight is 63.68 grams and the thickness of the rod 4.5 mm. There is also a fragment of one similar ring and a fragment of a ring with faceted end knob as well as further fragments of spirally striated rings (Wiechmann 1996: 527).

In 1973, in connection with excavations of the marine trading site of Ralswiek, a hoard consisting of 2211 Oriental coins and the above-mentioned fragmentary ring was found. The hoard was discovered in a house lying in a basket of plaited willow and buried in the floor close to the oven. Other finds in the house were sparse, some loom weights, an iron knife and a bucket fragment, among other things (Herrmann 2006: 11 ff.). The ring is cut at one end while the other ends with a hook. Half of the ring is striated and the rest, the part closest to the hook, is stamped with triangles with a raised dot. They are placed opposite one another to create a rhomboid pattern by the space in between. The ring is bent into 1½ windings. The ring is thus closely connected to the rings from Duesminde, as the thin rod, c. 4 mm, also indicates. The Ralswiek hoard is important as the ring was found in a closed context that gives a good dating. The youngest coin in the hoard was struck in 841/42. The majority of the coins are Abbasids, followed by Umayyad and Sasanian coins (Fomin 2006: 77). The composition of the coins indicates that the Ralswiek coins came to the isle of Rügen in connection with a coin stream via Khazaria. It is probable, according to A. V. Fomin, that the coins were collected within the Khazarian region. The composition of coins in the Ralswiek hoard has a close parallel in a hoard Vyžegša, raj. Jur'ev-Pol'skij, obl. Vladimir. These coins are thought to have come via the rivers Don and Oka. The Ralswiek as well as the Vyžegša hoards consist of a large share of Arab-Sasanian together with Umayyad coins, mainly fragmented (Fomin 2006: 79–80).

Recently pieces of thin spirally striated

and stamp-decorated rods have been found in culture or plough layers at central places like Uppåkra in Scania, Kaupang in Vestfold and Jyllinge, Kirke Hyllinge and Strøby, all on Zealand. They obviously derive from rings of the Duesminde type. Here they appear together with, among other things, fragments of Arab coins. A characteristic of these sites is that the Arab coins are dominated by Abbasids, dated to the 8th and 9th centuries (Hårdh 2008, 2010: 286 and works cited there). This is well in agreement with the dating of the hoards.

Opinion is divided as to where the spiral rings, rings of Stenberger's type Sa2, were made. According to Skovmand they are indigenous copies of foreign rings, i.e. Permian rings (Skovmand 1942: 34). Stenberger maintains that the Danish and Gotlandic rings are totally identical. They appear in the same period as the Permian rings and disappear as suddenly as they do. Thus he sees a close connection between the two types. Stenberger's explanation is that they show a limited import, which first reached Gotland, from where they might have been spread further to the west. He suggests that the area of origin may have been the same as for the Permian rings, i.e. the inner of Russia (Stenberger 1958: 129f.). Stenberger admits that the question is not solved; a complication is that from the Baltic area, with its rich variety of rings forms, no such rings are known, and the same is true for Finland (Stenberger 1958: 129).

In the Duesminde finds there is a fragment with a facetted knob and stamped decoration, and Munksgaard also mentions other similar finds from Denmark (Munksgaard 1970: 56, fig. 1, 3). The Witzwort hoard, as mentioned above, contains fragments of rings which should be classified as Perm'/Glazov rings together with a ring similar to the Duesminde rings but heavier and made of a somewhat thicker rod. Generally it is possible to state that there are two distinct types of striated, weight-standardized rings: (1) Rings of Duesminde type, hooks, decoration in three or five sections of striation and stamps, rod thickness generally 3–4 mm, occasionally 5 mm and with a weight of c. 50, occasionally c. 100, grams; (2) Perm'/Glazov rings, facetted knob and hook/loop, striation in two sections and smooth middle section, weight c. 100, 200 or 400 grams and rod thickness c. 5 mm or more.

Thus, clear differences between the two types are the type of lock, the arrangement of the decoration, the thickness of the rods and the weight. Munksgaard reports four rings which she classifies as large, with weights 97 to 102 grams (Munksgaard 1963, 1965). These rings should be seen in connection with Stenberger's Sa 2 rings, which are labelled as rings of thinner rods than Sa 1, striated and sometimes with stamped sections at the ends and middle of the rings. The ends are shaped as hooks (Stenberger 1958: 128). Thus Munksgaard's and Stenberger's definitions are compatible. There are two of the heavier Sa 2 rings, with weight around 100 grams, in Stenberger's catalogue.

However, there is a group of 11 rings in the record presented in this article, which might be regarded as something in between the two distinct groups. These have stamped decoration of small triangles as well as a facetted end knob. One of the Erridsø rings with a facetted end knob has a facetted ring body, stamped with triangles, Fig. 4 (Munksgaard

Fig. 13. The ring from Broungs, Gotland, SHM. Photo: Antikvarisk Topografiska Arkivet, Stockholm.

1963: 99). The rings from Sylt, Nordfriesland; Schwerinburg, Mecklenburg-Vorpommern; Böda, Öland (2 examples); Asarve, Norrgårda, Lojsta and Grötlingbo, all from Gotland; Hapsal, Estonia and Pälkäne, Finland, all with facetted knobs, have spiral striation interchanging with stamped sections. The stamped sections often have a facetted or octagonal cross-section. This group has a clear Baltic–South Scandinavian distribution.

Stamped decoration is further present on rings of Baltic types; for example, saddle rings are often stamp-decorated. A ring from Suchodrevo, Belarus, has rhombic stamps (Callmer 2013: 64, fig. 16). The find spot speaks in favour of this ring having connections with the Baltic area rather than with the Volga-Kama-Vyatka region.

One ring from Broungs, Gotland, is made of a rod with rhomboid cross-section, stamped on two sides with triangles, Fig. 13 (Stenberger 1947, Abb. 12). The ring has a facetted knob at both ends like a ring from Asarve, Gotland. These Gotland rings have a parallel in the Dobrino hoard, not far from the Dnepr, the watershed towards Dvina, a ring with facetted knobs at both ends (Callmer 2013: 62). However, rings with two knobs are also known from Perm' (Белавин & Крыласова/Belavin & Krylasova 2008: 497, fig. 215; Williams et al. 2013, fig. 54) and the ring from Perm' (GE 533/1) reported in this article.

Eight rings have small stamped rings at the facetted knob. There are two from Asarve, Gotland, two from Hapsal, Estonia, one from Böda, Öland, and one from Pälkäne, Finland. Further there are small stamped rings on two rings from Perm', Čerdyn and Bielowodsk, as well as on one from Udmurtija, Sedivanovo, raj. Balezino with four stamped small rings and engraved lines at the knob. One ring from Roždestvensk, raj. Karagaj, obl. Perm', closed with two knobs, also seems to have stamped rings on the knobs (Белавин & Крыласова/Belavin & Krylasova 2008: 497, Fig. 215). On the rings from Böda as well as on the ring from Bielowdsk there are ring stamps on the ring body at the ends. The two Perm' rings are moreover those which are closed by two knobs.

The rings of Duesminde type thus have their main occurrence in south-west Scandinavia, mainly Denmark with a smaller group on Gotland. They are connected to the Perm'/Glazov rings by the striation and above all by the standardized weights. However, their general weight is c. 50 grams, a low weight not reported for the Perm'/Glazov rings. Typical for the Duesminde rings is the frequent use of stamped decoration triangles, rhombs or hourglass arrangements. The Perm'/Glazov rings which have the same stamped decoration occur in the Baltic region and in south-west Scandinavia and make up a connection between the Duesminde rings and the Perm'/Glazov ones. The most probable solution is that the stamped and striated rings of Perm'/Glazov type were made in the Baltic/Scandinavian region.

The early datings of the hoards from Ralswiek and Wizwort are important. If the classical form of Perm'/Glazov rings was introduced in the second half of the 8th century, possibly in the region of the Permian Finns, and rings of Duesminde type are inspired by them, this shows that objects and information moved rapidly from east to west.

Weight systems in east and west

It has long been noticed that rings of Perm'/Glazov type were made according to certain weight groups. Weights around 200 or 100 grams seem to dominate. The purpose of this chapter is to look at weight systems in the east as well as in the west, in order to discuss the possibilities to put the weight pattern of the rings into a context.

The rings have been discussed with reference to eastern weight systems. Arne draws attention to the Sasanian drachm, of 4.25 grams; 96 drachms make up one pound of c. 408 grams. This weight corresponds to a weight of 819.97 grams found on Gotland, equivalent to two pounds (Arne 1914: 191 f.). The Oriental pound is also known as the ancient Russian pound, weighing 408–410 grams (von Schrötter 1930: 237 ff.). A fraction of this pound, 1/8 or c. 50 grams, is referred to as *grivna* in early medieval sources. The connection of the Russian pound to the Sasanian and Arab world seems likely. The crucial question is when it was adopted in Russia and whether it can be put in connection with the rings. R. M. Valeev, in an investigation of the monetary and weight system in the Volga-Bulgarian region from the 9th to the 13th centuries, emphasizes that in connection with the spread of Arab dirhams in the 9th century, the region became adapted to the use of metal money. In his opinion the Oriental *mitqal* of 4.26 grams,

which correlated with the Sasanian and Arab coin/weight systems and also the gold and silver currencies in the Abbasid system, in the Kama region received the local designation *kadak* (Валеев/Valeev 1995: 115; Encyclopædia Iranica – metqāl). According to A. V. Nazarenko, an Old Russian grivna of 51 grams was created for the needs of long-distant trade, with Byzantium as well as the Arab world and possibly also Western Europe (Назаренко/Nazarenko 1994: 76 ff.). Callmer maintains that it is most likely that the silver weights were influenced by the Sasanian drachms and the Arab-Sasanian half drachms. These reached the Permian Finns in the 8th and 9th century together with Ummayad and Chorezmi coins. The Sasanian drachms were still astonishingly common there in the first half of the 9th century (Callmer 2015: 17).

Islamic or eastern weight systems have also been discussed with relation to weights, ornaments and ingots from Eastern Europe and Scandinavia. Arne maintains that the Oriental pound of 408 grams was introduced to Scandinavia already in early Viking Age (Arne 1914: 192 f.; also Sperber 1996: 55). A. W. Brøgger, in his almost classic study, *Ertog og Øre* from 1921, describes how the Scandinavian weight system, known from medieval written sources, was built up around the *mark* = 8 *öre* = 24 *örtug* = 240 *pennies.* The word *öre* derives from the Latin word *aureus*. Through his analysis, mainly of gold rings, he states that the öre weight in the Viking age was 24.5 grams, which is indicated through several weights from the period. He also maintains that Viking Age gold rings were adjusted according to this öre unit. Eight öre would give a mark weight of 196 grams (Brøgger 1921: 9, 39, 82 ff.). Nils Ludvig Rasmusson notes a number of weights weighing c. 200, c. 100 or c. 50 grams, which he refers to as 1, 1/2 or 1/4 mark (Rasmusson 1966). Erik Sperber in his thesis analyses weights from some Swedish finds, mainly from Birka and Gotland. His conclusion is that an Islamic/Swedish system was applied in the Viking Age and that the Swedish weights are related to the mitqal unit of 4.26, with a unit of three mitqal, i.e. 12.7 grams, being used in the Islamic/Swedish system. This unit might further be directly associated with the mark-öre system as 12.7 grams is equivalent to ½ öre (Sperber 1996: 66, 110).

On the other hand, a western origin has also been suggested. Omeljan Pritsak sees the origin of the Scandinavian mark in the Anglo-Saxon monetary system. A unit of 25.5936 is derived from Alfred's pence. A fraction of this, 1/3, gives an ertog of 8.5312 grams (Pritsak 1998: 10–11). The oldest known reference to *mark* comes from an English source from the 9th century and indicates a Scandinavian origin (Engler 2001: 115 f.; Witthöft 2001). An Anglo-Saxon as well as an Oriental origin might be claimed for the emergence of the Scandinavian weight system.

In connection with ornaments and ingots from south-western Scandinavia, Jutland, Schleswig-Holstein etc. we must, however, also consider an influence from the Carolingian realm. An indication of this is a hoard from Westerklief, Netherlands, c. 850, which contained a number of ingots, weighing c. 25 and c. 50 grams (see further below). The ingots were found together with, among other things, Carolingian coins in a pot of

Badorf type. Carolingian influence is obvious in the Haithabu region, not least in connection with coins and weights. Already in the 9th century there was indigenous Scandinavian coining, characterized by high technical standard and probably located in Haithabu. These coins show in their form a clear influence from the coinage of Charlemagne and his son, Louis the Pious. Brita Malmer points out that the weight of the Carolingian denar, 1.7 grams, had a direct impact on the early Scandinavian coinage, where the average weight of a coin from the early 9th century was c. 0.8 grams, thus half of the Carolingian denar (Malmer 1966; Malmer 2002: 121 f.).

The weight and coin reform of Charlemagne from 793/94 meant that 240 denars of 1.7 grams became equivalent to one pound of 408.240 grams (Witthöft 2001; Kilger 2008b: 268). H. Witthöft suggests that this makes it possible to link the gold and silver currencies, which would mean that a gold solidus of 4.2525 grams would correspond to 30 denars = 51.030 grams of silver. Thus eight solidi would correspond to 408.240 grams of silver. A gold solidus with about the same weight as the Byzantine solidus was struck within the Carolingian realm (Witthöft 2001).

In Viking Age Scandinavia influences from two highly developed economies met, from the Caliphate and from the Carolingian realm. This is especially evident in south-western Denmark and Schleswig-Holstein, where besides Western European influences there are also clear manifestations of eastern influences. A striking example is coping or forgery of Arab silver dirhams, which has been carried out there (e.g. Steuer 1973; Steuer et al. 2002). Hoards from south-western Scandinavia and the north-western part of the Continent contain, as we have seen, ingots with weights related to the rings, which in some cases seem to be fractions of the same units, c. 50 grams or even c. 24 grams (see further in the chapter on ingots below).

East
The Russian pound 408–409.5 grams
1/8 of the pound 51.0–51.2 grams = the grivna weight
the Oriental mitqal 4.26 grams = 1/96 of the Iranian ratja = kadak in the Kama region
4.26 × 96 = 408.96 grams

Scandinavian
The Mark c. 200 grams
1/8 = c. 24–25 grams = öre

West after Charlemagne's reform
1 silver denar = 1.7 grams
240 denarii = 408.240 grams
Gold solidus (Byzantine) = 4.2525 grams = 30 silver denars = 51.030 grams
8 gold solidi = 408.240 grams

Table 1. Weight relations within various weight systems.

Omeljan Pritsak emphasizes the connection between the eastern and western weight systems. The weight *media libra* = the half pound of Charlemagne, found in Haithabu, and dated to 800–975, weighed exactly 204.615 grams. In Eastern Europe there is an odd phenomenon of dirham hoards where the coins have been trimmed around the edges into smaller but still round coins. Circular trimmed dirhams were, according to Pritsak, adapted to the weight of Charlemagne's denar of 1.7 grams, which might be a further proof of the interconnection between Khazaria and the Carolingian monetary sys-

tem (Pritsak 1998: 25 f., cf. Мельникова/Mel'nikova et al. 1982: 37).

In various parts of the medieval world there was a connection between silver and certain commodities, indicating that they were of central importance but also that a variety of commodities could be used as measures of value (e.g. Голдина/Goldina 1985: 167). Ivanov et al. cite a number of Udmurtian words for pelts and furs, which also denominate value/money (Иванов/Ivanov et al. 2004: 63). Pritsak refers to Ibn Rustah who mentions that that Volga Bulgarians do not possess silver money but that their "dirhams" are pelts, named *dalaq*. It has also been demonstrated that *dalaq* corresponds to *kuna* in the sense of pale marten skin (Pritsak 1998: 24–25).

There seems to have been a need to value furs in relation to precious metal. The requirements of long distance trade, according to Nazarenko, is linked to the origin of an Old Russian unit, *kun*, and also the habit of counting furs "sorokami" (=in forties). *Kun* was originally the value of one marten skin, which was equivalent to c. 8 grams of silver. This was the basis for the weight scale of spherical weights and was kept during the entire pre-Mongolian period. This old kuna was in convenient relation to, on one hand, the Byzantine *litro* (327 grams) and, on the other hand, to the Arab or Russian pound of c. 408 g. 1 litro corresponded to 40 *kuna* (8.175 × 40 = 327, 8 × 451 = 408). As a result of the active trade relations with Byzantium, counting in forties became standard in Russia already in the 9th century for skins. The habit of counting based on 40 seems to have been established early and has also left traces in the Russian language (Назаренко/Nazarenko 1994: 77; cf. Pritsak 1998: 24–25, 43).

According to Nazarenko the relation between the original *kuna* and the West European, Carolingian pound of c. 408 grams might have been established in Eastern Europe together with influence of Scandinavians during the 9th century, which resulted in the counting 1 pound = 50 kuna (which corresponds to the correlation pound-litro as 5:4) or a half pound (the late Old Russian silver grivna) = 25 kuna. Hereby two genetically incompatible structures are united: silver and skin/kuna values (Назаренко/Nazarenko 1994: 77–78; also Spasskij 1967: 60–61). Interestingly enough, *sorok* means etymologically "shirt". *Grivna* means "neckring", which is of especial interest here.

So, what relevance do these observations have for the understanding of the rings of Perm'/Glazov type? When and where was a proper weight system developed? Is it reasonable that, for instance, the *kadak* originated in the Kama region? I think that a more or less well-fixed weight standard for silver was of interest chiefly for those who obtained commodities, i.e. furs in this region. They were probably tradesmen from the south or with such contacts and paid with coined silver weighed to a fixed amount. The rings made in the Kama and Čepca regions related to these amounts and were made in order to obtain a medium that was easier to handle among middlemen in the region. Sellers as well as buyers certainly had an interest in rather fixed values. Further there seems to have been a need to "translate" the value of fur to silver. In this connection the relation between silver and furs was created.

It is obvious that different weight systems influenced each other and have some gen-

eral agreements. The different systems seem to be based on a pound of c. 408–409.5 as a common unit, from which various fractions can be extracted. It is likely that the demands of long distance trade promoted the need for an agreement between various systems. The various weight/money systems are usually known from written sources much later than the period under consideration here. However, frequent references to early coinage, Oriental as well as that of Charlemagne, speak in favour of these systems also being relevant for the rings being treated in this paper. The rings could function as value measure in the Rus-Scandinavian region.

The weight of complete rings

In this chapter the weight of the rings will be analysed. In the record presented above from the entire territory of investigation there are 148 complete rings whose weights are known and these have been assembled here in a bar chart (Fig. 14).

The step shaped form of the diagram clearly shows that weights of c. 200 grams dominate followed by a group of weights of c. 100 grams. A small group weighs as much as 400 grams. A couple of rings are close to 300 grams. A few rings are exceptionally heavy: 454, 422 and 417 grams, two from Čerdyn and one from Glazov. Another heavy ring which is known from Glazov weighs approximately 422 grams. The rings in the bar chart are divided regionally into rings from the Perm' and Udmurtija districts, where rings from the Čerdyn and Glazov regions dominate. The countries around the Baltic are presented together with rings from Scandinavia. Here the islands of Gotland and Öland dominate almost totally. From the diagram it is also clear that the heaviest rings are assembled primarily in the Perm' region, followed by Udmurtija. The heaviest rings occur only occasionally in the Scandinavian/Baltic region. Here, on the other hand, there is a large group of c. 100 grams. It is obvious that the rings are adjusted to some kind of weight standards. At the end of the group of c. 200 grams and c. 100 grams we can see some rings with gradually diminishing weights. In addition to this there are single rings with clearly deviating weights.

From the compilation in the previous chapter it is clear that in the west as well as in the east there are weight systems based on a unit of c. 408–409.5 grams. The following section will investigate how the rings might be related to this. The fact that the majority of the rings weigh c. 200 grams is an indication of such a relation. Then the ideal weight, if the pound of c. 408 grams is the base, would be c. 204 grams.

As we have already seen, the weights of the rings vary within some margins. If we scrutinize the bar chart it is clear that in the Perm group several rings weigh clearly more than 200 grams whereas the rings from Udmurtija seem to weigh more exactly 200 grams. The majority of the Scandinavian/Baltic rings weigh 100 or slightly below. In order to analyse this more closely it is necessary to define some limits within which the rings could be allowed to vary. Here I have fixed borders to a couple of grams around 408/9, 204 or 102 grams. This gives following norm groups: 407–410, 203–205, 101–103. Here I have looked at the three main concentrations of rings from Perm', Udmurtija and Scandinavia/Baltic. A total

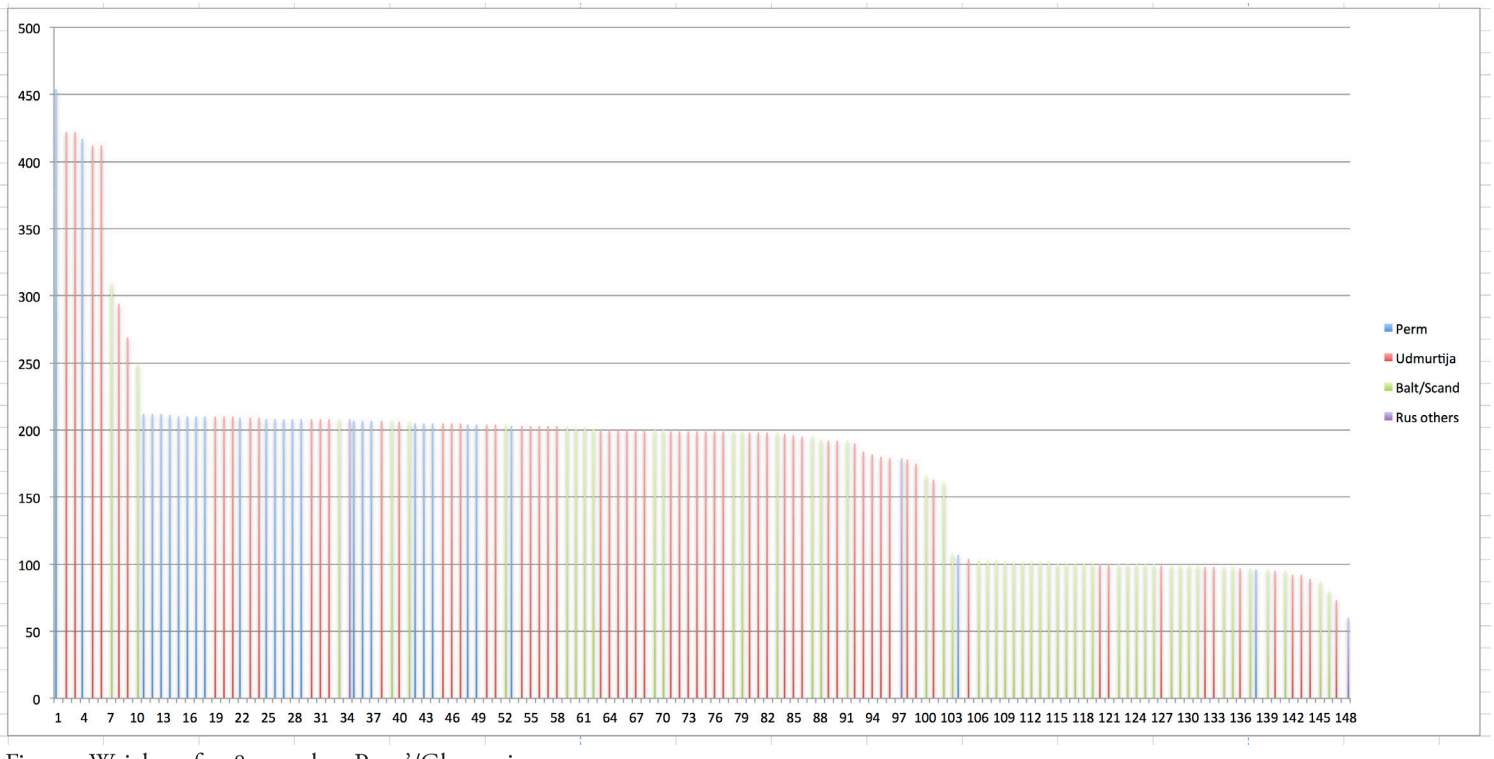

Fig. 14. Weights of 148 complete Perm'/Glazov rings.

of 125 rings seem to be grouped around weights of 400, 300, 200 or 100 grams with margins. The compilation shows that some rings correspond well to the norm weight groups and that some are overweight and some underweight.

	over	normal	under
Perm'	20	6	1
Udmurtija	15	10	28
Balt/Scand	5	16	24

Table 2. The distribution of overweight, normal and underweight rings of Perm'/Glazov type from the main concentrations.

There seems to be a pattern of overweight, normal and underweight rings, which also seems to have a geographical relevance. The table shows a dominance of overweight rings in the Perm' region, in the Udmurtija region there are overweight and normal-weight rings but the largest group is underweight. In the Baltic/Scandinavian region overweight rings make up a minority and underweight rings dominate. Thus, in the east, first and foremost in Perm', the rings are not only heaviest in absolute terms but also weigh slightly more than the supposed fixed norm. Further there is also a tendency that rings, even if weight-adjusted, are lighter in western regions and that they also are often lighter than the norm. So what does this pattern mean? Are there different weight systems behind the weights?

It is obvious that the majority of the rings seem to have a relation to a weight unit of c. 100, 200 or 400 grams. It is relevant here to think of the Russian pound, 408–409.5, the pound of Charlemagne, after the reform, of 409.5 or the Scandinavian mark weight of c. 200 grams.

There are also some rings which clearly deviate from the strict weight scheme: 60 (Tula), 72.46, 88.50, 175.40, 177.6, 178.9, 179.80, 182.20, 183.97, 189.9, 268.80 (Udmurtija), 179.00 (Kola peninsula), 87, 166 (Gotland) and 161 (Denmark). They might be adjusted to fractions of the pound weight, but it is also possible that they were adjusted to some other system or that weight here is not relevant at all. The grouping around c. 180 grams, which a number of rings show, might be of some significance. These rings also have a concentration in the Udmurtija region.

The ring from Supruty, Tula, weighs 60.5 grams. The ring displays all the characteristics of a Perm'/Glazov ring, only its size and weight are unique. The Supruty ring was found together with a collection of Abbasid dirhams, dated to the second half of the 9th century. The weight of the standard dirham in the 9th century is 2.9–3.0 g. (Назаренко/Nazarenko 1994: 77). 20 dirhams = 1 dinar. 3.0 × 20 = 60 grams. Thus the Supruty ring should be equivalent to one gold dinar. As the Supruty ring is unique according to weight we can only speculate on this.

Likewise, the so-called rings of Duesminde type, which have their main occurrence in Denmark, were obviously made according to strict weight norms (Fig. 15). The weights of the rings from Denmark, Gotland and Friesland are assembled in this bar chart.

The bar chart clearly shows the distribution of the weights of these rings. They clearly group themselves at 100 or slightly below and c. 50 or slightly below. As for the Perm'/Glazov rings, I have investigated the tendencies for over- and underweight rings. Here I have calculated with a norm of 101–102 grams and 50–52 grams respectively.

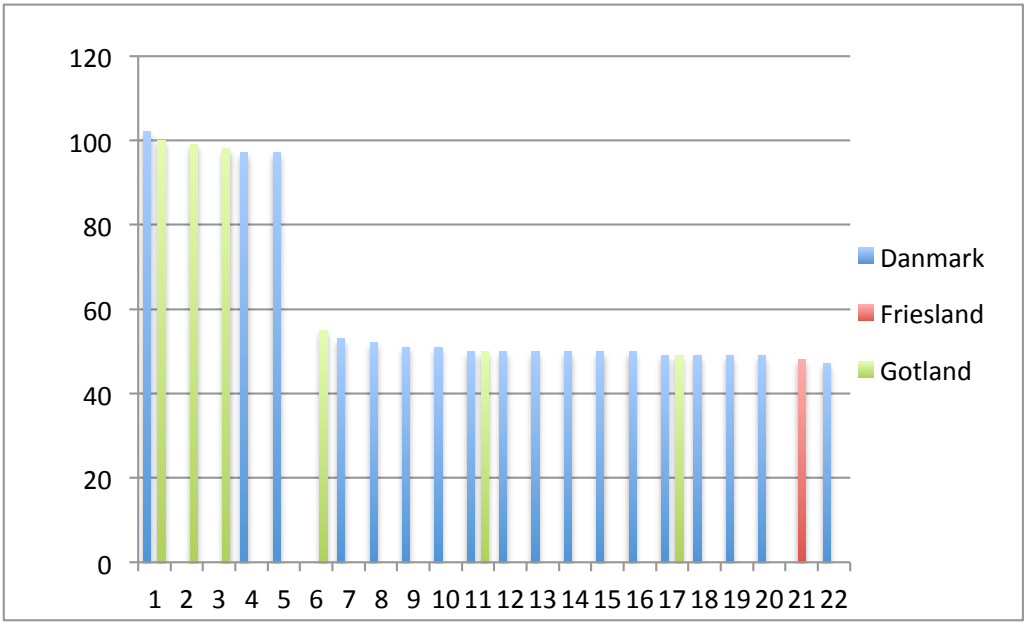

Fig. 15. Weights of 22 complete rings of Duesminde type, heavy, c. 100 grams and light, c. 50 grams.

	over	normal	under
Denmark	1	9	8
North Frisia			1
Gotland	1	1	4
Total	2	10	13

Table 3. The distribution of overweight, normal and underweight rings of Duesminde type from the main concentrations.

Here the majority of the rings are underweight. If the Duesminde rings were made according to the same weight system as the large rings, a module of c. 51/102 grams would be the target. The main part of the small rings weigh 50 grams or below.

If we had analysed only rings from Čerdyn/Perm' and compared them to the Duesminde rings it would have been reasonable to maintain that the two groups were made with different standards of weight. But if we also consider the rings from Udmurtija and Gotland, as we have seen, a pattern emerges with an increasing amount of normal and underweight rings when moving westwards. What does this mean? Of course there are a number of source-critical problems within the record. It is possible to draw conclusions from the material basis that we have, but not from what we do not have. Of course there might be underweight rings from Perm'. Perhaps they did not reach the museums in Moscow and St Petersburg. There might also have been deviating patterns of deposition between the regions under consideration. Thirteen rings in Table 2 come from three hoards from the Čerdyn region. Of a further 14 rings from various collections of rings from Perm' 10 are over weighed, two of normal weight and two underweight. This strengthens the impression of generally heavy rings in Perm'. The heaviest rings of all have been found in Perm' and Udmurtija. Could this be the

result of the so-called Gresham's law, with a large amount of hoarding of heavy and more valuable rings in the east, whereas silver circulated to a higher degree in the west, with the consequence that "cheaper" rings of lower weights were circulated to an increasingly higher degree? Another possibility could be a filter effect, the heaviest, i.e. most valuable rings stop early in the chain of transmission and lighter rings pass further to more peripheral regions. Perhaps, as has been suggested, silver was more expensive the further from the source one gets (cf. Suchodolski 1977: 6, 9).

As regards weight, the Duesminde rings mirror the tendency shown in Perm'/Glazov rings from Udmurtija and the Baltic/Scandinavian region, with light and underweight rings. They belong to an even lighter weight group and are generally underweight. Thus there seems to be some connection between the ring types according to weight. This of course raises the question of different manufacture regions. If the Duesminde rings were made in Denmark, the öre-weight of 24.5 grams, suggested by Brøgger for the 9th century, might explain why they are to a large extent lighter than the expected 50–52 grams. Is this relevant also for underweight Perm'/Glazov rings?

Silver analyses

One possibility to elucidate the question of connections between different types of spiral-striated rings might be to analyse the silver they were made of. It would of course be important to state from which silver source the metal came, for example the raw material that was used. The silver metal could perhaps elucidate the dating of the rings.

In 2000 analyses of a number of rings were performed at Geochemisches Labor, MPI, Universität Basel. Three rings from the Hellvi hoard on Gotland were analysed. These are three rings which are closely similar to one another and probably also were made in close connection to one another (Fig. 1). They have all the characteristics typical of rings of Perm'/Glazov type, generally thought to have an eastern origin and they have close parallels among rings from, for example, Perm'. Two samples come from two rings from the Duesminde hoards. These are typical of the type of spirally striated and stamped rings with hook ends, the type referred to here as rings of Duesminde type. In addition to these, four samples come from spirally striated rods from Uppåkra. They correspond in thickness to rings of Duesminde type. The samples were taken from the core of the objects to avoid the surface where material might be enriched.

The result of the investigation, shown in Table 4, was that the silver content varies widely, also within the assumed typological groups. It was thus not possible to separate the groups from the silver content. Two of the Gotlandic rings, the two Danish rings and one of the Uppåkra fragments have a silver content of 90–94%, thus what is usually referred to as sterling silver. Typical for sterling silver is a degree of softness that is favourable for working it into ornaments and the like.

The samples were further analysed for their ratios of gold/silver, copper/silver and lead/silver. The result was that similarities between the following samples could be stated:

	U41	U4731	U6919	U5119	NMDNF 9	NMDNF 9
Ag	86.3	88.3	88.8	92.9	93.9	90.9
Cu	11.0	9.1	9.0	5.7	4.9	7.7
Bi	0.06	0.08	0.05	0.07	0.02	0.22
Au	0.44	0.26	0.48	0.23	0.29	0.13

	SHM 194.6	SHM 199.8	SHM 208.4
Ag	89.1/87.9	90.2/91.4	93.4/93.8
Cu	7.2/7.9	7.7/6.6	4.8/4.5
Bi	0.63/0.69	1.15/1.17	0.50/0.46
Au	0.38/0.43	0.31/0.26	0.19/0.22

Table 4. The main components in silver from 9 different objects in the alloys. U = rods from Uppåkra, Scania, Lund University Historical Museum; NMDNF = rings of Duesminde type from the National Museum, Copenhagen; SHM = rings from the Hellvi Hoard, Gotland, Swedish History Museum, Stockholm. The numbers refer to internal registration at the museums. For the Hellvi rings the weights are given to distinguish them.

1. One ring from Duesminde, one ring from Hellvi and the rod U5119.
2. One ring from Duesminde and one ring from Hellvi.
3. One ring from Hellvi and the rods U4731 and U6919.
4. One rod U41 deviates from the other samples through low silver content and high copper and gold content, which might be related to early Central Asian dirhams (W. Stern in the report).

The rings seem to have been made of similar silver, possibly the same type of raw material. It was thus not possible to distinguish between rings of Duesminde type and typical Perm'/Glazov rings. The probable reason is that the same type of silver, generally Arab dirhams, was available in the east as in the west and was used as raw material for their manufacture. It is also important to remember that the number of analyses is limited.

The two fragments from Öland mentioned above, which were analysed with archaeometallurgical methods in 2016, consisted of very pure silver with only 2–3% copper and small amounts of gold and lead (Hjärthner-Holdar 2016: 18).

Weight-adjusted ingots in east and west

In several hoards from the Baltic region and South Scandinavia striated rings are combined with ingots, which often seem to be weight-adjusted in the same way as the rings. Example of such hoards are Asarve and Spillings on Gotland, Erridsø in Jutland and Rantrum and Witzwort in Schleswig-Holstein.

Besides the four rings, the Erridsø hoard also contains four oblong ingots, two of which weigh c. 100 grams and two c. 200 grams (Holm Sørensen 1989; Hårdh 1996: 142). Of the 34 ingots in the Rantrum hoard, 11 weigh between c. 48 and 51 grams and six weigh between 98 and 102 grams. The Wizwort hoard contains 24 ingots, eight of them weighing between 48 and 51 grams

Schleswig-Holstein		
	Oldenburg II	**109**
	Giekau	**18.22, *24.99*, 78.98**
	Rantrum I	**28.88, 34.2, 48.7, 48.96, 49.01, *49.91*, *50.77, 51.01, 51.76*, 66.43, 78.73, 98.32, 98.74, 99.74, *100.78, 101.20, 102.12***
	Witzwort	**49.44, *49.90, 51.01, 51.35, 51.35*, 57.78, 76.51, *99.99, 102.03***
Denmark		
	Erridsø	***100.5, 100.6, 201.6, 206.4***
Gotland		
	Ocksarve	**99.7, *100.4***
	Spillings I and II	**64, 67, 74, 84, 97, 99, *100*, 104, 148,**
	Asarve	***50.27*, 53.2, 56.67, 59.36, *100.9, 101.10, 101.23, 102.1*, 105.9, 106, 107.2, 146.62, 203.17**
Netherlands		
	Westerklief	**21.3. *25.8*. 30.4. 37.2. 48.4. 48.6. 48.6. 48.6. *50.0. 50.2. 51.6. 52.2*. 52.8. 53.9. 54.2. 55.5**
England		
	Croydon, Surrey	**16.60, 22.39, 23.74**

Table 5. Weight distribution of complete ingots in some early Viking Age hoards (from Hårdh 2008 with additions. Italics mark ingots which might be standardized to the same system as the Perm'/ Glazov and Duesminde rings, cf. Figs 14 and 15).

(Wiechmann 1996: 424, Tab. 45, 528, Tab. 59). The Rantrum hoard contains 13 Arab coins with tpq. 873–, Witzwort and Erridsø lack coins but Erridsø is referred by Skovmand to the period before 900 (Skovmand 1942: 30 ff.).

In this connection the above-mentioned Dutch hoard from Westerklief, on the island of Wieringen, is of interest. This is the first hoard of Scandinavian character found in the Netherlands. It is an early hoard, coin-dated to c. 850. It consists of arm rings, one neck-ring, three Arab coins transformed to ornaments and 72 Carolingian coins. Moreover there are 16 ingots, all complete. Twelve of the 16 ingots weight c. 50 grams. J. Besteman compares the ingots to those from Rantrum and Witzwort and points out that complete ingots primarily occur in 9th-century hoards. Ingots are known from British hoards too, and Besteman maintains that ingots from those hoards tend to cluster around 25 grams while ingots from Norwegian and Danish hoards cluster around 25 grams, fewer around 100 grams but the majority weigh around 50 grams (Besteman 1997: 209; Besteman 1999: 257 f.). Ingots of this type were cast in open moulds. Soapstone

moulds for casting such ingots have been found in large quantities in Haithabu, and there is one mould, dated to the 9th century, found at Oldenburg, Holstein (Gjøstein Resi 1979: 61 ff.; Wiechmann 1996: 65). The Gotlandic Asarve hoard contains 13 complete ingots. Of these two weigh 50 grams and five 100 grams. The two Spillings hoards contain nine complete ingots. Of these four weigh between 97 and 104 grams. Thus, here less than half of them seem to be adjusted to c. 100 grams.

The table shows that a substantial share of the complete ingots seem to belong to weight groups clustering around 50 and 100 grams, although not so absolutely grouped as the Perm'/Glazov or Duesminde rings. The ingots of c. 25 grams might be a fraction of this. Weight-adjusted ingots from south-western Scandinavia and Gotland seem principally to belong to the 9th century (Munksgaard 1963: 103; Wiechmann 1996; Hårdh 1996: 142 ff.; Besteman 1997, 1999).

From Lithuania, Latvia and Russia various types of ingots are known. Their weight is generally grouped around 50, 100 or 200 grams. However, they are usually dated to the 11th century and later (Šnore 1938: 181 f.; Ūrtans 1977; Duksa 1981: 98 ff., 151 f.; Noonan 1987: 403; Hårdh 1996: 42 ff.). I. G. Spasskij discusses the term *grivna*. He maintains that the word originally denoted a neck ornament but gradually acquired a new meaning as a weight, corresponding to a designated amount of silver, *grivna serebra*. From the 11th century onwards payments were made with grivna ingots, standardized in shape and weight (Spasskij 1967: 60). The weight of the so-called Novgorod ingots is c. 200 grams. They have a wide distribution from the Baltic in the west to the Volga region in east and to the Chersonese and Crimea in the south. They were in use up till the 15th century. Neither the Novgorod ingots nor the likewise weight-adjusted Kiev ingots have been found in depots with Arab dirhams or even with West European denars; they have been found separately (Spasskij 1967: 64–65). The weight-adjusted ingots emerge in close connection to the Old Russian trading centres of Novgorod and Kiev. Ingots are also known from early Russian hoards, from the 9th century, but no weight grouping has been discerned (Noonan 1987: 403). N. F. Kotljar refers to a hoard from Jagošur, raj. Balezino, rep. Udmurtija, with an ingot and coins, tpq. 843. But the ingot in this and some other 9th-century hoards are not monetary grivnas, as they are not standardized according to weight and shape. Moreover, as Kotljar points out, means of payment were in this period totally dominated by Arab dirhams (Котляр/Kotljar 1994: 81ff.). As mentioned above, Sasanian coins were also abundant there. However, during the 9th century, besides the Sasanian/Arab coins, we have the accurately shaped and weight-adjusted rings of Perm'/Glazov type. They have their main occurrence in the forested regions in the north and represent a kind of money in large units probably a result of the cosmopolitan trading networks of the time and region. Ingots, seemingly adjusted to the same weight system as the Perm'/Glazov rings, are thus known from Gotland, Schleswig-Holstein, the Netherlands and England, dating to the 9th century. However, ingots are not weight-adjusted to the same high degree as rings of Perm'/

Fig. 16. Parts of the Spilling hoard with bangles of Gotlandic type and spirals. Photo: Swedish History Museum, Stockholm.

Glazov types are. Weight-adjusted ingots are most abundant in the regions east of the Baltic Sea but they belong to a considerably later period.

Gotlandic bangles and "money" spirals

A type characteristic for the Gotlandic hoards is the bangle, called *Armbügel* by Stenberger. This is by far the most common type of ornament in the Gotland hoards. These bangles are obviously of Gotlandic origin. The oldest type, which Stenberger labels Ab1, consists of a rod with octagonal cross-section, the outer three sides stamped with triangles with three dots, arranged like an hourglass or alternatively to create a zigzag pattern between them (Fig. 16).

In several instances the bangles have been found together with Arab coins, and in those finds there are often spiral rings and simple undecorated spirals. The oldest coin-dated hoards with those bracelets come from Kinner, Lummelunda, with 117+184 Arab coins with tpq. 880/81 (Stenberger 1958: 104–106; data in e-mail from Christoph Kilger, 17 March 2015), and Dals, Grötlingbo, four bracelets of type Ab1 together with 37+10 Arab coins, tpq 873/4 (Stenberger 1947: 84). Stenberger has noted the weight of 13 complete bracelets of type Ab1. Of these 10 have weights close to 100 grams: 93.1, 95.8, 97.7, 98.1, 98.4, 98.48, 100.2, 100.3, 104.6 and 108.3 (Stenberger 1947).

The Spillings hoards, tpq. 870/1, contains a large number of bangles. Those which I have been able to weigh have the following weights: 62, 74, 92, 99, 100, 102 and 102 grams. Six of them have an octagonal and one a facetted cross-section. Five bangles are stamped on three sides with hourglass-placed triangles with one or three dots. The one with facetted cross-section is stamped on four sides. The Spillings hoard contains approximately 230–240 bangles of Stenberger's type Ab1. Further, the two Spillings hoards contain a number of bangles of other types

(Thunmark-Nylén 2006: 702; Östergren 2008: 24, 27, caption).

Another type of object which might be of interest in this connection is spirals, made of rods with a rhomboid cross-section, bent into in 3–7 windings. They usually occur, according to Stenberger, in Gotlandic hoards dated to early or middle Viking Age and are often combined with spiral rings, Stenberger's type Sa1 and Sa2 (i.e. Perm'/Glazov and Duesminde rings), early bangles and spiral rings of foreign types. Here the Asarve and Norrgårda hoards are important with their dating to late 9th century or early 10th. Stenberger maintains that those spirals vary in weight between certain limits. Of 22 weighed items 12 have a weight between 94 and 103.9 grams, but the majority weigh between 96 and 102 grams (Stenberger 1958: 226–7). Lillemor Lundström in her thesis analysed 57 spiral rings of this type and reports that 25 items, or 44%, weigh between 92 and 104 grams (Lundström 1973: 56–57). The Asarve hoard contains two spirals with rhomboid cross-section weighing 200.80 and 205.77 grams. Also in the Spillings hoards there are spirals of rods with rhomboid cross-section. Their weights are: 76, 92, 93, 94 and 176 grams. The heaviest spiral is badly corroded and obviously originally weighed more.

Most interesting is that in some Gotlandic hoards there are bundles of spirals which have been linked into one another. For example, in the hoard from Botvalde, Stånga, six rings have been linked together two by two and the linked spirals weigh 194.7, 196 and 197.7 grams (Stenberger 1947: 206–7, Abb. 40 4–6). In the hoard from Ocksarve, Hemse, retrieved in 1997, there are several bundles of rings and ingots. Three of them are very heavy: 435, 452, 499 and 779 grams. Six bundles consist mainly of several interlinked spirals, weight: 155.4, 194.5, 200, 201.2, 202.3 and 301 grams. The Ocksarve hoard is coin-dated with tpq. 999 (Documentation SHM; Thunmark-Nylén 2006: 708; Östergren 2008: 13, caption). Especially the interlinking of spirals and rings might show an intention to create units. A large number of the rings and bracelets in the Spillings hoards have been joined together into large bundles, which sometimes seem to be standardized to obtain certain weights (Östergren 2008: 26, caption). They consist of interlinked bangles, spirals and other types of rings. In one case a number of bangles and spirals are fixed on a ring of Perm'/Glazov type. The whole bundle weighs 2176 grams. Another bundle with the same components weighs 1692 grams (personal observation and documents in GF).

One complete ring of Perm'/Glazov type in Spillings I has a small rod with rhomboid cross-section fixed to it. The weight together is 102 grams. This seems to be a clear example of weight adjustment. There are some more examples of rings with attachments, possibly made to adjust the weight. In the Asarve hoard, Gotland there is a ring with an attached Arab coin, which makes the collected weight 204.17 grams, and a fragment of a ring with another attached fragment the total weight of which is 99.56 grams. In the Spillings I hoard there is a small ring of Perm'/Glazov type with a small rod attached, total weight 102 grams, and a fragment of a striated ring with facetted knob with an attached stamped fragment with a total weight of 98

grams. In those cases there seem to be target weights.

The rods of the spirals usually taper towards the ends but some of them have bent ends and in some instances swan-neck shaped, for example Vestris, Tingstäde; Tänglings, Etelhem; Botvalde Stånga; and Hageby, Etelhem (Stenberger 1947, Abb. 31, 39, 40, 51). In this respect the spirals are connected to the rings of Duesminde type. This is clearly shown by a spiral from Gotland without known find spot. This one has swan-neck shaped hooks and is stamped with triangles with three dots and an angled band in tooth stamp. The weight of the spiral is 99 grams (Stenberger 1947: 255, Abb. 41).

The relation between Perm'/Glazov rings

In South Scandinavia and the Baltic region we thus have a complex of objects, rings of various types and ingots, which belong to the Early Viking Age, where weight seem to matter. These items probably relate to the same weight system. However, there is one trait which connects Duesminde rings, bangles and some Perm'/Glazov rings: the stamp decoration which is rare or non-existent in the east. The stamp decoration is concentrated in South Scandinavia and speaks in favour of the manufacture of weight-standardized rings in this region. The shape and the weight system connect the Perm'/Glazov rings over their entire region of distribution. However, the weights of the rings diminishes, virtually and in relation to the units, the further west we come. The most likely interpretation of this is that Perm'/Glazov rings were made in several centres in the west as well as in the east but that there were also close connections between these centres. The only explanation of this is that the rings were used as means of payment and that they were important in long-distance trade, which connected those centres. Kivikoski's dating of bronze rings of Perm'/Glazov rings to the Merovingian period, together with early rings from graves in the regions west of the Urals, might indicate that a well-known type of neck-ring was adopted as suitable as large-unit money. It might also have been important that the type could be recognized and reliable (cf. Gustin 2004: 233 f.; Kivikoski 1963: 83, 125; Callmer 2015: 16 f.).

Kilger maintains that in the period 825–840 the Baltic islands, dominated by Gotland, show a number of finds rich in dirhams. In this period the Baltic region as a whole became a common circulation region for dirham silver and it is also from this period we have the first reliable datings for spirally striated rings and ingots with D-shaped cross-section (Kilger 2008a: 225–226). Bangles and spiral rings were in all probability made on Gotland. This speaks in favour of Gotland as a centre for craft and innovation with hoards like Spilling and perhaps also Asarve as examples of collections of workshop material together with collections of means of payment in large units.

Concluding discussion

The Perm'/Glazov rings treated in this paper have some characteristics which distinguish them from other silver ornaments from the period. They are made according to a relative

stereotype pattern, with only minor variations. Most striking is the weight grouping. Even if this, as shown above, also may occur in other types of silver objects, here weights show clear groupings where only a few items do not fit in. The term grivna, i.e. neck-ring, was later transferred to the younger, weight standardized ingots, which functioned as money in large units. This strengthens the idea that the Perm'/Glazov rings also had a monetary function.

The intention of this study was to discuss their possible function as means of payment, other possible use of the rings as well as attitudes towards precious metal. In whose interest were the well-executed and weight-adjusted rings made? Were they used in the same way in the east and the west? These questions are difficult to answer and the record I have at hand is not quite sufficient. What is possible is to discuss various scenarios.

The rings of Perm'/Glazov type show a connection in shape and weight from the region west of the Urals to the Baltic region and Scandinavia. Proceeding from local ring shapes, a certain type in silver ring of certain weight groups was developed. The rings indicate dense contacts from the Finno-Ugrian regions in the east to the south-western parts of Scandinavia. They show an agreement of weight standards and shape of a mean of payment in a most widespread region. These rings might be seen as some kind of money, apparently used for payment in large transactions.

The question of where these rings were made has been intensely debated. Details in their appearance, with local spread, speak in favour of several regions of manufacture. This is corroborated by residue of production in the Čepca region and, for example, the Spillings hoards on Gotland, which might be seen, at least partly, as workshop material.

The similarity in shape was probably important for an effective means of exchange, making the medium more reliable. The weight systems in the east and west had an effect on each other already at the beginning of the Viking Age. The rings of Perm'/Glazov type are apparent testimony to this. The majority of the heavy rings are obviously adapted to a weight around 200 grams, possibly half of the pound/kadak weight of c. 408–409 grams, or to the Scandinavian mark weight of c. 196–200 grams. The small Scandinavian rings of the Duesminde type, generally underweight, might be related first and foremost to the mark weight.

The heaviest rings have been found in the east, which probably shows that the largest transactions took place in the easternmost regions. It is also here, especially in the Perm' region, that rings are overweight to a large extent, which possibly indicates that overweight rings were taken out of circulation to be hoarded, for economic or other reasons. The lightest rings as well as the underweight rings belong to more westerly regions.

In the Glazov region, around the river Čepca, where the rings have by far their largest concentration, they probably played a mainly commercial role. The hoards show a mixture of rings of different manufacture together with a number of fragments, probably indicating "exchange". On the other hand there are several hoards where the rings are so similar that they probably were made in close connection to one another. This also indicates that the rings did not circulate in the region but were deposited soon after the

acquisition. These depots are thus the result of larger transactions where the payments were concealed in the earth and for some reason or other not retrieved again, which probably shows an economy where money was used, albeit without intense circulation.

The emergence of the rings might be related to the interest of middlemen in the exchange. Trade in fur was probably carried out on a large scale and the rings of standardized weights were easier to handle than a large number of coins. The rings are concentrated along rivers, which were central contact links and where those who organized the fur trade also had their bases. Many of them were probably also manufactured there. It was here that the rings also functioned as money. In more remote fur-producing regions, the rings acquired another function as prestige objects and in religious rituals. My suggestion is that it was first and foremost the traders and middlemen who had an interest in the accurate weights of the rings, to be able to calculate the amount of silver transferred. When the rings reached more remote regions they rather got a role as prestige objects, family fortune or cult objects.

In the Baltic region there seems to have been production of rings with local traits such as stamped decoration and an emphasis on narrow and high knobs. Further, there was manufacture of a number of other types of weight-adjusted objects, such as rings, ingots and so on, possibly also as means of payment.

It is interesting that rings which were obviously made in the Baltic region have not been found in the West Ural regions. Also, the coarse striation typical of some rings in the Čepca region has not been found in the Baltic. On the other hand there are rings, for example from Hellvi, Gotland or Sandby, Öland, which are generally identical to, for example, rings from the Perm' region. It is quite possible that they were imported from the east to the west. However, the occasional fragments with swan-neck hooks from Glazov possibly show inspiration from the Baltic region but the coarse, broad striation indicates that they were made in the region where they were found.

Graffiti on the knobs is most abundant and varied in the Perm' region but also common in the Glazov region. In the Baltic region some knobs have graffiti but here they are restricted to very few types, mainly simple crosses. Similar signs are also known in the east and further strengthen the impression of close connections over vast areas where a certain form of payment was recognized and accepted.

Thus, there was obviously a manufacture of rings in the east as well as in the west. However, it seems to be possible to claim that eastern rings moved westwards but the opposite movement has not been possible to prove. This might show that people from the Baltic took part in trade in the east and brought parts of their wealth back home whereas we have no evidence of the opposite. This is reasonable as the most important commodity, fur, mainly derived from the eastern part of the distribution region of the rings.

In the Baltic region, mainly Gotland, rings of the same type were made but with variations in knobs and decoration and in lighter units designed for the requirements of trade within this region. Trade here was obviously carried out on a broad scale with frequent

transactions with many participants but with smaller transactions. Yet the rings were also here made according to shapes common and widely trusted among tradesmen. The utmost consequence of this is the even lighter and simpler rings of Duesminde type with their main distribution in Denmark, which might be regarded as having been adapted directly to the economies there.

English revised by Alan Crozier

Abbreviations

ALM: Archäologisches Landesmuseum, Schloß Gottorf, Schleswig, Gemany.
C: National Museum of Denmark, Copenhagen, Denmark.
CNS: Corpus Nummorum Saeculorum IX–XI qui in Suecia reperti sunt. Catalogue of Coins from the Viking Age found in Sweden. Kungl. Vitterhets Historie och Antikvitets Akademien, Stockholm.
GE: State Hermitage Museum, St Petersburg, Russian Federation.
GF: Gotlands Fornsal, Visby, Sweden.
GIM: The State Historical Museum, Moscow, Russian Federation.
NM: National Museum of Finland, Helsinki, Finland.
PMA: Państwowe Museum Archeologiczne, Warszawa, Poland.
SHM: Statens Historiska Museum, Stockholm, Sweden.

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A group of distinctive Viking Age silver rings, sometimes described as neck-rings, sometimes as arm-spirals, have long been a cause of academic dispute. Where were they made and how were they used? So far the scholarly perspectives have been limited to either the western or the eastern material, which has hampered interpretations.

This book deals with a greater number of these rings than hitherto, mainly dated to the 9th century, retrieved in present-day Russia, the Baltic region and Scandinavia. By analysing them it is possible to elucidate and discuss questions of contacts, economy and also craft traditions in the early Viking Age. It is especially worth noticing that these rings also seem to have been made according to distinct weight groups, which can also be associated with ancient weight systems. Obviously they are to be seen as value denominations or means of payment in large units. The similarity between rings in east and west indicates close relations between Scandinavia/the Baltic Region and the interior of Russia. This can probably be explained by the well-developed fur trade, aimed ultimately at the markets in the Abbasid caliphate and Byzantium. Only by considering the collected material in the east as well as in the west has it been possible to discuss interpretations of them.

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