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"Alia vero gens ibi moratur Suehans, quae velud Thyringi equis utuntur eximiis" or the excellent horses in Svealand

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This study discusses horses and horse breeding during the Late Iron Age in central Sweden. We studied the hyper-variable mitochondrial sequences HV1 and HV2 in horses from Svealand and have so far found four different mitochondrial types of horses. The problems of morphologically determined breeds are discussed. We argue that the horses analysed from Vendel and Skedemosse share the same maternal ancestor and could thus be descended from the horses kept by the Suehans and described as excellent by Jordanes.

Introduction

We know from Jordanes (551:21) that the "Suehans", just like the "Thyringians", used excellent horses. From Jordanes we also know that a slave could be bought free for the same value as a working horse (Jordanes 551:38). The importance of horses to prehistoric man is obvious when you regard their representation in art (e.g., Herrmanns 1990), among artefacts (e.g., Müller-Wille 1971), and in written sources (e.g., Hyland 1990). The origin of the horse (e.g., Mac Fadden 1992), its function (e.g., Junkelman 1990) and its outfit have also been considered in numerous books and papers. The Swedish Iron Age horse was a symbol of status and a highly prestigious gift; our purpose is to study its characteristics through molecular analysis.

Greek and Roman written sources mention the occurrence of around fifty different horse breeds in the Roman Empire (Hyland 1990). In these sources the necessity of selective horse breeding for different purposes is discussed, e.g., the warrior horse, the hunting horse and the racing horse (Hyland 1990). Thus it is obvious that horse breeding was practised in the Roman Empire and also that it was based on selection towards or against certain characters. The Roman poet Nemesian describes the Libyan horse as being small and ugly not favoured by the Romans who preferred large horses which they bred successfully (Azzaroli 1985). However, the Libyan horse, despite its ugliness, was a highly appreciated war horse and caused a lot of trouble to the Romans (Hyland 1990).

We also know that certain horse breeds were reserved for certain categories in society. At approximately 600 BC the Persian horse was reserved for the governors in Armenia since this horse was regarded to be of remarkable quality (Hyland 1990).

A prerequisite for effective horse breeding is access to fodder, a fact particularly apparent from studies of horse breeding in Tudor England. Here the main limiting factor was the access to pasture and it is clear that a mixture of forest and meadow land was preferred (Edwards 1988). The possibilities and prerequisites for such horse breeding have been discussed by Ulf Erik Hagberg (1967) among others. During the excavations of Skedemosse, situated on Öland and dated to AD 200–500, approximately 100 sacrificed horses were found. The horses were discussed by Hagberg (1967) as being a possible main part of the area's economy, since he believed that both horses as such and their hides could have been exported. The large number of artefacts connected to leather working found in contemporary female burials also support this assumption. The need for hides is understood to have been large, for instance in the Roman Empire (Hagberg 1967).
There existed, then, a large number of different horse breeds within the Roman Empire; selective breeding was practised, and certain horse breeds were reserved for certain categories within the society. Such selective breeding of horses would have necessitated specific types of pasture.

Based on morphology, three different horse breeds have been identified from the Swedish Iron Age. They are summarized in a paper by Sundkvist (1992) as 1) the old Nordic Bronze Age horse, 2) *Equus caballus nehringii* (the Ihre horse,) and 3) a horse of Tarpan

type (as e.g., the horses from Valsgärde). In Valsgärde two types of horse apparently existed, the old Nordic Bronze Age horse (i.e., in the Viking Age graves 2, 3, and 4), and the horse of tarpan type (i.e., in the Vendel Age graves 5, 6, 7). The horse in grave 5, however, appears to be something in between the above two types. In Birka on the other hand the horses appear to have been a homogenous group being a mixture of type 1 and 3 (Lundholm 1947:248), i.e. just as in Valsgärde 5. This would thus be unique for Birka since all other horses from Uppland during the Iron Age appears to be of type 1 (Lundholm 1947), i.e., except for Valsgärde 5 (Sundkvist 1992). Beside these three, morphologically determined types, there existed a type of horse dated to AD 200–500 from Skedemosse called "the north European wood horse" (Hagberg 1963). This horse should have been slightly larger than the modern "Gotlandsruss", but still smaller than the Iron Age horses in Svealand; where these horses are to be placed among the former three types is unclear. To confuse this a bit more Boessneck & von den Driesch (1979) writes about the horse from Eketorp II (c. AD 400–700) as being larger than the horse from Skedemosse but smaller than the Viking Age horse from Iceland and also smaller than today's fjordhorse. It is thus obvious that we have several different breeds in Scandinavia during the Iron Age although it is slightly unclear how many.

With molecular methods we address the question of the excellent horses in Svealand as mentioned by Jordanes combined with the question of horse breeding and the role of the horse in the aristocratic system of gift-giving. Thus we have collected horse bones from a number of sites within Svealand as well as adjacent areas and areas used as controls (fig. 1).

Material and methods

We have chosen to work with teeth as the source for DNA, since there are a number of advantages in extracting nucelic acids from this material as opposed to bone (Götherström 1998). We extracted DNA according to Lidén et al. (1997) with all necessary precautions taken as described by Götherström & Lidén (1998).

When we collected genetic information for our horse analysis we concentrated on the first (HV1) and the second (HV2) hyper-variable region in the mitochondrial DNA. Mitochondrial DNA is popular in work concerning ancient DNA, partly due to the fact that each cell contains such a large number of mitochondria that there are very high probabilities of finding DNA remains (Pääbo et al. 1988; Hagelberg & Clegg 1991; Merriweather et al. 1994). Another contributory factor is that lots of studies have already been performed on mitochondrial DNA from modern horses in order to make it meaningful to work with

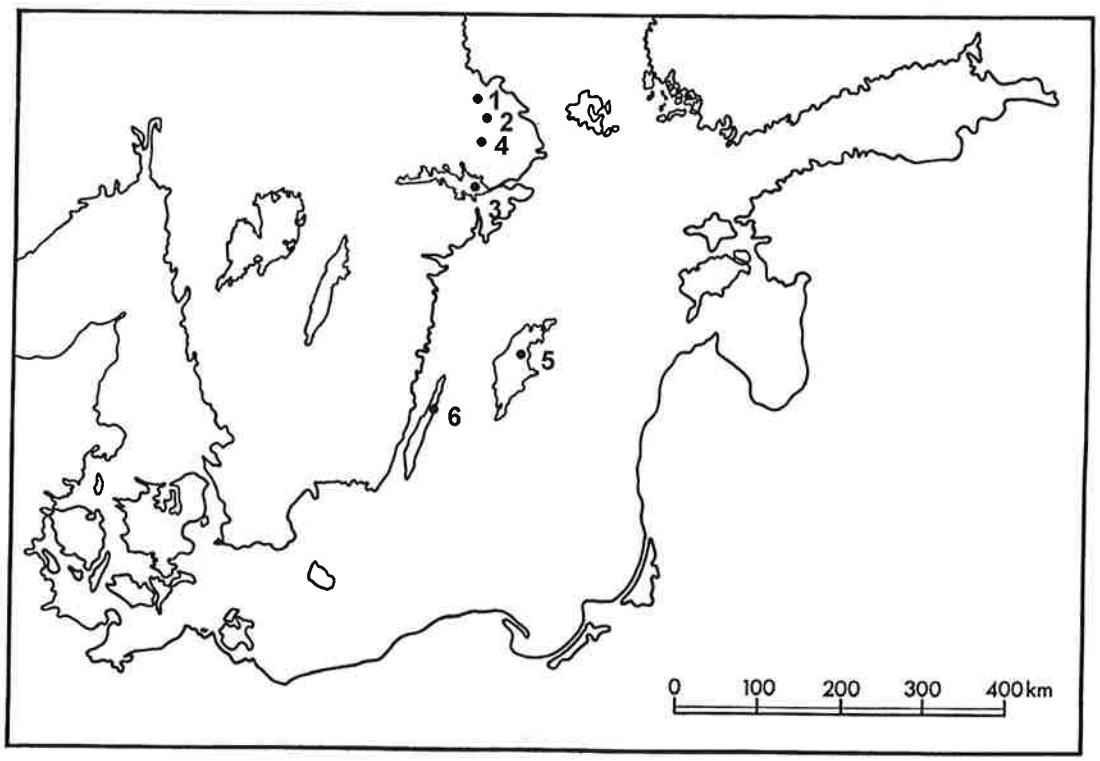

Figure 1. Map of the sampling area marked with sites where from analysed horse bones originate 1) Vendel, 2) Valsgärde, 3) Birka, 4) Tuna in Alsike, 5) Broa in Halla, 6) Skedemosse.

Table 1. Horse samples analysed for mtDNA, HV1 and HV2. Horse types are denoted as A, B, C etc.

Site	Burial	Biological sex	Weapon burial	Equestrian equipment	Date AD	Horse Type
Skedemosse	Sacrifice	–	–	–	200–500	A
Vendel XII	Boat burial	M	X	X	c. 550	A
Valsgärde 7	Boat burial	M	X	X	c. 600–675	E
Broa in Halla *grave a*	Flat grave	M	X	X	750–800	B*
Birka 842	Chamber grave	M	X	X	c. 800?	C
Tuna in Alsike IX	Coffin burial	F?	–	X	900–950	D*

* *Maternal horse type now being extinct.*

archaeological horses (e.g., Xu & Arnason 1994). The limitation is that mitochondrial DNA is only inherited on the maternal line which means that only one of the individual's parents, here the mother, is visible in the genetic information obtained. Discussing horse breeding, the first thing that comes into your mind is probably stallions and not mares which implies that mitochondrial DNA is not the optimal method. We are, however, still missing Y-chromosomal markers for horses in order to perform both maternal and paternal studies but are working on the problem for future studies (Götherström 1998).

In this study we have analysed horses from six different sites within Sweden dated to the Iron Age (fig. 1). The analysis includes samples from grave XII in Vendel, dated to c. AD 550 (Arrhenius 1983), grave 7 from Valsgärde dated to AD 600–630 by Arrhenius (1983) and AD 675 by Arwidsson (1977). This horse has been determined morphologically to be of a tarpan type (Lundholm 1947). We have further looked at three Viking Age horses, where Birka is represented by grave 842 which can be dated to c. AD 800 (Arbman 1943), grave IX from Tuna in Alsike dated to AD 900–950 (Arne 1934), and *grave a* from Broa in Halla, Gotland, dated to AD 750–800 (Salin 1922). Besides these horses which were all deposited in graves, we also have a sacrificed horse from Skedemosse, Öland, thus dated to AD 200–500 (Hagberg 1967). All the horses, except the one from Skedemosse which was deposited together with other animals of varying species, had been deposited with different kinds of equestrian equipment (table 1). Equestrian equipment was also found in Skedemosse although not exactly in connection with the horses.

Results and Discussion

We obtained amplifiable DNA from all of the above six mentioned sites. Originally we had at least two individuals from each site but were only successful in extracting DNA from one. What we can see is that the horse from Vendel and the horse from Skedemosse are of the same type, that the horse from Birka is of a type that is known from modern thoroughbreds (table. 1). The horse from Valsgärde 7 has a haplotype which is quite common and found in a number of different horse breeds, i.e., Exmoor pony, Connemara pony, Ardenner, thoroughbred and the Norwegian fjordhorse (table 1). Finally the horse from Halla, Gotland and the horse from Tuna in Alsike are of two types so far unknown from modern material (table 1). We do not in any case have sequences from all polymorph sites within the HV1 or the HV2 regions. When all polymorph sites can be analysed it will be possible to obtain a higher resolution. Although the data is not optimal it is interesting to note that both the horse from Halla and the horse from Tuna in Alsike are from a maternal line that could be extinct. In order to verify this it is however necessary to use a larger modern reference material.

The fact that the horse from Birka 842 originates from a thoroughbred on its mother's side is somewhat surprising. Thoroughbred horses are usually defined as Arabian/Oriental- (ox), English- (xx) or Anglo-Arabian- (x) thoroughbred, whereof the Arabian-thoroughbred is the origin. The English-thoroughbred originates from the Arabian-thoroughbred and the Anglo-Arabian-thoroughbred is a cross-breeding of the former two. The English-thoroughbred (xx) is the one usually referred to in daily terms, it is the one used among our references, and it is also the today most common of the three. The Spanish-Arabian-thoroughbreds of today can be traced back as far as to the Moorish conquest, and in Spain you also find the oldest stud breeding records (the Spanish Stud Book) which started in 1847 for the stables of Queen of Spain Isabel II. However, we have to keep in mind here that the Birka horse is, until we have full information on its father's origin, still only a thoroughbred on the maternal side. This means that we could have had a thoroughbred mare dating far back in time being the ancestor to this specific specimen. The main thing here is that the origin of the mother of this horse must have been from outside Sweden.

The horse from Valsgärde 7 was morphologically determined as a Tarpan type. The molecular results points towards several different horse breeds: Exmoor

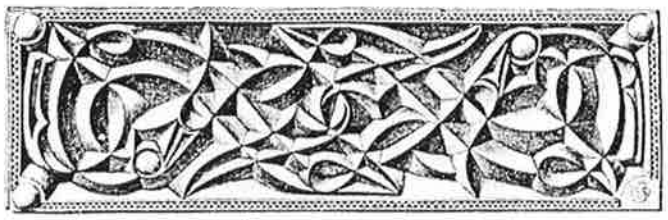

Figure 2a) Mount found in Vendel grave XII, (Stolpe & Arne 1912, Pl XXXVII fig. 7). Scale1:1.

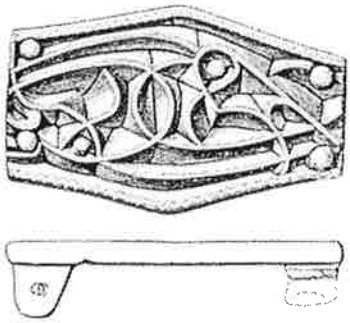

Figure 2b) a strap end found in Gärdslösa, Öland, which had been reused as a brooch made with the same chip-carving technique as the ones from Vendel XII, (Åberg 1923:154 fig. 276). Scale 1:1.

pony, Connemara pony, Ardenner, thoroughbred and the Norwegian fjordhorse. Interesting here is that all those breeds are of a north western European origin, if you regard the thoroughbred as an English-thoroughbred (xx). This means that the horse in Valsgärde 7 can not be a Tarpan, which is of an oriental origin and this brings to mind the problems concerning morphological determination of horses breeds.

It is also interesting to note that the horses from Vendel, Svealand and Skedemosse, Öland are of the same type.

Are these examples of the excellent horses kept by the "Suehans" as mentioned by Jordanes?

The time difference between these two sites should be pointed out and taken into consideration, which at most could be 350 years and at least be 150 years. Now, as Jordanes wrote this in AD 551 he cannot have been referring to a group including the horse found in Vendel XII dated to c. AD 550. He could, however, have been referring to the ancestors of these horses, and, since the vendel horse shared its maternal ancestor with the horse studied from Skedemosse, dated between AD 200 and 400, Jordanes could well have been referring to the horses of the type found there, on Öland. Öland must have provided excellent conditions for horse breeding during this period. We know that the area surrounding Skedemosse changed to a more open landscape. There was a decline in the mixed oak forest and an increase in species related to an open landscape i.e., juniper and heather, as well as in species related to human activities e.g., nettles (Hagberg 1967:20). Vendel also must have provided excellent conditions for horses during the Iron Age. At that time the landscape consisted of a mixture of large forest areas, of mixed deciduous and conifer trees, and open meadow land for pasture. The large areas of wet meadows surrounding the Vendel lake could have been utilized for pasture but even more so for hay making, with high yields to be stored as winter fodder (Seiler 1997).

It is quite possible that there existed an exchange of horses, as well as other items, between these two areas. The distribution of the typical leather worker's knives, of which the majority are found on Öland, and Roman imports (Hagberg 1967), does not contradict such an exchange of items between Öland and northern Uppland. Neither do the bronze matrices found in Torslunda (Öland), with similar motives as on the helmets found in Vendel and Valsgärde (Arrhenius 1994). Connections the other way around, i.e., influences from northern Uppland towards Öland can also be found as e.g., the strap end found in Gärdslösa (fig. 2a), which had been reused as a brooch and is of the same kind as that found in Vendel grave XII (fig. 2b), (Åberg 1923).

We argue that there is a high degree of likelihood that the horses from Vendel and Skedemosse actually are those mentioned by Jordanes.

As discussed earlier it has been stated on morphological grounds that there existed three different horse types during the Iron Age in Sweden (Sundqvist 1992). Our preliminary results based on a small number of individuals (n = 6) have shown that there existed at least four different mitochondrial types.

The problem of separating different horse types based on skeletal morphology has been discussed by e.g., Azzaroli (1985), where he concluded that it is impossible to separate horse types morphologically in all but extreme cases, e.g., the English Shire horse and the Shetland pony. This is also evident in the case with the horse from Valsgärde 7 which had previously been morphologically determined to be of a tarpan type, i.e., an east-European type (Lundholm 1947) but molecularly turned out to be of the same type as five west European breeds. Based on this information and the written sources mentioning the existence of more than 50 different horse types in the Roman Empire it is not surprising that we find more than four horse types, despite the small sample size, during the Swedish Iron Age. Adding the information on the breeding of horses for specific purposes in the Roman Empire, (e.g., the war horse) it is not difficult to imagine that there existed special breeds also in Sweden.

The connection between high social status and horses is seen in a number of studies. For example in a study of Merovingian family groups, i.e., aristocratic and warrior families in the cemetery at Kirchheim am Reis dated to the 6th–8th Century, there was a clear over-representation of horsemen's graves in the aristocratic family as compared to the rest of the family groups (Jørgensen et al. 1997). Also, horse burials were found exclusively in

the aristocratic family. This social stratification connected to horses or equestrian equipment was also found in an analysis of Norwegian equestrian burials dated to the Viking Age (Braathen 1989). Here weapons were found in 98% of the equestrian burials whereas only 68% of the contemporary non-equestrian burials contained weapons. Braathen (1989) also found that the equestrian burials in general contained more artefacts, were located on big farms, and that the farms had a special location within their local environment.

Johan Engström (1994), while studying the Vendel Age cavalry, discusses the individuals deposited in the boat-graves in Vendel on the basis of the weapons found. He argues that the boat-graves are to be regarded as horsemen burials where the buried first and foremost should be regarded as horsemen. He argues further that the exclusive weapon equipment is typical for a mounted warrior and that the Vendel Age horsemen must have been strongly influenced by the Sassanidian cataphract cavalry. He compares the Vendel Age helmets with those that were used in the Late Roman cavalry, which are of the same type, and he discusses the Nordic throwing spear which was related both to the Roman's and the Franc's equivalents. Assuming that the buried men in Vendel were horsemen/warriors of a high social rank, as also the Merowingians buried in Kirchheim am Reis and the Viking Age men in the Norwegian equestrian burials were of a certain social rank, it could be assumed that they were equipped with horses of a high rank intended for war, cf., the Libyan horse. This would also be in accordance with the statement made by Jordanes (551:21) where he talks about the Suehans having excellent horses.

If so, we would expect to find a special type of horse in graves with and another type of horse in graves without weapon equipment. Examples exist which permit us to test this hypothesis. We would thus expect the horses from the boat-graves in Tuna in Alsike (Arne 1934), to be of different types i.e., the horses in female burials to be of one type and the horses in male burials to be of another type. We have so far found a unique horse type from the female burial in Tuna in Alsike, grave VIb (Arrhenius 1990). Also in Birka there is a horse deposited in a female burial, grave 965 (Arbman 1943), which will be analysed in a future investigation.

Another interesting comparison is between the horses in Birka deposited in chamber graves containing weapons as opposed to the horses in the non-weapon chamber graves i.e., Birka 965 and Birka 1997 (Thålin-Bergman 1986:6–9, Holmquist Olausson & Götherström 1998). Since it appears, according to the differentiated weapon distribution among the graves, as if an officer/rank distinction can be observed (Holmquist Olausson & Olausson 1997), this distinction could thus also be reflected in different horse types.

Cordula Krüger (1995) discusses the importance of horses, not only as an indicator if high prestige but also for more practical uses such as communication. We could thus expect to find a number of different horse types intended for purposes other than war. Johan Engström (1997) mentions the sacrifice of a carriage horse in the Vendel graves, i.e. in this case used for cavalry purposes.

A major source of error in the above analysis of the connection between horse type and social status would be if there was a resistance or reluctance to deposit the finest horses in the finest graves. This has been discussed e.g., in connection with the deposited horses surrounding the grave of Childeric, where in three different depositions there were stallions, geldings and foals (Brulet 1990). The geldings in the graves have been interpreted by Joachim Werner (1992), by comparative studies of grave depositions, as valuable riding horses (Boessneck in Brulet 1990). It is also worth noting that Müller-Wille (1971) reports graves with foals deposited. Now if it was a conscious move to deposit low status animals in grave offerings, one would expect to find, as well as foals, stallions and geldings of less valuable horse types in the graves. In fact the available evidence argues against this possibility. In the frozen Scythian horse graves, for example, all the horses discovered were of the highest quality (Hyland 1990). Here any variation that could be observed between the different animals reflected the variation in the status of the graves evident from other artefacts. Thus the largest horse was deposited in the "finest" grave (Azzaroli 1985). It seems reasonable to suppose that this self evident hierarchy should also apply in other cases.

Conclusion

We conclude that our method and methodology provide new and important information on the existence of different horse breeds, so far four, in the Swedish Iron Age. That two of these maternal types have become extinct, that one of them is a thoroughbred, that one could be related to five different breeds and that two of them are of the same maternal type. We argue that there is a problem with morphologically determined horse breeds. We also argue that we have detected differences in horse breed between different categories of burials. Finally we think that the two common types from Vendel and Skedemosse could be the horse type referred to by Jordanes as being the excellent horses kept by the Suehans.

In an enlarged study, already under way, we have included one of the Scandinavian horse breeds that has gone extinct i.e., the "Öland-horse" of which there is one specimen at the Museum of Natural History in Stockholm. In the enlarged study we have also included horses deposited in the cultural layers from a number of Iron Age sites in Estonia to get hold of more "low status" horses, horses from Old Uppsala, from Eketorp (Öland), the recently excavated horse from a chamber

grave on Birka (Holmquist Olausson & Götherström 1998) as well as one example from Sutton Hoo. Finally we aim to enlarge the study by including an analysis of Y-chromosomal markers in a stud breeding study.

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