Two Bridles and a Yoke

A new study into the horse gear from the chieftain's burial of Oss

Leiden University, Faculty of Archaeology
Master Thesis, 4ARWF-1011ARCH

Author: Joris Brattinga, s0705543
Supervisor: Prof. Dr. H. Fokkens
Track: Prehistory of Northwestern Europe
Place and date: Leiden, May 2012

Contact details:
Joris Brattinga
Groenhovenstraat 13
2311BT Leiden
+31 (0)617876881
joris_br@hotmail.com

Content

1. Introduction

In the Early Iron Age, the so-called Hallstatt Culture spread over Central Europe. This 'culture' is named after an Early Iron Age cemetery, which was excavated near the Austrian town of Hallstatt. The cemetery contained almost 1000 graves with rich grave goods. (Fokkens and Jansen 2004, 77). Similar graves have been found all over Central Europe and are often called 'princely burials'. Characteristic for all of these graves are the specific types of grave goods, such as wagons, horse gear, weapons and objects for feasting and drinking. Bavaria, Bohemia and the region north of the Alps are considered as the core area of the Hallstatt Culture.

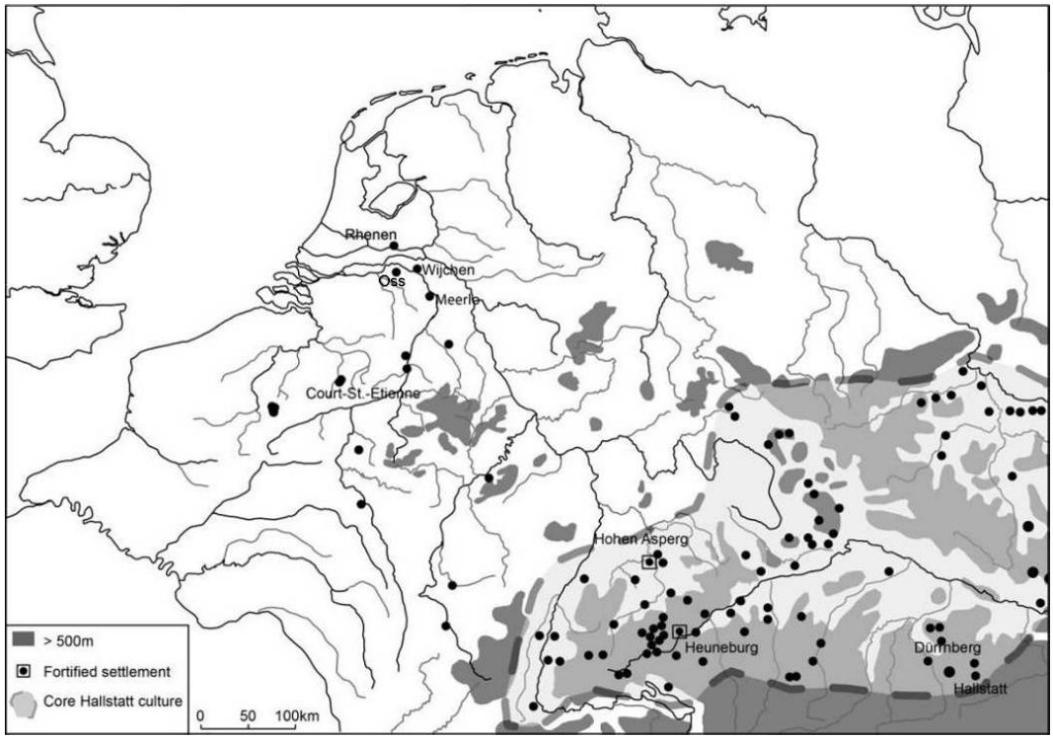


Fig. 1 Map of Hallstatt burials in the Lower Rhine Area and the Hallstatt core area. Note the absence of graves in between these two regions (after Fokkens and Jansen 2004).

The Lower Rhine Area has a special position within the Hallstatt period (fig 1). A small concentration of rich graves is situated in this region. The Hallstatt burial found near the Dutch city of Oss, also called the 'chieftain's burial from Oss', is the most famous of these. For over 70 years it has been the subject of multiple publications and investigations.

Following its discovery in 1933 much of the attention was drawn to the most striking objects of the grave, such as a bent sword with gold leaf and a bronze *situla.* 30 years later it became clear that horse gear was another important component of this rich grave. This is in line with the rich Hallstatt burials of

Central Europe, where wagons and horse gear for draught horses play a crucial part in the burial tradition of that time.
Prof. Chris Pare, a specialist in Early Iron Age wagons and wagon-graves, published some of the objects from the Oss grave in 1992 with the following description:

"Two iron bits, four iron cheek pieces, and two oval bronze yoke "rosettes" certainly indicate paired harnesses for draught horses. Rich horse gear types 3 (iron), 6, and 11." – Pare 1992, 346.

In 2004, with the publication of the re-examination of the chieftain's burial by Fokkens & Jansen, a more complete list of the horse gear from Oss was presented. They added a tubular cross-shaped bronze object, eight iron rings, two ring-shaped ornaments and three solid bronze rings to the list of horse gear (Fokkens & Jansen 2004, 67).

1.1 Research problems

One of the problems with previous research on the horse gear from the chieftain's grave of Oss is that the publications are quite descriptive and primarily show which objects were found, and which are considered as part of the horse gear. For most of the objects function, context and a good analysis is lacking. It is obvious that the bits were part of the bridle, but we do not have a clear picture of the other objects and their position as part of the horse gear. For instance, it is not sure for some objects whether they were part of the bridle, the yoke or the reins.
Another problem is that most of the objects, for instance the bits, are made of iron. After being in the ground for almost 2700 years it is very hard to see any traces of use due to the fact that they were very corroded at the time they were found and heavily restored afterwards. This makes it very hard to say anything about how long, or even if they were used before they were buried within the *situla*.
Small pieces of organic materials survived inside the *situla.* Actually, two pieces of leather were found but it's far from clear where they are from. Clear traces of reins or leather straps of the bridles could not be identified. This makes it difficult to reconstruct the horse gear. The reconstructions of Hallstatt C-horse gear known today (Kossack 1954; Koch 2004) are based solely on the wear of only two finds; from Thalmässing-Alferhausen and Budinjak.

The dating of the objects is also a point of discussion. Most of the typologies of Iron Age horse gear (c.f. Kossack 1954a; Trachsel 2004) are based on finds from the core of the Hallstatt area: Bohemia and the region north of the Alps. Because the Dutch and Belgian graves represent more or less a north-western periphery of the Hallstatt area we cannot assume that the people at that time used the same objects for the same period of time and with the same purpose. It is quite possible that the objects were still in use in the periphery while they were already 'out of fashion' in the core area.

1.2 Research goal

Previous publications of the horse gear from Oss focused on typological aspects and descriptions of the objects. It is evident that a clear analysis of the horse gear and its context is lacking. Further in-depth analysis will be provided within this thesis of which the main question will be:

What information does the chieftain's grave of Oss provide about horse gear, its technical aspects, its social meaning and its use in Early Iron Age in Europe?

In the following chapters this main question will be further investigated:

The domestication of the horse is a marking point in human history. Besides their role in transport, war, hide and food production this noble animal played an important role in the burial tradition of the Early Iron Age in Central Europe. For a better understanding, the developments that ultimately lead to this important role will be studied in Chapter 2, together with the evolution of horse gear, horse drawn vehicles and the role horses had in prehistoric society.

The chieftain's grave of Oss contains multiple objects that can be classified as horse gear and yoke components. For a better understanding of the research on this important Dutch grave, Chapter 3 will provide a short research history. Furthermore, it will be investigated which of the objects were part of the harness, to examine if the horse gear from Oss is complete. Moreover, typological parallels will be examined to see if any pattern can be recognized in their distribution throughout Europe.

Rich Early Iron Age graves, like the chieftain's grave of Oss, are quite rare in the Lower Rhine Area. Nevertheless they fit into a wider context of rich Hallstatt graves in Central Europe. In Chapter 4 this context will be investigated. This will be done by a statistical analysis of, in total, 60 inventories of rich Hallstatt finds with similar objects as the grave of Oss. In this way an attempt is made to see whether the situation in Oss is 'normal' or that it differs from the other inventories.

Prehistoric horse gear has been subject to typological and descriptive studies in the past decades. However, a contemporary approach on prehistoric horse tack is lacking. In Chapter 5 it will be investigated how the horse gear from Oss technically appears to equestrian professionals nowadays. An attempt will be made to determine if and how the horse gear from Oss differs from horse gear that is used nowadays. Moreover, with the help of the equestrian professionals it will be examined if the traditional reconstruction of Hallstatt C-horse gear by Kossack (1954) and Koch (2004) is plausible.

2. Horses and horse gear

Before turning to the actual finds from Oss and their context some information about horses and horse gear will be provided within this chapter. First of all, the technical aspects of horse gear will be highlighted to understand how horse gear works and where specific objects are located within the horse tack. Second, the domestication of the horse and the development of horse gear and horse drawn vehicles will be discussed to get a better understanding of the animal and the associated material.

2.1 Horse Gear: Technical

For a better understanding of how horse gear works the most important elements will be discussed below. In the case of Oss the components of two elements of horse gear have been found: the bridles and the yoke. This section therefore focuses on these horse gear elements.

2.1.1 The bridle

One of the most important tools to influence a horse's movement is the use of a bridle, which is placed on the head of a horse. It has the greatest effect on a horse's movement because of the concentration of sensory organs and nerves in this area of the animals anatomy. Nevertheless, instruments invented to direct a horse have some impact on its head although the result is not created mechanically but rather through influence on the behaviour of the animal (Dietz 2003, 189).

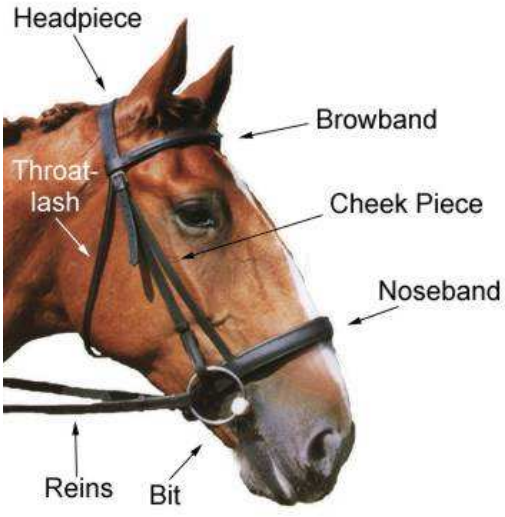


Fig. 2 The bridle and its characteristics (Newrider.com).

To understand the terminology of horse gear it is important to know a bridle's common characteristics and functional elements. In general we can distinguish two types of bridles: bridles with, and bridles without a bit. Bridles with a bit consist of a headstall that holds the bit that goes in the mouth of a horse, and the reins that are attached to the bit. Bitless bridles, also called hackamores, control the horse by a noseband which puts pressure on the animal's head. The reins are attached to the noseband. No traces of a

hackamore have been found in the princely grave of Oss and therefore I will not discuss this type of bridle further.

The bridle with a bit has a number of important elements to keep it in its place and to control the horse as effective as possible (fig. 2). The most important element of the bridle is the crownpiece, or headpiece, which is a leather strap that goes over the horse's head just behind the ears. It is the main strap that holds the rest of the bridle in place. In most cases, two leather cheek-pieces, or '*Backenstücks*', attach to either side of the headpiece. They run down the horse's face along the cheekbone and attach to the bit-rings to hold the bit in its place.

The headpiece runs through the browband. The latter is a leather strap that holds the headpiece in its place and runs from under one ear, across the head, to just under the other ear. At the crossing of these straps under one ear, another leather strap starts its way down, under the throat, to the crossing of straps under the other ear. This strap is called the throat lash and prevents the bridle from coming off the horse's head. A noseband can be fastened over the nose of the horse for a better attachment of the cheek-pieces. Finally, the leather straps can be decorated with bronze knobs, *Tutuli*, *phalerae* and other ornaments.

The bit, which in most cases consists of a mouthpiece and rein-rings, is one of the most important elements of the bridle. The width of the mouthpiece is of great importance since the it has to fit the width of the horse's mouth exactly to be effective. If a mouthpiece fits poorly the animal plays with it and eventually discards it, which can cause the loosening of the whole headstall and loss of control over the reins, necessary for steering the horse (Kossack 1988, 100). In most cases the reins are directly attached to the bit. The function of the bit is not simple and requires preparation and schooling of the horse (Dietz 2003,193). There are various types of bits which can be used for various purposes. A bit can be made out of one piece, or two pieces joint together. The most common bit is the latter, or so called 'broken' mouthpiece, which works like a nutcracker in the mouth of the horse (fig. 3). The two bars of the bit rest on the horse's mandible, in an area where there are no teeth, to create pressure when the reins are pulled. Nowadays the bit is made of metal or synthetic material. Torsion of the bars and bars provided with studs are intended to make the bit

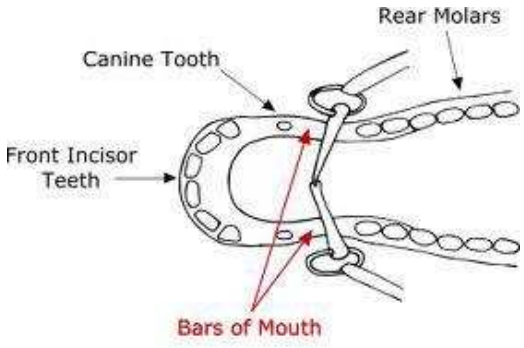


Fig. 3 The way in which the mouthpiece lies in the horse's mouth (tackandtalk.worldpress.com).

stronger. The thinner the bars of the bit, the more impact they have on a single point and the sharper their impact in relation to the tension of the reins (Dietz 2003, 192).

2.1.2 The yoke

The yoke is a harness element which nowadays is used to locomotive energy from draught oxen (fig. 4). Most of the time it is used for a pair of animals but sometimes a yoke can be used for a single one. A yoke consists of a wooden beam which lies on the shoulders of the animal. Each end of the yoke has so called yoke-saddles, for a better fit around the animal's neck and shoulders. The yoke is connected to a carriage by a wooden draught pole. A bow around the neck or leather straps, running along the belly and the breast of the animals, hold the yoke on its place while the animals pull a vehicle. Today one can distinguish three different types of yokes: the head yoke, the withers yoke and the neck yoke. Their design varies according to local customs and regions (Conroy 2004, 2).

Fig. 4 Oxen with a neck yoke (Conroy 2004).

For experts of horse gear nowadays it can be confusing to hear about wooden yokes used on horses due to the fact that only before the Roman Period this element was also used on these animals. It is because of the difference in anatomy and physiology between equines and cattle that yokes nowadays are used only for the latter. Cattle is better suited for a yoke because they hold their head lower, have more prominent and loosely attached shoulders, their skin is thicker and they are more deliberate and tolerant in difficult environments (Conroy 2004, 10).

2.2 The domestication of the horse.

The horse has been a major food and hide source for human populations for several millennia. How, where and when horses were domesticated for the first time in human history is still a subject of debate. The horse is one of the most ecologically flexible species among domestic animals and it is very adaptable. This makes it difficult to find out where the horse was domesticated. Because the horse is so plastic, it is insufficient to review only skeletal size and proportion to determine whether archaeological bones belonged to either a domestic or a wild

horse (Kosintsev 2006, 127). Since the introduction of DNA research, more information has come to light. Genetic data shows that there is no ancestral mare that was the “Eve” of all domesticated horses (Olsen 2006, 81). Mitochondrial DNA studies, comparing a wide range of domestic horse breeds, demonstrated that there is a high diversity of matrilines among modern horses. This indicates the utilization of wild horses from a large number of populations as founders of the domestic horse. A single geographically restricted population would not suffice as founding stock (Vila *et al.* 2001, 476).

Many experts accept that some horseback riding was necessary to manage herds of horses that were kept for meat in the western Eurasian steppes in the fourth millennium BC (Anthony *et al* 2006, 148; Olsen 2003, 101). But the step from taming horses to actually mounting them is too great to have been taken in just a few generations of early horse husbandry (Dietz 2003, 191). The most reliable evidence for horseback riding are traces on the animal’s skeleton caused by bridles or bits. The earliest bits were probably made of organic material. Even though these materials generally do not survive in the archaeological record, they can cause bit wear on the horse’s second premolars (Anthony & Brown 2003). It is thought that bit wear was found on teeth from the Botai site, Kazakhstan, dated between 3500-3000 BC Still there is discussion about this subject due to the fact that some scholars think that the wear on the teeth is actually natural (Olsen 2003, 101). Nevertheless it is generally accepted that horses were initially domesticated and ridden in different periods of time in the fourth millennium BC at various locations by cattle breeders of the steppe and forest-steppe zones of Eurasia, between the Volga and Danube (Kelekna 2009, 2; Kosintsev 2006, 133; Anthony & Brown 2003, 55).

Besides their function as food and hide supply horses already played an important social role in prehistoric human society. In the Volga-Ural steppes horses were treated like cattle and sheep in funerals around 4500 BC (West 2006, 25). Images of horses were also important in art. This can be seen on pictorial representations in the form of clay figurines or impressions of cylindrical seals (Oates 2003, 115). The word for horse is first encountered on clay tablets in the Ur III Period in which their status is also put forward. For example, small numbers of horses, together with lions, were fed at the court of King Su-Sin at around 2037-2029 BC. This stresses the special positions horses already had at that time due to the fact that more common animals were not used in such spectacles (Oates 2003, 117). Furthermore, horses were important for society

because of their speed. The horse was used by messengers and for transportation (Oates 2003, 118).

2.3 The development of horse-drawn vehicles

In the Hallstatt Period the wagon played an important role. However, to understand the use of the wagon in the burial tradition of the Hallstatt period it is important to mention the history of the development of horse-drawn vehicles.

It is known that the first wheeled transport with the use of animals was done by oxen and donkeys in Mesopotamia, using so called 'solid-wheeled wagons' (Sherrat 2003, 242). At the end of the fourth millennium BC the first effort was made to adapt carts to harnessing the superior speed of the horse (Kelekna 2009, 65; Sherrat 2003, 242). Human populations migrated into the Eurasian steppes from the Near East at the end of the 3rd millennium BC. These people already possessed advanced donkey breeding skills as well as owning well developed harness and light carts for donkeys (Kosintsev 2006, 133; Sherrat 2003, 238). In the northern Caucasus they came across human populations with domesticated horses. They were able to adapt their knowledge of donkey husbandry and the production of harnesses and wagons to horse breeding (Kosintsev 2006, 133). The wagons mainly consisted out of four wheels and solid platforms and were used for transport. Speed did not play a primary role since the traditional traction animals, for instance oxen, did not have the capability of moving at great speed over a long distance. To control two draught horses, travelling at far greater speed than the traditional ox, experimentation with the weight of the wagon and the harness was needed to produce a more smaller and manoeuvrable vehicle for transport. To lower the weight of the wagons spoked wheels were invented. These kind of wheels are much lighter than the solid disc wheels used before. In Eurasia, where this development started, the spread of spoked wheel technology was so swift that it is not possible to determine whether there was a central point of diffusion or multiple independent inventions (Kelekna 2009, 73).

As a result of the improvements on wagons the first light chariots arrived at the beginning of the second millennium BC (Sherrat 2003, 244). Certain considerations indicate that the horse drawn chariot was developed in the Near East. It's development can be explained by the necessity of greater speed and manoeuvrability in battle (Kelekna 2009, 74; Pare 1992, 12; Sherrat 2003, 244). The first evidence for horse drawn vehicles with spoked wheels comes from pictorial representations of chariots on cylinder seals and clay tablets from

Assyrian colonies in Cappadocia dated around 2000 BC (Pare 1992, 12). Wheeled vehicles as such probably remained a 'prestige' element, rather than an item of everyday use, well into the Bronze Age. The development of chariots originates from the military needs of Near Eastern states, who had the capital investment to afford them. It is unlikely that such a development would have occurred in the steppe lands or in Central Europe due to the absence of pioneer attempts in the context of state-sponsored warfare. (Sherrat 2003, 244). Although the chariot did not gain widespread acceptance in Bronze Age Europe, especially because the level of social development in that area does not seem sufficient to have supported the use of chariots in war, it was rather suited for the realms of cult and mythology.

The start of the Urnfield Period saw the development of the elaborate four-wheeled ceremonial wagon. Eventually it represented an important element of Central European culture and flourished in the Hallstatt Period (Pare 1992, 177). Especially graves in which wagons were deposited provide a good source of information about the start of the wagon-grave tradition (Pare 1992, 17). The earliest examples of these wagon-graves in Central Europe are found north of the Alps. These graves contain wagon parts but mostly lack the presence of horse gear (Kossack 1954, 126). In addition, so-called vessel-carrying wagon models, or *Kesselwagen*, which share some characteristics i.e. symbolism, were deposited in graves around the same time. These wagon models were provided with waterbirds, wheels and a vessel. Like the wagon-graves these *Kesselwagen*-graves are characterized by their rich grave goods and elaborate grave construction. The wagon and the *Kesselwagen* were used to carry the remains of the dead individual and therefore both had an important, possibly related function in the funerary ideology (Pare 1992, 179). This might have been caused by a new religious movement in which wheeled conveyances played an important role. Through their similar symbolism it seems that the wagons of the Urnfield Period and the *Kesselwagen* represent the earliest stage of a new cult tradition in which a wagon had a role as carriage for the dead (Pare 1992, 186). This tradition eventually lived on through the later Urnfield Period and into the Early Iron Age where it continued with the Hallstatt wagon-graves.

2.4 The development of prehistoric horse gear

No Eneolithic artefacts have thus far been found which can be reconstructed as convincing mouthpiece. Therefore it is assumed that bitless bridles, probably evolved from the simple halter for leading or tethering for grazing, had been used

first for directing the horse from horseback or from a vehicle (Dietz 2003, 197). Moreover, the use of organic bits can also explain why no mouthpieces from the fourth and third millennium BC have been found. But organic bits can cause wear on the teeth of a horse. The oldest reliable bit-wear traces on the lower second premolars of horses were found at the sites of Botai and Kozhai 1 in northern Kazakhstan and Russia, dated between 2800-1500 BC (Anthony *et al.* 2006, 138).

Fig 5 The recently discovered bit from Tell Haror (© Paleontological research Corporation).

The first metal object concerning equestrian harness was recently found at a 17th century BC site at Tell Haror, Egypt, in the form of a bronze bit with wheel-shaped cheek-pieces (fig 5). However, there are several types of artefacts made of bone and antler that are assumed to be the check-pieces of bridles but are still subject to debate (Brownrigg 2006, 170; Dietz 2003, 193). For the control of draught horses the use of cheek-pieces is of great importance. The cheek-pieces hold the mouthpiece and bridle in its place. Eastern Europe is considered as the centre of the invention of cheek-pieces which later spread over the Balkans and Greece (Dietz 2003, 193; Pare 1992, 12).

In Central Europe, the first incidental finds of horse harness generally include bronze mouthpieces dating from the beginning of the Urnfield Period at the end of the 13th century BC. Mouthpieces at that time were made of a solid bronze bar with loops at each end. In the 9th and 8th centuries BC. the two-pieced, so-called broken mouthpieces are first encountered in the middle Danube lands, principally in hoards but also in graves. At the end of the Urnfield Period these types of mouthpieces come into use in Central Europe and Italy (Kossack 1988, 101). The mouthpieces from the Urnfield Period have an average width of 70 mm. According to their size they were used for a small breed of horses (Pare 1992, 138; Kossack 1988, 101).

The Hallstatt period is characterized by the introduction of larger bits, indicating the use of a larger breed of horses, probably from the Pontic Steppes (Pare 1992, 138). The bronze bits were replaced by iron bits in the early Hallstatt period (Ha C1). The measurements of the iron two-pieced mouthpieces from graves in

Central Europe are considerably larger than the bits from the Urnfield Period and have an average width of 100 mm (Pare 1992, 138; Kossack 1988, 100). Kossack states that the Hallstatt mouthpieces correspond well with the size groups of central Danubian bits of the 9th and 8th centuries. The form of the cheeckpieces also originates from that area, differing only slightly from those found in Central Europe. Considering that all the parts of bar cheeckpieces must be carefully fitted to the shape of the horse's head and that the manner of bridling during the Hallstatt period replaced that of the Urnfield Period, the animals used in Central Europe must have been breeds obtained from the Danubian lands, and together with them came the new kind of bridle (Kossack 1988, 102).

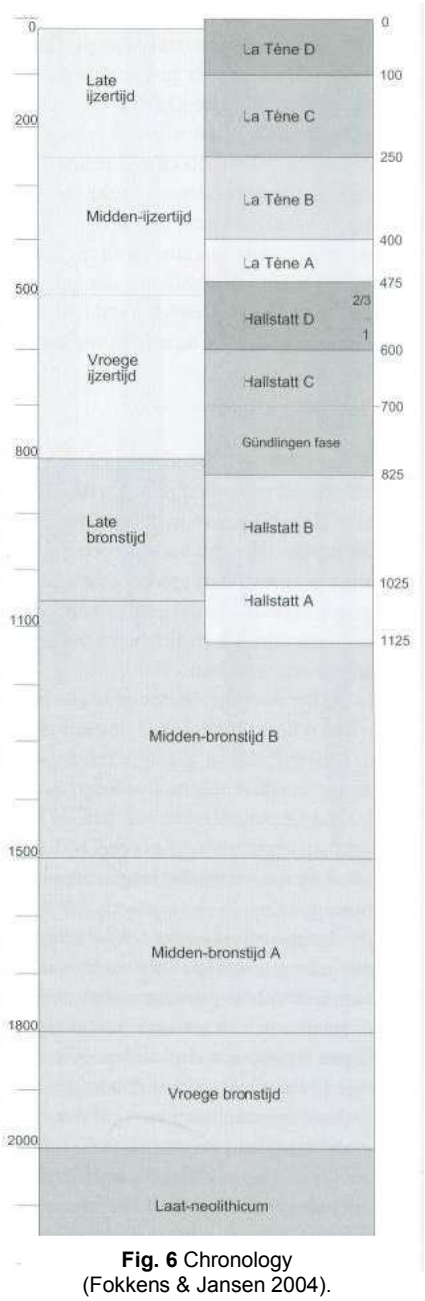


Fig. 6 Chronology
(Fokkens & Jansen 2004).

2.5 Horse gear in the Hallstatt Period

The Hallstatt period is characterized by rich wagon graves. This period roughly starts at the end of the Bronze Age and is taken over by the La Tene Period at the beginning of the Middle Iron Age (fig. 6). The rich graves from this period mainly contained a standardized set of funerary goods: a four wheeled wagon, the harness for a pair of draught horses, weapons and pottery or bronze vessel sets. Besides burying an actually wagon there were also different ways to express the concept of vehicle burial (Pare 1992, 195-198). Graves that only contain wagon components or horse gear for draught horses and also include the other funerary goods are considered to be rich Hallstatt graves (Pare 1992, 195). The wagon components and horse gear are interpreted as a *pars pro toto* deposition of a wagon. The plans of some graves without an actual wagon, such as graves from Frankfurt-Stadtwald (fig. 7) and Planany, seem to be constructed in a way that they take account of an imaginary wagon. The way in which horse gear was part of the burial tradition in the Hallstatt period can be divided into three categories.

The first category concerns the Hallstatt horse gear-graves that include the harness for a pair of draught horses and sometimes yoke components. The second category are known as 'horse-riders graves'. These graves contain the harness for one horse and therefore exclude the possibility that the harness was meant for draught horses. These horse-rider graves are found in the east of Europe and can include the same type of horse gear as the wagon burials and horse gear-graves of Central Europe. In fact, they are considered to be a different burial custom (Pare 1992, 199). The third category contains the harness for three horses. These graves are situated on the border between the distribution of wagon-graves and horse-rider burials. It is suggested that this represented the provision of a third, ridden horse alongside the wagon with the draught horses. It is likely that these graves provide a *pars pro toto* for both ridden and draught horses and can therefore be seen as a manifestation of two burial customs. (Pare 1992, 200).

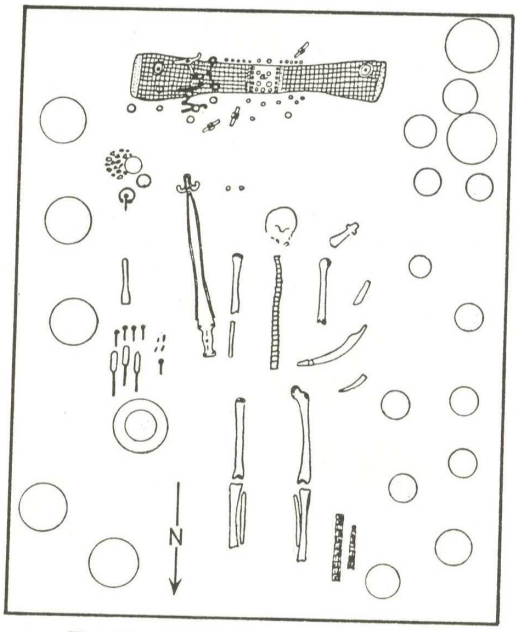


Fig. 7 Grave plan from Frankfurt Stadtwald (Pare 1992, 198).

Thus horse gear was an important element in the Hallstatt burial tradition. The most important types of horse-gear used in the Hallstatt-period are bits, cheek-pieces and decorative ornaments. Through time the different types of objects have been analyzed multiple times in order to establish a reliable typology (Kossack 1954; Pare 1992; Metzner-Nebelsick 1994; Trachsel 2004).

Throughout the Hallstatt-period the wagon and horse gear-graves generally contain the same types of objects. In this period a shift in the burial ritual is visible whereby the (imaginary) wagon as a burial gift became more exclusive. In general, wagon graves became increasingly rare during the Hallstatt-period and horse gear-graves did not even occur anymore in the south of Germany during Hallstatt D (Ha D) (Pare 1992, 203).

The horse-gear found in Hallstatt B3 is quite different from that of Hallstatt C1. The horse gear from early Hallstatt graves is still quite poorly decorated and made of bronze (Pare 1992, 137). The bits do not yet have rein-rings attached to either side. Also the deposition of yokes or yoke-components is not known from this period (Koch 2006, 254). In Hallstatt C this changes. The bits dating from

Hallstatt C1 are made of iron or bronze and do have rein rings. At the beginning of Hallstatt C the inventory of the horse gear is also extended with new objects, most of them used as decoration on leather straps of the bridles or yoke: Tutuli, *Ringfussknöpfen*, rein distributors and *Jochschnallen* (fig. 8). This 'rich' horse gear is traditionally seen as characteristic for the Hallstatt C-period (Pare 1992, 139). Nevertheless, it is useful to note the caution one must take with linking 'rich' horse gear to the Hallstatt C-phase. The typology of Hallstatt horse gear is based on finds from the core area; Bohemia and the south of Germany. Peripheral areas may have continued the production of these types of horse tack after they went out of fashion in the core areas (Pare 1992, 139). It must also be noted that some graves from later periods included re-used Hallstatt C-objects, transformed into pendants or amulets (Pare 1992, 140). For instance the same type of *Tutulus* found in Oss was also found in a grave in Lublewo Gdánskie, where it was transformed into a pendant (See Chapter 4).

In 1978 a rich Hallstatt burial was excavated in Eberdingen-Hochdorf, Germany. It contained the remains of a man together with a wagon and horse gear, a bronze couch, a big bronze cauldron, drinking and feasting equipment and weapons. The grave was dated in the Hallstatt D-phase. Quite unique was the fact that a lot of organic material was preserved. For the horse gear this meant that the leather straps of reins and bridles were still present and the wooden yoke survived including its metal ornaments. Because of that the Hochdorf horse gear could be reconstructed very accurate.

Due to the accurate reconstruction of the Hochdorf horse gear and the extensive publication of the finds (Koch 2006) a lot of new information on the use of horse gear in the Hallstatt Period became available. Although the grave dates from the Ha D-phase the bridle parts and yoke components and the way in which they were applied on the horses is comparable with those dating from the Hallstatt C-phase.

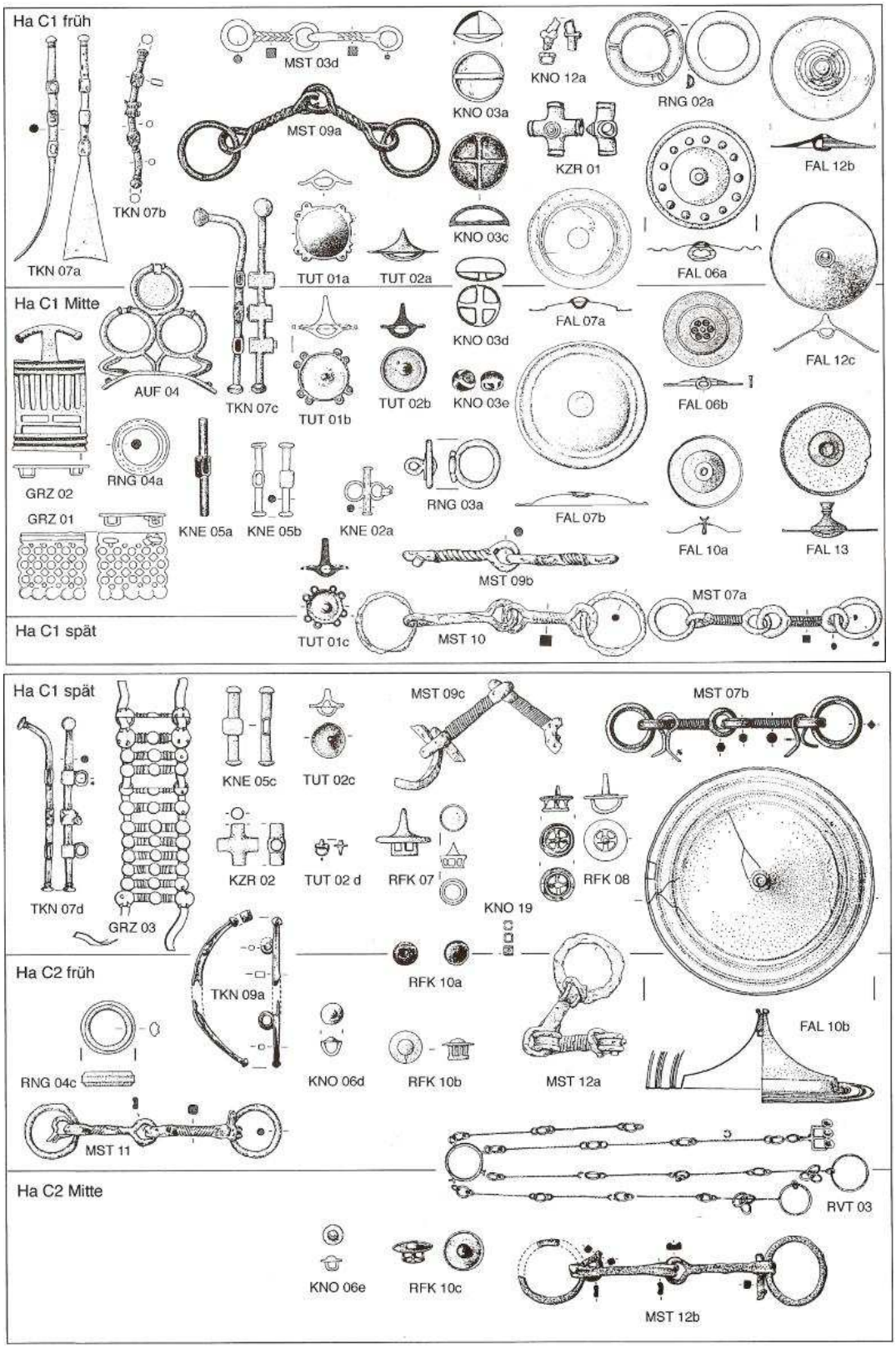


Fig. 8 Characteristic horse gear from the Ha C-Period (Trachsel 2004).

3. The horse gear from the Chieftain's burial of Oss

In 1933 workmen were reclaiming heath nearby the Dutch city of Oss and made a remarkable discovery. Traces of a huge burial mound were found. After a quick investigation by local 'diggers' T. Rouwen and T. Van Dreumel it became clear that the burial mound contained a bronze urn (fig 9). Due to a proper manner of acting by these two men and the municipality archivist J. Cunen the work was stopped and the find was protected until dr. F.C. Bursch from the National Museum of Antiquities arrived and took it with him to the museum in Leiden (Holwerda 1934, 39; Fokkens and Jansen 2004, 10).

3.1 Research History

After restoration in Leiden by D. Versloot the urn appeared to be a bronze bucket, or *situla*. The remains of the *situla* were very fragile and in pieces. The only way to restore the object was to attach every piece to a plaster mould. The content was examined and it appeared that, besides the cremated remains of a person, various kinds of objects were present (Holwerda 1934, 39). It became clear that these finds were part of a relatively rich Early Iron Age grave which was soon called the 'Chieftain's grave of Oss'.

Fig. 9 The bronze *situla* as it was found in 1933 (Fokkens and Jansen 2004).

One of the most striking feature among the objects from this grave was a bent iron sword of the *Mindelheim* type. The pommel and hilt were probably made of wood and/ or bone decorated with gold leaf. Among the finds J.H. Holwerda, head of the National Museum of Antiquities, recognized and published the remains of two daggers, two elliptical plates of bronze, a tubular cross-shaped bronze object, three small solid bronze rings, a whetstone and pieces of wood and textile. Based on the typology of the sword and *situla* Holwerda dated the grave to the 5th century BC (Holwerda 1934, 40-48).

After the discovery of the 'Chieftain's grave of Oss', Holwerda decided to excavate parts of the barrow in the summer of 1933 to determine its shape and the way in which it was built up. During the excavation he concluded that the

barrow had two ring ditches, a diameter of approximately 52 meters, and was built up out of sods of heath (Holwerda 1934, 50-51). In 1935, per request of J. Cunen, a new excavation started under the supervision of Dr. F.C. Bursch. This time the surrounding area of the Chieftains grave was investigated and three other barrows were excavated dating from the Bell Beaker period and the Middle Bronze Age (Fokkens and Jansen 2004, 91-92).

There was renewed attention to the finds from Oss in the 1960's. After a visit of Prof. Kossack from the University of Kiel, specialized in the archaeology of the Hallstatt Period, Prof. Modderman from the Faculty of Archaeology of the University of Leiden thought that the finds from Oss needed a new description after 30 years due to the fact that new knowledge was gathered and some unattractive though interesting pieces from the grave had not yet been published (Modderman 1964, 57).

For the first time the actual cremation remains were examined by Dr. J. Huizinga of the Institute for Bio-Anthropology of the University of Utrecht. He concluded that the cremation belonged to an individual, probably a man, who was not older than fifty years when he died. A striking discovery was a bony growth on the spinal column caused by a disease which restricted the man's flexibility (Modderman 1964, 57). Another 30 years later, the re-examination of the cremation remains by drs. L. Smits in 1993 showed that they belonged to a man of 40 to 60 years of age. Smits also noticed the concrescence of the vertebrae and stated that the chieftain suffered from a disease called *Diffuse Idiopathic Skeletal Hyperostis* (DISH). This is nowadays is linked to diabetes. The man was therefore limited in his movements, could walk poorly and could not handle tough physical labour (Fokkens and Jansen 2004, 67).

Modderman's interest was also drawn to a rusty lump. To him the lump seemed to be of great interest because it consisted of all sorts of iron rings and bits, originating from bridles, which were not understood at first sight (Modderman 1964, 57). Furthermore, for some objects it was known that they existed but they were simply not described in the publication of Holwerda. Among the new objects Modderman distinguished two knives, an iron socketed axe, eight small hemispherical bronze buttons for the decoration of leather objects, horse bits and cheek-pieces, iron rings, fragments of carved wood and fragments of textiles. Holwerda had suggested that pieces of wood on the blade of the sword were part of a sheath because the grains of the wood ran parallel to the length of the sword (Holwerda 1934, 40). After reconsideration Modderman did not share this

explanation. The way in which the sword was placed in the *situla* made it impossible for a sheath to be bent in the same curve as the sword (Modderman 1964, 58).

For the first time the presence of two sets of horse gear in the chieftain's grave of Oss was evident. In this way Modderman could place this grave among others found all over Central Europe. G. Kossack had already pointed out three typical objects from to Oss grave as part of a horse harness and now the iron bits could also be determined as such (Kossack 1954, Modderman 1964). Modderman ends his article with the comment that due to this discovery the chieftain of Oss must have had close connections with Central Europe. With the help of Kossacks typology he dated the grave in the Hallstatt C1-period, the first half of the 7th century BC (Modderman 1964, 61).

After the discovery in the 1930's little attention was drawn by the actual location of the grave and barrow. Therefore it was uncertain where the site was located when it had to be re-examined in the 1990's because the area would be developed as an industrial area. In 1997 the Faculty of Archaeology of the University of Leiden started an investigation in an attempt to relocate the barrow of the chieftain of Oss (Fokkens and Jansen 2004, 7). The results of this research were combined with the re-examination, including the cremation, and restoration (by J. Kempkes and T. Lupak) of the finds (Fokkens and Jansen 2004, 54). Within this research the excavators were able to relocate the barrow (fig 10).

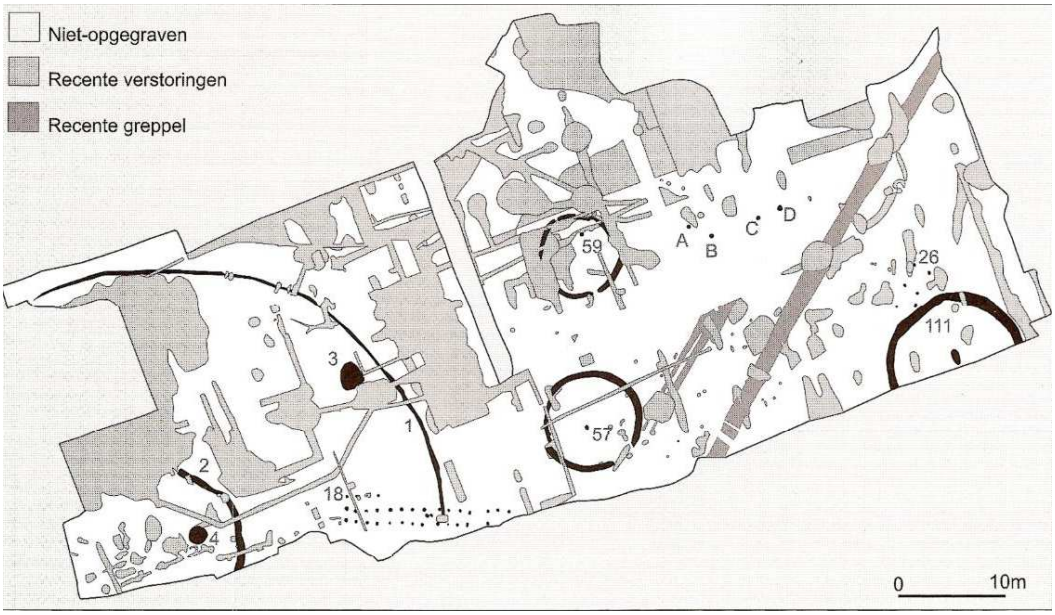


Fig. 10 The relocated barrow of the chieftain of Oss (left) and the new discovered barrows. On the mid-left the *allée* can be recognized as a double row of postholes (Fokkens and Jansen 2004).

Although the site was subject to recent disturbances, the two ring ditches of the barrow were found again. It could be determined that the inner ditch had a

diameter of 16 meters and the outer ditch had a diameter of 53 meters. Holwerda thought that the inner ditch was part of the Iron Age barrow but the new excavation pointed out that it was part of an older, probably Middle Bronze Age or Neolithic burial mound (Fokkens and Jansen 2004, 134). Other new findings in this excavation campaign were the discovery of three barrows and an *allée*, which runs partly under the Chieftain's barrow and is therefore probably older (Fokkens and Jansen 138).

Even 60 years after the discovery of the grave new information and objects were retrieved from the finds (fig. 11). During the re-examination of the *situla* and its content some remarkable discoveries were made. One of the pieces of which Modderman thought to be the end of an antenna sword appeared to be the actual end of the *Mindelheim* sword. Another piece of which was thought that it was part of an antenna sword also tuned out to be part of the *Mindelheim* sword. The four fragments of iron, of which Modderman concluded that they were parts of knives, turned out to be one knife, one piece of (unidentified) iron, and one razor blade (Fokkens and Jansen 2004, 57-61). During the restoration of the finds Jo Kempkes also discovered a third, complete pin with a bronze knob, or so called *Bombenkopfnadeln,* designed to keep two overlapping pieces of clothing together (Fokkens and Jansen 2004, 62).

Fig 11 Most of the finds from the princely Grave of Oss (© RMO).

In 2011 the finds from Oss were re-examined together with the Hallstatt burials of Meerlo, Rhenen and Wychen (Van der Vaart 2011). The artifacts from these graves were inventoried and photographed all together for the first time. This

research focused on the description of all the finds (including all organic and metal fragments that weren't published before) and the reconstruction of the burial rituals. it was examined which objects belonged to the bridles or the yoke and for the first time a reconstruction was made of the horse gear.

3.2 The horse gear from Oss

The princely grave of Oss contains elements of horse gear varying from pieces of bridles to yoke components. In the following text each object is described and replaced within its assumed position of the bridle or yoke. By doing so a realistic reconstruction of the bridle and yoke can be made (see chapter 5). For the typology of the objects the publication of M. Trachsel (2004) is used. The find numbers of the objects are derived from the inventory list of the princely grave of Oss made by Van der Vaart (2011). Maps with the distribution of the objects can be found in Appendices 1–5. The iron bits with rod-shaped cheek-pieces and rein-rings (*1933/7.10i* and *1933/7.10h*) are the most distinctive objects (fig. 12). These objects came to light during the restoration of 1963 when the rusty clump from the *situla* was examined. The clump revealed two bits and fragments of cheek-pieces. After the 1990's restoration by Kempkes and Lupak a complete set of bits with cheek-pieces were reconstructed out of these fragments.

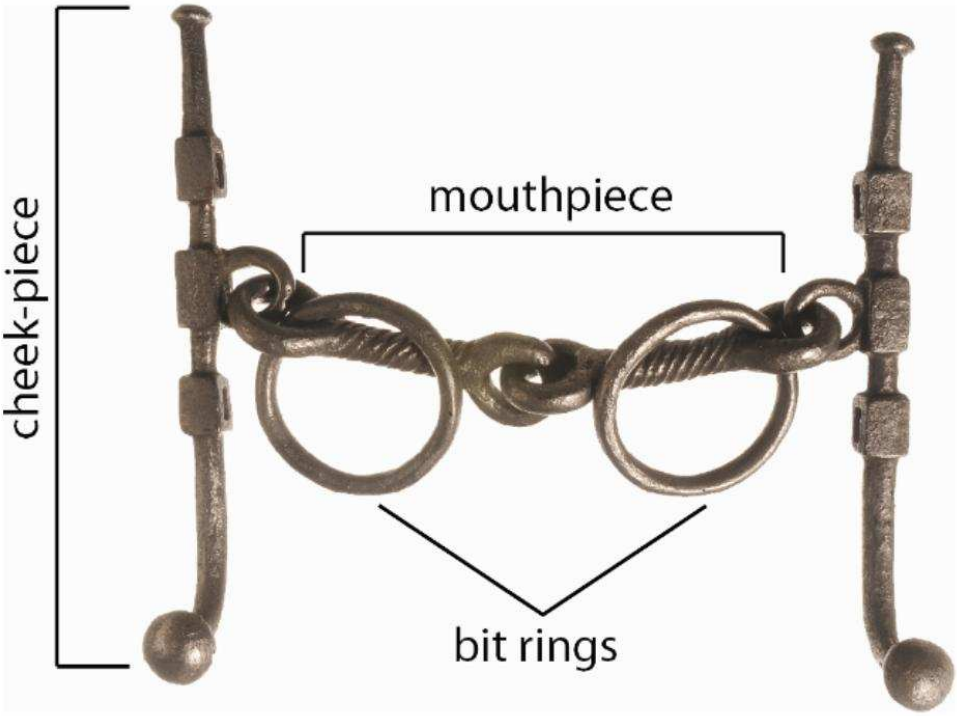


Fig. 12 Terminology of the bit. In this figure bit *7.10i* is depicted (Van der Vaart 2011).

3.2.1 The bits

The bits are so called 'broken' mouthpieces and consist of bit-rings connected to either side of the mouthpiece, made of two iron rings that were joined and twisted into bars with loops at each end. These loops attach the cheek-pieces and the bit-rings to the mouthpiece. One of the rein-rings of *7.10i* is bigger than the other. The bars of the bits are grooved.

The bits are of type MST09b (Trachsel 2004, 486). This type of bit has been found in 23 inventories spread over Central Europe (App. 1). Most of the 09b-bits have been found in Bohemia, the east of Bavaria and the area north of the Alps. In the distribution a cluster of six sites can be noticed in the east of Bavaria north of the Danube river. Nowadays the bits from Oss and Court Saint Etienne are the only examples of 09b-bits in the Lower Countries. To the east the sites of Ritopek and Sofronievo appear to be isolated from the 'core area'.

3.2.2 Cheek-pieces

The rod-shaped cheek-pieces are identified as a type TKN07e (Trachsel 2004, 544). They each have two holes in the straight section of the bars to attach two leather straps of the bridle. The rods are attached to the bit by an iron ring which is situated between the two strap holes. At each end of the rods there are round knobs. One end of the rods is longer than the other and is curved. The cheek-pieces of bit *7.10h* differ slightly from the cheek-pieces of bit *7.10i*. For instance, the knobs on the short ends of the *7.10h* cheek-pieces are a little smaller than those of *7.10i* (fig. 13).

These kind of cheek-piece has been found in 24 inventories across Europe. In the distribution of these finds no big clusters can be identified (App. 3). Generally these objects are found in the same areas as the 09b-bits. The only difference with the distribution of the bits is the fact that the bar cheek-pieces are found to a

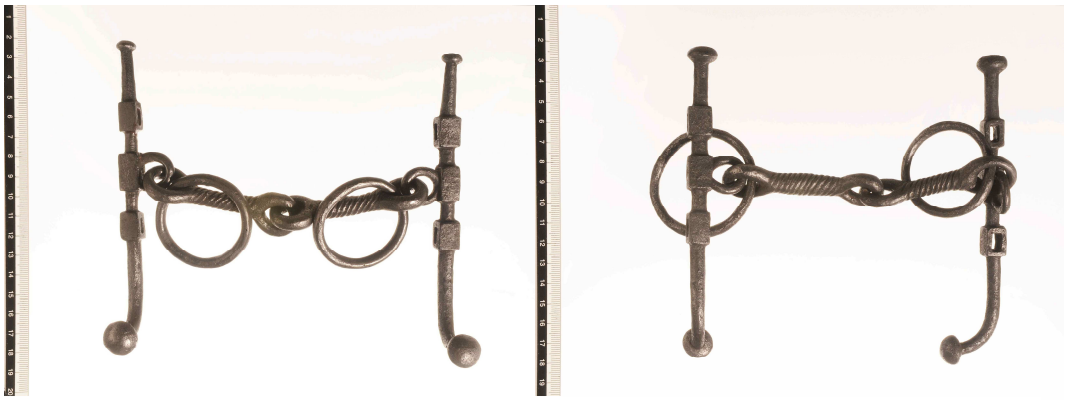


Fig. 13 The two bits with attached cheek-pieces and rein-rings (*7.10h* left and *7.10i* right) (© RMO).

greater extend in eastern Europe. In four inventories, including Oss, this combination of bits and cheek-pieces have been found.

3.2.3 Bronze rings

Besides the bits and check-pieces there are several other objects recognized as being part of the horse gear. For the fastening of the different leather straps of the bridle three bronze rings (*7.5*) could have been used (fig. 14). A precise function is lacking due to the fact that it is very hard to know where these pieces were originally situated. On basis of their deposition in the situla, associated with the position of the bits, it is assumed that they were part of the bridles (Van der Vaart 2011, 99).

Fig 14 The three bronze rings (© RMO).

3.3.3 Tubular cross-shaped object

The bronze tubular cross-shaped object (*7.7*) is a very interesting piece(fig. 15). It is about 4 cm wide with tubes measuring about 0.6 mm. The bottom side of the object is open. It is often suggested that this object was used as a strap distributor on the bridle (Koch 2011, *pers. comm*.; Fokkens and Jansen 2004, 61). This seems likely at first sight because the tubes are hollow and therefore suitable for the distribution of straps. Nevertheless, the very small size of the

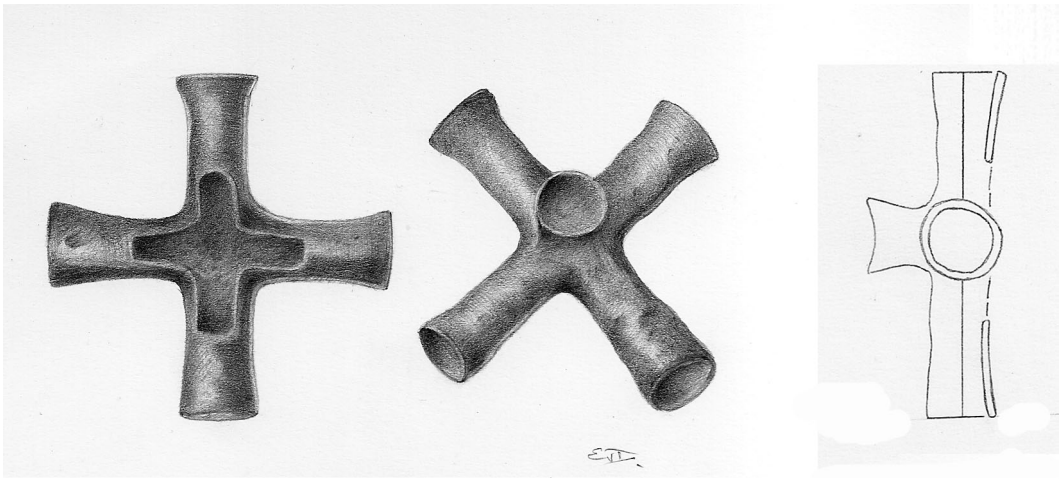


Fig. 15 The tubular cross-shaped object (Drawing by E. van Driel).

tubes would indicate that the straps of the bridle would have been no thicker than a shoestring. Moreover, a bridle does not have an overlay of straps in the shape

of a perfect cross. It is therefore doubtful that this object had a functional role and, in my opinion, it was more likely part of the decoration of the bridle (see Chapter 5).

This object, type KRZ02, has been found in nine different places in Europe (App. 3) of which two pieces, from Slovenia and Hungary, are known as loose finds (Trachsel 2004; 479). Table 1, which excludes these loose finds, shows that most inventories include multiple crosses. In Oss, Hallstatt and Rosegg only one of such an object has been found. When looking at the distribution map one can notice the relative absence of this kind of object in the western part of the core-area.

Inventory/ # objects	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**x**	
Oss	x									
Hradenin				x						
Pullach-Süd								x		
Mitterkirchen				x						
Hallstatt	x									
Rosegg-Frög	x									
Brno-Holasky									x	
Dobrnic-Reva				x						

Table 1 Inventories containing one or more cross-shaped objects, type KRZ02. X=unknown.

3.3.4 Tutulus

Another typical bronze object from the grave is a *Tutulus* (*7.18*). This disc-shaped object (fig. 16) with small rings on its edge, a pin in the centre and a loop on the back was also a decorative part of the bridle. A strap from the bridle ran through the loop on the back to hold it on its place. It is assumed that the shape of *Tutuli* developed out of Late Bronze Age decorated buttons. The *Tutuli* became smaller over time during the Hallstatt C1 phase and eventually disappeared in the Hallstatt C2 phase (Trachsel 2004, 547). The shape of the *Tutulus* of Oss is unique; its distinctive bell-shape is different than the disc-shape of

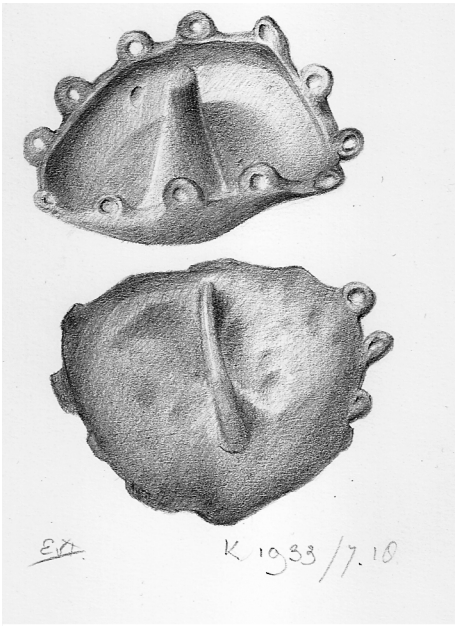


Fig. 16 The tutulus from Oss, top and bottom (Drawing by E. van Driel).

other *Tutuli* found in Europe. Therefore it is possible that it was produced locally. Another explanation is that the shape altered over time due to deformation in the ground and heavy restoration.

In the typology of this object a distinction is made between *Tutuli* with attached small rings (TUT01) and *Tutuli* without them (TUT02). Furthermore these categories include subcategories depending on the size of the object. The *Tutulus* found in Oss is identified as a type TUT01b. There are only six other inventories in Europe that contain the same type of object. Because type 01b and 01c are only different in size they are both included in the distribution map (App. 4). No cluster can be recognized in their distribution. In Beratzhausen the grave also contained 09b-type bits as described above. Remarkable are the *Tutuli* found in the north of Europe of what is now Poland. The *Tutulus* found in Lublewo Gdánskie has been used as a necklace while the *Tutuli* found in Solniki Male were probably part of a hoard instead of a grave (Trachsel 2004; 548).

Table 2 shows all the inventories with this type of *Tutulus* and in what number they occur. Most of the inventories include two or more of these objects. Only three inventories exist that include only one of such an object. The most obvious explanation for this is that bridles were decorated with at least two of these objects.

Inventory/ # objects	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**X**
Oss	x														
Beratzhausen														x	
Emmerting-Gendorf	x														
Morasice			x												
Bylany								x							
Somlóvásárhely															x
Kameniec	x														
Mitterkirchen Grave 4					x										
Beilngries im Ried										x					
Thalmässing-Alfershausen									x						
Wiesenacker Mound 4								x							
Bad Rappenau								x							
Tannheim-Härtle		x													
Lublewo Gdánskie		x													
Solniki Male				x											

Table 2 Inventories containing one or more *Tutulus*, type TUT01. X=unknown.

3.3.5 *Bronze hemispherical sheet-knobs*

In total 12 (fragments of) loose bronze hemispherical sheet-knobs (*7.4a-l*) have been found (fig. 17). Three others are still corroded onto other objects (*7.10j* and *7.20a*). Some of the knobs still have two small legs These legs are bent inwards

which indicates that they were attached on soft material such as leather. In general knobs attached to hard material, such as wood, have straight legs. Bronze sheet-knobs from Hallstatt burials are known to be attached on the leather straps of the yoke as well as on bridles (Koch 2006, 135-136). In the case of the burial of Oss it is likely that the knobs were part of the bridles due to their position in the *situla* (Van der Vaart 2011, 88). Two of them are corroded on the mass of iron rings and one other is attached to a loose ring. Some bronze remains have also been found on the bits and cheek-pieces and on some iron ring fragments. Moreover, the knobs were situated far lower in the bucket than the yoke components which makes it not likely that they were part of the decoration of the yoke. This indicates that the objects on which the knobs were attached were deposited with the rest of the horse gear and makes it therefore more convincing that they were used as decoration of the bridle (Van der Vaart 2011, 99).

Fig. 17 The 12 loose hemispherical sheet-knob from Oss (© RMO).

3.3.6 Yoke rosettes

A number of objects from Oss can be assigned as being part of a yoke. Two rosettes (*7.6*) fastened leather panels on the yoke (fig. 18). They were nailed on top of the yoke at each end for the fastening of leather straps. These oval objects are made of bronze and have a hole in their centre for a nail to fasten them on the wooden yoke. Comparable rosettes have been found *in situ* in Plaňany grave 5 and Hradenín graves 24 and 46 (Pare 1992,198; Koch 2006,134). In these graves the rosettes were still attached onto the wooden yoke. Trachsel distinguishes two types of yoke rosettes. Based on the form of their rims the type 2 rosettes are divided into three subtypes. The rosettes found in Oss are of type 02a, with broad and concave curved edges (Trachsel 2004, 462). The objects were removed from the wooden yoke before they were deposited in the *situla*

(Van der Vaart 2011, 88). A total of ten inventories are found in Central Europe that also contain the JOCH02 type yoke-rosettes. The distribution of the objects shows a cluster of rosette finds in Bohemia (App. 5). This cluster only contains variant JOCH02a and JOCH02c. Except from Oss all rosette finds are located in Central Europe of what is now Germany, Austria and the Czech Republic.

Fig. 18 The two yoke rosettes from Oss viewed from the top (left) and bottom (right) (® RMO).

3.3.7 Toggles

Two toggles (*7.10e* and *7.10f*) were probably used for the fastening of leather stomach or breast straps of the horses' harness to keep the yoke on its place while pulling a carriage (fig. 19). These objects were the forerunner of the buckle. The strap of the stomach or breast strap was attached to the toggle by the hole in the middle. The toggle was then pulled through a ring, attached to the yoke, to fix it all together. This kind of fastening is also used in the reconstruction of the horse gear from Thalmässing-Alferhausen (Koch 2004, 30). Interesting to note is that one should expect wear on the bars of the toggles caused by friction. In this case, no traces of wear can be observed.

Fig. 19 The toggles from Oss (© RMO).

3.3.8 Miscellaneous

At least 12 iron rings (*7.10j, 7.10k, 7.10l*) are found in the grave of Oss (fig. 20). It has to be noted that these rings came out of the situla in very bad shape. They were very corroded and sometimes broken into many pieces. They have been heavily restored. It is therefore not unusual to think that the rings now differ from their original shape. These rings could have been part of the bridle as sometimes

is suggested (Fokkens and Jansen 2004, 61) but also could have had something to do with the control of the reins. In that case it is possible that the rings were attached to the yoke.

Fig. 20 Mass of iron rings (*7.10j*) Note the two bronze sheet-knobs corroded onto the rings (© RMO).

3.4 Distribution

The objects found in Oss are not unique in the rest of Europe. What makes them unique is that generally these kind of objects are found in Central Europe. As shown in the distribution maps, it seems that Bavaria, Bohemia and the area north of the Alps include most of the finds. Especially the yoke rosettes, *Tutuli* and the cross-shaped object are only found in that region, whereas the bits and cheek-pieces are also found in the east and south of Europe. Therefore, Bavaria, Bohemia and the area north of the Alps can be seen as the 'core area' from where the objects of Oss originated. Oss is the only place in the Rhine area where these types of objects have been found, except for the bits, cheek-pieces and sheet-knobs. It seems that the form of the bar cheek-pieces and the bits, as often suggested (Metzner-Nebelsick 1994, 399), originate from eastern Europe and finally spread across the rest of Europe. Furthermore, in the region between the core area and the Lower Rhine Area no objects have been found.

4. The horse gear from Oss in a European context

The Hallstatt grave of Oss is in itself a unique grave and one of the few Early Iron Age 'princely graves' found in the Lower Rhine Area. These graves are characterized by their imported grave goods such as bronze *situlae* and horse gear. Remarkably, all grave goods from a sample of Dutch graves together have only recently been investigated and compared (Van der Vaart 2011). For the Low Countries graves as these are exceptional but fit into a wider context of the Hallstatt burial tradition of Central Europe in the Early Iron Age. This chapter will deal with comparable graves found in Europe and dated to the same phase as the burial of Oss (Hallstatt C). Nevertheless we must note that different types of horse gear could have been used during the same time. For this investigation I will only compare the types of horse gear similar to those found in Oss. In the following chapter the distribution and a statistic analysis of the object categories will be investigated. The abbreviations used in these analyses are taken from the chronological study of Trachsel (2004).

4.1 The statistics

As discussed in Chapter 3 the Hallstatt C-period is known for its 'rich' horse gear. Ornaments to decorate the bridles and the yoke have been found in many different types but in general these types are categorized. It appears that there is a standardized set of horse gear-objects appearing in graves. Trachsel identifies 13 categories of horse gear appearing in graves in the Hallstatt C-period: bronze sheet-knobs (BES), *phalerae* (FAL), belt decorations (GRZ), hooks (HKN), yoke components (JOCH), toggles (KNE), buttons (KNO), rein distributors (KZR), bits (MST), *Ringfussknöpfen* (RFK), cheek-pieces (TKN), *Tutuli* (TUT) and rein-hooks (ZHK). Within the following statistic analysis these categories will be further investigated.

In total, 60 inventories are selected for the statistic analysis. The condition for the selection was that every inventory has at least one similar object of the same type as one of the objects from Oss. Next, it is investigated if there are any other object categories of horse harness present in the selected inventories. In this way it can be checked whether the harness from Oss is complete or if some object categories are missing. It will also be possible to see if there is something 'unique' about the inventory of Oss.

The table in Appendix 6 gives an overview of the results of this comparative study. On the vertical axis of the table one can see the selected inventories in alphabetical order. When inventories have been found in the same place, the names of these have extra features. This has to be done to avoid confusion and therefore, for example, a feature includes the place name and grave number of the inventory.
On the horizontal axis the abbreviations of the categories are indicated. Because of the fact that the categories are derived from Trachsels study the abbreviations are of German origin. Hence, the word for bit is abbreviated with the letters MST (*Mundstücke*). Also these categories are listed in an alphabetical order.

4.1.1 Results

First of all, the exact inventory of harness from Oss does not have a clear parallel in the rest of Europe. A total of 15,3% (X=9) of the inventories includes more categories than Oss, but a vast majority of 81,4% (X=48) has less. Oss includes seven out of the 13 object-categories presented in the table. 28,8% of the other inventories include at least one of the seven categories from Oss while they also lack the others.
The category that is lacking in Oss but is most often part of the inventory of others is KNO (*Knöpfe*; nodes that are part of the bridle in some way or another and cannot be categorized as *Tutuli*, *Ringfussknöpfe* or *phalerae*). This category has been found in 49,2% (X=29) of all the inventories. The second most common category that was not found at Oss is *Ringfussknöpfen*. Of all the inventories 32,2% (X=19) included one or more of these objects. 25,4% (X=15) of the inventories included belt decorations while 13,6% (X=8) included *phalerae*. Noteworthy is that none of the inventories included hooks (HKN).

The most common object which was also found in Oss is the bit. Most of the inventories, namely 79,7%(X=47), included one or more bits. Another common object is the bar cheek-piece. This category is included within 52,5% (X=31) of all the inventories. More than a third of the cases, 35,6% (X=21), contained *Tutuli*. Toggles and yoke components were present in circa a quarter of the inventories, respectively 27,1% (X=16) and 23,7% (X=14). The most absent of all categories are the rein distributors. Only 10,2% (X=6) of the inventories included one or more of these objects.
There is a total of three inventories that are the most similar in content than that of Oss: Thalmässing-Alferhausen, Platenice Grave 5 and Planany Grave 5.

These inventories include all categories of Oss except for the toggles. Besides the similar categories as Oss these inventories also include buttons (KNO). Planany and Platenice also contain *Ringfussknöpfen* and rein-hooks while Thalmässing solely includes belt decorations in its inventory.

4.1.2 Analysis

The results show that the inventory of the harness from Oss is one of the most diverse in Europe. More than half of the object-categories of Hallstatt C-harness are present at Oss. Although no inventory has been found which corresponds exactly with that of Oss, there are some sites of which the composition of the objects is broadly similar.

It is remarkable to note that the vast majority of the inventories contained only a few categories of horse gear. Figure 21 shows that the inventories can be divided into two groups of which the first group only contains one to five different types of categories. The second group contains a diverse range of categories ranging from six up to nine different types of harness. The number of inventories in this group is far more smaller than the first, 'simpler' group.

Bits (79,7%) and bar cheek-pieces (52,5%) are the most common categories of horse gear within the inventories. In addition, the categories of objects that have to do with the decoration of the bridle are often present, of which the *Tutuli* are the most common (35,6%). In almost a quarter of the cases parts of a yoke are present, which makes clear that the objects deposited in the graves indicate a pair of draught horses.

It is evident that most inventories only contain a limited number of object-categories (fig. 21). For this there are several explanations to consider. Firstly, there are many graves which were excavated more than a century ago at a time when excavation methods and techniques were very different from what they have been in the past few decades. It has to be taken into account that more categories of objects were deposited during the funeral but only a few survived time and their excavations many centuries later.

Secondly, a horse's harness can be made out of a limited number of different objects. It is possible that some very rich graves only contained bridles which were provided with only a limited number of metal ornaments. Graves containing horse gear with a large number of object categories could have been quite quickly gathered together to have at least two bridles for the funeral.

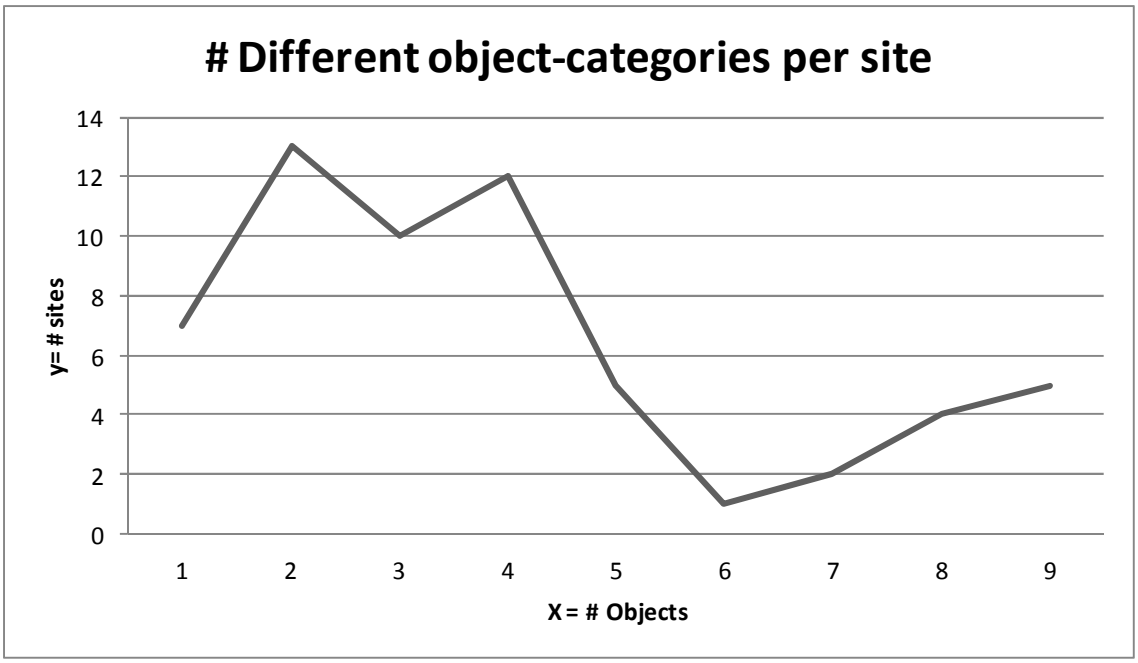


Fig. 21 The number of different horse gear categories per inventory (Figure by athor).

It should also be taken into account that some situations, especially the way in which the objects were deposited, differ from the deposition of the objects from Oss and other Hallstatt graves. In that way the same types of objects might have had another meaning or use. For example, the objects from Budinjak were probably part of a horse rider-grave whereas the *Tutulus* found in Lublewo Gdanski was secondarily used as a pendant.

5. Reconstructions

The fact that most parts of a bridle are made of organic material makes them problematic to reconstruct. Most of the time these organic parts do not survive in the archaeological records. Of course there are exceptions, such as the Hallstatt burial of Eberdingen-Hochdorf (Koch 2006). This burial included a pair of bridles and because of the good conservation conditions a lot of organic material was conserved. It was therefore possible to reconstruct the bridles as realistically as possible. The Eberdingen-Hochdorf bridles are characterized by large *phalerae* used as decoration, and hemispherical cheek-pieces made of wood and bronze. Finds like these give a glimpse of what a bridle looked like in the Early Iron Age. Nevertheless the finds from Eberdingen-Hochdorf are much younger and of another type than the horse gear from Oss. In this way we cannot assume that the construction of both types of bits and bridles were the same.

5.1 Previous reconstruction of Hallsatt C-bridles

In 1954 G. Kossack published the reconstruction of a bridle from Mindelheim grave 11 in his typology of Hallstatt horse gear (fig. 22). The finds are dated in roughly the same period as the princely grave of Oss; Hallstatt C. The grave contained the same type of bit and cheek-pieces as the ones found in Oss. Kossack states that it is not possible to reconstruct the bridles of all Hallstatt finds but some indications made it possible to reconstruct at least the bridle from the Mindelheim grave (Kossack 1954, 116).

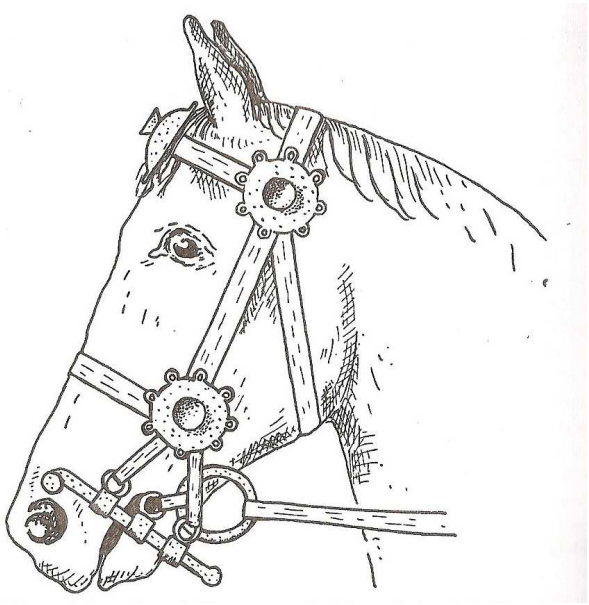


Fig. 22 The reconstruction of the bridle from Mindelheim (Kossack 1954).

In his reconstruction two iron rings, one attached at each end of the bit, are recognized as the fasteners for reins. Besides their function as rein fastener these rings could have been attached to the leather cheek-pieces, or '*Backenstücks'*, of the bridle (Kossack 1954, 115). The other elements attached to the bit are the iron bar cheek-pieces, or '*Knebelstangen'*, in this case

recognized as Kossack's type Ib. They consist of a metal bar with knobs at both ends. One of the ends of the bar is curved. In the middle of the bar there are three square or rectangular blocks for the fastening of the bridle and the bit. In his reconstruction, Kossack attaches the iron bars to the *Backenstücks* by the upper and lower blocks on the iron bars. The bars were attached to the bit by the middle block. An iron ring connects the bars to the bit. The upper and lower blocks sometimes have iron rings attached to them or were hollow for the fastening of leather straps. In his reconstruction he mentions that the bent ends of the bars point upwards (Kossack 1954, 119).

Kossack bases his reconstruction theory of the bar cheek-pieces on a find from Thalmässing-Alferhausen. This find includes a horse bit complete with type 07e cheek-pieces and rein-rings, all still attached to the bit rings. He states that this bit can only be worn by the horse if the bent ends of the cheek-pieces point upwards (Kossack 1954, 119). This is also stated by Dr. Koch in her reconstruction of the Thalmässing-Alferhausen bridle (fig. 23). She shows that an indication on how the bit and cheek-pieces are positioned can be derived from the wear on the bits (Koch 2004, 30). Most of the bits and cheek-pieces are often so much eroded or restored that possible wear caused by the teeth of the horse or long-term use is completely gone. This is not the case with the iron bits from Thalmässing-Alferhausen in Germany and a bronze bit from Budinjak in Croatia. From the first it is known that the loops of the bit have been repaired with bronze while it was in use. The latter show wear and abrasion in the inner loops of the bit. It is caused by the angle in which the bit lies in the mouth of the horse. That can only be achieved when the horse wears the bits with the bent rods of the cheek-pieces pointing upwards (Koch 2012, *pers. comm.*; Koch 2004, 30).

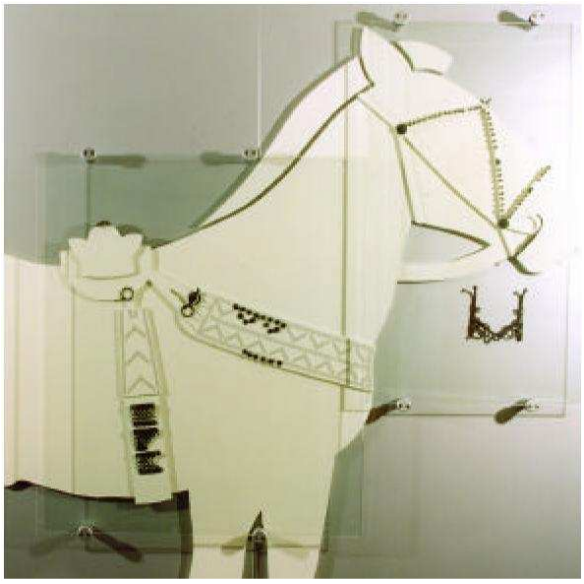


Fig. 23 Reconstruction of the bridle and yoke from Thalmässing-Alferhausen (Koch 2004).

Kossack briefly discusses the possible function of the bar cheek-pieces of his type Ib (Kossack 1954s, 120). Besides his comment that they could have had something to do with an '*Aufsatzzugel*' (double reins) or a '*Kappzaum*' (cavesson)

he does not provide any further technical explanation. After his publication most research of Hallstatt C-horse gear focused solely on typological aspects (Kossack 1954; Pare 1991; Pare 1992; Metzner-Nebelsick 1994; Trachsel 2004). For a more technical approach Koch provided a lot more information in her publication of the Hochdorf horse gear. Although the types of horse gear she reconstructed are of a completely different type, as mentioned above, her technical research on horse gear in general is useful.
Van der Vaart (2011) already made a reconstruction of the bridle and yoke from Oss. in her reconstruction she positions the bar cheek-pieces with the bent ends downward. Nevertheless she doesn't give an explanation for that. Moreover, she does not address any function to the bars.

Following this reasoning, the reconstruction of the bridles from Oss (fig. 24) could be as follows: The most obvious objects that can be attributed to the bridles are the bits, rein-rings and cheek-pieces. The examples from Thalmässing-Alferhausen and Budinjak indicate that the bent ends of the cheek-pieces pointed upwards. The bars of the iron cheek-pieces were connected with the leather straps of the cheek-pieces of the bridle, running through the crownpiece and the throat lash. At the point where these straps meet the bronze rings or the cross-shaped rein distributor - although this piece is still subject of debate - are placed to hold the bridle-parts in their place. For the decoration of the bridles the *Tutulus* and the hemispherical bronze sheet-knobs were used. On which strap of the bridle these sheet-knobs have been attached is uncertain and therefore they do not occur on the reconstruction.

The reconstruction of the yoke is less problematic. For the Hallstatt C-period we have examples of complete yokes found *in situ*, for example from Hradenín (fig. 25). This makes it easier to reconstruct the yoke from Oss because at Hradenín the complete wooden yoke and leather straps were preserved and dated to the same period. Moreover, Van der Vaart (2011) published a reconstruction of the yoke from Oss which (fig. 26) which, in my opinion, is correct. The yoke rosettes are fastened on each side of the yoke. for the fastening of the leather breast and belly straps iron rings and toggles are use.

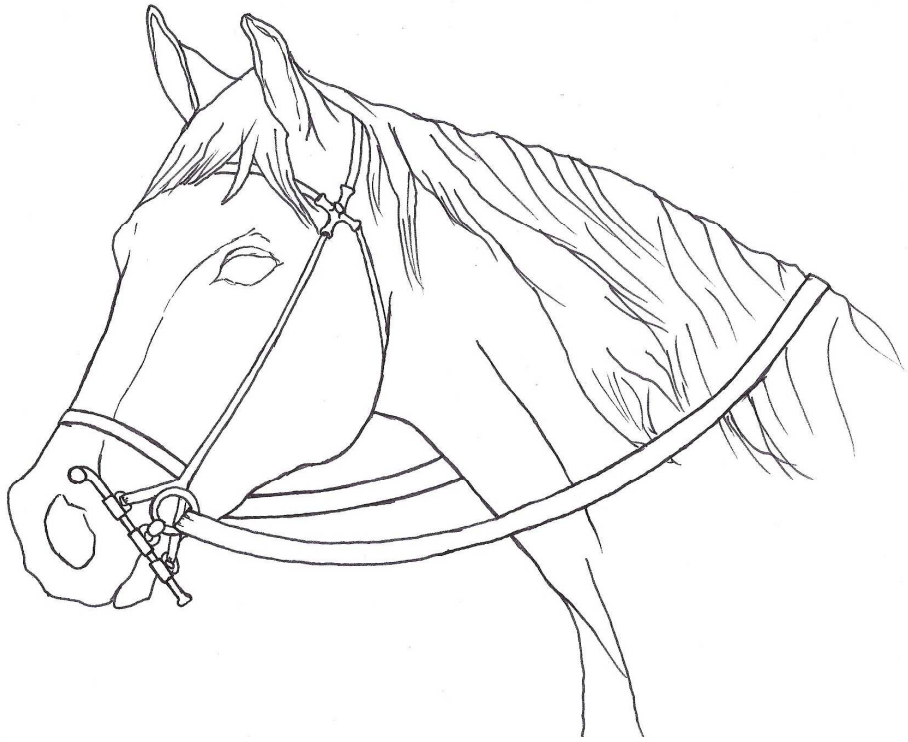


Fig. 24 Reconstruction of the bridle from Oss on basis on the view of Kossack and Koch (drawing by author).

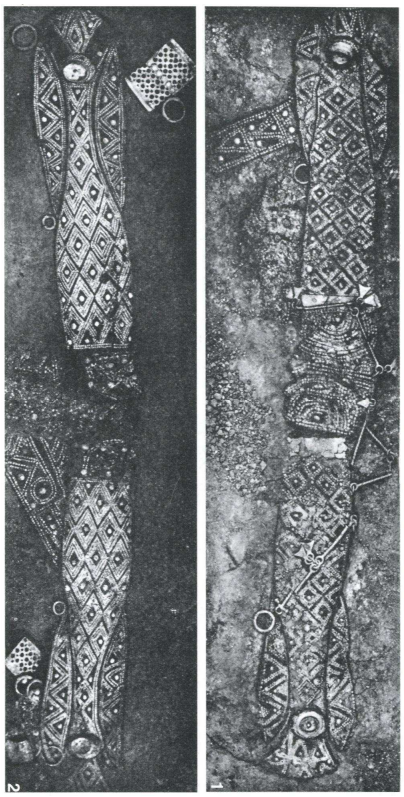


Fig. 25 Two yokes from Hradenín. Note the presence of yoke rosettes at each end of the yokes (Koch 2006).

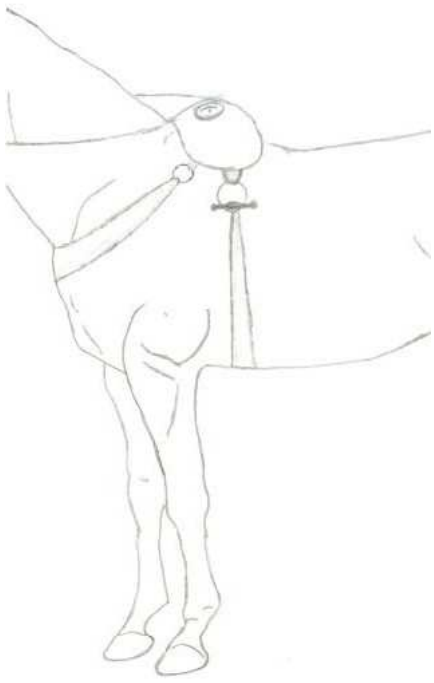


Fig. 26 Reconstruction of the yoke from Oss (After Van der Vaart 2011).

5.2 Alternative reconstruction and new insights

The bit and especially the attached cheek-pieces play an important role in previous reconstructions of Hallstatt C-bridles. The characteristic form of the bar cheek-pieces raise questions: Is it functional or not? Kossack noted in his reconstruction that the cheek-pieces could have had something to do with double reins. Eventually he reconstructed the bit with the curved ends pointing upwards and without any clear function (Kossack 1954, 120). The reason he gave for his reconstruction was that the wear on the bits and cheek-pieces from Thalmässingen-Alferhausen would indicate this orientation. Any explanation why this would be the right position is not given. Koch also shares Kossack's view. In addition to Thalmässingen she comes up with another example of bits and cheek-pieces from Budinjak that show wear that would indicate the position of the bars (Koch 2004, 30). In her reconstruction of the Thalmässingen-Alferhausen bridle, exhibited in the museum of Gunzenhausen, she also places the cheek-pieces with the curved ends pointing upwards (see chapter 3). Also, in this reconstruction no function is given to the shape of the objects.

The problem with reconstructing bridles with these kind of cheek-pieces is that there are only two objects known today that indicate the orientation of the bars. There are also very few bits and cheek-pieces that have been found in their original state (Koch 2004, 30). Often these objects are also extensively restored, so that any signs of wear are no longer recognizable.

In my view the reconstructions of both Kossack and Koch are incorrect. For instance, there has to be a function for the distinctive shape of the bar cheek-pieces. If they did not have a function they could have been shorter, which saves metal, or both ends could have been straight. In the previous reconstructions these objects seem to have no function at all, except for the attachment of the leather cheek straps of the bridle. Van der Vaart (2011) also doesn't seem to support the traditional reconstructions. In her reconstruction of the bridle from Oss she places the bent ends of the cheek-pieces in such a position that they point downwards (Van der Vaart 2011, 87). Nevertheless she does not explain why and furthermore, she does not assign any function to the shape of the object. Having this in mind I therefore tried to create an alternative reconstruction of the Hallstatt C-bridles from Oss (Fig. 27). Objects with a decorative function, such as the sheet-knobs and the *Tutulus*, are not included in this reconstruction due to the fact that their position on the bridle is uncertain.

Three people with a lot of equestrian experience were consulted to help with this alternative reconstruction. Furthermore, they looked at the technical aspects of the objects such as the grooves on the bit and a possible function of the tubular cross-shaped object.

The first of them is L.M.F. Van Bronkhorst. He is chairman of the Committee on Education of the CTG/ NVTG (Dutch Association for Traditional Driving), member of the Member Council of the KNHS (Royal Dutch Equestrian Federation) and scorer for the KNHS region Noord-Holland. He also wrote a handbook for the training of equestrian jurymen. Furthermore, he has over 60 years of experience with horses and horseback riding and is juror in different equestrian disciplines such as jumping, driving and dressage. The second person is Linneke Brattinga. She has worked with horses for over 40 years and owns a riding school in Overasselt, The Netherlands. The third person is Jan Brattinga. He also has worked with horses for over 40 years and is a builder of traditional horse drawn vehicles in Mellionec, France.

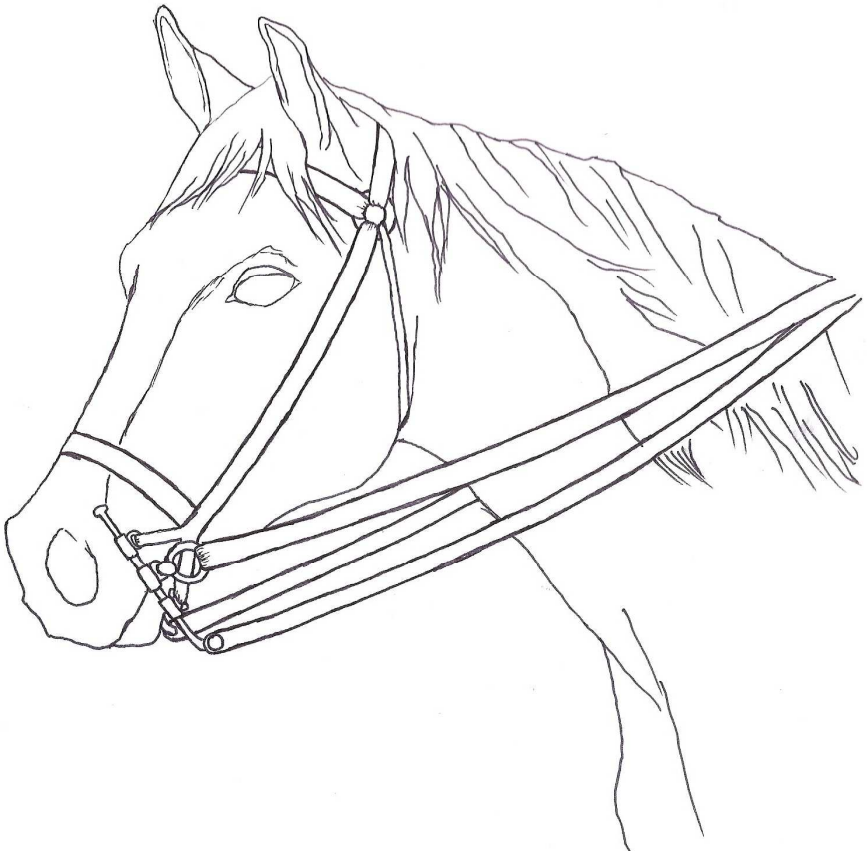


Fig. 27 The alternative reconstruction of the Hallstatt C-bridle from Oss (drawing by author).

To these experts the traditional reconstruction of Kossack and Koch does not seem acceptable. At first glance they all determined that the curved ends of the bars have to point downwards. In that way they fulfill a functional role for the attachment of reins. The knobs on the ends of the bars would ensure that the reins would not slide off. These kinds of cheek-pieces look like cheek-pieces that are used nowadays, such as those of a Pelham bit. When reins attach to the ends of the cheek-pieces it will start to work as a lever, creating more pressure on the animal's mouth. This type of cheek-pieces is generally combined with a chin chain to maximize the lever effect (fig. 28). The way the animal orientates its head and neck is also influenced by the use of cheek-pieces (fix. 29). It is also possible that the bridles from Oss were equipped with double reins because the bits also contain rein-rings. This is also still used on modern horses (fig. 30). Double reins have effect on different parts of the horse's head: one set of reins, attached to the lower end of the cheek-pieces, has a leverage effect on the jaw, or so-called curb effect. The other set, attached to the rein-rings, puts direct pressure on the lips, bars and tongue of the animal. It is more difficult to use double reins instead of a single set of reins but in good hands they can provide better and refined control over the horse. A well trained horse will respond immediately to the lightest of signals given by the double reins (J. Brattinga 2011, *pers. comm*., L. Brattinga 2011, *pers. comm.*).

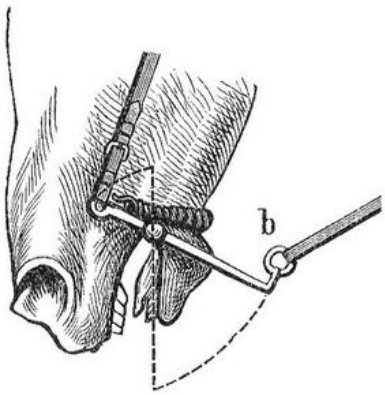


Fig. 28 Working of the cheek-piece as a lever (de.academic.ru).

The vision of the experts brought some other things to light. They could not attribute a clear function to the bronze cross-shaped object. Judging from their statements this object must have been part of the decoration of the bridle instead of actually distributing leather straps. The tubes of the cross are just wide enough to pull a shoestring

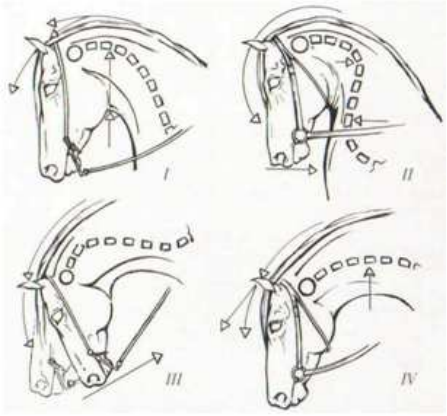


Fig. 29 How bar cheek-pieces influence the position of the horse's head and neck compared to a snaffle bit (klassiekpaardrijden.nl).

through. Leather straps with such a small width would not have been strong enough to use on a bridle, confirming my statement in Chapter 3. Furthermore, there is no place on a bridle where the leather straps cross each other just so that a cross-shaped object can function as a distributor. I therefore left this object out of the reconstruction and replaced it by a bronze ring. A ring suits better because the straps of the bridle can move more freely.

Another functional aspect came to light. The fake tordation of the bits is very functional. Bits like these are not experienced as being cruel for the animal to wear as sometimes is stated (Van der Vaart 2011, 64). Some horses play more with bits of this type in their mouth because of the grooves on the bars. In that way some horses produce more saliva and accept this kind of bit more easily in their mouth than others (Van Bronkhorst 2012, *pers. comm*.). Nowadays comparable bits still exist, also with grooves on the bars. Some have grooves on one side of the bar and a smooth surface on the other. In that way the same bit can be used on different horses.

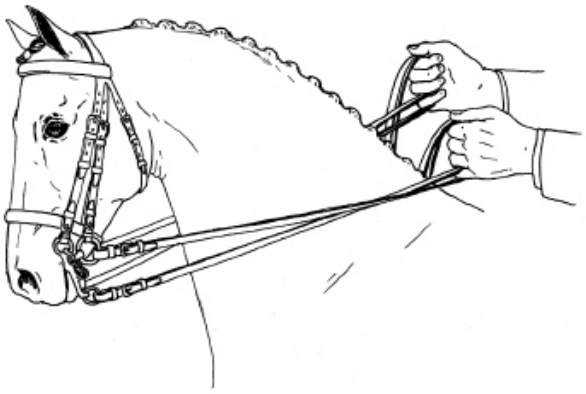


Fig. 30 Double reins. Nowadays, it is used on ridden horses and in driving as well (imeha.org).

6. Conclusion

Horses have always played an important role in human society. First in the provision of hides and meat, later in ceremonies and symbolism. After their domestication wagons were adjusted to their speed and from then on played an important role in warfare and transport. With the start of the wagon-grave burial tradition in the Urnfield Period and the continuation of it in the subsequent Hallstatt Period, the horse became inextricably linked with the burial ritual in Central Europe.

With the domestication of the horse, the development of horse tack also starts. First in the form of organic bits, but with the upcoming bronze and later iron production in the form of metal parts. The development of this early horse gear started in the Middle East and quickly spread to Europe and Asia. The peoples in the Eurasian Steppes in particular started focusing on herds of horses and from there new types of bits developed. These new objects were soon taken over by the peoples in Central Europe and form the core of the early prehistoric horse harness.

Although clear influences from the east are visible in the use of horse harness in Europe a more local tradition of producing and using horse gear was created. This is clearly reflected in the objects coming in to use in the Hallstatt Period. In Central Europe, in particular with Bohemia and the area north of the Alps as core area, a strong regional tradition with horse harness develops. In general a distinct standardization of the horse gear develops, in particular in the Hallstatt C-Period in which a clear typology of objects becomes visible.

The inventory of the princely grave of Oss, roughly dated to the Hallstatt C-Period, contains a total of seven categories of objects that can clearly be attributed to horse gear and a yoke. Bits, cheek-pieces, a *Tutulus*, bronze decorative knobs and a bronze cross-shaped object can be assigned to bridles. Paralells from graves in Central Europe are known for all of these objects. The objects show a strong regional tradition in form and use although the bits and cheek-pieces still show influences of precursors from Eastern Europe. A yoke is represented by yoke rosettes which were attached on either end of the yoke, possibly to hold leather straps in place. Two toggles, with which leather breast or stomach straps were fastened to hold the yoke in place, can also be assigned as being part of the horse gear.

The objects from Oss are all of a type which in particular have been found in Central Europe. It is clear that the bits and cheek-pieces have been found beyond the 'core area' of Bohemia and the region north of the Alps. The distribution of the other objects only appear to be concentrated in that area. In the region between the core area and the Lower Rhine Area these objects seem to be missing. The Lower Rhine Area could have had an important relationship with the Hallstatt core area. On the other hand, it is also possible that these objects do not occur in the region in between simply because they have not been found yet.

It was immediately evident that the inventory of Oss is relatively rich in different objects after comparing it with 59 other Hallstatt C-inventories. A total of 13 object-categories of horse gear have been used in a statistical analysis. A vast majority of the analyzed inventories, about 80%, contain less object categories than Oss. Bits and cheek-pieces occur in most of the inventories. A quarter of them also contained yoke components. Elements for the decoration of the bridle, such as tutuli and *Ringfussknöpfen*, are also common although there is a difference per inventory in what element is given. The most interesting piece from Oss, the bronze cross-shaped object, is also the most rare of all. It has been found in only 6% of all the investigated inventories.

With relating these objects to the horse harness an attempt can be made to reconstruct the bridles from Oss. The reconstruction of Hallstatt C-horse gear is still subject of debate though. For example, previous reconstructions are based on only two findings which would indicate the exact position of the bar cheek-pieces. Because of this scarce source of information it seems careless to just adopt previous reconstructions of the same type of objects. That is why an attempt was made to look for an alternative reconstruction in this thesis.

Important factors that influenced this new reconstruction were the comments of three people with a lot of equestrian expertise. There is still some controversy about the technical aspects of the bit and cheek-pieces. The old reconstructions do not attribute any technical function to the curved ends of the latter. Also, the orientation of the bar cheek-pieces is still a point of discussion. In consultation with the three experts I have come to an alternative reconstruction in which the bar cheek-pieces play an important role. Not only do the bent ends point downwards, it is also taken into account that they were functional for the attachment of reins. In this way it is possible that the bridles could have been equipped with double reins.

The experienced insights of the experts brought some other things to light. They could not attribute a clear function to the bronze, cross-shaped object. Judging

from their statements this object must have been part of the decoration of the bridle, instead of actually distribute leather straps. The fake tordation of the bits is functional though. Because of the grooves on the bars the horse plays more with it in its mouth. In this way some horses accept this kind of bit more easily in their mouth than others. Nowadays comparable bits still exist, also with grooves on the bars. They are not experienced as being cruel for the animal to wear.

In the future more research is needed on prehistoric horse gear to find out more about its function and use. It is crucial to investigate wear on prehistoric harnessing in order to establish a reliable reconstruction. It is also interesting for future research to see what this kind of horse gear does to the animal. For example, reconstructed material can be tested on real horses by experienced riders with enough substantive knowledge about the animal to see what its reaction is like.

7. Bibliography

7.1 Literature

Anthony, D.W. and D.R. Brown, 2003. Eneolithic Horse Rituals and Riding in the Steppes: New Evidence. In: Lavine, M., C. Renfrew, K. Boyle (eds.). *Prehistoric Steppe Adaptation and the Horse*. 55-68. Macdonald Institute Monographs. Cambridge: Oxbow Books.

Anthony, D.W., R.D. Brown and C. George, 2006. Early Horseback Riding and Warfare: The Importance of the Magpie around the Neck. In: Olsen, S.L., S. Grant, A.M.Choyke, L. Bartosiewicz (eds.). *Horses and Humans: The Evolution of Human-Equine Relationships.* BAR International Series 1560, 137-156. Oxford: Archeopress.

Brownrigg, G., 2006. Horse Control and the Bit. In: Olsen, S.L., S. Grant, A.M. Choyke, L. Bartosiewicz (eds.). *Horses and Humans: The Evolution of Human-Equine Relationships.* BAR International Series 1560, 165-171. Oxford: Archeopress.

Conroy, D., 2004. Ox Yokes: Culture, Comfort and Animal Welfare. In: *Common ground: moving forward with animals.* TAWS Workshop paper. Silsoe Research Institute. United Kingdom.

Dietz, U.L., 2003. Horseback Riding: Man's Acces to Speed. In: Lavine, M., C. Renfrew, K. Boyle (eds.). *Prehistoric Steppe Adaptation and the Horse*. 189-199. Macdonald Institute Monographs. Cambridge: Oxbow Books.

Fokkens, H. and R. Jansen, 2004. *Het vorstengraf van Oss. Een archeologische speurtocht naar een prehistorisch grafveld*. Utrecht: Matrijs.

Holwerda, J.H., 1934. Een vroeg Gallisch vorstengraf bij Oss (N.B.). In: *Oudheidkundige mededeelingen uit 's Rijksmuseum van Oudheden te Leiden.* 39-52. Leiden: E.J. Brill.

Kelekna, P., 2009. *The Horse in Human History.* New York: Cambridge University Press.

Koch, J.K., 2004. Ein Pferd für Gunzenhausen. Die Rekonstruktion eines HaC-zeitlichen Pferdegeschirres. *Leipziger online-Beiträge zur Ur- und Fruhgeschichtlichen Archäologie* 15, 29-31.

Koch, J. K., 2006. *Hochdorf VI: Der Wagen und das Pferdegeschirr aus dem spa□thallstattzeitlichen Fu□rstengrab von Eberdingen-Hochdorf.* Stuttgart: Theiss.

Kosintsev, P.A., 2006. The Human-Horse Relationship on the European-Asian Border in the Neolithic and Early Iron Age. In: Olsen, S.L., S. Grant, A.M. Choyke, L. Bartosiewicz (eds.). *Horses and Humans: The Evolution of Human-Equine Relationships.* BAR International Series 1560, 127-135. Oxford: Archeopress.

Modderman, P.J.R., 1964. The Chieftain's grave of Oss reconsidered. In: *Bulletin van de Vereeniging tot bevordering der kennis van de antieke beschaving 39,* 57-62.

Oates, J., 2003. A Note on the Early Evidence for Horse and the Riding of Equids in Western Asia. In: Lavine, M., C. Renfrew, K. Boyle (eds.). *Prehistoric Steppe Adaptation and the Horse*. Pp. 115-125. Macdonald Institute Monographs. Cambridge: Oxbow Books.

Olsen, S.L., S. Grant, A.M. Choyke and L. Bartosiewicz (eds.), 2006. *Horses and Humans: The Evolution of Human-Equine Relationships.* BAR International Series 1560. Oxford: Archeopress.

Olsen, S.L., 2006. Early Horse Domestication: Weighing the Evidence. In: Olsen, S.L., S. Grant, A.M. Choyke, L. Bartosiewicz (eds.). *Horses and Humans: The Evolution of Human-Equine Relationships.* BAR International Series 1560, 81-114. Oxford: Archeopress.

Pare, C.F.E., 1991. *Swords, wagon-graves, and the beginning of the early Iron Age in Central Europe.* Marburg: Phillips-Universität (= Kleine schriften aus dem vorgeschichtlichen Seminar Marburg 37).

Pare, C.F.E., 1992. *Wagons and Wagon-Graves of the Early Iron Age in Central Europe.* Oxford: Oxford University Press (= Oxford university Committee for Archaeology Monograph 35)

Sherrat, A., 2003. The Horse and the Wheel: the Dialectics of Change in the Circum-Pontic Region and Adjacent Areas, 4500-1500 BC. In: Lavine, M., C. Renfrew, K. Boyle (eds.). *Prehistoric Steppe Adaptation and the Horse*. 233-252. Macdonald Institute Monographs. Cambridge: Oxbow Books.

Trachsel, M., 2004*. Untersuchungen zur relativen und absoluten Chronologie der Hallstattzeit.* Bonn: Dr. Rudolf Habelt GMBH (= Universitätsforschungen zür prähistorischen Ärchäologie 104).

Vaart, S. Van der, 2011. *Hail to the chieftain. A detailed examination of grave goods from Dutch chiefly burials and their role in funerary rituals during the Hallstatt Period.* Leiden (Unpublished Research Master thesis University of Leiden).

Vila, C., J. Leonard, A. Götherström, S. Marklund, J. Sandberg, K. Lidén, R. Wayne and H. Ellegren., 2001. Widespread Origins of Domestic Horse Lineages. *Science* 291, 474-477.

West, D., 2006. Horse Hunting in Central Europe at the End of the Pleistocene. In: Olsen, S.L., S. Grant, A.M. Choyke, L. Bartosiewicz (eds.). *Horses and Humans: The Evolution of Human-Equine Relationships.* BAR International Series 1560, 25-47. Oxford: Archeopress.

7.2 List of Figures

7.3 List of tables

8. Acknowledgements

I would like to thank several people who, to a greater or lesser extent, helped me with this thesis. First of all I would like to thank Professor Harry Fokkens for helping me with the subject and for monitoring my progress. He gave me good insights and was always able to help me on moments when it was needed. Second, I would like to thank Sasja van der Vaart for her positive criticism, enthusiasm and for correcting my English. Furthermore, for the use of detailed photos of some of the objects I would like to thank Luc Amkreutz from the National Museum of Antiquities.

I also thank Loek van Bronkhorst. Through his equestrian expertise and his enthusiasm I was able to gain useful information. The same can be said for Linneke en Jan Brattinga. Thank you for your expertise and our exchange of thoughts and ideas last Christmas.

Next, I would like to thank my parents and my brother for their never ending support and positivism. Of course my appreciation also goes out to all my friends and family members whose names are not mentioned above. For years you helped me out through good and bad times, thank you all for that!

Abstract

In 1933 the so-called chieftain's burial of Oss was found. It dates from the Early Iron Age, or Hallstatt C-period, in the second half of the 7th century BC. This rich grave, of which the cremation rests and grave goods were deposited in a bronze situla, included different imported artefacts from Central Europe. In the 1960's it became clear that a number of these objects were parts of horse gear. In the past decades, all the objects from the chieftain's grave of Oss have been published. Nevertheless, these publications generally only included a description of the finds. Function, context, and an analysis of the objects are now presented within this thesis for the first time.

All objects from Oss that can be assigned as horse gear are described together with typological parallels and their distribution throughout Europe. Oss contains components of two bridles and a yoke. It is now clear that most parallels of the objects are found in Bohemia, Bavaria and the area north of the Alps.

A total of 13 object-categories of horse gear, dating from the Hallstatt C-period, have been used for a statistical analysis. It compares the inventory of the horse gear from Oss with that of 59 others. It is now evident that the inventory of Oss includes relatively many object-categories. About 80% of the other inventories contained less. It can therefore be concluded that the inventory of Oss is one of the richest in its kind. The most common objects are the bits and cheek-pieces.

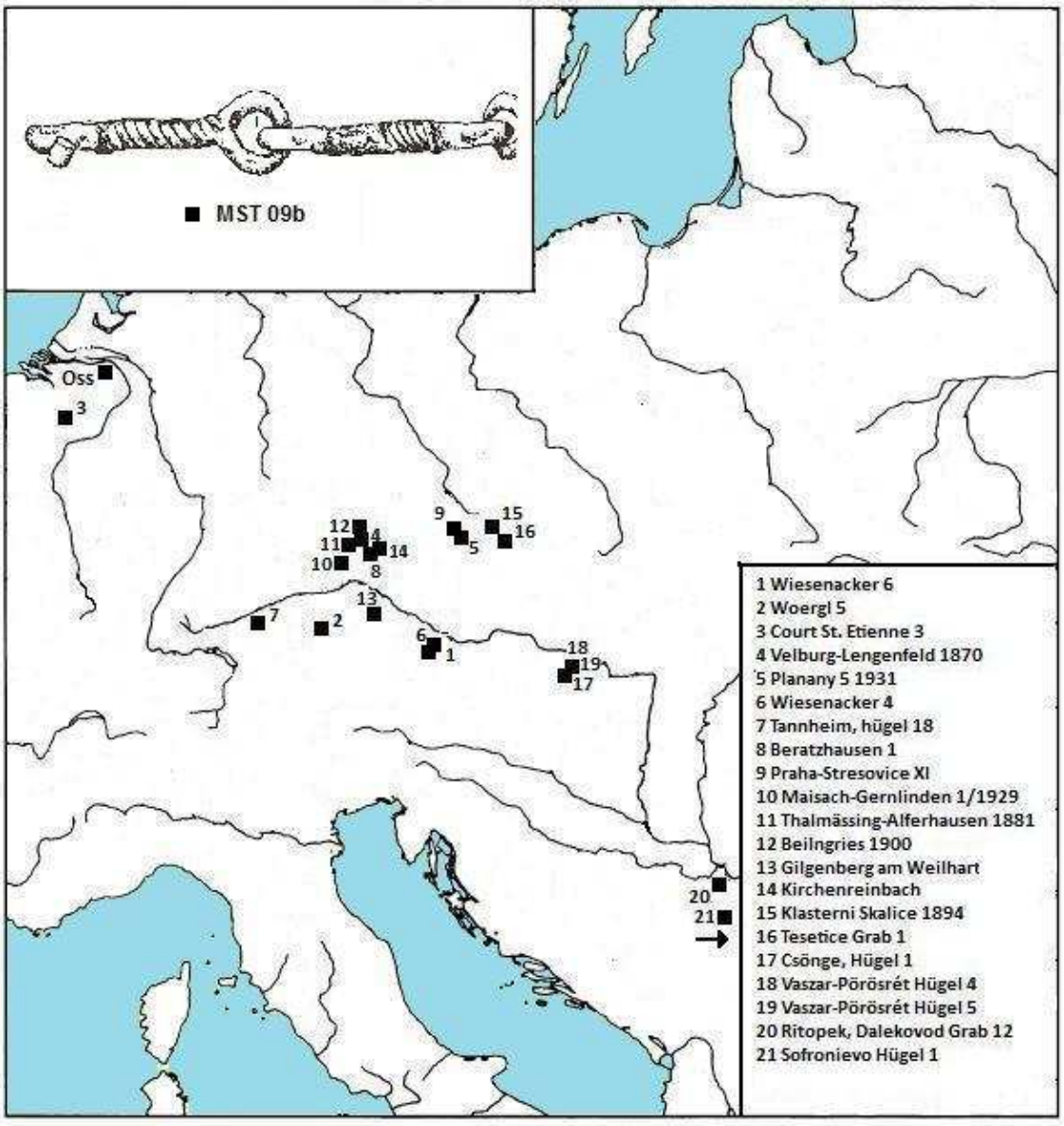
The experience of three equestrian professionals was used for a contemporary approach on the horse gear from Oss. New technical aspects came to light: the grooves on the bars of the bits are functional. They are not cruel, as sometimes is stated. Some horses play more with such a bit in their mouth and therefore accept them more easily. Furthermore, because of the grooves more saliva is produced.

Finally, old reconstructions of Hallstatt C-bridles do not attribute any technical function to the curved ends of the cheek-pieces. Within this thesis a new reconstruction of the bridle has been made which includes a functional element of the cheek-pieces: they could have been used for the attachment of reins. This was also underlined by the comments of the equestrian professionals.

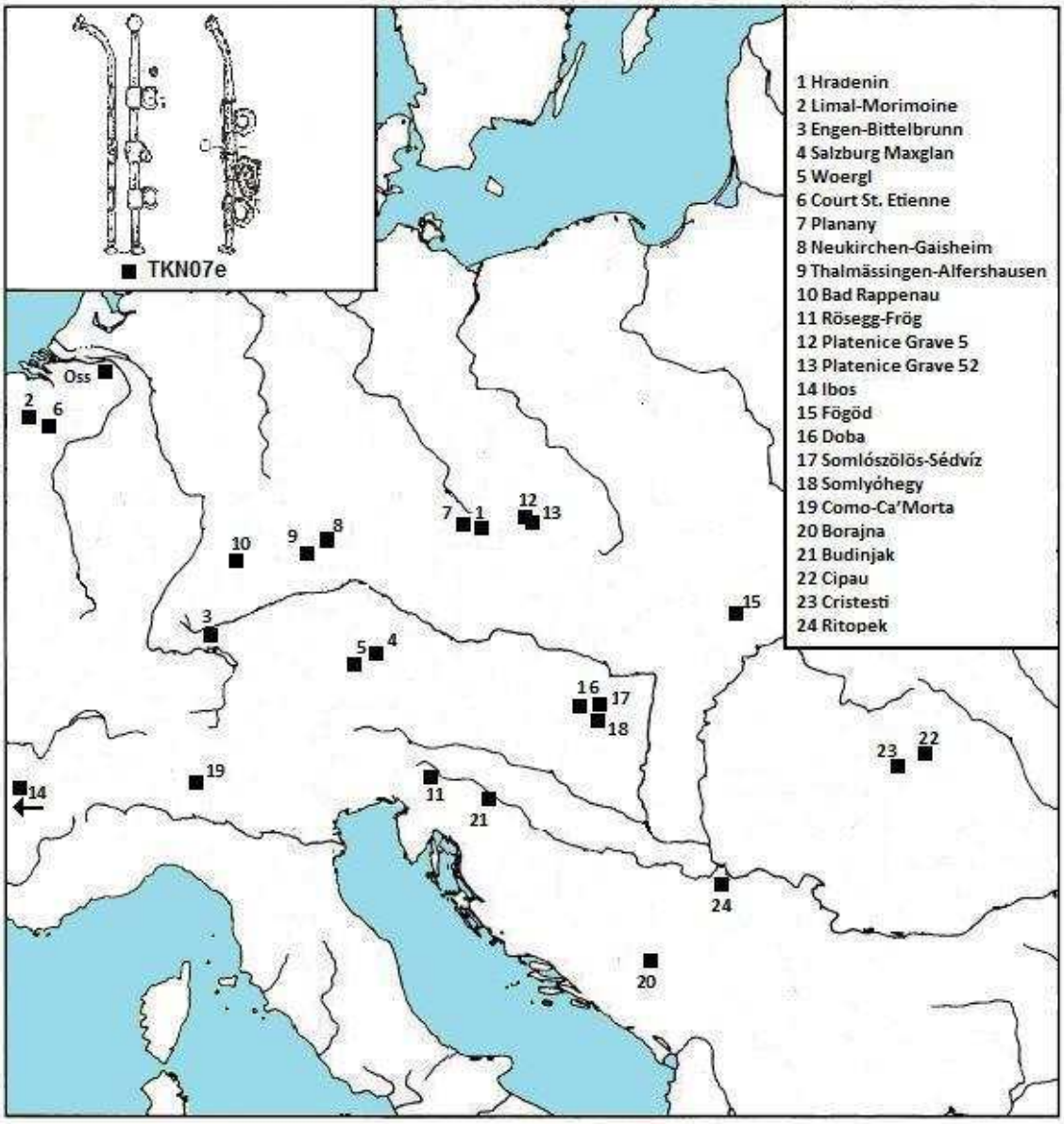
Two Bridles and a Yoke

Appendices

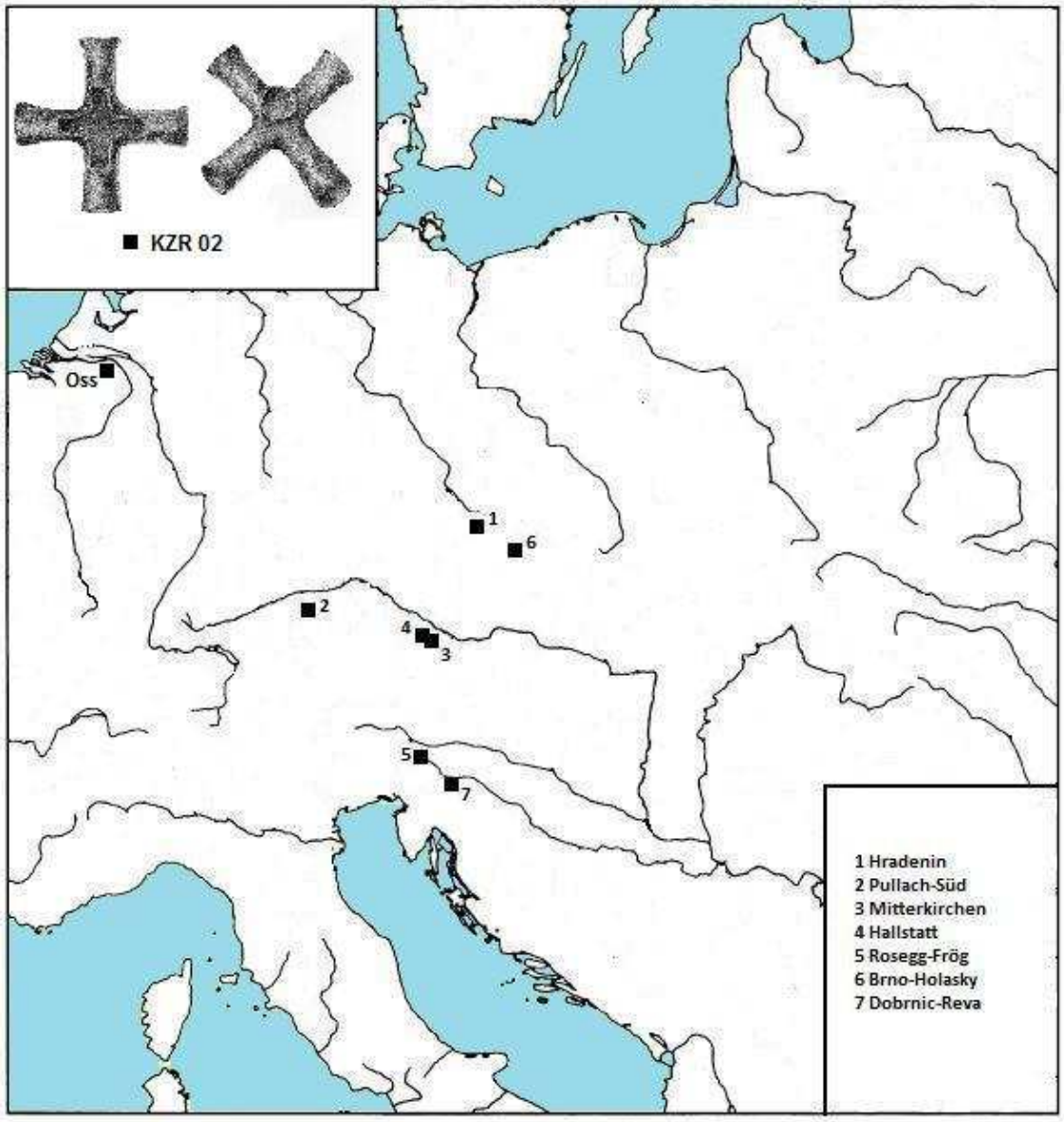
Appendix 1. The distribution of MST 09b-type mouth-pieces (fig. by author).



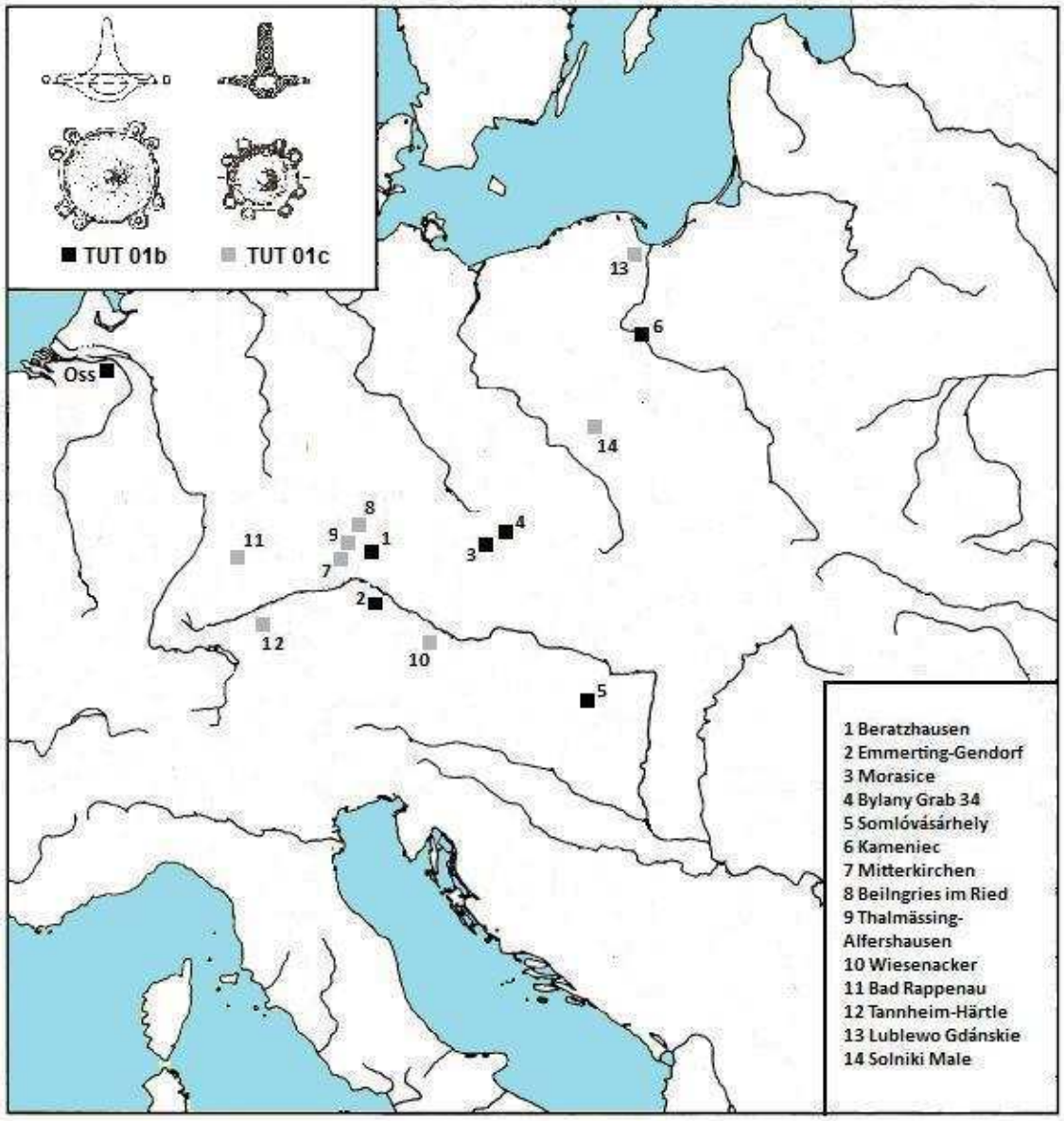
Appendix 2. The distribution of TKN 07e-type cheek-pieces (fig. by author).



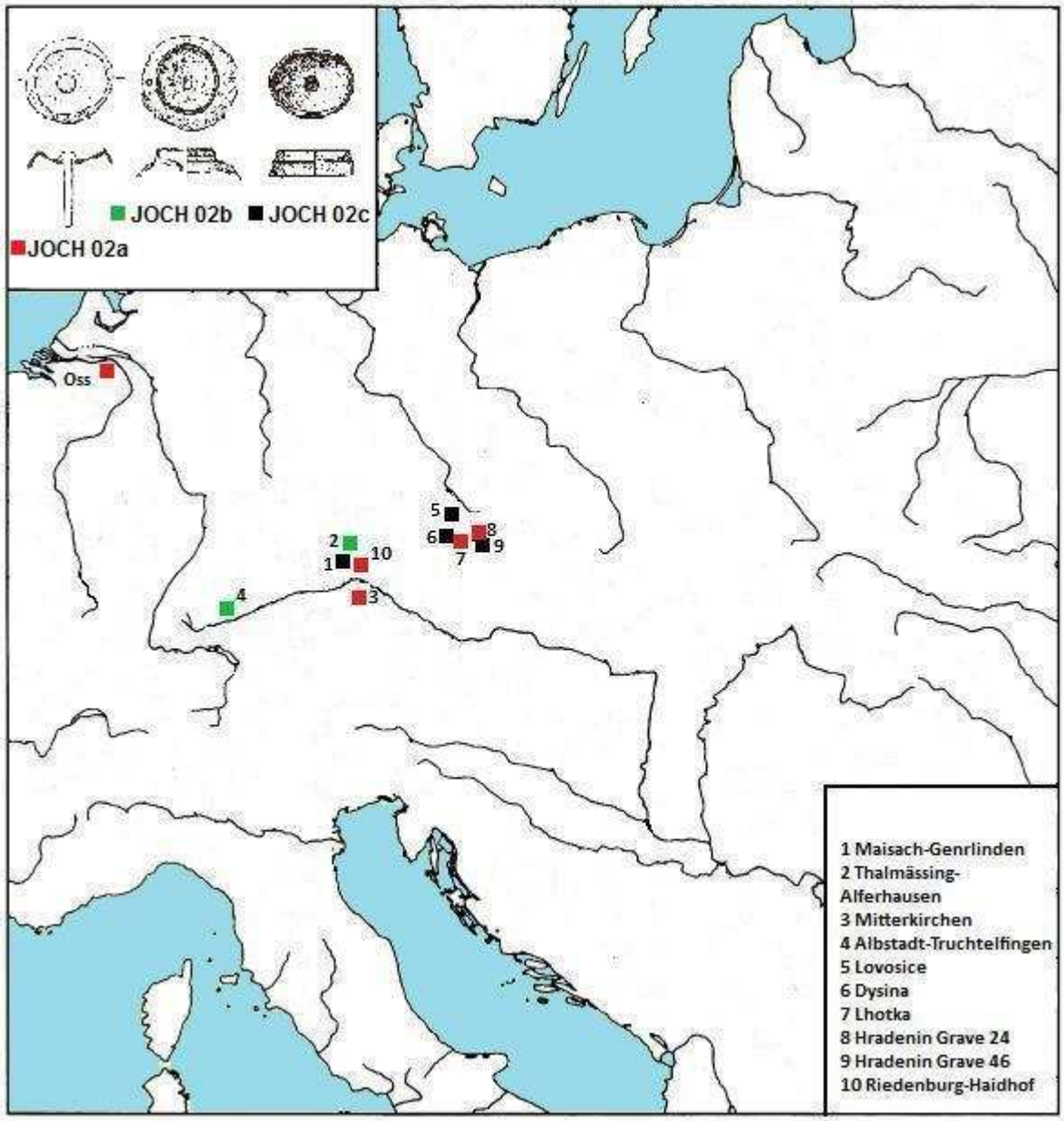
Appendix 3 The distribution of KZR 02-type cross-shaped objects (fig. by author)



Appendix 4. The distribution of TUT 01b and 01c-type Tutuli (fig. by author).



Appendix 5. The distribution of JOCH 02- type yoke-rosettes (fig. by author).



Appendix 6 – List of inventories used for the statistical analysis

The list below shows all 60 inventories used for the statistic analysis of Chapter 4. The inventories are arranged in alphabetical order in the left column. The abbreviations of the 11 object-categories are listed in the upper row of the table in alphabetical order. The information provided below is derived from the typological publication of Trachsel (2004).

Site	BES	FAL	GRZ	HKN	JOCH	KNE	KNO	KZR	MST	RFK	TKN	TUT	ZHK
Oss	**x**				**x**	**x**		**x**	**x**		**x**	**x**	
Albstadt-Truchtelfingen			x		x					x			
Bad Rappenau			x			x	x				x	x	
Beilngries Im Ried 1900	x		x			x	x		x		x	x	
Beratzhausen						x	x		x			x	
Borajna											x		
Brno-Holasky Hügel 1		x					x		x			x	
Budinjak							x		x		x		
Bylany Grave 2/ 1897						x	x		x			x	
Cipau 1908							x		x		x		x
Como-Ca'Morta									x		x		
Court Saint Etienne Barrow 3									x		x		
Cristesti											x	x	
Csönge									x				x
Doba		x							x				x
Dobrnic-Reva								x	x				
Dysina Mound 2	x	x	x		x	x	x			x	x		
Emmertingen-Gendorf									x			x	
Engen-Bittelbrunn		x					x		x	x	x		
Fögöd		x					x		x		x		x
Gilgenberg am Weilhart Barrow 1							x		x	x	x		
Hallstatt Ramsauer Grave 672								x					
Hradenin Grave 1							x				x		
Hradenin Grave 20						x	x	x	x				x
Hradenín Grave 24	x		x		x	x	x		x	x	x		x
Hradenín Grave 46			x		x	x	x		x	x	x	x	x
Ibos		x									x		
Kameniec							x		x	x		x	
Kirchenreinbach-Beckerhölzl									x				
Klasterni Skalice									x		x		x
Lhotka	x		x		x	x	x		x	x			x
Limal-Morimoine	x						x		x		x		
Lovosice-Garaze			x						x		x	x	
Lublewo Gdánski												x	
Maisach-Gernlinden	x	x	x		x	x			x	x			
Mitterkirchen Mound 10	x		x		x		x			x			
Morasice							x					x	
Neukirchen-Gaisheim Barrow 6	x		x		x	x	x		x	x	x		x
Planany Grave 5	x				x	x	x		x	x	x	x	x
Platenice Grave 5	x				x	x	x		x	x	x	x	x

Platenice Grave 52									x		x		
Praha-Stresovice									x				
Site	**BES**	**FAL**	**GRZ**	**HKN**	**JOCH**	**KNE**	**KNO**	**KZR**	**MST**	**RFK**	**TKN**	**TUT**	**ZHK**
Pullach-Süd	x		x					x	x			x	
Riedenburg-Haidhof	x				x		x			x			
Rosegg								x			x		
Salzburg-Maxglan Grave 400							x		x	x	x		
Sofronievo									x				x
Solniki Male			x				x					x	
Somlószölös-Sédvíz								x	x		x		
Somlóvásárhely Barrow 1									x	x		x	
Somlyóhegy							x		x	x	x		
Tannheim Mound 9									x	x		x	
Tesetice									x				
Thalmässing-Alferhausen	x		x		x	x	x		x		x	x	
Vaszar-Pörösrét Mound 4									x				
Vaszar-Pörösrét Mound 5									x			x	
Velburg-Lengenveld 1870					x	x			x				
Wiesenacker Mound 4	x	x	x		x	x	x		x		x		
Wiesenacker Mound 6									x		x	x	x
Wörgl Grave 5									x	x	x		